



PROCEEDING

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"Navigating the Human-AI Collaboration in Education:
Challenges and Opportunities"

*Universitas Negeri Yogyakarta
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"Navigating the Human-AI
Collaboration in Education:
Challenges and Opportunities"

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WELCOME MESSAGE FROM THE ORGANIZING COMMITTEE

Assalamu'alaikum warrahmatullah wabarakatuh

I would first like to express my gratitude for the blessings and guidance that have brought us together for this conference.

It is my pleasure to welcome you to the 13th International Conference on Educational Research and Innovation (ICERI) at Universitas Negeri Yogyakarta. This year's theme is "Navigating Human-AI Collaboration in Education: Challenges and Opportunities," with a special focus on Artificial Intelligence in education.

We would like to welcome and recognize our esteemed keynote and invited speakers: Dr. Fauzan Adziman, M.Eng., Director General of Research and Development, the Ministry of Higher Education, Science, and Technology, Indonesia; Prof. Oh Jin Park, Ph.D., CEO, 3PLINK, Korea; Prof. Nur Hidayanto Pancoro Setyo Putro, Ph.D., Vice-Rector for Academic Affairs, Universitas Negeri Yogyakarta, Indonesia; Assoc. Prof. Chailerd Pichitpornchai, Ph.D., Director of International Institute for Learning, Mahidol University, Thailand; and Assoc. Prof. Kuan-Ting Lai, AIoT Laboratorium, National Taipei University and Technology. Thank you to all our speakers for sharing your valuable time and wisdom at this conference.

This conference is a forum for participants to share and discuss the latest advancements and issues in Education. We have received more than 1000 abstracts. We hope you find the keynote presentations, plenary panels, and paper presentations interesting and illuminating. We encourage you to participate in the discussion, take advantage of the many benefits the Conference offers, and connect with new friends.

We are very honored to welcome you to Yogyakarta. The city is the capital and administrative center of the Special Region of Yogyakarta, Indonesia. Yogyakarta is a large urban area that preserves Javanese culture and traditions. It is home to the Sultan's palace, several universities, and the famous World Heritage Site of Borobudur. I hope you have a memorable experience exploring the city, the palace, and this World Heritage Site.

Thank you to all Committee members for making this conference possible. I warmly welcome you to Yogyakarta, and wish you an inspiring conference experience.

Wassalamu'alaikum warrahmatullah wabarakatuh

Prof. Dr. Yudik Prasetyo, S.Or., M.Kes.
Director of the Directorate for Research and Community Service
Universitas Negeri Yogyakarta

RECTOR' SPEECH

Assalaamu'alaikum Warahmatullaahi Wabarakaatuh

I gratefully welcome all participants to the 2025 International Conference on Educational Research and Innovation (ICERI). This conference is a crucial opportunity for the academic community, education practitioners, and policymakers from various countries to discuss and collaborate in responding to global dynamics in education, particularly in the era of collaboration between humans and artificial intelligence.

The development of digital technology, particularly artificial intelligence, has brought about major changes in the way we learn, teach, and conduct research. However, this progress also demands that we ensure that technology remains aligned with humanitarian values, ethics, and social justice. This is where human AI collaboration becomes crucial, not to replace humans, but to strengthen their capacity to create more adaptive, inclusive, and meaningful learning.

Universitas Negeri Yogyakarta is strongly committed to being an active part of this transformation. Through strategic policies in developing a smart campus, improving digital literacy among its academic community, and strengthening interdisciplinary research in the field of artificial intelligence in education, UNY continues to encourage innovation oriented towards human well-being and the sustainability of education. We believe that research and learning that utilize technology wisely will expand access, improve quality, and foster national competitiveness on the global stage.

ICERI 2025 is a concrete manifestation of this collaborative spirit. Through this forum, we hope to forge a cross-national knowledge network capable of generating strategic ideas for the future of ethical and equitable AI-based education. May the discussions during this conference inspire and provide new direction for the development of more humane educational policies, research, and practices.

Finally, I would like to express my appreciation to all the committee members, speakers, and participants for their dedication and participation. Let us continue to move together toward a future of intelligent, ethical, and humanity-oriented education.

Have a great conference.

Wassalaamu'alaikum Warahmatullaahi Wabarakaatuh

Prof. Dr. Sumaryanto, M.Kes., AIFO
Rector of Universitas Negeri Yogyakarta

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Self-Assessment of Junior High School Teachers on the Implementation of Deep Learning Approach in Indonesia Language Subjects in Yogyakarta City

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Abstract. This study aims to determine teachers' self-assessment of the implementation of the deep learning approach in Indonesian language learning. Teacher self-assessment allows teachers to assess their own capacity in certain areas. This study used a mixed-method method, namely teacher questionnaires that were filled out and analyzed quantitatively and supplemented with qualitative descriptive. The teacher assessment scale instrument was developed by referring to <https://deep-learning.global/> and has been declared valid and reliable. The research subjects were 31 Indonesian language teachers in Yogyakarta City. Based on the analysis results, it was concluded that there were differences in the average of each aspect of the self-efficacy scale based on the clustering of public and private schools. In the aspect of Learning Partnerships, the largest percentage, namely 51.32% of public respondents stated they were very confident, while in private schools the answer was balanced, 50% stated they were very confident and able to develop elsewhere. The second aspect, in the Learning Environments, the largest percentage in both clusters chose very confident with 51.75% of public respondents and 52.78% of private respondents. Furthermore, in the third aspect of Pedagogical Practices, the largest percentage in both clusters chose very confident with 57.89% of public respondents and 56.94% of private respondents. Then, in the final aspect of Leveraging Digital, the largest percentage in both clusters chose very confident with 57.02% of public respondents and 58.33% of private respondents. Thus, it can be concluded that teacher respondents in both public and private schools in the Yogyakarta City area generally feel very confident in implementing the deep learning approach in the Indonesian language learning process. **Keywords:** self-efficacy, teachers, deep learning, Indonesian

INTRODUCTION

Indonesian language learning in the era of the Merdeka Curriculum emphasizes the development of critical, collaborative, creative, and communicative skills. As a subject, Indonesian is categorized under general education, which refers to foundational learning materials that every individual must master to develop and maximize their potential¹. Achieving this goal requires a learning approach that goes beyond the mere transfer of knowledge, encouraging students to engage in deep learning. Such an approach enables students to connect learned concepts with real-life experiences, engage in critical reflection, and cultivate contextual literacy skills. However, the implementation of deep learning is strongly influenced by the teacher's role as facilitator, classroom manager, and instructional innovator. Therefore, teacher reflection and self-assessment are essential for understanding the extent to which their teaching practices align with the principles of deep learning.

Teacher self-assessment is an area of educational research that can generate positive impacts, particularly in improving the quality of teaching². Teachers play a crucial role in education, as their perspectives shape educational goals, teaching strategies, and learning outcomes³. Through self-assessment, teachers can reflect on both the strengths and weaknesses of their instructional practices, which in turn enables them to refine their methods and approaches. This makes self-assessment an essential tool for fostering teacher professionalism. In line with this, language teachers hold a key responsibility in equipping students with the skills and competencies necessary to navigate complex and unpredictable situations⁴. Moreover, teacher self-assessment contributes to the improvement of student achievement. Learning achievement encompasses the outcomes of the educational process, including knowledge, skills, and attitudes acquired by students⁵. When teachers engage in objective self-reflection, they can create more effective and adaptive learning environments that are better aligned with students' needs. Consequently, self-assessment not only supports teachers in enhancing the quality of their instruction but also directly impacts the optimization of student learning outcomes, particularly in the context of complex and unpredictable educational challenges.

This study is significant as it provides a comprehensive overview of Indonesian language teachers' reflective awareness regarding the implementation of deep learning. The primary aim is to identify and analyze teachers' self-assessment results across four main categories, thereby revealing areas of strength as well as those requiring further development. Theoretically, this research contributes to the growing body of literature on the relationship between teacher self-assessment and the application of deep learning in Indonesian language instruction. Practically, the findings are expected to serve as a foundation for policymakers, educational institutions, and teacher professional development programs in designing training, mentoring, and support systems that better address teachers' needs. Thus, this study has the potential to foster Indonesian language learning that is more meaningful, contextual, and relevant to the demands of the twenty-first century.

LITERATURE REVIEW

Deep learning has emerged as a transformative approach in education, revolutionizing the way learning processes are understood and experienced. From a pedagogical perspective, the term "deep learning" refers to the level of cognitive engagement achieved when students are encouraged to analyze, synthesize, and evaluate knowledge rather than merely memorize⁶. Scholars have further expanded this concept, proposing that deep learning should emphasize the comprehension and retention of content through processes of organization, synthesis, and conceptual transfer⁷. Other perspectives suggest that deep learning in education encompasses meaningful learning, mindful learning, and joyful learning⁸. Through critical analysis of learning resources and active participation in online discussions, students can develop a deeper understanding of the concepts being studied. Nevertheless, not all students are able to demonstrate that the deep learning approach has a significant impact on their learning when carried out through online discussions⁹.

Deep learning in education involves analyzing large amounts of data to identify patterns in student behavior, preferences, and performance, enabling educators to design personalized lesson plans that enhance student engagement. Within the educational process, deep learning models can also be applied as AI-based technologies to support teaching and learning¹⁰. In addition, deep learning can facilitate administrative tasks such as grading and feedback, allowing teachers to devote more time to what truly matters, nurturing meaningful relationships with their students. The potential of deep learning further expands when teachers encourage students to explore scientific inquiries across broader and interdisciplinary contexts. With the appropriate approach, teachers can design projects that balance student-driven inquiry with structured guidance, thereby fostering active student participation¹¹.

RESEARCH METHOD

This research employed a qualitative descriptive design based on data collected through questionnaires distributed to the study's respondents. The sample size was determined using proportional stratified random sampling, drawn from a population of 79 schools (22 public/ government owned schools and 57 private/swasta) in Yogyakarta City. From this population, 19 public schools (government owned schools/negeri) and 12 private schools (private schools/swasta) were selected. This consideration was made to ensure stronger representation of public schools, given their relevance to the research focus, while also maintaining balance between public and private schools for comparative analysis. Accordingly, the sampling procedure combined stratified random sampling with purposive sampling, with purposive considerations applied to public schools, as they serve as the primary implementers of the Merdeka Curriculum that emphasizes deep learning. Data collection was carried out using a questionnaire developed based on teacher self-assessment indicators related to the deep learning approach, completed by junior high school teachers who served as respondents. Prior to deployment, the questionnaire was tested and confirmed to be valid and reliable. The collected data were then analyzed using descriptive quantitative techniques by calculating the mean scores of each indicator, which were subsequently converted into percentages. These percentages were used to illustrate the level of teacher self-assessment in both public and private schools, thereby allowing clearer interpretation of the findings.

RESULTS AND DISCUSSION

Results

Based on the questionnaires completed by the respondents, the data were analyzed according to each item within the respective aspects. The data were then categorized by strata, distinguishing between junior high school teachers in public and private schools. The results of Indonesian language teachers' self-assessment in public schools regarding the deep learning approach are presented in Table 1.

TABLE 1. Teacher Self-Assessment of the Deep Learning Approach in Public Schools

Aspect	Question	Not Confident	Somewhat Confident	Very Confident	Able to Develop in Other Contexts
A. <i>Learning Partnerships</i>	I establish learning objectives and expectations explicitly in collaboration with students.	0	0	57,89	42,11
	I facilitate opportunities for students to learn from a variety of learning partners (for example, peers, community members, or external experts).	0	10,53	57,89	31,58
	I employ collaborative processes to engage partners in supporting students' learning experiences.	0	5,26	52,63	42,11
	I build and facilitate relationships that nurture students' self-awareness, perseverance, and self-appreciation.	0	5,26	36,84	57,89
B. <i>Learning Environments</i>	I create an interactive, structured, and productive learning environment	0	0	57,89	42,11
	I employ diverse instruments (such as observation sheets, interviews, and texts) to assess students' interests, talents, and academic needs.	0	10,53	52,63	36,84
	I foster a classroom climate and culture that support students' well-being (physical, mental, social, and spiritual) as well as equity.	0	0	57,89	57,89
	I intentionally cultivate relationships and social skills (life skills) among students.	0	5,26	47,37	47,37
	I incorporate students' aspirations and opinions into the development of instruction and classroom improvement.	0	0	42,11	42,11
	I utilize the classroom and surrounding environment as a rich context for learning.	0	5,26	52,63	42,11
C. <i>Pedagogical Practices</i>	I design learning experiences that are grounded in empirical inquiry and engage students in authentic ways.	0	0	73,68	26,32
	I develop deep learning tasks (analytical, critical, and creative) that foster complex thinking.	0	10,53	68,42	21,05
	I apply a variety of strategies to cultivate deep learning competencies (analytical, critical, and creative).	0	15,79	47,37	36,84
	I implement strategies that actively engage and motivate students to contribute to the common good.	0	10,53	47,37	42,11
	I employ multiple forms of assessment to evaluate and adapt students' learning processes.	0	5,26	52,63	42,11
	I provide choices that enhance students' motivation and engagement in learning.	0	5,26	57,89	36,84
D. <i>Leveraging Digital</i>	I encourage students to engage in reflection and feedback to enhance metacognition (thinking in problem-solving).	0	5,26	52,63	42,11
	I utilize digital technologies to deepen learning and foster innovative knowledge creation.	0	0	57,89	42,11
	I integrate digital technologies to increase student engagement and strengthen learning outcomes.	0	0	52,63	47,37
	I employ technology to enable connections and collaborative knowledge-building at both local and global levels.	0	0	63,16	36,84
	I cultivate students' awareness of digital citizenship and personal safety in the use of technology.	0	10,53	47,37	42,11

I facilitate students' access to digitalization that allows them to receive accurate and timely learning feedback.	0	0	68,42	31,58

Based on the data in Table 1, it was found that Indonesian language teachers in public junior high schools demonstrated a high level of self-confidence across all examined aspects. None of the respondents reported lacking confidence; rather, the majority fell into the categories of being very confident and able to further develop their competencies in other contexts. These findings indicate that teachers not only possess confidence in their own competencies but also recognize the importance of continuous professional growth to strengthen the implementation of deep learning. In the aspect of Learning Partnerships, teachers generally reported being very confident in setting explicit learning goals with students (57.89%) and facilitating opportunities to learn from partners (57.89%). Meanwhile, the Learning Environments aspect revealed a relatively balanced pattern. Most teachers expressed strong confidence in creating interactive and productive learning environments (57.89%) as well as classroom climates that support student well-being (57.89%). This suggests that classroom management is already well established, though teachers also acknowledged the need for further professional development to maximize student participation.

For Pedagogical Practices, teachers showed high confidence in designing authentic learning experiences (73.68%) and developing deep learning tasks (68.42%). Offering choices to enhance student motivation was also dominated by the very confident category (57.89%). However, in terms of employing varied instructional strategies, only 47.37% of respondents reported being very confident, while 15.79% indicated only emerging confidence. This question recorded the highest proportion of responses in the "somewhat confident" category, corresponding to a Likert scale score of 2. These results highlight that diversifying instructional strategies remains a particular challenge for teachers, especially within the deep learning approach. The final aspect, Leveraging Digital, showed that teachers were confident in utilizing technology. A total of 63.16% reported being very confident in using technology for global knowledge connection and collaboration, while 68.42% were very confident in facilitating timely digitalization of learning.

Taken together, these findings suggest that Indonesian language teachers in public junior high schools in Yogyakarta City possess a high level of self-assessment regarding the implementation of deep learning. The four aspects examined; Learning Partnerships, Learning Environments, Pedagogical Practices, and Leveraging Digital; were predominantly rated as very confident. This confirms that teachers already have a strong foundation in designing authentic learning, creating productive classroom environments, and making effective use of digital technologies. Nonetheless, further development is still needed in areas related to personal relationships, student engagement, and digital citizenship awareness.

Subsequently, Table 2 presents the data on Indonesian language teachers' self-assessment regarding the implementation of the deep learning approach in teaching at private junior high schools in Yogyakarta City.

TABLE 2. Teacher Self-Assessment of the Deep Learning Approach in Private Schools

Aspect	Question	Not Confident	Somewhat Confident	Very Confident	Able to Develop in Other Contexts
A. <i>Learning Partnerships</i>	I establish learning objectives and expectations explicitly in collaboration with students.	0	0	41,67	58,33
	I facilitate opportunities for students to learn from a variety of learning partners (for example, peers, community members, or external experts).	0	0,00	50,00	50,00
	I employ collaborative processes to engage partners in supporting students' learning experiences.	0	0,00	50,00	50,00
	I build and facilitate relationships that nurture students' self-awareness, perseverance, and self-appreciation.	0	0,00	58,33	41,67
B. <i>Learning Environments</i>	I create an interactive, structured, and productive learning environment	0	0	41,67	41,67
	I employ diverse instruments (such as observation sheets, interviews, and texts) to assess students' interests, talents, and academic needs.	0	0,00	50,00	50,00
	I foster a classroom climate and culture that support students' well-being (physical, mental, social, and spiritual) as well as equity.	0	8,33	58,33	33,33
	I intentionally cultivate relationships and social skills (life skills) among students.	0	0,00	58,33	58,33

	I incorporate students' aspirations and opinions into the development of instruction and classroom improvement.	0	0	50,00	50,00
	I utilize the classroom and surrounding environment as a rich context for learning.	0	0,00	58,33	41,67
C. <i>Pedagogical Practices</i>	I design learning experiences that are grounded in empirical inquiry and engage students in authentic ways.	0	0	58,33	41,67
	I develop deep learning tasks (analytical, critical, and creative) that foster complex thinking.	0	8,33	66,67	25,00
	I apply a variety of strategies to cultivate deep learning competencies (analytical, critical, and creative).	0	0,00	58,33	41,67
	I implement strategies that actively engage and motivate students to contribute to the common good.	0	0,00	33,33	66,67
	I employ multiple forms of assessment to evaluate and adapt students' learning processes.	0	8,33	58,33	33,33
D. <i>Leveraging Digital</i>	I provide choices that enhance students' motivation and engagement in learning.	0	8,33	66,67	25,00
	I encourage students to engage in reflection and feedback to enhance metacognition (thinking in problem-solving).	0	8,33	41,67	50,00
	I utilize digital technologies to deepen learning and foster innovative knowledge creation.	0	0	41,67	58,33
	I integrate digital technologies to increase student engagement and strengthen learning outcomes.	0	0	58,33	41,67
	I employ technology to enable connections and collaborative knowledge-building at both local and global levels.	0	0	66,67	33,33
	I cultivate students' awareness of digital citizenship and personal safety in the use of technology.	0	0,00	75,00	25,00
	I facilitate students' access to digitalization that allows them to receive accurate and timely learning feedback.	0	0	66,67	33,33

Based on the data presented in Table 2, the self-assessment of teachers in private junior high schools in Yogyakarta City regarding deep learning-based instruction shows a relatively high level of confidence across all measured aspects. None of the respondents placed themselves in the "not confident" category; rather, the majority reported being very confident or able to further develop their competencies in other contexts. This indicates that teachers not only have confidence in their existing competencies but also demonstrate awareness of the need to continually enhance their instructional skills.

In the first aspect, Learning Partnerships, teachers expressed confidence in establishing learning objectives together with students (41.67% very confident and 58.33% able to develop) and in facilitating opportunities to learn from various learning partners (50% very confident and 50% able to develop). Collaborative processes were also well managed, with responses evenly distributed between very confident (50%) and able to develop (50%). The second aspect, Learning Environments, showed a similar trend. A total of 41.67% of teachers reported being very confident in creating interactive learning environments. In terms of using diverse assessment instruments, responses were evenly split between very confident (50%) and able to develop (50%). The creation of a classroom climate that supports student well-being was dominated by the very confident category (58.33%).

In the third aspect, Pedagogical Practices, teachers reported high levels of confidence in designing authentic learning experiences (58.33% very confident). Regarding the use of varied teaching strategies, 58.33% of teachers again reported being very confident. Finally, in the Leveraging Digital aspect, 41.67% of teachers reported being very confident in promoting reflection and metacognition through technology, while 50% believed they could further develop in this area. The use of technology for connecting global knowledge received 66.67%, while 75% of teachers reported being very confident in fostering digital citizenship awareness.

In conclusion, Indonesian language teachers in private junior high schools in Yogyakarta demonstrated high levels of self-assessment in supporting deep learning-based instruction. The four examined aspects were dominated by the very confident and able-to-develop categories. These findings reflect both the readiness and awareness of teachers to continually enhance their competencies in implementing the deep learning approach in Indonesian language instruction. Based on all the data collected, the results are further summarized in Table 3,

which presents the overall self-assessment levels of Indonesian language teachers in junior high schools across Yogyakarta City regarding the implementation of the deep learning approach.

TABLE 3. Self-Assessment of Indonesian Language Teachers in Junior High Schools in Yogyakarta City on the Implementation of the Deep Learning Approach

Aspect	Stratified	Not Confident	Somewhat Confident	Very Confident	Able to Develop in Other Contexts
A. <i>Learning Partnerships</i>	Negeri	0	5,26	51,32	43,42
	Swasta	0	0	50	50
B. <i>Learning Environments</i>	Negeri	0	3,51	51,75	44,74
	Swasta	0	1,39	52,78	45,83
C. <i>Pedagogical Practices</i>	Negeri	0	7,89	57,89	34,21
	Swasta	0	4,17	56,94	38,89
D. <i>Leveraging Digital</i>	Negeri	0	2,63	57,02	40,35
	Swasta	0	1,39	58,33	40,28

Based on Table 3, none of the respondents fell into the “not confident” category. This indicates that teachers in both public and private schools demonstrated positive levels of confidence in implementing the deep learning approach in Indonesian language instruction. In the aspect of Learning Partnerships, public school teachers were dominated by the very confident category (51.32%), with most of the remaining respondents identifying as able to develop in other contexts (43.42%). Meanwhile, private school teachers showed a balanced distribution between very confident (50%) and able to develop (50%). For Learning Environments, both public and private school teachers similarly showed dominance in the very confident category (51.75% in public schools and 52.78% in private schools), followed by able to develop (44.74% in public schools and 45.83% in private schools). This affirms that teachers generally feel well-prepared to create conducive learning environments. In the aspect of Pedagogical Practices, public school teachers recorded the highest proportion of very confident responses (57.89%), while private school teachers showed a comparable figure (56.94%). Both types of schools also reported considerable proportions in the able-to-develop category, 34.21% in public schools and 38.89% in private schools. For Leveraging Digital, teachers in both public and private schools again reported dominant percentages in the very confident category, 57.02% and 58.33% respectively, while about 40% of teachers in both contexts felt they could further develop these skills elsewhere.

Overall, the data suggest that teachers in both public and private schools reported high levels of self-assessment across all aspects of learning. The dominance of the very confident and able-to-develop categories reflects teachers’ readiness to adapt to the challenges of implementing the deep learning approach, including building partnerships, creating learning environments, applying pedagogical practices, and leveraging digital technology. This serves as a positive indicator that the learning process in schools is supported by teachers who hold strong confidence in their professional abilities. According to Table 3, it can be concluded that Indonesian language teachers in both public and private junior high schools in Yogyakarta City demonstrated high self-assessment in relation to deep learning–based instruction. Among public school teachers, there was a stronger tendency toward the very confident category in the aspects of Learning Partnerships, Pedagogical Practices, and Leveraging Digital, while responses in Learning Environments were more evenly distributed with the able-to-develop category. Conversely, private school teachers displayed a relatively more balanced distribution between very confident and able to develop across most aspects, although they stood out in digital technology utilization. Thus, public school teachers appeared stronger in their confidence regarding pedagogical practices and instructional design, whereas private school teachers placed greater emphasis on continuous development, particularly in learning environments and partnerships. Nonetheless, both groups demonstrated clear readiness to support the implementation of the deep learning approach in Indonesian language teaching.

Discussion

Learning Partnerships focus on the teacher’s role in explicitly building learning goals and expectations together with students, while at the same time facilitating opportunities for them to learn through various learning partners. In formal educational settings, the teacher’s primary role in facilitating and guiding language use is undeniable^{12,13}. Teachers are expected to employ collaborative processes to engage partners in students’ learning experiences, as well as to establish relationships that support self-awareness, perseverance, and self-appreciation, thereby fostering a collaborative and meaningful learning ecosystem. A flexible collaborative learning model can be developed by providing differentiated teaching materials tailored to students’ individual needs, applying diverse learning strategies, and grouping students according to their characteristics¹⁴. Activities within collaborative learning can be clustered into two levels, namely cognitive and social, with the necessary resources

including technological mediation; personal or group workspaces; learning materials; data analysis tools; references as collaborative repositories; and modeling tools to monitor the learning process¹⁵.

The Learning Environments aspect directs teachers to self-assess their ability to create an interactive learning environment by enhancing students' participation in the learning process. Previous studies have concluded that the presence of creative instruction, while remaining under teacher supervision, has implications for increasing students' imagination and creativity through project-based learning activities¹⁶. Furthermore, building an authentic learning environment requires substantial preparation, adequate resources, and teacher training¹⁷. Nevertheless, the findings of this study reveal that in the Learning Environments aspect, more than 50% of teacher respondents reported feeling very confident. This data represents the teachers' belief in their ability to create effective and interactive learning environments without overlooking students' social skills.

Pedagogical Practices refer to teachers' ability to design authentic and empirical learning experiences, develop assignments that require analytical, critical, and creative thinking, and apply diverse instructional strategies to foster students' deep competencies. One of the instructional methods that incorporates the deep learning approach is case-based learning and problem-based learning, as both provide opportunities for students to modify and value their own learning needs¹⁸.

The effectiveness of digital technology in deep learning can be enhanced when accompanied by appropriate instructional guidance. The leveraging digital aspect assesses how teachers utilize technology in the learning process while fostering students' awareness of their roles as digital citizens. Moreover, efforts to integrate digital technology with collaborative learning have a more significant impact on deep learning compared to individual learning¹⁹. In line with the integration of digital technology into instruction, teachers' selection of learning materials for classroom activities must also ensure high interactivity and flexibility, allowing them to be applied across various contexts²⁰. Therefore, it can be concluded that digital technology alone does not guarantee the achievement of deep learning; rather, it requires instructional design and the support of interactive and flexible learning resources. This indicates that within the concept of leveraging digital, technology merely serves as a medium, while the quality of learning depends on teachers' ability to integrate digital tools with pedagogical strategies and materials relevant to students' needs. Thus, the effective use of digital technology can genuinely encourage students to think critically, creatively, and reflectively in the process of learning Indonesian language.

CONCLUSION

This study seeks to examine the self-assessment of junior high school Indonesian language teachers in Yogyakarta regarding the application of the deep learning approach, which is framed within four dimensions: Learning Partnerships, Learning Environments, Pedagogical Practices, and Leveraging Digital. The results provide insights into the extent of teachers' confidence and preparedness in integrating deep learning principles into Indonesian language teaching. The analysis highlights variations between public and private school teachers. For Learning Partnerships, the majority of public-school teachers (51.32%) expressed being very confident, while private school teachers were evenly distributed between very confident (50%) and able to further develop elsewhere (50%). In Learning Environments, the largest proportion of both groups indicated strong confidence (51.75% in public schools and 52.78% in private schools). Similarly, for Pedagogical Practices, the most frequent response was very confident (57.89% in public schools and 56.94% in private schools). In Leveraging Digital, the dominant category remained very confident, with 57.02% among public school teachers and 58.33% among private school teachers. Overall, the findings suggest that teachers in both public and private schools in Yogyakarta demonstrate a generally high level of self-confidence in implementing deep learning in Indonesian language instruction. The dominance of the categories "very confident" and "able to develop further elsewhere" illustrates their readiness to adapt to the challenges of deep learning across partnership-building, classroom environment design, pedagogical practice, and digital integration. Both groups of teachers show comparable preparedness to apply deep learning in practice. Nevertheless, this study is limited to examining self-assessment alone. Future research is therefore encouraged to explore teachers' actual classroom practices or to analyze the relationship between teachers' self-assessment and student learning outcomes, which would allow for a more comprehensive and sustainable understanding of deep learning in Indonesian language education.

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Psychometric Evaluation of the Parenting Stress Scale: Evidence from a Confirmatory Factor Analysis

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Abstract. Parenting stress is a critical psychological construct that influences parental well-being and child development outcomes. The present study aimed to examine the psychometric properties of the Parenting Stress Scale (PSS) among mothers of typically developing children in an Indonesian context. A total of 423 participants participated in the study. Confirmatory Factor Analysis (CFA) was conducted to assess the factor structure of the scale. The final model demonstrated excellent fit with the following indices: CFI = .948, TLI = .926, GFI = .963, RMSEA = .059, and SRMR = .045 with $\alpha = .772$. The Parent Domain and Child Domain showed acceptable reliability (CR = .694 and .728, respectively) and marginal convergent validity (AVE = .492 and .404). However, the Parent-Child Interaction domain exhibited lower reliability and AVE (CR = .628, AVE = .375). The results support the factorial validity and internal consistency of shortened Indonesian version of the Parenting Stress Scale, particularly for the Parent and Child domains. While the Parent-Child Interaction domain requires further refinement, the overall scale offers a brief and reliable tool for assessing parenting stress in research and applied settings. Future studies should consider improving the interaction domain and validating the scale across diverse populations.

Keywords: Parenting Stress Scale, psychometric validations, confirmatory factor analysis.

INTRODUCTION

Parenting stress is a psychological condition that emerges when the demands of parenting exceed an individual's perceived ability to cope effectively with those demands (Deater-Deckard & Panneton, 2017; Johnson et al., 2022). It represents a maladaptive response to the challenges of child-rearing and has significant implications for parental functioning and child development. Research has shown that parents' perceptions of the daily caregiving hassles tend to increase with the child's age (Crnic & Booth, 1991), particularly during the preschool years, which are considered a critical development phase requiring intensive parental involvement (Koeske & Koeske, 1990; Kuczynski et al., 1990).

The sources of parenting stress are multifactorial and may originate from child characteristics, parental psychological traits, and environment factors (Abidin, 1990; Mash & Johnston, 1990). For instance, parents who perceive their children as excessively demanding often struggle to establish positive interactions, which, in turn, heightens their stress levels (Östberg & Hagekull, 2000). Moreover, stress in the parenting role is frequently exacerbated by parents' mental health challenges such as depression, anxiety, limited social support, and relationship difficulties (Davis & Carter, 2008; Ekas et al., 2010). First-time parents or those with inadequate parenting knowledge and insufficient emotional support are particularly vulnerable to elevated stress (Anthony et al., 2005; Deater-Deckard, 1998).

The consequences of parenting stress are far-reaching. Elevated levels of stress have been associated with negative parenting practices, lower parental well-being, and adverse child outcomes (Crnic et al., 2005; Johnson et al., 2022). In severe cases, chronic parenting stress has been linked to harsh discipline, parental anger, and even child maltreatment (Aracena et al., 2016; Chung & van der Lippe, 2020; Holly et al., 2019). A growing body of literature also highlights gender differences in parenting stress, consistently showing that mothers tend to report higher stress levels than fathers (Dabrowska & Pisula, 2010; García-López et al., 2016; Kaniel & Siman-Tov, 2011).

Given the importance of accurately identifying and measuring parenting stress, psychometrically sound instruments are essential for both research and clinical practice. One such instrument is the Parenting Stress Scale (Daulay et al., 2020), which offers a concise, yet comprehensive measure of the stress experienced by parents. However, to ensure its utility across different populations and cultural context, it is necessary to examine its

psychometric properties rigorously. Therefore, the present study aimed to examine the psychometric properties of the Parenting Stress Scale (PSS) among mothers of typically developing children using Confirmatory Factor Analysis (CFA).

LITERATURE REVIEW

Parenting stress is a multifaceted construct that arises from the dynamic interaction between parental demands and the perceived ability to meet those demands. Abidin (1995) through his conceptualization and development of the Parenting Stress Index, categorized the sources of parenting stress into three primary domains: Parent Domain, Child Domain, and Parent-Child Interaction Domain. Each of these domains reflects a unique source of stress that contributes to the overall parenting experience.

1. Parent Domain

The Parent Domain encompasses stressors that originate from the parents' own characteristics, psychological state, and perceived limitations in fulfilling their parenting role. This domain reflects internal factors that may hinder parental functioning, regardless of the child's behavior. Abidin (1995) identified several key components within this domain:

- a. **Depression:** Parents may experience emotional distress, including symptoms of depression, anxiety, and guilt, which compromise their ability to effectively engage in caregiving.
- b. **Role Restriction:** Parents often entail sacrificing personal freedom, which can lead to feelings of being trapped or overwhelmed by the constant needs and demands of the child.
- c. **Sense of Competence:** A parent's perceived self-efficacy plays a critical role in stress level. Feelings of inadequacy or failure in meeting parental responsibilities can heighten stress.
- d. **Social Isolation:** Lack of social support, particularly from a partner or extended family, can intensify the sense of burden in caregiving, especially when parenting is experienced as a solitary endeavor.
- e. **Parental Health:** The chronic stress associated with parenting can negatively impact physical health, including sleep disturbance, fatigue, and other stress-related health problems.

These dimensions suggest that a parent's psychological resources and perceived support systems are central to the management of parenting stress.

2. Child Domain

The Child Domain reflects stressors that are related to the child's behavioral characteristics, temperament, and developmental functioning. This domain focuses on how the child's behavior may pose challenges to the parent. Abidin (1995) described four main indicators:

- a. **Adaptability:** This refers to the child's ability to adjust to changes in routines or environmental demands. Children who are less adaptable may evoke greater stress in parents.
- b. **Demandingness:** Highly dependent children who require frequent assistance or display constant needs may increase parental workload and emotional fatigue.
- c. **Mood:** Children with a negative or irritable mood can contribute to higher parental stress, especially if such mood states lead to increased conflict or emotional tension in the household.
- d. **Distractibility:** Difficulties in sustaining attention, following instructions, or managing impulsive behavior are often perceived as particularly stressful, especially in daily routines or structured activities.

These indicators underscore the role of child temperament and behavior in shaping parenting experiences, particularly when the child's needs exceed normative expectations.

3. Parent-child Interaction Domain

The third domain captures stress that arises from dysfunctions in the relational and emotional bond between parents and their children. It reflects the parent's perception of the quality of their interactions and emotional connection with the child. Key components include:

- a. **Attachment:** A weak or disrupted emotional bond may lead parents to feel distant or disconnected from their child, reducing the sense of reward and satisfaction in the parenting role.
- b. **Acceptability:** When a child does not meet a parent's expectations—whether in terms of behavior, development, or temperament—parents may experience disappointment or frustration, contributing to stress.
- c. **Parent Reinforcement:** Parenting is often sustained by reciprocal positive feedback. A lack of perceived appreciation, affection, or responsiveness from the child may leave parents feeling emotionally unrewarded.

This domain emphasizes the reciprocal nature of parent-child relationships and highlights how relational difficulties can compound stress levels in parenting.

Together, these domains offer a comprehensive framework for understanding the multiple dimensions of parenting stress. They also serve as the foundation for psychometric assessment such as Parenting Stress Index (Abidin, 1995) and Skala Stress Pengasuhan (Daulay et al., 2020), which aim to identify the specific sources of stress that parent experience in various family and developmental contexts. Recognizing these dimensions is essential for developing targeted interventions that reduce stress and promote parental well-being.

RESEARCH METHOD

Participants

A total of 423 participants participated in the data collection process. The demographic characteristics of the participants are presented in Table 1 below.

Table 1. Demographic Characteristics of Participants (N = 423)

Characteristic	Category	n	%
Gender	Female	423	10.0%
Age	20-25 years	32	7.6%
	26-30 years	131	31%
	31-35 years	153	36.2%
	35-40 years	68	16.1%
	>40 years	23	5.4%
	Not answered	16	3.8%
Highest education	Junior high school	12	2.8%
	Senior high school	87	2.5%
	Diploma	84	19.9%
	Bachelor's degree	201	47.6%
	Master's degree	38	9%
	Doctoral degree	1	.2%
Occupation	Housewife	133	31.4%
	Part-time worker	121	28.5%
	Full-time worker	169	4.1%

Research Instrument

This study employed the Skala Stress Pengasuhan (Parenting Stress Scale) developed by Daulay et al. (2020), which is the Indonesian adaptation of the widely used Parenting Stress Index (PSI) originally developed by Abidin (1995). The instrument is a multidimensional self-report scale designed to assess the level of stress experienced by parents in relation to their caregiving role. It consisted of three primary dimensions: Parent Domain, Children Domain, and Parent-Child Interaction Domain, reflecting the various sources of parenting-related stress.

The scale comprises twenty-six items, evenly divided between favorable (13 items) and unfavorable (13 items) statements. Respondents are asked to rate each item on a 5-point Likert scale, ranging from 1 (not at all true) to 5 (completely true). For scoring purposes, unfavorable items are reverse-coded, ensuring that higher total scores reflect greater levels of parenting stress, while lower scores indicate less stress experienced by the respondent.

The scale has demonstrated good internal consistency in previous studies. In the original validation by Daulay et al. (2020), the scale yielded a Cronbach's alpha coefficient of .823, indicating satisfactory reliability for use in research contexts. Given its theoretical foundation, cultural adaptation, and psychometric robustness, the Skala Stress Pengasuhan is considered appropriate for assessing parenting stress among Indonesia mothers of typically developing children.

Research Procedure

The data collection process was conducted through an online survey using a Google Form link containing the *Skala Stress Pengasuhan*. Respondents were recruited voluntarily and completed the instrument digitally. Prior to the conducting of CFA, key assumptions were examined by multivariate normality to ensure the suitability of maximum likelihood estimation (MLE).

The initial model, derived from the original 26-item scale Parenting Stress Scale, was labeled Model 1 (M1). To evaluate the factorial validity of the instrument, Confirmatory Factor Analysis (CFA) was performed on M1 using appropriate model fit indices. The fit of the model was assessed based on CFI $\geq .90$, TLI $\geq .90$, GFI $\geq .90$,

RMSEA $\leq .05$, and SRMR $\leq .08$. If M1 failed to meet these criteria, the model was revised by removing items with standardized factor loadings below .50, resulting in Model 2 (M2). CFA was then re-run on M2 to assess improvements in model fit.

This iterative process of item elimination continued -producing subsequent models- until the model achieved acceptable fit across all indices. This stepwise refinement ensured that only psychometrically robust items were retained in the final version of the scale. In addition to evaluating overall model fit, the study also calculated Composite Reliability (CR) and Average Variance Extracted (AVE) for each latent construct, to assess the convergent validity and internal consistency of the final model.

All research procedures in this study were reviewed and approved by the Ethics Committee of the Faculty of Psychology, Universitas Gadjah Mada. Ethical clearance was granted with the approval number 10339/UN1/FPsi.1.3/SD/PT.01.04/2024, confirming that the study adhered to ethical standards for research involving human participants, including informed consent, voluntary participation, and data confidentiality.

Data Analysis Techniques

This study employed several statistical techniques to analyze the quantitative data, including descriptive statistics, Confirmatory Factor Analysis (CFA) for assessing the factorial validity of the instrument, and reliability analysis to evaluate internal consistency and construct reliability. All statistical analyses were conducted using JASP version .19.3.0, which was used to generate descriptive statistics and conduct CFA. Additional psychometric calculations, including Construct Reliability (CR) and Average Variance Extracted (AVE), were conducted using Microsoft Excel (Microsoft 365 Apps).

RESULTS AND DISCUSSION

Preliminary Analysis: Normality Test

Before conducting the Confirmatory Factor Analysis (CFA), a normality test was performed to examine skewness value of the items. According to Hair et al. (2022), skewness values between -1 and +1 are considered excellent, values between -2 and +2 are acceptable, while values beyond ± 3 indicate non-normality. The normality test was conducted using descriptive statistics via JASP version .19.3. The result indicated that out of 26 items in the initial model (M1), three items (SPD9 = 1.003, SPC12 = 1.242, SPC15 = 1.165) showed skewness values slightly above +1, but still within the acceptable range. The remaining twenty-three items had skewness values ranging from -.382 to .971, which are considered excellent. Therefore, the data was deemed sufficiently normal to process with CFA.

Confirmatory Factor Analysis

The initial model (M1), based on the original twenty-six items of the Parenting Stress Scale, was assessed using CFA. The model fit indices are summarized in Table 2 below.

Table 2. CFA Fit Indices for the Parenting Stress Scale

Fit Index	Threshold	M1	M2	M3
CFI	$\geq .90$	.638	.848	.948
TLI	$\geq .90$	.602	.803	.926
RMSEA	$\leq .05$	.086	.092	.059
SRMR	$\leq .08$	.081	.065	.045
GFI	$\geq .90$	.809	.909	.963

Note: M1 = Model 1; M2 = Model 2; M3 = Model 3

As shown in Table 2, the initial model (M1) did not meet the required thresholds for any of the goodness-of-fit indices. Consequently, the model was modified by removing items with standardized factors loading below .5. The revised factor loadings across models are displayed in Table 3.

Table 3. Standardized Factor Loadings Across Models

Item	M1	M2	M3
SPD1	.417	-	-
SPD2	.286	-	-
SPD3	.639	.906	.905
SPD4	.521	.507	.505

SPD5	.498	-	-
SPD6	.454	-	-
SPD7	.420	-	-
SPD8	.011	-	-
SPD9	.317	-	-
SPD10	.390	-	-
SPD11	.561	.523	.525
SPD12	.276	-	-
SCD1	.524	.531	.543
SCD2	.489	-	-
SCD3	.556	.615	.654
SCD4	.533	.454	-
SCD5	.562	.605	.640
SCD6	.474	-	-
SCD7	.636	.669	.691
SCD8	.563	.499	-
SPCI1	.378	-	-
SPCI2	.429	-	-
SPCI3	.574	.609	.642
SPCI4	.138	-	-
SPCI5	.602	.616	.634
SPCI6	.611	.572	.522
Cronbach's α	.823	.788	.772

Note: M1 = Model 1; M2 = Model 2; M3 = Model 3

As presented in Table 3, a total of thirteen items with factor loadings below .50 in the initial model (M1)-namely SPD1, SPD2, SPD5, SPD6, SPD7, SPD8, SPD9, SPD12, SCD2, SCD6, SPC12, and SPC14-were removed to produce Model 2 (M2). The CFA results for M2 indicated improved model fit, with acceptable values on several indices: CFI =.848, TLI =.803, GFI =.909, and SRMR =.065. However, the RMSEA value remained above the recommended threshold at .092, suggesting room for further improvement. To enhance the model's parsimony and fit, two additional items with low factor loadings in M2-SCD4 and SCD8-were excluded in Model 3 (M3). The CFA results for M3 showed a notable improvement in fit: CFI =.948, TLI =.926, GFI =.963, RMSEA = .059, and SRMR =.045. These results meet the thresholds for acceptable model fit (Browne & Cudeck, 1992; Fabrigar dkk., 1999; Steiger, 1989), thus providing strong support for the factorial validity of the Indonesian version of the Parenting Stress Scale. A visual representation of the final CFA model (M3) is provided below.

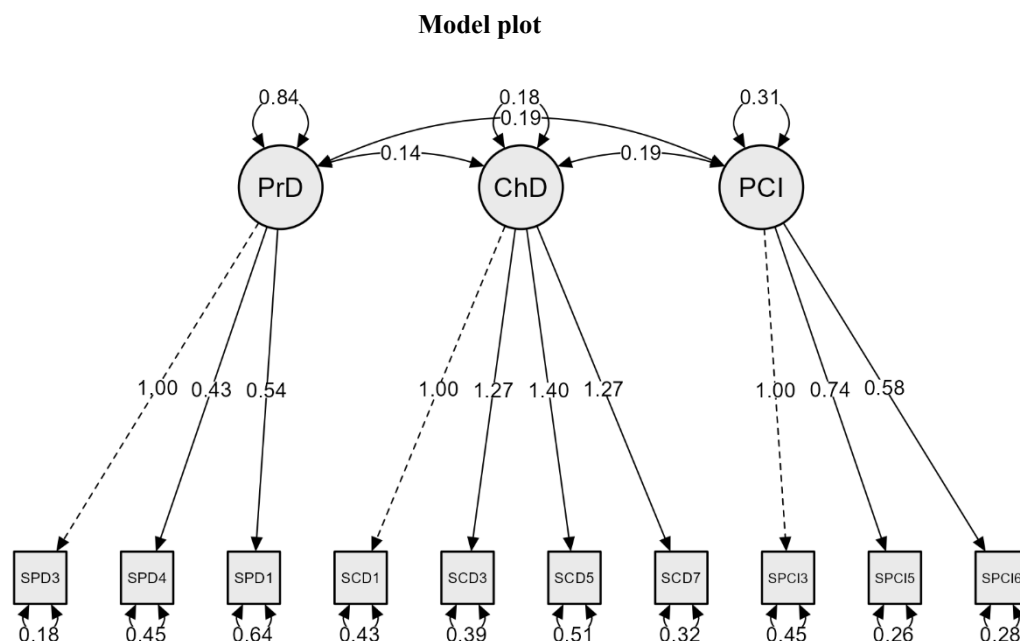


Figure 1. Model Plot of the Parenting Stress Scale

The final version of the Parenting Stress Scale used in this study consists of 10 items selected from the original 26-item Skala Stress Pengasuhan (Daulay et al., 2020). These items are distributed across three domains: the Parent Domain includes three items (SPD3, SPD4, SPD11), the Child Domain contains four items (SCD1, SCD3, SCD5, SCD7), and the Parent-Child Interaction Domain consists of three items (SPCI3, SPCI5, SPCI6). This model demonstrates adequate fitness and constructive validity, as detailed in Table 4.

Table 4. Final Items of the Parenting Stress Scale

Item Number	Item Content
SPD3	Kesibukan mengurus anak mengakibatkan saya tidak memiliki waktu untuk diri sendiri.
SPD4	Saya dapat meluangkan waktu untuk menikmati hal-hal yang saya gemari. ^{*)}
SPD11	Saya mudah merasa lelah setelah disibukkan dengan tugas mengasuh anak.
SCD1	Kemampuan anak saya berada di bawah kemampuan anak-anak seusianya.
SCD3	Saya merasa bahwa anak saya lebih banyak menuntut dibandingkan anak-anak lainnya.
SCD5	Anak saya akan marah jika hal yang diinginkannya tidak terpenuhi.
SCD7	Saya merasa perilaku anak saya lebih sulit diatur dibandingkan anak lainnya.
SPCI3	Terkadang saya merasa belum dapat menerima kekurangan yang dimiliki anak saya.
SPCI5	Anak saya jarang melakukan hal-hal yang membuat saya bangga.
SPCI6	Anak saya mampu mengerti perasaan yang sedang saya alami (misalnya pada saat sedang bersedih, anak akan memeluk). ^{*)}

Note. ^{*)} = reversely-coded items

In addition to the CFA results, this study also calculated the Average Variance Extracted (AVE) and Construct Reliability (CR) to assess the convergent validity and internal consistency of each domain in the Parenting Stress Scale. The results of the AVE and CR calculations for each domain are summarized in Table 5 below.

Table 5. Construct Reliability and Average Variance Extracted of the Parenting Stress Scale (Model 5)

Construct	Items	AVE	CR
Parent Domain	SPD3, SPD4, SPD11	.492	.694
Children Domain	SCD1, SCD3, SCD5, SCD7	.404	.728
Parent-Child Interaction Domain	SPCI3, SPCI5, SPCI6	.375	.628

Note. CR = Construct Reliability; AVE = Average Variance Extracted

For the Parent Domain, the CR value was .694, while the AVE was .492. Although the AVE was slightly below the recommended threshold of .50 (Fornell & Larcker, 1981), the CR exceeded the minimum acceptable level of .60, suggesting that the construct indicating acceptable internal consistency and marginal convergent validity. The Child Domain demonstrated a CR value of .728, indicating good composite reliability, while the AVE was .404. Although the AVE value falls slightly below the ideal cutoff, it is considered acceptable given the high CR, especially in the context of early-stage instrument adaptation and validation (Hair et al., 2022). In contrast, the Parent-Child Interaction Domain showed lower reliability, with a CR of .628 and AVE of .375, the AVE value was below recommended thresholds. These results imply limited internal consistency and insufficient convergent validity for this domain in its current form. The weaker performance of this domain may reflect how mothers with typical developmental children perceived and interpreted interactional aspects of the parent-child relationship or may suggest the need for the inclusion of additional indicators to capture this construct more comprehensively.

CONCLUSION

This study aimed to assess the psychometric properties of the Indonesian version of the Parenting Stress Scale (Skala Stress Pengasuhan) among mothers of typically developing children. Using Confirmatory Factor Analysis (CFA), the final 10-item model (M3) demonstrated excellent overall fit indices, supporting the factorial validity of the scale. Further analysis of convergent validity showed that the Parent Domain and Child Domain met acceptable levels of composite reliability (CR) and average variance extracted (AVE), whereas the Parent-Child Interaction domain showed weaker psychometric performance, indicating the need for refinement.

Despite some limitations, such as the reduced number of items per domain and marginal AVE values, the findings support the use of the Indonesian Parenting Stress Scale as a brief, reliable, and partially valid instrument for assessing parenting stress in research and clinical settings. Future studies should aim to strengthen the interaction domain and further explore the scale applicability across diverse populations and cultural contexts.

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Authenticity, Education, and Communal Solidarity: A *Ke-Jogja-an* Based Tourism Service Model

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Abstract. Rural tourism has emerged as a key alternative to mass tourism, offering authenticity, cultural immersion, and sustainable development opportunities. Yet, many village-based destinations face challenges in providing service models that integrate authenticity, educational value, and collective solidarity. This study introduces the *Ke-Jogja-an* service model, rooted in Javanese philosophy, as a framework for enhancing tourism services in Tourism villages Segajih, Yogyakarta. The research aims to examine how values such as *hamemayu hayuning bawana* (harmony with nature), *mangasah manising budi* (ethical refinement), and *karyenak tyasing sasama* (hospitality and empathy) shape authentic, educational, and community-driven tourism practices. Employing a qualitative phenomenological approach, data were collected through in-depth interviews, participant observation, and document analysis involving village leaders, tourism managers, homestay coordinators, local residents, and visitors. Findings reveal that the *Ke-Jogja-an* model enriches existing theories of tourism services by embedding spiritual and ethical dimensions into practice. Authentic cultural experiences, educational activities, and collective participation strengthen service quality while fostering sustainability and social cohesion. The study concludes that embracing indigenous philosophies provides both theoretical contributions to global tourism scholarship and practical guidance for rural destinations seeking differentiation and resilience.

INTRODUCTION

In recent decades, tourism villages have emerged globally as significant arenas for sustainable and culturally rooted tourism, offering alternatives to mass tourism's standardization and homogenization. Tourism villages often center on maintaining and showcasing intangible cultural heritage-such as traditional arts, rituals, crafts, and local languages-which become key attractions for visitors and reinforce community identity¹⁻⁵. Active local participation in tourism management is crucial. Community-based tourism models foster economic benefits, social cohesion, and environmental stewardship, while also ensuring that tourism development aligns with local values and needs⁶⁻⁸. Sustainable tourism villages generate income and jobs, support micro and small enterprises, and promote environmental conservation through practices like waste management and renewable energy use^{6,9-11}. Tourism villages can successfully promote sustainable tourism and cultural preservation when they empower local communities, protect cultural heritage, and foster multi-stakeholder collaboration. However, ongoing challenges-such as modernization, stakeholder commitment, and capacity-building-must be addressed to ensure long-term sustainability and authenticity.

The concept of service models for tourism villages has thus acquired importance: what kind of service delivery differentiates one tourism village from another, especially in terms of authenticity, education, and communal solidarity. Authenticity in tourism has been theorized as a multifaceted construct, often divided into *objective authenticity*, *existential authenticity*, and *constructive authenticity*^{12,13}. Meanwhile, *educational tourism* refers to tourism activities that explicitly integrate learning - of culture, environment, heritage - into the visitor experience¹⁴. *Communal solidarity*, expressed in Indonesian as *gotong royong*, is a social value that involves mutual cooperation among community members, which has been recognized as important for the success of community-based tourism (CBT), particularly in fostering local participation, shared responsibility, and ensuring that benefits are felt broadly¹⁵.

Despite this, many tourism villages in Indonesia face challenges in maintaining integrity and authenticity in their service offerings. For instance, a study in Tourism villages *Ciburial*, *Garut* found that while the village promotes slow tourism and authentic experiences, tourist satisfaction was more strongly influenced by *value for money* and amenities than by authenticity per se, signaling a potential gap between the ideal of authenticity and visitor perception and service output¹⁶. Similarly, in *Pujon Kidul Tourism Village* (Malang), research identified the lack of quality among human resources, weak infrastructure, and limited innovation as contributing to declining competitiveness; visitors noted that local culture and traditions were sometimes presented superficially,



driven more by marketing than by lived authenticity¹⁷. In other cases, tourism villages that theoretically base themselves on culture and education struggle visually to preserve traditional forms or include education meaningfully, often because of external pressure to modernize or commercialize.

Moreover, literature on educational tourism in Indonesia points to a tension: tourism programs with educational intent may end up commodifying culture or reducing learning to a shallow experience unless deeply integrated with local community participation and value systems¹⁴. Authenticity becomes compromised when service delivery privileges visitor expectations or profitability over cultural sensitivity, or when communal solidarity (*gotong royong*) is absent in organizing, guiding, or managing tourism experiences. When communal values are weak or decorative rather than operational, the result can be alienation, loss of local ownership, and visitor disillusionment.

The theoretical frames of Authentic Tourism, Community-Based Tourism (CBT), and Educational Tourism offer useful lenses for analyzing this challenge. Authentic Tourism theory emphasizes the importance of experiences perceived as genuine, sincere, and tied to local culture^{12,13}. CBT underscores local participation, ownership, and equitable benefit sharing¹⁵. Educational Tourism adds that tourism can be more transformative when learning is embedded-not as optional but as core-to the visitor experience¹⁴. In combination, these theories suggest that a strong service model in tourism villages should integrate authenticity, educational value, and communal solidarity.

Yet, there is a persistent gap in the literature: few studies explicitly examine how service models in tourism villages operationalize authenticity, education, and solidarity as an integrated whole, particularly through the lens of indigenous philosophical values like *Ke-Jogja-an*. Much of the scholarship on rural tourism has focused on authenticity as a singular dimension, often conceptualized as the preservation of tradition or cultural heritage for visitor consumption^{12,18}. While this stream of research emphasizes the importance of “authentic” experiences, it has been critiqued for reducing authenticity to a marketing device or aesthetic performance, rather than a lived communal value^{19,20}. Similarly, most educational tourism research focuses on the benefits for visitors-such as experiential learning, skill acquisition, and cultural understanding-often facilitated by higher education institutions or organized programs²¹. These studies highlight the importance of direct experience, immersion, and interaction with local culture as central to meaningful learning²¹. For example, integrating indigenous and local knowledge into educational settings can foster intercultural dialogue, strengthen community identity, and support more culturally sensitive learning experiences²²⁻²⁵. When examined in isolation, these strands fail to capture the interdependence of authenticity, education, and solidarity in creating sustainable and culturally rooted service models.

In practice, many tourism villages have struggled with this fragmentation. Research on Indonesian rural tourism demonstrates that while authenticity is often showcased through cultural festivals or handicrafts, it is not always accompanied by genuine community empowerment or educational frameworks that benefit both visitors and hosts^{26,27}. At times, communal solidarity-expressed as *gotong royong*-is celebrated symbolically in promotional discourse but weakened in actual practice, where unequal power relations or external investors dominate decision-making^{28,29}. The presence of external investors or top-down development initiatives can crowd out intrinsic motivation for collective action, making *gotong royong* more performative than substantive. The effectiveness of *gotong royong* depends on local context, leadership, and the degree of genuine community involvement in decision-making^{30,31}. Research in various Indonesian villages shows that while *gotong royong* is still practiced in some contexts, its intensity and authenticity are challenged by internal factors (e.g., individualism, weak management) and external factors (e.g., cultural shifts, lack of government support, external investor dominance)^{30,31}.

These issues underscore why integrating authenticity, education, and solidarity into a coherent service model remains an urgent research agenda. Without such integration, tourism villages risk falling into what Jamal and Hill³² describe as “superficial sustainability,” where the rhetoric of cultural preservation and participation masks shallow practices driven primarily by market imperatives. Furthermore, existing research rarely engages with indigenous values-such as *Ke-Jogja-an*-as epistemological foundations for service design, despite their potential to harmonize local philosophy with contemporary tourism needs³³⁻³⁵. While some research explores how indigenous knowledge systems and socio-cultural values can inform tourism development and business models, there is a noted scarcity of work that explicitly integrates these values into the design of tourism services or experiences^{34,35}. By situating the service model of Segajih within the framework of *Ke-Jogja-an*, this study responds directly to these gaps, offering a culturally grounded perspective that reconceptualizes how authenticity, education, and solidarity can be embedded simultaneously in rural tourism services.

Therefore, this study aims to address that gap by investigating a service model in Tourism villages Segajih, Yogyakarta, which is explicitly grounded in *Ke-Jogja-an*, and examining how authenticity, educational practices, and communal solidarity shape and define its tourism service model. Specifically, the objectives of this research are; (1) to describe how tourism services in Segajih incorporate authenticity, in terms of local cultural forms, practices, and visitor experience, (2) to examine how educational tourism components are embedded in the service design, (3) to explore how communal solidarity (*gotong royong*) influences decision-making, service delivery,



and community benefit-sharing within the tourism service model, (4) to propose a refined service model based on *Ke-Jogja-an* that can guide other tourism villages in achieving service offerings that are both authentic and educational, with strong communal participation.

Research Methodology

This study adopted a qualitative phenomenological approach to explore how authenticity, education, and communal solidarity are experienced and enacted within the service model of Tourism villages Segajih. Phenomenology seeks to uncover the lived experiences, meanings, and perceptions of participants, emphasizing how individuals interpret phenomena in their own contexts³⁶. In the context of this research, phenomenology was employed to understand how community members, leaders, and visitors perceive and operationalize *Ke-Jogja-an* values in tourism services. The choice of phenomenology is grounded in its ability to bridge philosophical concepts with everyday practices, aligning with the research aim of investigating culturally embedded service models.

Participant Selection

Participants were selected using a purposive sampling strategy, focusing on individuals directly involved in or affected by the implementation of the Segajih tourism program. The selection criteria were based on their role in shaping or experiencing the tourism service model, ensuring diversity of perspectives while maintaining relevance to the research objectives. The participants included:

1. Village government of Hargotirto – to provide policy-level insights into tourism governance.
2. Head of Segajih Tourism Village management – to understand strategic management and overall service design.
3. Coordinator of the homestay division – to capture perspectives on hospitality and service quality.
4. Three residents of Segajih Village involved in tourism operations – to represent grassroots involvement and communal solidarity.
5. Two visitors – to provide external perspectives on authenticity, educational value, and hospitality.

This selection reflects a balance between institutional, managerial, community, and consumer perspectives, which is essential for triangulating insights³⁷.

Data Collection Techniques

Semi-structured interviews were conducted with all participants to explore their experiences, perceptions, and practices. Semi-structured interviews were chosen because they provide flexibility while maintaining focus, allowing participants to articulate meanings in their own words³⁸. Each interview lasted between 45 and 90 minutes and was recorded with participants' consent. Interview Guide³⁸:

1. Perceptions of authenticity: How do you understand authenticity in Segajih tourism services? What makes the experience different from other tourism villages?
2. Educational dimension: How does Segajih provide learning opportunities for visitors? What role do cultural or environmental lessons play?
3. Communal solidarity (*gotong royong*): How does mutual cooperation shape the way services are organized and delivered? Can you share examples?
4. *Ke-Jogja-an* values: Which local values are integrated into services, and how are they practiced?
5. Challenges: What difficulties do you face in maintaining authenticity, education, and solidarity in tourism services?
6. Outcomes: How do you think visitors perceive and benefit from Segajih's approach?

The researcher engaged in participant observation during village tourism activities, including homestay operations, educational workshops, cultural performances, and communal gatherings. Observation focused on interactions among community members and with visitors, the enactment of *gotong royong*, and the ways authenticity and education were presented. Field notes were taken systematically using an observation protocol adapted from³⁹⁻⁴³. The observation guide become:

1. Nature of interaction between hosts and visitors (hospitality, emotional expression, sincerity).
2. Evidence of educational elements in tourism programs (workshops, guided tours, storytelling).
3. Manifestations of *gotong royong* in service delivery (division of roles, collective efforts, resource sharing).
4. Symbols of *Ke-Jogja-an* values in rituals, service design, and community participation.

As the purpose to complete the instrument of research. These documents provided background information, policy context, and evidence of how service models are formally articulated and promoted ⁴⁴. Document analysis was conducted to complement interviews and observations. The documents reviewed included:

1. Local government policy documents on tourism villages development.
2. Segajih tourism promotional materials (brochures, websites, social media posts).
3. Minutes of community meetings related to tourism planning.
4. Records of homestay guest logs and activity reports.

Data Validation and Analysis

The data analysis followed a phenomenological framework, integrating multiple sources of evidence and iterative cycles of coding and validation. The process unfolded through five interconnected stages:

1. Data Sources

The primary data sources comprised field observations, semi-structured interviews, focus group discussions, and participatory engagement with the Segajih community. Supporting data included program documents, village meeting notes, and visual evidence (photographs and promotional content). Triangulation was applied by comparing these multiple sources to ensure consistency and credibility, following established practices in qualitative tourism research ⁴⁵.

2. Coding

The raw data were transcribed and subjected to open coding, where meaningful statements were highlighted to capture community experiences, values, and practices. Codes such as *authentic experience*, *gotong royong*, *cultural pride*, *youth disengagement*, and *economic motivation* emerged. These codes were validated through peer debriefing and member checking, ensuring they accurately represented participants' voices ^{46,47}.

3. Themes

Through axial coding, the initial codes were clustered into broader thematic categories:

- Authenticity: rooted in cultural traditions, rituals, and daily practices.
- Education: emphasis on cultural transmission, environmental awareness, and skill-sharing.
- Gotong Royong (Collective Solidarity): community cooperation in infrastructure, events, and service delivery.
- Motivation and Constraints: economic benefits, cultural pride, but also uneven youth participation and financial limitations.

Themes were constantly compared across data sources, ensuring alignment with the lived realities of Segajih residents.

4. Descriptions

Each theme was elaborated into textural and structural descriptions. For instance, textural accounts highlighted *what* participants experienced (e.g., collective work in building gazebos), while structural descriptions analyzed *how* these experiences occurred (e.g., rooted in *Ke-Jogja-an* values of *golong-gilig* and *hamemayu hayuning bawana*). This dual-layer description provided both richness and interpretive depth, as recommended in phenomenological analysis ⁴⁸⁻⁵⁰.

5. Essence

Finally, the integration of descriptions led to the essence of the phenomenon: the emergence of a *Ke-Jogja-an Based Tourism Service Model*. This model encapsulates three service dimensions—authenticity, education, and collective solidarity—as interconnected pillars shaping visitor experiences and community empowerment. The validation process showed that these dimensions are not isolated but mutually reinforcing, forming a holistic approach to sustainable and culturally grounded tourism development.

RESULTS

Identification of Service Model Dimensions

The experience in Segajih Village shows that community participation is the foundation of its tourism service model. Villagers take an active role at every stage of tourism development—starting from planning and decision-making, all the way to program implementation. Their involvement is not limited to formal meetings; it also comes to life through collective action, such as building homestays, gazebos, and prayer facilities together through gotong royong. This spirit of working hand in hand not only speeds up infrastructure development but also strengthens social bonds and a shared sense of responsibility among community members. Participation goes

beyond physical labor. It also includes contributions in education and cultural activities. Many villagers take part as cultural mentors, homestay hosts, and tour guides in the “Live In & Education” program. This shows that community involvement works on two levels: some contribute material and physical resources, while others share knowledge, skills, and cultural heritage. Still, participation is not evenly spread across all groups. The younger generation, for instance, shows inconsistent involvement. Many are often tied up with jobs or studies outside the village. According to Mas Didik, the local *karang taruna* leader, this gap is both a challenge and a lost opportunity—because young people carry creative energy and digital skills that could greatly improve the tourism experience. At the same time, the value of *gotong royong*, deeply rooted in Javanese culture and connected to the broader Ke-Jogja-an philosophy, continues to act as the glue that unites the community. Events like Indonesia’s Independence Day celebrations prove that, when mobilized, young villagers can co-create cultural activities that not only build community pride but also enrich the experiences of visiting guests.

At the same time, the *gotong royong* ethos—deeply rooted in Javanese values and linked to the broader Ke-Jogja-an philosophy—functions as a cultural glue binding diverse community members together. Collective celebrations such as Indonesia’s Independence Day illustrate that, when mobilized, the youth can co-create cultural activities that strengthen both community pride and visitor experiences. Based on the phenomenological data collected from interviews, observations, and documentation in Segajih Village, three central dimensions emerged as the foundation of a “Ke-Jogja-an based” tourism service model: authenticity, education, and communal solidarity (*gotong royong*). These dimensions not only characterize the cultural identity of the village but also serve as practical pillars in shaping sustainable and community-based tourism practices. Here’s a simple conceptual diagram illustrating the three interrelated dimensions in Figure 1. Dimensions of the “Ke-Jogja-an” Based Service Model.

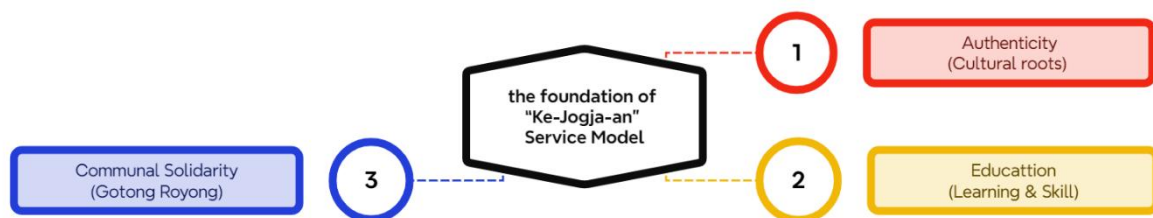


FIGURE 1. Dimensions of the “Ke-Jogja-an” Based Service Model

In the actual academic article, this diagram would be presented using arrows, boxes, and circular connectors (similar to Scopus-indexed qualitative studies) to emphasize that these three dimensions are not linear, but rather mutually reinforcing layers of a cultural service model.

Authenticity in tourism refers to the extent to which the offered experiences reflect cultural originality, honesty, and lived tradition rather than staged or commodified performances^{12,51}. In Segajih, authenticity was reflected through local participation in daily village routines, such as bamboo handicrafts, *gamelan* rehearsals, and traditional culinary practices like palm sugar processing. This authenticity builds trust between hosts and visitors by ensuring that the tourism experience remains rooted in genuine local culture. Several respondents emphasized that the preservation of authenticity is critical, since many rural destinations risk diluting their cultural assets under market pressures^{18,20}. The “Ke-Jogja-an” framework, emphasizing humility (*andhap asor*), harmony (*rukun*), and sincerity (*tulus*), helps ensure that tourism does not become detached from cultural values.

Educational elements emerged as another core dimension. In Segajih’s *Live in & Education* program, tourism is designed not only as leisure but also as cultural and environmental learning. This resonates with the growing discourse on educational tourism, where travel serves as a platform for knowledge transfer, skill-building, and cultural awareness^{52–57}. The village integrates visitors into activities such as batik workshops, bamboo craft making, and ecological conservation projects. Such participatory learning ensures that tourists acquire deeper understanding, while local people gain opportunities to showcase and preserve their traditions^{58–63}. This aligns with the Ke-Jogja-an ethos of “*nguri-uri budaya*” (preserving culture), transforming tourism into an intercultural classroom.

The third dimension is communal solidarity, operationalized through *gotong royong* (mutual cooperation). Phenomenological accounts show that villagers collectively contribute labor, resources, and ideas to manage tourism facilities—from building homestays and gazebos to organizing cultural festivals. *Gotong royong* serves as social capital that strengthens bonding ties among residents while simultaneously sustaining tourism services^{64–67}. The synergy between solidarity and tourism supports resilience against financial and infrastructural constraints, making service delivery more inclusive and sustainable. However, participation is not evenly distributed. Youth engagement, for instance, was reported as inconsistent due to migration for work or study. This echoes findings

from other community-based tourism contexts, where generational gaps challenge sustainability. Addressing these disparities is vital to ensure that *gotong royong* remains a living practice rather than a symbolic ideal.

Case Study of Segajih Live in & Education

The Segajih *Live in & Education* program represents an operationalized form of the *Ke-Jogja-an* based service model, where the interconnection between authenticity, education, and *gotong royong* manifests in daily tourism practices. Drawing on phenomenological interviews, observations, and documentation, the findings illustrate how community involvement, promotion strategies, challenges, and motivations shape the trajectory of the village's tourism service system.

Community Participation in Tourism Governance

The study found that community participation is the backbone of Segajih's tourism governance. Residents actively take part in village meetings, contribute labor for the construction of homestays, gazebos, and prayer facilities, and engage in capacity-building trainings. Such practices exemplify *gotong royong* as a living social institution, directly reinforcing the solidarity dimension of the service model^{29,30,68}. The findings, however, show that participation is not evenly shared across groups. Older generations and women are often more active, especially in roles tied to tradition such as preparing food or guiding cultural events. In contrast, youth involvement tends to be less steady, largely because many young people leave the village for work or education. This generational divide reflects a common challenge in community-based tourism, where maintaining active engagement across different age groups is essential for long-term sustainability.^{69–72}

The phenomenological study of Segajih Village shows that community participation is more than just an organizational requirement—it is a cultural way of life, deeply tied to Javanese values. Participation takes shape in the ordinary routines of the community: preparing meals together for guests, fixing village paths ahead of events, and making sure rituals and performances stay true to ancestral traditions. In this sense, *gotong royong* is not simply a symbol—it is something lived, experienced, and continually affirmed through the act of working side by side. For many residents, this involvement is seen as a devotion to their land and heritage, echoing the philosophy of *hamemayu hayuning bawana* (preserving the beauty of the world). As one village elder put it, welcoming tourists “is like receiving guests in your own home, only this time, the whole village is the host.” This illustrates how participation holds not only social but also spiritual meaning, going well beyond economic considerations. At the same time, the analysis also uncovers tensions and inequalities. Women often take on roles in cooking, hospitality, and guiding traditional crafts—tasks that align with cultural expectations—while men are more involved in construction and external relations. Youth participation is uneven: some young people take pride in showcasing their village, yet others feel limited by the lack of local income opportunities compared to what they might find in the city. This creates a kind of generational ambivalence, where pride and belonging exist alongside practical concerns about economic survival.

For visitors, these acts of participation are often seen as signs of authenticity and genuine warmth. Many tourists describe the experience as “being welcomed into a family” rather than treated simply as customers. This sense of belonging shows how community involvement has a direct impact on the quality of the tourism experience, echoing Wang's¹² idea of *existential authenticity*. In Segajih, this lived reality can be understood through three interconnected layers:

1. Embodied Practice – participation expressed in everyday cooperation and ritual activities.
2. Cultural-Spiritual Meaning – services grounded in harmony with nature, heritage, and community life.
3. Tensions and Gaps – challenges that arise from uneven youth participation and traditional role divisions within the community.

This layered reality shows that community participation is not static; it is constantly negotiated between tradition and modern pressures, between local pride and external opportunities. Yet, it remains the core essence of Segajih's tourism governance model, sustaining both the material and immaterial dimensions of village tourism.

Promotion and Community-Supported Marketing

The promotion of Segajih's programs grows mostly from the ground up. Word-of-mouth, the warmth of personal hospitality, and the stories shared by past visitors are the main drivers of its reputation. Alongside this, villagers work together to create digital content—photos, short videos, and other media—that they share through social platforms. This way, the promotional material stays authentic and true to local culture, avoiding the sense of being overly commercialized²⁰. What makes this approach powerful is the villagers' direct role in storytelling. Their involvement not only keeps the message genuine but also adds an educational layer. Visitors don't just see

cultural symbols from a distance; they are invited to understand their meaning straight from the people who live them, turning the experience into a form of learning as well as tourism.

In Segajih, tourism promotion doesn't come from a formal marketing office or glossy professional campaigns. Instead, it grows out of the community's daily life. Communication with the outside world follows the rhythms of the village, making promotion less of a technical task and more of a social process rooted in relationships and cultural values. The first pattern that stands out is the heavy reliance on word-of-mouth. Many visitors hear about the Segajih Live In & Education program through friends, alumni, or relatives who have already taken part. This shows how reputation is built on personal trust and lived experiences, giving it more weight than formal advertising ever could. The second pattern is the modest but effective use of social media. A small group of young villagers manage Facebook and Instagram accounts, sharing snapshots of everyday activities—farming, batik-making, or community gatherings. Rather than projecting a polished or commercial image, these posts highlight the simplicity and sincerity of village life. In doing so, promotion aligns with authenticity: instead of staging experiences, the community simply extends its cultural narrative into digital spaces. The third pattern is the way cultural explanation is woven into promotion. When residents talk about their programs, they often include references to values such as *gotong royong* or the philosophy of harmony with nature. This turns promotion into more than just an economic tool; it becomes a form of cultural education. Flyers, videos, and stories shared by word-of-mouth often emphasize that the program is not only about tourism but also about learning and living the values of the village.

At the same time, field data point to several challenges. Because Segajih's promotion relies so much on voluntary contributions, it can be inconsistent and easily disrupted if key people are unavailable. Limited financial resources also make it difficult to invest in professional marketing, which in turn restricts the program's reach beyond familiar networks. On top of that, the lack of a standardized brand sometimes leaves Segajih less visible compared to other rural tourism initiatives that are more commercialized. Taken together, these conditions suggest that promotion in Segajih should not be seen merely as an economic instrument. Instead, it is best understood as a cultural extension of communal life—where hospitality, authenticity, and education are expressed through personal relationships and simple storytelling. In fact, the way Segajih promotes itself reflects the very same values that shape its tourism program: sincerity, togetherness, and a deep grounding in local culture.

Challenges and Barriers to Service Quality

Community participation in Segajih's tourism program unfolds as a dynamic process, shaped by both supportive and limiting factors. On one hand, enthusiasm and cultural pride encourage involvement; on the other, structural and social barriers sometimes make it difficult to sustain collective efforts. The first challenge lies in balancing economic needs with voluntary contributions. Most residents rely on farming or wage labor for their livelihoods, and joining tourism activities often means giving up time that could otherwise be spent earning income. This creates a recurring dilemma: while villagers deeply value the cultural and communal meaning of the Segajih Live In & Education program, their ability to contribute is sometimes constrained by economic realities. A second challenge concerns how responsibilities are distributed. Field observations show that hospitality, guest reception, and logistics often fall to the same small group of highly committed individuals. Their dedication keeps the program running, but it also leads to fatigue and, at times, a sense of imbalance. When expectations are not shared more broadly, small frictions can arise within the community. The third condition relates to generational differences in motivation. Older villagers often see participation as a moral duty—an obligation to uphold cultural values and safeguard tradition. Younger participants, meanwhile, are more driven by opportunities for personal growth, such as learning new skills, engaging in digital promotion, or practicing English with visitors. This diversity of motivations enriches the program by bringing complementary strengths, but it also calls for negotiation between different understandings of what "participation" means.

When it comes to motivation, pride in cultural heritage stands out as the strongest force that unites the community. Villagers often emphasize that what makes Segajih special is its authenticity—the chance for visitors to truly live within the community, not just watch from the outside. This pride acts as a source of resilience, encouraging people to keep going even when challenges arise. The shared value of *gotong royong* also plays a key role, shaping contributions not as personal sacrifices but as part of a collective responsibility. External recognition further strengthens this motivation. Warm feedback from visitors, repeat visits from schools, and occasional coverage in local media all reinforce the community's sense of worth. These acknowledgments inspire them to continue—and even improve—their involvement. In this way, participation becomes both a cultural duty and a form of social validation. Taken together, the essence of participation in Segajih tourism can be seen as a balance between cultural pride and structural limitations. Motivation grows out of deeply rooted values and external recognition, while challenges emerge from economic pressures, uneven distribution of tasks, and intergenerational differences. Participation, then, is not a fixed achievement but an ongoing negotiation—shaped by values, capacities, and collective aspirations.



Motivations and Drivers of Participation

The reasons behind community participation in Segajih are shaped by both economic and socio-cultural factors. For many families, tourism brings direct benefits through income from homestays, handicrafts, and agricultural products. At the same time, residents take great pride in sharing their traditions—whether through batik-making, gamelan performances, or bamboo crafts—with visiting guests. These two forms of motivation work hand in hand, reflecting the idea in authentic tourism theory that economic gains and cultural values can strengthen one another^{12,73}. Support from outside institutions has also played a role. Training programs run by government agencies and NGOs have helped boost villagers' confidence in providing hospitality services, showing how education can be linked to empowerment in practice^{74–78}.

The motivations behind community participation in Segajih tourism are shaped by more than just material benefits. They are rooted in layers of cultural identity, social connections, and the desire for recognition. Unlike participation driven solely by financial gain, the Segajih experience shows how involvement grows from a blend of internal values and external encouragement. At the heart of this is a strong sense of cultural pride. For residents, tourism is not simply an industry but a platform to showcase, share, and affirm their Jogja identity. This pride is reflected in everyday practices: opening their homes to guests, preparing traditional meals, and leading workshops in local arts and crafts. Through these acts, participation becomes a way of expressing identity, where villagers communicate who they are through hospitality and cultural teaching. In this sense, participation carries a deeper, almost existential meaning—it serves as a way to protect and pass on their heritage to others.

Another important source of motivation is the sense of communal solidarity. In Segajih, participation is not seen as an individual transaction but as a contribution to the greater good. The practice of *gotong royong* continues to serve both as a guiding principle and as a practical mechanism, ensuring that tasks—whether preparing homestays or keeping shared spaces clean—are carried out together. This creates a kind of emotional fulfillment that goes beyond material benefits. Many residents describe their involvement as a way to feel connected and to reaffirm their belonging within the community. In this way, solidarity becomes a social glue, making participation naturally self-sustaining.

A third source of motivation comes from external recognition. Feedback from visitors, partnerships with schools and universities, and even modest exposure through local government channels all help strengthen villagers' sense of accomplishment. Recognition acts like a mirror, reflecting back the value of their efforts and inspiring them to keep going, whether by expanding existing programs or improving the quality of services offered.

A fourth driver is the aspiration for intergenerational continuity. Older residents often speak of their participation as a way of leaving behind a legacy—not only material resources but also traditions, stories, and moral values for the next generation. For the youth, the motivation is somewhat different. They are drawn to opportunities for skill development, from digital literacy and marketing to cross-cultural communication. For them, involvement in tourism opens doors to experiences beyond the village, allowing them to connect their local identity with wider global opportunities.

When viewed together, these factors show that people's involvement is shaped by a blend of symbolic, social, and aspirational values. On the symbolic side, participation grows out of cultural pride and the desire to live out their identity. Socially, it is held together by solidarity and the recognition people receive from others. Aspirationally, it reflects hopes for continuity and future opportunities. These layers work in combination, giving participation a kind of resilience. Even during times of economic difficulty or internal challenges, people remain engaged because their motivation comes from deeper meanings that go far beyond short-term benefits.

Strategies for Sustaining Community Spirit

To keep community involvement alive, Segajih relies on several key strategies:

1. Village deliberation forums (*musyawarah desa*): creating an open space for collective decision-making, so everyone feels included and responsible.
2. Capacity-building workshops: offering training in areas like hospitality, digital marketing, and environmental care to strengthen local skills.
3. Recognition systems: showing appreciation for active contributors, both through public acknowledgment and fair economic rewards.
4. Shared infrastructure projects: developing facilities such as the Rumah Pajang for local businesses (UMKM), which fosters pride and a stronger sense of belonging.

These efforts show how *gotong royong* is not just a cultural slogan but a working principle of local governance. They embody what scholars describe as “participatory sustainability,” where active involvement of residents helps the community stay resilient over time.



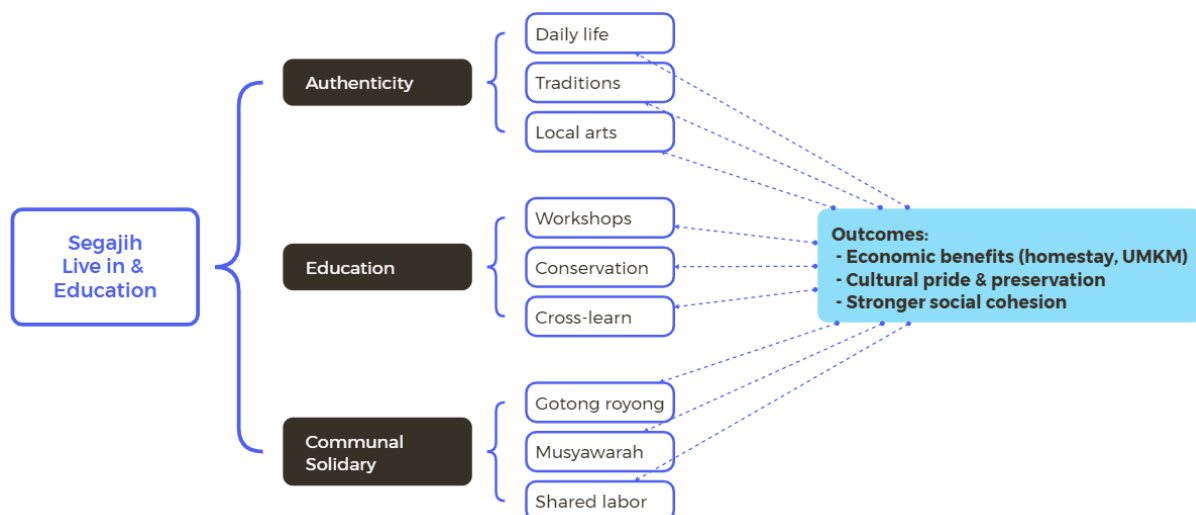


FIGURE 2. Case Study Segajih: Embedding Dimensions into Practice

DISCUSSION

A New Model of Tourism Service Based on *Ke-Jogja-an* Values

The research on Segajih *Live In & Education* shows that tourism in Yogyakarta goes beyond simple economics or leisure. It is deeply rooted in the local values known as *Karakter Ke-Jogja-an*. This cultural foundation reshapes the way services are delivered, highlighting authenticity, education, and collective solidarity (*gotong royong*). While global theories on tourism provide useful insights, they often overlook the spiritual and philosophical elements, as well as the sense of ownership that comes from community-driven service.

At the core of this model lie two guiding philosophies: *hamemayu hayuning bawana*—the effort to preserve harmony within the universe—and *mangasah manising budi*—the pursuit of moral refinement. These values shift the meaning of tourism from something centered only on leisure and consumption toward a practice that also carries ethical and spiritual depth. This approach resonates with and expands upon Pine & Gilmore's Experience Economy⁸⁰, which argues that experiences should integrate education, aesthetics, entertainment, and escapism. In the Yogyakarta context, however, service delivery adds a moral dimension—linking tourism to cultural preservation and environmental responsibility. Scholars have emphasized the need to embed local wisdom into service design to create sustainable and culturally respectful tourism^{36,81}. The *Ke-Jogja-an* framework thus serves as a moral compass for guiding tourism practices toward long-term socio-ecological harmony^{82,83}.

Authenticity is central to both visitor satisfaction and community empowerment. Wang's¹² theory of *existential authenticity* argues that the most meaningful tourism experiences emerge not from objects or staged performances but from interpersonal relationships and emotional connections. In Segajih, this is expressed through *karyenak tyasing sasama*—the ethic of making others happy. Homestay interactions, village rituals, and personal storytelling embody *existential authenticity*, providing tourists with emotional resonance and cultural intimacy. Research in heritage and rural tourism confirms that authenticity is co-created through host–guest relationships rather than static artifacts^{18,20,73}. This challenges commodified forms of “staged authenticity”⁵¹ by foregrounding genuine community engagement.

Tourism in Segajih incorporates workshops (batik, bamboo crafts), river trekking, and ritual participation, all framed by *sangkan paraning dumadi*—reflection on life's origins and destiny. Education here is not merely skill transfer but an integrated ecological and spiritual pedagogy. This perspective expands Butler's framework on sustainable tourism, which mainly stresses cultural and environmental preservation, by weaving in the element of spiritual responsibility⁸⁴. Research on eco-cultural tourism has shown that community-based initiatives can nurture respect and awareness for both cultural traditions and natural environments^{85,86}. In this light, Segajih stands as an example of transformative tourism—one that goes beyond entertainment to also guide visitors toward more ethical and meaningful ways of living.

Unlike the usual models of tourism services where responsibility rests on individual providers, in Segajih the whole community functions as the service system. Guided by the principle of *golong-gilig*—unity in action—service here is not an individual transaction but a shared performance of solidarity. This approach contrasts with the SERVQUAL model⁶⁸, which defines service quality through one-on-one interactions between provider and customer (tangibles, reliability, responsiveness, assurance, empathy). In Segajih, quality is not judged by those

dimensions alone, but by the extent to which services foster social harmony and reflect a sense of collective ownership. Such an approach resonates with emerging scholarship on community-based tourism^{87–89}, which emphasizes inclusivity, equity, and shared benefits. Gotong royong ensures that tourism development strengthens social cohesion, as seen in community work for infrastructure, festival organization, and hospitality services. This not only improves preefficiency but also builds trust, aligning with theories of social capital in tourism development⁷⁹.

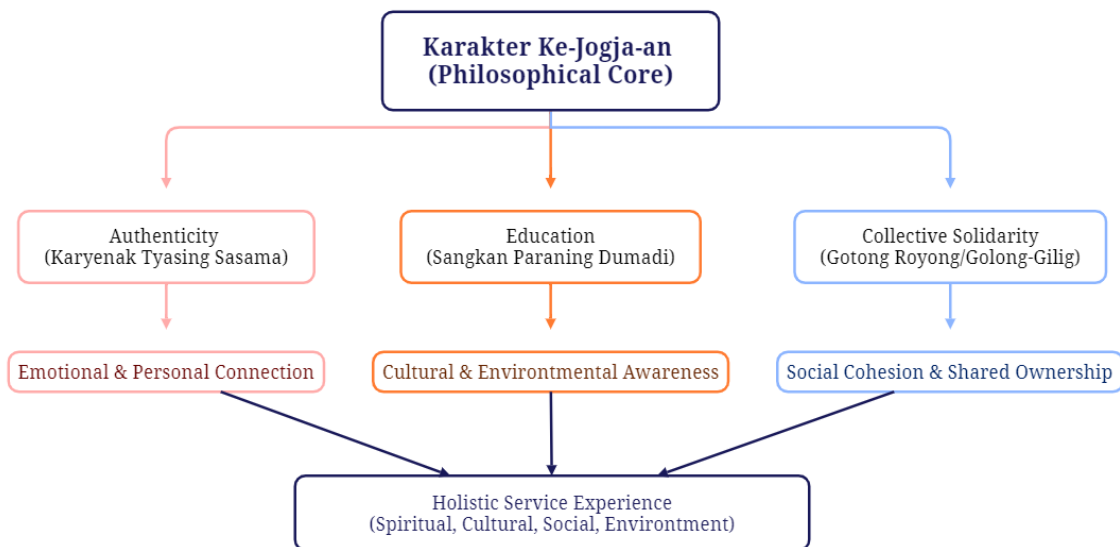


FIGURE 3. Tourism Service Model Based on *Ke-Jogja-an* Values

The *Ke-Jogja-an* model of tourism service demonstrates that spiritual values, cultural authenticity, and communal solidarity are not peripheral but central to creating holistic visitor experiences. By embedding *hamemayu hayuning bawana*, *karyenak tyasing sasama*, *sangkan paraning dumadi*, and *golong-gilig* into service delivery, the model reconceptualizes tourism quality as an integrated process of ethical, cultural, social, and environmental stewardship.

Comparison with international models

This section critically compares the *Ke-Jogja-an* service model developed from the Segajih case with key international service and tourism models widely used in the literature: SERVQUAL (service quality), The Experience Economy, Butler’s Tourism Area Life Cycle / sustainable tourism, Authenticity theory, Community-Based Tourism (CBT), Service-Dominant (S-D) Logic, and emotional labor scholarship. For each model I summarize core propositions, highlight points of alignment with the *Ke-Jogja-an* model, and identify the conceptual or operational gaps that the *Ke-Jogja-an* model helps to fill. Citations to foundational papers and reviews are provided after the relevant discussion points.

The *Ke-Jogja-an* model does not displace international frameworks; rather it complements and extends them by supplying culturally specific mechanisms (spiritual norms, communal governance, embedded education) that enhance explanations for service quality, authenticity maintenance, community empowerment, and sustainability. For scholar-practitioners working on rural or community tourism, *Ke-Jogja-an* offers a concrete example of how indigenous philosophies can be intentionally leveraged to strengthen both theoretical models and on-the-ground practice. Positioning the *Ke-Jogja-an* model within international frameworks highlights several unique contributions:

1. Cultural–spiritual dimension: The *Ke-Jogja-an* perspective adds a clear spiritual and ethical layer to theories of experience and sustainability (e.g., Experience Economy, sustainable tourism), offering insight into how conservation is tied to meaning-making for guests.
2. Collective actor of service quality: It shifts the focus of service provision from individual providers to the entire community, broadening the scope of debates around SERVQUAL and service quality.
3. Operational mechanisms for authenticity: Instead of leaving authenticity as an abstract idea, the model outlines concrete practices—such as education, communal rituals, and village governance—that help preserve it in day-to-day tourism.

4. Cultural motivators for community-based tourism (CBT): It shows how indigenous value systems serve as intrinsic motivators, strengthening both the sustainability and resilience of CBT initiatives.
5. Culturally grounded service-dominant logic (S-D Logic): It demonstrates a lived example of value co-creation, where cultural norms actively shape how resources are shared and integrated.

TABLE 1. Comparison of *Ke-Jogja-an* Model with International Service and Tourism Frameworks

Framework	Core Proposition	Alignment with <i>Ke-Jogja-an</i>	Gaps Addressed by <i>Ke-Jogja-an</i>
SERVQUAL ⁶⁸	Service quality = customer perceptions across 5 dimensions (tangibles, reliability, responsiveness, assurance, empathy).	Emphasis on empathy & responsiveness maps to <i>karyenak tyasing sasama</i> and personalized care in Segajih.	Expands from provider–consumer dyad to collective/community actor; adds spiritual–ethical dimension of service.
Experience Economy ⁸⁰	Organisations stage memorable experiences (education, esthetics, entertainment, escapism).	Segajih stages educational, aesthetic, participatory experiences (e.g. batik, homestays).	Extends beyond staged design: experiences are emergent from cultural practice; embeds spiritual–ethical meaning.
Tourism Area Life Cycle & Sustainable Tourism ⁸⁴	Destinations evolve through stages; sustainability requires balance of economic, social, environmental factors.	<i>Hamemayu hayuning bawana</i> frames environmental harmony; communal stewardship aligns with sustainability.	Adds cultural–cosmological drivers of conservation, not only resource management logics.
Authenticity Theory ^{12,51}	Authenticity as objectivist, constructivist, or existential; meaningful experiences emerge from existential authenticity.	Segajih offers existential/constructivist authenticity via participatory rituals, crafts, and host–guest relations.	Provides operational mechanisms (education, ritual, governance) to sustain authenticity beyond commodification.
Community-Based Tourism ^{34,88}	Emphasises local participation, empowerment, equitable benefit distribution, community control.	Segajih's <i>rembug desa</i> , benefit sharing, and gotong royong reflect CBT ideals.	Highlights intrinsic cultural motivators (philosophy, ethics) sustaining CBT, not only structural participation.
Service-Dominant Logic ^{90,91}	Value is co-created; service exchange and resource integration among actors is foundational.	Community and visitors co-create value via shared education, cultural activities, and conservation.	Specifies which local cultural logics enable co-creation, grounding S-D Logic in context.
Emotional Labor ⁹²	Workers manage emotions to meet service expectations, often at personal cost.	Hosts express emotional labor as moral practice (<i>karyenak tyasing sasama</i>), fostering hospitality.	Shows how cultural ethics mitigate emotional costs, turning emotional labor into communal, authentic expression.

The comparative analysis shows that while international models such as SERVQUAL, the Experience Economy, and Sustainable Tourism provide valuable foundations for thinking about service quality and destination development, they tend to remain framed in managerial, economic, or consumer-centered terms. The *Ke-Jogja-an* model of service offers a different perspective. It demonstrates that community-based hospitality cannot be fully understood through universal service frameworks alone, as it is deeply rooted in cultural and spiritual ethics that reshape the meaning of quality in rural tourism. Principles like *hamemayu hayuning bawana* (preserving harmony) and *karyenak tyasing sasama* (bringing comfort to others) expand the focus of service from efficiency and empathy to also include ecological care, spiritual responsibility, and communal solidarity. This suggests the importance of bringing non-Western ways of knowing into broader tourism theory.

The Segajih experience shows that local philosophies are not just symbolic ideals but serve as practical guides for keeping tourism authentic, educational, and collectively managed. In contrast to mainstream tourism models, which often separate concepts like authenticity or community involvement into stand-alone variables, the *Ke-Jogja-an* approach weaves them together into an integrated way of working. Within this system, emotional effort becomes a form of ethical care, education is understood as the passing down of cultural heritage rather than a marketing tool, and communal solidarity is treated as the foundation of service itself. These elements set the model apart from more instrumental frameworks and position it as an indigenous perspective that can engage in meaningful dialogue with global tourism theory.

This discussion points to wider lessons for the future of sustainable rural tourism. By reframing service as something collective, rooted in ethics, and attuned to spiritual values, the *Ke-Jogja-an* model offers a pathway for destinations struggling with issues like overtourism, over-commercialization, and the loss of cultural identity. It highlights the need for global tourism scholarship to embrace more plural perspectives—ones that recognize local ways of understanding service and hospitality as valid theoretical contributions in their own right. In doing so, the

findings from this study not only enrich existing frameworks but also open space for cross-cultural dialogue, where Indonesian rural wisdom can stand alongside and converse with international perspectives.

CONCLUSION

This study shows that the *Ke-Jogja-an* service model offers a unique way to understand how tourism services work in rural settings. Rooted in local philosophies—*hamemayu hayuning bawana*, *mangasah manising budi*, and *karyenak tyasing sasama*—the model redefines what “quality” in service means. Rather than focusing only on efficiency or customer satisfaction, it frames service as a practice that blends authenticity, education, and collective solidarity. The Segajih case study demonstrates that these values are not just symbolic heritage but active forces that shape how people participate, host, and sustain tourism in daily life. In this way, the model does more than reflect culture; it expands international frameworks like SERVQUAL, the Experience Economy, and Community-Based Tourism by embedding spiritual and ethical dimensions that dominant theories often overlook.

Theoretically, this research contributes to a more pluralistic understanding of service and tourism, showing how local knowledge systems can generate new concepts that add depth to global discussions. On a practical level, the findings suggest that rural destinations can build competitiveness and sustainability not by copying outside models, but by drawing on their own cultural wisdom as the basis for service. For policymakers and practitioners, this means that supporting rural tourism should go beyond economic indicators, placing greater emphasis on preserving cultural integrity, fostering educational creativity, and strengthening collective governance.

That said, this study is not without its limitations. By centering on a single case in Yogyakarta, it offers depth but cannot fully represent the wide diversity of cultural frameworks that exist across Indonesia or in other regions. Broader comparative research that includes multiple destinations would help test and strengthen the applicability of the *Ke-Jogja-an* model. From a methodological standpoint, the use of qualitative phenomenology allowed for deep insights into lived experiences, yet this approach could be enriched by incorporating quantitative methods to capture wider visitor perceptions and measurable impacts.

Future research should therefore pursue two directions. First, cross-regional studies could examine how similar or divergent cultural logics of service manifest in other contexts, thereby contributing to a global dialogue on indigenous tourism frameworks. Second, longitudinal studies could explore the sustainability of such models over time, particularly in the face of commercialization and generational shifts in community values. These efforts would further establish the role of cultural–spiritual ethics in shaping tourism that is not only economically viable but also socially cohesive and environmentally harmonious.

In conclusion, the *Ke-Jogja-an* model affirms that service in tourism is not a neutral or technical practice but a deeply cultural act. By recognizing and operationalizing local philosophies, destinations like Segajih reveal how rural tourism can achieve authenticity, education, and solidarity in ways that resonate with both visitors and hosts. This approach provides a meaningful contribution to tourism scholarship and offers a pathway toward more sustainable, humanistic, and culturally grounded tourism futures.

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Sustainable Learning in Education Through Android-Based Learning Media: Analyzing Student Responses

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Abstract. The use of android learning media provides advantages in the achievement of the learning process, making it easier to learn in formal educational institutions and at home, this is in line with definition of Sustainable Learning in Education (SLE). The study seeks to provide an overview of students' reactions to Android-based interactive media. This study utilizes a quantitative descriptive method with selective random sample data collecting on 27 grade XII students via observation, questionnaire, and literature review. The results of the study showed that the student's response to Android-based interactive learning media received positive feedback in terms of attractiveness, clarity, flexibility, and usefulness. This medium has a helpful impact in helping pupils understand how to make suit patterns. Students become more active, learning information is simpler to comprehend, they are not bored or frightened to study, they can learn independently with greater flexibility, and they are more driven to learn attentively.

INTRODUCTION

Education is unquestionably the foundation for a country's long-term growth in all three dimensions: economic, social, and environmental. It has an essential role in reducing inequality and poverty. One of the problems in education today is preparing future generations to meet the Sustainable Development Goals (SDGs) of the 2030 agenda. Education is one of the most efficient methods to contribute to the implementation of sustainability^{1,2}. According to Article 15 of Law No. 20 of 2003, Vocational High School is a secondary school program designed to prepare students to enhance their talents, skills, and abilities to work in a certain sector. Teachers are expected to develop student abilities through relevant, entertaining, creative, and dynamic learning that facilitates students' absorption of knowledge or learning materials. Rapid technology progress has had a far-reaching influence on classroom teaching practices. Schools are challenged to provide instruction that will help children develop the skills needed in the twenty-first century³.

The rapid development of information and communication technology has altered not only modern people's lifestyles, but also the educational environment. The development of such information and communication devices allows both teachers and students to experience a new teaching and learning environment⁴. Information and communication technology (ICT) can help create effective and efficient learning environments. Education is meant to assist students in realizing their potential and adjusting to current changes⁵. Mobile phones have recently emerged as a must-have device for those living in the digital age. Mobile phones provide multitasking functions such as wireless computer activity, phone, camera, notepad, and personal information management that are not limited by time or space⁴. Mobile phones may be used as a new educational instrument to speed the development of a new form of mobile learning environment, such as a learning media. Learning media is one of the methods that may be utilized to deliver exciting learning to students and increase the quality of education.

Observations at the State Vocational High School 2 Godean on the subject of Making Custom Made Clothing with Content for Making Suit Patterns show that the media utilized are mostly books, job-sheet, handouts, product prototypes, and PowerPoint presentations. The use of one-way media such as books, job-sheet, and handouts are deemed less communicative for students. Students find it difficult to read instructions and explanations of pictures on the job-sheet without the guidance of the teacher; most students are lazy to read written media, which they consider monotonous and boring; as a result, students continue to ask questions that have been explained in detail on the learning media. Meanwhile, learning media in the form of product prototypes need close supervision and is ineffective when distance education emphasizes student autonomy. It differs from the Power Point learning media, the conversation remains in the form of points, necessitating explanation and guiding from the teacher. Assistance from the teacher is required, however it is not as extensive as guidance with other media. Based on

this, different types of learning media are needed that can allow students to study independently and are flexible in their usage, anytime and anywhere.

The media that can potentially support the improvement of understanding, competence, and independence of learners is multimedia learning. Generally, the benefits of using multimedia in the learning process are as follows: (a) Learning becomes more interesting, (b) Learning becomes more interactive, (c) Teaching time is shortened, (d) The quality of student learning improves, (e) Learning process becomes more flexible, (f) Learner attitudes improve⁶. The use of multimedia provides advantages in achieving the learning process. The combination of various elements (audio, visual, images, text, numbers, and animations) that interact with each other makes learning easier in formal educational institutions and at home⁷. This is in line with the definition of Sustainable Learning in Education (SLE). A new educational philosophy known as SLE refers to the curricula and teaching approaches that provide people the skills they need to continue learning in a variety of situations (such as a crisis or a normalcy), as they move from school to the workforce, or in different subject areas (like math or literature)^{8,9}. SLE involves educating students to ask questions, be open-minded, reuse, renew, and rebuild in order to deal with difficult situations that call for learning and relearning. In order to successfully improve themselves and others, learners must be proactive, watchful, observant, and aware of both internal and external circumstances as part of continual evaluations of their social and material reality. When teaching with an SLE approach, teachers may better facilitate individual students' proactive and purposeful learning as a component of group learning⁹.

Media audio, visual media, audiovisual media, and other types of instructional media can be accessed and utilized in the classroom learning process, with the use of unlimited technology such as computers, laptops, the internet, and even smartphones. There are many instructional media resources available that can be utilized effectively¹⁰. An option for media in the teaching and learning process is Android-based media. According to the findings of a Cambridge International survey, 81% of Indonesian students use their cellphones for assignments, and 67% of students use them for instructional and learning purposes. In Indonesia, millennials are mostly the owners of smartphones and mobile phones. The majority of students have cellphones as opposed to computers. Smartphones have a lot of promise and opportunity when it comes to developing instructional material. Students may more easily access the curriculum in a flexible manner thanks to this media. These days, Android-powered smartphones are a common kind of electronic media. Due to its effectiveness and efficiency, Android has grown to be a highly widely used operating system. Owing to its ease of use and adaptability, Android is frequently utilized in educational settings. The most popular operating system in Indonesia is called Android, and it is based on Linux. Mobile learning, which is defined as learning via the use of Android-based mobile systems and devices, includes learning materials based on the Android operating system¹¹. Considering its widespread acceptance as a reliable means of knowledge acquisition, its accessibility from anywhere at any time, and its numerous applications in the education sector, mobile learning has become rather popular¹².

While there has been much development and testing of Android-based interactive learning materials at different educational levels¹³⁻¹⁵, there hasn't been much discussion of how students are responding to the materials. As a result, research is needed to give a general picture of how students are responding to the use of Android-based interactive learning materials, particularly when it comes to SLE. Responses and reactions that students give during their learning are examples of how observations and environmental stimuli may affect a behavior. The response may be expressed as an impression or reaction following the observation, understanding, assessment, and development of an attitude toward the possibly beneficial or unfavorable android-based learning material. It can also take the shape of an exceptional and fairly qualified assessment. It's critical for teachers to understand how their students respond towards their education. In order to promote the achievement of sustainable education, educators require to get insight into students' thoughts and traits from their replies. This will enable them to guide students toward improvement

LITERATURE REVIEW

Vocational education is an educational unit whose purpose is to build a professional mindset capable of competing, as well as the ability to work and pursue a career. The objective of education is to improve intelligence, knowledge, personality, noble character, and skills¹⁶. With the push for lifelong education and competency-based education, TVET focuses not only on building high-level occupational skills, but also on assisting learners in becoming well-rounded persons¹⁷. This leads to the use of the idea of Sustainable Learning in Education (SLE) to promote vocational education, with human growth and sustainable development seen as inextricably linked, and planning and assessing Vocational Education and Training (VET) done cooperatively. Such an approach must be based on a vision of work, as well as job-related abilities¹⁸. SLE is a multidimensional strategy that integrates ideas of sustainability into the educational process, seeking to provide learners with the skills and dispositions required to survive in complex and ever-changing situations.

SLE is a transformational idea intended to modify people's perspectives on learning and education, resulting in a paradigm shift in higher, continuing, and professional education. As a course or training program, SLE seeks to provide participants with the information, skills, techniques, tools, and attitudes necessary to create and sustain

circumstances for dynamic, continuous, and renewable learning in whatever endeavor they pursue and wherever they work. Individuals, teams, organizations, and communities all benefit greatly from such deliberate, continuing, and progressive learning. Indeed, it may be claimed that constant learning is crucial for global well-being and is necessary to address the most serious challenges of our time ¹⁹.

When a student acquires SLE, they become self-sufficient, able to self-evaluate their learning and its utility, and alter the learning material or method to meet their needs and goals. The purpose of SLE is to teach learning skills that are usable wherever, anytime, and for all topics ⁹. SLE enables the learner to explore and produce new ideas while self-evaluating, a skill that is especially important during life changes that need new ways of thinking, responding, and emotional coping. To that aim, SLE views learning to be robust and adaptable to global changes, and it believes that long-lasting learning abilities and techniques may be taught. SLE does not directly address the concept of global citizenship, responsible economy, or sustainable energy; however, these forms of sustainability are promoted as learners focus on how to maintain and renew resources as a way of life through their SLE-related learning skills, particularly by adopting healthy strategies and behaviors.

Viewing learning as a resource that can be regenerated via lifelong learning and education is an essential aspect of SLE. This component is known as renewing and relearning. SLE stresses the significance of continuous learning and adaptation, which allows learners to refresh and develop their knowledge and abilities to deal with new difficulties. A second recurring component in the literature is the interdependence of humans and the planet, emphasizing the accountability and obligation that humans bear in learning how to preserve the durability of resources on a daily level and as members of a larger community. Much of the work on sustainability focuses on providing individuals with the information, methods, tools, and skills required to maintain and create circumstances for continuous and renewable energy, both individually and jointly. This part is known to be independent and collaborative learning. It encourages both self-directed and collaborative learning, building a feeling of community and shared responsibility among learners ⁹.

A third component of sustainable is taking action to maintain the earth's supplies. Humans are required to be active, initiate, and create solutions to ensure the sustainability of resources. Applied to learning, this would require active learning. Engaging students actively in their learning process is crucial, as it helps them develop critical thinking and problem-solving skills. A fourth component, repeated throughout the sustainable learning pedagogy literature, is the transferability of learning from formal to informal settings, or what may also be termed as lifelong learning. Skills and knowledge gained through SLE should be transferable to various contexts, ensuring that learners can apply what they have learned in different situations.

Several bodies of research offered improvements to vocational education in terms of strategy, tool, subject matter, and instructional approaches. We suggest that one of the tools relevant to the notion of SLE in vocational education is the use of Android-based learning media, particularly in accordance with increasing reliance on digital education, through the implementation of four important SLE components. The first component, Renewing and Relearning, focuses on students' capacity to refresh their knowledge and re-learn when there are changes or new information. This is assisted by the Flexibility and Usefulness of Android-based learning media, which can be accessible at any time, provide material that can be updated, and give extra value for long-term learning ^{20,21}. In the second component, called Independent and Collaborative Learning, one learns freely at their own speed while also collaborating with others, helped by the Attractiveness and Flexibility of an engaging Android app (both visually and interactively) ²² and learners to learn individually while still providing flexibility for collaboration through forum features and discussions. The third component, Active Learning, equates to students actively investigating, experimenting, discussing, and engaging with the material, which is made possible by the Attractiveness and Clarity of an android application, that offers clear instructions for students to get involved directly in learning activities ²³. The final component is Transferability relates to the capacity of learners to apply what they have learnt in real-world situations (job environment, everyday life), while being assisted by Usefulness and Clarity, wherein an android application must be relevant to practical demands ²⁴.

RESEARCH METHOD

The purpose of this study is to determine the students' response to Android-based interactive media that is specific to the material for making women's suit patterns. This research is a descriptive study that uses current information to explain a specific scenario. Questionnaires are sent to students for data collection, and the findings are examined. This research focuses on students' impressions of Android-based interactive multimedia in learning to make custom made clothes. The questionnaire includes questions about students' experiences using Android-based interactive multimedia. Once the data is obtained, it is statistically examined using percentages. The data collection techniques used are observation, questionnaires with a likert scale of 4 answer choices and document study.

This research was conducted at State Vocational High School 2 Godean. The research population consists of 108 students in the 12th grade of Fashion Design, and the sample size was determined to be 20-25% of the population or more ²⁵. This study used a 25% sample size, assuming that a larger sample would yield more accurate

data, resulting in 27 participants. The research is in the form of quantitative descriptive, using the method of descriptive statistical data analysis. Descriptive statistics analyze research data through description or depiction of the collected data as is, without making generalizations ²⁶, to describe students' perceptions of Android-based learning media. The following are the guidelines for the suitability criteria in this study ²⁷:

TABLE 1. Criteria Guidelines

Score Intervals	Category
$X < 0.40$ times Highest Score	Disagree
$0.60 \text{ times Highest Score} > X \geq 0.40 \text{ times Highest Score}$	Somewhat disagree
$0.80 \text{ times Highest Score} > X \geq 0.60 \text{ times Highest Score}$	Agree
$X \geq 0.80 \text{ times Highest Score}$	Strongly agree

Explanation:

X = Student Score

Highest Score = Number of Question Items $\times$ Highest Score

Lowest Score = Number of Question Items $\times$ Lowest Score

Then the results are converted into a percentage of suitability to determine the suitability score of the media as follows ²⁸:

$$\text{Suitability level} = \frac{\Sigma \text{Score result}}{\Sigma \text{Maximum score}} \times 100\%$$

The result of this calculation is then translated into a sentence, which aims to assess the suitability of the media based on the rating-scale categories of media suitability as follows:

TABLE 2. Category Distribution of Students Responses

Score Intervals	Category
0-25	Disagree
>25-50	Somewhat disagree
>50-75	Agree
>75-100	Strongly agree

RESULTS AND DISCUSSION

The student's response is defined as the social reaction carried out by the student in response to the impact or stimulation of events carried out by others. It is crucial for educators to understand how students respond to teaching and learning activities. Educators should comprehend how students think and guide them towards proper and effective thinking. This way, educators can identify where student errors occur and use those mistakes to provide learning information so that they are not repeated. This helps students gain a deeper understanding. Research tools are verified for logical and empirical validity before conducting research. The pilot test includes 38 questions based on student perception indicators. The first level is valid, meaning that the questionnaire instrument has been verified by an instrument expert (validator). The general evaluation results from the validator's questionnaire indicate that the instrument is appropriate, and the questionnaire can be used with adjustments. Research data results can be seen in the table below.

TABLE 3. Assessment Results

Aspect	Total Amount	Average	Ideal Score	Percentage	Approval Raten
Attractiveness	636	23.5	28	84	Strongly agree
Clarity	1177	43.5	52	83.8	Strongly agree
Flexibility	381	14.1	16	88	Strongly agree
Usefulness	1265	46.8	56	83.6	Strongly agree

The assessment of attractiveness aspect consists of 7 statements with a minimum score of $1 \times 7 = 7$ and a maximum score of $4 \times 7 = 28$. This aspect obtains an average score of 23.5, which falls into the category of strongly agree. The class interval for the attractiveness aspect is as follows:

TABLE 4. Attraction aspects Interval

Score Intervals	Category
$X < 11.2$	Disagree
$16.8 > X \geq 11.2$	Somewhat disagree
$22.4 > X \geq 16.8$	Agree
$X \geq 22.4$	Strongly agree

The clarity aspect assessment consists of 13 statements with a minimum score of $1 \times 13 = 13$ and a maximum score of $4 \times 13 = 52$. This aspect has an average score of 43.5, which falls into the category of "strongly agree." Below is the class interval for the clarity aspect:

TABLE 5. Clarity Aspect Intervals

Score Intervals	Category
$X < 20.8$	Disagree
$31.2 > X \geq 20.8$	Somewhat disagree
$41.6 > X \geq 31.2$	Agree
$X \geq 41.6$	Strongly agree

The flexibility aspect assessment consists of 4 statements with a minimum score of $1 \times 4 = 4$ and a maximum score of $4 \times 4 = 16$. This aspect has an average score of 14.1, which falls into the category of strongly agree. Below is the class interval for the flexibility aspect:

TABLE 6. Flexibility Aspect Interval

Score Intervals	Category
$X < 6.4$	Disagree
$9.6 > X \geq 6.4$	Somewhat disagree
$12.8 > X \geq 9.6$	Agree
$X \geq 12.8$	Strongly agree

The assessment of the utility aspect consists of 16 statements with a minimum score of $14 \times 1 = 14$ and a maximum score of $14 \times 4 = 56$. This aspect obtained an average score of 46.8, which falls into the category of strongly agree. The class interval for the utility aspect is as follows:

TABLE 7. Interval Usefulness Aspect

Score Intervals	Category
$X < 22.4$	Disagree
$33.6 > X \geq 22.4$	Somewhat disagree
$44.8 > X \geq 33.6$	Agree
$X \geq 44.8$	Strongly agree

Then based on the assessment results from 27 students, the attractiveness aspect scored 84%, clarity aspect obtained 83.8%, flexibility aspect scored 88%, and usefulness aspect had a percentage of 83.6%. This means that the interactive Android-based learning media for pattern-making material has received positive feedback from the students.

Students' opinions about instructional media in the learning process vary. Student responses are influenced by observation and environmental stimuli, manifested as reactions and responses during their learning. If students are interested, their responses will be positive. Furthermore, several factors contribute to the emergence of responses, including experience, work processes, learning processes, individual experience levels, and personality values. The experiences of learners in using interactive Android-based instructional media and their responses to this media in the topic of pattern-making for jackets will be analyzed below.

Student's Response to The Attractiveness of Android-Based Learning Media

State Vocational High School students, especially those at State Vocational High School 2 Godean, exhibit the characteristics of Generation Z, who are very familiar with technology, particularly smartphones and computers, and have an independent attitude. In pedagogical strategies, a tutorial model is implemented as a supplementary approach in the learning process, where the teacher acts as a facilitator, allowing students to review the material independently²⁹. Based on this consideration, Android-based media in the form of applications is in line with the technological development inherent in the lives of current students, one of which is the use of expressive elements with new design characteristics. The attractiveness aspect obtains a score of 23.5 with a 84%

presentation, which can be interpreted as students having a positive response towards Android-based interactive media for creating suit patterns in terms of its appeal. Students have a positive interest in application design, including layout selection, proportional layout, font type, and contemporary user interface. The text in educational media applications depends on the creativity of the developer³⁰. The type of font also needs to be adjusted (such as Times New Roman or Arial); if more complex writing styles are needed, they should be transformed into more appealing graphic forms.

User interfaces and media elements design in the application supports the improvement of students' understanding of the material. After conducting testing, the author confirms the students' responses to the learning media that were tested. Students are facilitated in obtaining information and affirmation related to the material they have learned in a more engaging manner, enhancing their learning experience^{31,32}. Students can concentrate on topics when they learn through instructional media. Learning media includes comprehensive media elements such as music, animation, video, text, and images, allowing users to interact with various functions³³. This means that interactive media can have a positive response and enhance students' interest in learning, as evidenced by very high learning evaluations and excellent learning activities. Respondents say that interactive multimedia is engaging and enjoyable, significantly increasing students' motivation, activeness, and digital skills, creating a more dynamic and interactive learning atmosphere^{34,35}.

Student's Response to The Clarity of Android-Based Learning Media

The clarity aspect score, which obtained a score of 43.5 with a percentage of 83.8%, indicates positive feedback from students in terms of clarity. Students assessed that the material on creating jacket patterns was presented systematically, coherently, easily understandable, and with clear supporting text. The presented pattern diagrams were easily comprehensible and practicable. Some students expressed that the instructional media provided very clear material, supported by demonstrations through jacket pattern-making videos. This application enables students to learn jacket pattern-making material more effectively. The development of multimedia media adds various media with background sound and sound effects, making learning media appealing to students. Multimedia learning can assist both classical classroom learning and individual learning, designed as educational aids in teaching and learning activities, thus creating creative and innovative learning experiences^{34,36}.

The learning media program operated through Mobile is able to make learning activities interesting and interactive, which can assist in information delivery. Android-based learning media is able to enhance the attention and concentration of learners and provide a pleasant experience, which influences the improvement of learning outcomes for learners^{37,38}. According to research on the efficiency of Android learning media based on the results of 43 students' learning tests, the average value of the experimental class students was 95.50, while the control class had an average score of 81.48. Thus, we can conclude that the average value of the experimental class is better than the average value of the control class, implying that employing the android-based scientific learning paradigm is extremely successful for students³⁹.

Student's Response to The Flexibility of Android-Based Learning Media

Mobile Learning is a new trend in e-learning that involves the use of portable media such as smartphones running Android, iOS, or Windows Phone operating systems. The adoption of Mobile Learning to help the teaching and learning process is seen as significant to increase flexibility in the learning process. As a result, learning can be done anywhere and anytime^{34,40}. The average score of 14.1 with a percentage of 88% shows that the flexibility aspect received positive responses from students. It can be seen that there is media flexibility in the application, which can be seen from the ease of users in accessing subject matter. Mobile learning media can be an option in learning because it is adaptable, can be taken anywhere, and can be used at any time⁴¹. The flexibility brought about by modern technology can become a way of reviving the teaching and learning process by providing a persistent communication and coordination link for the learner with his/her learning environment.

Users can learn material without being bound by time and place. Technically, the application is designed according to the principles of Student Active Learning Design (centered on the student). Users can learn material and independently take evaluation tests³⁷. In addition, the application includes a help page containing information about the pages within the app and/or available components and icons, as well as instructions on how to access them, allowing the application to fully empower users in operating it. Learning media can be used repeatedly over a long period of time by students. M-learning enables students to pursue their own learning according to their own abilities, with the freedom to choose their own location, time, topic, and direction of study⁴².

Student's response to The Usefulness of Android-based learning media

Multimedia is the digital integration of various forms of media such as text, numbers, graphics, photos, videos, animations, and sound. It allows users to fulfill interaction needs without requiring a sequence. Multimedia involves using two or more forms of media to create a series of programs that effectively convey concepts using sound and graphics. Computers are typically used to generate and control multimedia output. The use of computers to display and combine text, audio, and video with connections and tools that enable users to explore, engage, create, and communicate is known as multimedia. It is generally established that education can be significantly enhanced when conducted visually and interactively rather than solely conceptually ^{34,43}.

The usefulness aspect of receiving positive feedback from students with a score of 46.8 and a percentage of 83.6. Students assess that the media is able to motivate them to independently learn and work on pattern-making for jackets, aided by worksheets and practice exercises. Students can easily follow the provided examples. They become more active, find the learning content easier to understand, are not bored or afraid to learn, can study independently with greater flexibility, and are more motivated to learn attentively. Android-based smartphones can be used not only for communication but also for learning, with one example being the integration of engaging instructional materials. If Android can be used to share interesting stories, Android media can also be used to deliver educational content ⁴⁴. This is undoubtedly an opportunity for teachers to use it as a learning medium. M-learning is closely related to phones/mobiles, and even more advanced in the form of smartphones. Smartphone-based learning has the advantage of providing a holistic learning environment, enhancing subject knowledge, and facilitating interaction between teachers and students ⁴⁵.

The use of technology in the field of education is expected to enhance students' learning capacity. Multimedia learning activities have been found to improve students' learning outcomes. Effectiveness tests reveal that students taught using interactive Android-based multimedia outperform those taught with internet-based multimedia ⁴⁶. Students who use mobile devices in the classroom believe that it helps them become more focused and effective learners ⁴⁷. This is confirmed by a study by Macaluso and Hughes, which found that students who learn using mobile applications outperform those who exclusively use textbooks ⁴⁸. Students are more motivated to learn when utilizing Android-based mobile applications as a learning medium ⁴⁹. Using Android makes it easier for students to study anything because they can access information and evaluate their abilities using Android applications anywhere and any-time they choose ⁴⁷. The attractiveness of Android-based applications enables students to enhance their learning motivation and creativity.

According to research, integrating digital media into education can strengthen the factors of sustainable learning. To begin, the aspects of renewing and relearning may be helped by flexible and usable Android media, which allows for frequent content upgrades in accordance with the evolution of knowledge and industry demands. Android-based learning media may help by delivering current information and interactive features that keep learners interested and motivated to review and refresh their knowledge ⁵⁰⁻⁵². Second, appealing and adaptable features may be used to encourage students to learn individually while still participating in digital forums or discussion areas. Android-based instructional material supports individual and collaborative learning. Students can access learning materials at any time and from any location, encouraging self-paced learning ^{50,52}. Additionally, features like discussion boards and collaboration tools can help with group work and peer learning ⁵³.

Furthermore, the attractiveness and clarity of Android media, such as gamification, simulations, or interactive quizzes, can improve active learning by encouraging student engagement ^{51,54,55}. Android-based learning material is extremely appealing to students, as indicated by strong engagement and good comments from users ^{22,50,54}. These media's visual and interactive features make learning more engaging. Finally, transferability, defined as the ability to apply information in real-world situations, is supported by utility and clarity, as Android media may provide content that is relevant to industrial practices and is presented clearly, making it simple to comprehend and implement. The skills and information acquired through Android-based learning material are easily transferable to real-world scenarios. The practical applications and simulations given by these media enable students to apply what they have learnt in a variety of circumstances ^{20,52}. The clarity of material in Android-based learning media is critical to successful learning. According to studies, well-designed apps with clear instructions and material presentation improve comprehension and retention ⁵⁴.

CONCLUSION

The student response to Android-based interactive media in the topic of creating clothing patterns is evaluated based on attractiveness, clarity, usefulness, and flexibility which are utilized to facilitate four key components. of SLE, namely: renewing and relearning, independent and collaborative learning, active learning and transferability. The student's response to Android-based interactive learning media on the topic of creating clothing patterns received a percentage score of 84% for attractiveness, 83.8% for clarity, 88% for flexibility, and 83.6% for

usefulness. This indicates that the Android-based interactive learning media for creating clothing patterns has a positive response from the learners' perspective. Learners show positive interest in the design of the application, proportional layout selection, font type, and contemporary user interface.

The students responded that the material on creating jacket patterns was presented systematically, clearly, and in an easy-to-understand manner. The pattern diagrams provided were also easy to comprehend and practice. The majority of students stated that the media was well-presented. The flexibility of the media in its application was evident, as seen from the ease with which students could access the learning material. The instructional media was considered suitable for repeated use over an extended period of time by students. The students assess that this media is capable of motivating them to learn and independently create suit patterns. The students can easily follow the given examples. They become more active, find the learning content easier to understand, are not bored or afraid to learn, can study independently with greater flexibility, and are more motivated to learn attentively.

LIMITATIONS

This research has several limitations. First, it is related to a limited research subject in one department, namely fashion design, which may yield different results if applied to other departments. Second, Android learning media has been proven effective and efficient in many studies when implemented in schools, but there may be challenges from external factors such as internet connectivity and additional funding, which may not be suitable if applied in areas with inadequate internet and funding. Lastly, this research examines student responses, but has not investigated responses from teachers, school committees, management, or educational authorities. Therefore, future research should cover multiple perspectives on the implementation of Android learning media and its impact on educational goals.

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Enhancing Tax Competence Through Income Tax Article 21 Calculation Training Based on the Average Effective Rate for Vocational High School Accounting Teachers in Yogyakarta

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Abstract. This community service program aimed to enhance the tax competence of vocational accounting teachers through training on Income Tax (PPh) Article 21 calculation using the Average Effective Rate (TER) method. The activity was motivated by the limited understanding of teachers regarding the newly introduced TER system under Government Regulation No. 58 of 2023 and Minister of Finance Regulation No. 168 of 2023, which significantly changed the mechanism for calculating individual income tax. The training was conducted on June 14, 2025, at SMK Koperasi Yogyakarta, involving 28 accounting teachers from the Accounting Teachers' Working Group (MGMP Akuntansi) of Yogyakarta City. The program consisted of two main sessions: (1) a conceptual session explaining the principles of income tax, taxable income classification, and TER-based calculation procedures; and (2) a practical session where participants performed simulations of PPh 21 calculations using Microsoft Excel. Data collection was carried out through observation and post-training questionnaires. Evaluation results showed that participants gave positive feedback, with 84% rating the facilitators' mastery of materials as excellent and 74% rating the clarity and relevance of content as very good. As a tangible output, the program produced a teaching module on PPh 21 using the TER method, designed to support vocational teachers in integrating current tax regulations into classroom learning. The module includes conceptual explanations, updated regulations, and practical examples to strengthen both theoretical and technical understanding. The activity successfully improved teachers' competence in tax calculation and contributed to developing updated, application-oriented learning resources for vocational education.

Keywords: Vocational accounting teachers; income tax; PPh Article 21; Average Effective Rate (TER)

INTRODUCTION

Vocational high school (SMK) accounting teachers play a strategic role in preparing graduates who are ready to enter the workforce, particularly in the fields of finance and taxation. However, one of the key challenges faced by accounting teachers at SMKs is the lack of in-depth understanding of the latest tax regulations, especially regarding the calculation of Income Tax (PPh) Article 21 using the Average Effective Rate (TER) method. This issue has become increasingly important following the implementation of Government Regulation No. 58 of 2023 and Minister of Finance Regulation No. 168 of 2023, which introduced the new TER mechanism for calculating individual income tax.

A preliminary survey conducted among accounting teachers in the Special Region of Yogyakarta (DIY) revealed that more than 60% of teachers had not fully mastered the TER method in PPh 21 computation. The causes of this gap include limited access to up-to-date training, the rapid pace of regulatory changes, and the lack of practical learning resources that integrate real-world taxation applications. Wulandari, Rahwani, and Budiman¹ emphasize that the swift regulatory updates often create compliance challenges, particularly when dissemination to educators and the general public is limited. As a result, inadequate understanding among taxpayers and educators can lead to potential non-compliance risks.

Taxpayer compliance itself is influenced by both external and internal factors. External factors include the effectiveness of tax socialization and policy dissemination, while internal factors are largely determined by the individual's tax knowledge and understanding². In the educational context, teachers who possess accurate and current tax knowledge play a vital role in transferring that understanding to students, thereby improving their readiness for the workplace and professional certification.

In the Yogyakarta region, there are over 80 vocational schools offering accounting and finance programs, employing more than 300 accounting teachers. However, many still rely on outdated curricula and instructional modules that have not been aligned with the latest tax policies. Consequently, teaching methods have not yet optimized students' preparedness for industrial internships (PKL) or professional certification exams. Strengthening teachers' competence through structured and contextual tax training is therefore essential to ensure the sustainability and relevance of vocational education.

Several studies have shown that training programs based on practical applications can significantly enhance teachers' competence in taxation and digital tax systems. For example, Putra et al.³ found that computer-based taxation training improved teachers' technical skills and confidence in applying tax regulations in classroom settings. Similarly, Prabasari et al.⁴ demonstrated that TER-based training on PPh 21 and the use of e-Bupot applications helped participants better understand the computational and administrative aspects of modern tax reporting. These findings suggest that pedagogical and practical training initiatives have a tangible impact on teacher capability and teaching effectiveness.

The urgency for improving accounting teachers' tax competence aligns with the national educational reform agenda and the Key Performance Indicators (IKU) for higher education institutions. MBKM emphasizes collaboration between universities and schools in creating experiential learning activities grounded in real-world practice. Meanwhile, the IKU framework encourages universities to conduct community service programs that have measurable impacts on education and society. Hence, conducting training on PPh 21 calculations using the Average Effective Rate method not only addresses teachers' professional development needs but also supports the achievement of IKU objectives by enhancing the practical relevance and social contribution of higher education institutions.

LITERATURE REVIEW

Tax education in vocational high schools (SMK) plays a vital role in preparing students for careers in accounting, finance, and taxation. To ensure the relevance of vocational learning, teachers must possess up-to-date knowledge of tax policies and computational methods. The latest tax reform in Indonesia implemented through Government Regulation No. 58 of 2023 and Minister of Finance Regulation No. 168 of 2023 introduces the Average Effective Rate (TER) mechanism, which fundamentally alters the calculation of Income Tax (PPh) Article 21 for both permanent and non-permanent employees^{5,6}.

The new TER mechanism was designed to simplify income tax calculation, promote transparency, and improve taxpayer compliance through an efficient and accountable administrative process. Suharsoyo⁶ explains that the TER method aims to streamline the system by providing uniform tax rates based on income categories, while reducing administrative complexity. Similarly, Anggraeni and Dhaniswara⁵ highlight that this reform enhances fairness and clarity for individual taxpayers. Nevertheless, many taxpayers and educators still lack sufficient understanding of the new rules. In the educational context, this knowledge gap also affects teachers, who play a strategic role in transferring tax concepts to students. Strengthening teachers' understanding of taxation is therefore essential not only to support compliance but also to align school curricula with current tax regulations.

The TER system introduces two major calculation bases monthly and daily rates categorized as A, B, and C, depending on gross income and family status. The Directorate General of Taxes expects this system to provide a simpler and more accurate framework for computing PPh 21 obligations⁷. Although the method is easier to apply, its implementation requires adequate training to ensure accurate understanding among educators and practitioners.

Previous studies emphasize that training and capacity building are effective strategies for improving teachers' professional competence in taxation. Utami et al.⁸ demonstrated that TER-based PPh 21 training significantly improved the conceptual and technical understanding of productive teachers in Bali. Likewise, Prabasari et al.⁴ reported that TER and e-Bupot workshops enhanced teachers' ability to calculate and report taxes digitally. Putra et al.³ further found that case-based computer taxation training increased teachers' confidence and technical proficiency in teaching tax-related subjects.

Furthermore, Wardani and Wati² argue that tax knowledge mediates the relationship between tax socialization and taxpayer compliance, underscoring the importance of systematic dissemination and education. In line with this, Wulandari, Rahwani, and Budiman¹ highlight the need for structured mentoring and socialization to support the adoption of PP 58/2023 and PMK 168/2023 in various sectors. These findings collectively suggest that training programs grounded in real-world tax practices can significantly improve teachers' professional competence and ensure alignment with current tax policies. Thus, providing training on PPh 21 calculation using the TER method is not merely a response to policy change but also a strategic initiative to enhance teachers' capacity to integrate updated tax content into vocational education.

Drawing from the reviewed literature, this study establishes a conceptual framework linking regulatory awareness, training implementation, and competence enhancement as sequential components in strengthening teachers' professional capabilities.

Regulatory Awareness

Teachers awareness of new tax regulations (PP 58/2023 and PMK 168/2023) is the foundation of their motivation to participate in professional training and update their knowledge¹. The Average Effective Rate (TER) system is introduced as a new method for calculating Income Tax Article 21 (PPh 21), replacing the previous progressive structure. The TER consists of two main forms Monthly TER and Daily TER each applied according to the taxpayer's income frequency and employment status. The Monthly TER is further divided into three categories based on gross monthly income and the taxpayer's family status for non-taxable income (PTKP):

- Category A: Includes TK/0, TK/1, and K/0 with PTKP values between IDR 54 million and 54.8 million; the rate scale covers 44 income brackets, with a maximum rate of 34%.
- Category B: Includes TK/2, TK/3, K/1, and K/2, applicable for gross annual income up to IDR 63 million, consisting of 40 brackets with a maximum rate of 34%.
- Category C: Applies to K/3 taxpayers with PTKP of IDR 72 million, comprising 41 brackets and a maximum rate of 34%.

Lisdiana⁷ explain that these categories aim to simplify tax calculation for employers and employees by applying standardized effective rates instead of progressive computations. The Directorate General of Taxes expects this approach to minimize calculation errors, improve taxpayer convenience, and enhance compliance across income levels.

Training Implementation

TER-based training functions as an intervention to bridge the gap between regulatory updates and classroom application. It integrates conceptual understanding, practical calculation exercises, and digital reporting tools such as e-Bupot^{8,4}. This reform highlights the necessity of providing adequate training and socialization to ensure accurate understanding and implementation, particularly among educators who are responsible for teaching taxation concepts in vocational schools^{8,1}.

Competence Enhancement

The expected outcome is an increase in teachers' professional competence evident through their improved understanding of tax regulations, mastery of TER calculation, and ability to integrate the material into the accounting curriculum³.

RESEARCH METHOD

The community service activity was participated in by 28 vocational accounting teachers who are members of the Accounting Teachers' Working Group (MGMP Akuntansi) of Yogyakarta City. The activity was conducted on June 14, 2025, at SMK Koperasi Yogyakarta. The program aimed to strengthen teachers' competence in the calculation of Income Tax (PPh) Article 21 using the Average Effective Rate (TER) method in accordance with the latest tax regulations (PP 58/2023 and PMK 168/2023).

1. Activity Design and Stages

The training was carried out through two main stages:

a. Theoretical Session

In the first stage, participants received theoretical materials and conceptual explanations related to PPh 21 calculation using the Average Effective Rate method. The materials delivered included:

- 1) The concept and objectives of income tax;
- 2) The definition and classification of income taxpayers.
- 3) Income categories subject to tax;
- 4) Procedures for calculating PPh 21 payable based on the TER system; and
- 5) Procedures for reporting and compliance related to PPh 21.

This session provided participants with a comprehensive understanding of income tax principles and the regulatory updates concerning the TER mechanism. The presentation was conducted interactively, allowing participants to discuss real cases and clarify technical issues commonly encountered in school or industry contexts.

b. Practical Session

The second stage focused on practical application. Participants were guided to simulate PPh 21 calculations using the Average Effective Rate method with Microsoft Excel. Teachers were encouraged to use their laptops or mobile devices during exercise. The simulation included step-by-step guidance in determining taxable income, applying the correct TER category (A, B, or C), and verifying the final tax payable.

At the end of the practice session, each participant's calculation results were evaluated by the facilitator team to ensure the accuracy and consistency of the computation with the theoretical framework presented earlier. Feedback was provided individually, enabling participants to correct errors and reinforce their understanding of the TER-based calculation model.

2. Implementation Framework

The implementation method of the training can be illustrated in Figure 1, which describes the systematic flow of activities:

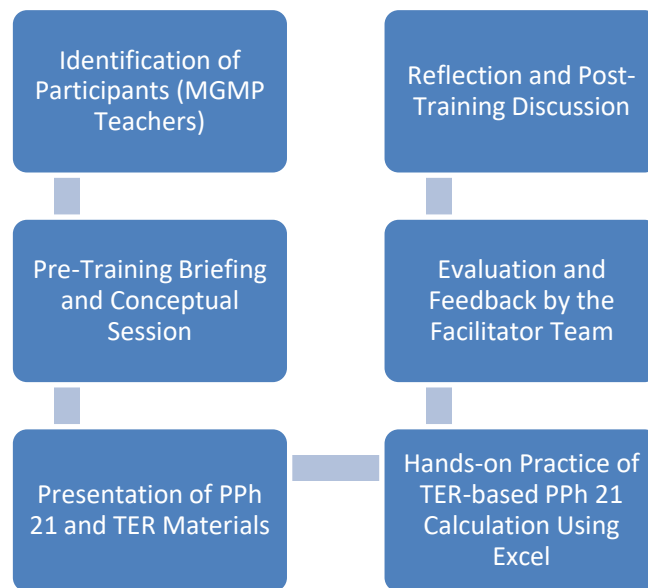


FIGURE 1. Training Design and Implementation Framework

3. Evaluation Approach

The evaluation process was conducted through both formative and summative assessments:

- Formative Evaluation: Conducted during the practice session to ensure participants understanding of each calculation step.
- Summative Evaluation: Conducted at the end of the training to assess participants' overall comprehension of the PPh 21 TER method and their ability to apply it in their teaching practices.

The combination of these evaluations provided a clear picture of learning outcomes and the effectiveness of the training method in enhancing teachers' tax competence.

RESULTS AND DISCUSSION

1. Implementation Overview

The community service activity was attended by 28 vocational accounting teachers from various SMKs in Yogyakarta City under the MGMP Akuntansi forum. The event took place at SMK Koperasi Yogyakarta on June 14, 2025. The activity was carried out in several stages: preparation, opening, material presentation, simulation, and evaluation.

During the preparation stage, the PKM team coordinated logistical aspects such as attendance lists, multimedia equipment, and learning materials. The formal opening included greetings, prayers, and welcoming remarks from school and MGMP representatives, reflecting the strong institutional collaboration between higher education and vocational schools.

The program consisted of two major learning components designed to integrate theory and practice:

- Conceptual and Regulatory Session
This session provided a comprehensive explanation of the concept of income tax, tax subjects and objects, and the new calculation system for PPh Article 21 using the Average Effective Rate (TER) as regulated under PP No. 58/2023 and PMK No. 168/2023. Participants learned how TER is classified into Monthly and Daily categories, and how monthly TER is divided into Category A, B, and C based on income and family status. This session aimed to build teachers' understanding of how the new method simplifies tax computation and supports compliance.
- Practical Application Session
In the second session, teachers performed hands-on simulations using Microsoft Excel to calculate tax obligations using the TER approach. Each participant applied the correct rate category, computed taxable income, and validated results based on sample employee data. Facilitators guided participants individually, helping them interpret each calculation step.

Through these stages, participants were expected to acquire not only conceptual understanding but also practical skills in implementing TER-based PPh 21 calculations in classroom learning.



FIGURE 2: Material Presentation

2. Outcomes and Observations

The program produced several outcomes, both tangible and intangible:

1. Knowledge Improvement:

The teachers' understanding of PPh 21 and TER concepts improved significantly. At the beginning of the activity, many participants admitted to being unfamiliar with the TER system, as it was recently introduced in 2024. After the training, most participants were able to complete case studies accurately and independently, showing notable progress in comprehension and calculation skills.

2. Learning Resource Development:

A key product of the activity was the teaching module on PPh Article 21 using the TER method. This module contains up-to-date explanations, step-by-step calculations, case examples, and Excel-based exercises that can be directly integrated into taxation subjects at SMK. The resource aims to strengthen the alignment between vocational learning and current tax regulations, bridging the gap between policy and classroom practice.

3. Teacher Engagement and Reflection:

The interactive approach encouraged teachers to share classroom challenges related to taxation instruction. Discussions revealed that many schools still use outdated materials that do not reflect the TER system. Through this program, participants expressed their intention to revise their teaching modules to include the new method.



FIGURE 3: Material Presentation of Tax

3. Participant Feedback and Evaluation

At the end of the activity, a feedback questionnaire was distributed to evaluate the training's effectiveness. The summarized results are presented in Table 1 below.

Table 1. Participant Feedback and Evaluation

Valuation Aspect	Score (%)	Category
Clarity and relevance of material	74	Very Clear & Highly Relevant
Alignment with teachers' needs	68	Very Relevant
Quality of presented content	68	Very Good
Facilitators' mastery of subject	84	Excellent
Systematic delivery of materials	63	Clear
Service and organization	68	Good
Communication and interactivity	74	Very Good
Contribution to professional competence	74	Strongly Agree
Overall satisfaction	68	Very Satisfied

The data indicate that participants responded positively to the entire program. The highest satisfaction level (84%) was observed in the facilitators' mastery of content, reflecting effective material delivery. Meanwhile, the lowest score (63%) was related to the sequence of material delivery, suggesting the need for improved pacing or division of sessions in future implementations.

Qualitative responses revealed that participants appreciated the balance between conceptual discussion and practical exercises. Teachers found that using Excel-based simulations helped them connect tax theory with real-world applications. This result is consistent with Prabasari et al.⁴, who highlighted the effectiveness of practice-based training in improving educators' understanding of TER and e-Bupot applications.

Furthermore, teachers emphasized that the material was relevant to their teaching responsibilities, particularly in subjects like Taxation and Applied Accounting. This reflects findings by Putra et al.³, who demonstrated that training programs combining conceptual instruction and practical simulation strengthen teachers' self-efficacy and teaching quality.

4. Discussion and Interpretation

The improvement in participants' competence can be viewed from two perspectives:

1. Professional Development:

The training fulfilled its objective of enhancing teachers' technical and conceptual skills in taxation. Consistent with Wardani and Wati², increased tax knowledge facilitated through structured training correlates with improved compliance behavior and accuracy in application. The same principle applies to teachers as facilitators of tax literacy among students.

2. Educational Relevance:

The activity successfully addressed a key educational gap: the mismatch between vocational tax education and current regulations. According to Wulandari, Rahwani, and Budiman¹, frequent tax reforms require proactive dissemination to ensure that educators can adapt curricula accordingly. The TER-based module developed from this program acts as a strategic medium for this alignment.

In addition, teachers' active participation indicated that they viewed taxation not merely as a theoretical subject but as a practical competency that students must master before entering the workforce. This aligns with Lisdiana and Wijaya⁷, who stated that mastery of TER-based tax literacy supports both educational and social objectives by fostering awareness of tax obligations from an early stage.

5. Broader Implications

The outcomes of this activity demonstrate its impact across several dimensions:

- **Pedagogical Impact:** Teachers now have access to updated teaching materials that accurately reflect recent regulations, improving learning outcomes in taxation subjects.
- **Professional Impact:** The activity contributed to the enhancement of teachers' confidence and ability to implement practical taxation exercises in their classrooms.
- **Institutional Impact:** The collaboration between universities and SMKs strengthened the link between academic expertise and vocational needs, ensuring sustainable knowledge transfer.
- **Social Impact:** By increasing teachers' tax competence, the program indirectly promotes tax literacy among students, supporting broader efforts to cultivate responsible future taxpayers.

In summary, the training on PPh Article 21 calculation using the Average Effective Rate (TER) achieved its intended objectives. The combination of conceptual understanding, practical simulation, and the production of a learning module proved effective in enhancing teachers' knowledge, skills, and readiness to implement the updated taxation system within their teaching practices.

CONCLUSION

This community service program, titled Training on Income Tax (PPh) Article 21 Calculation Using the Average Effective Rate (TER) Method for Vocational Accounting Teachers in Yogyakarta City, was successfully implemented and achieved its objectives. The activity combined conceptual explanation and practical simulation, enabling participants to understand and apply the TER-based calculation system effectively. Teachers who initially lacked familiarity with the new regulation were able to complete tax computation exercises accurately after the training.

Evaluation results indicated strong positive responses from participants, particularly in the facilitators' mastery of the material (84%) and the clarity of content (74%). The materials were considered relevant, well-structured, and applicable to classroom learning. The participants' engagement during discussions also reflected high motivation to integrate the TER approach into teaching practices.

A significant outcome of this activity was the development of a teaching module on PPh 21 using the TER method. The module provides step-by-step calculation procedures, regulatory references, and Excel-based exercises, serving as a practical guide for teachers to update their tax instruction. This product supports the modernization of tax education in vocational schools and helps align learning materials with current government regulations.

To sustain the program's impact, it is recommended that follow-up activities be conducted focusing on digital taxation tools such as e-Bupot and e-SPT, while the module should be disseminated more widely to other MGMP teacher groups. Vocational schools are encouraged to integrate TER-based taxation into their curricula, supported by ongoing collaboration and mentoring between universities and schools. A follow-up evaluation is also suggested to measure the long-term effects on teachers' competence and student learning outcomes.

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Language Interference in the Acquisition of Indonesian, English, and German: A Case Study of Cross-Department STUDENTS

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Abstract. The present study was designed to identify forms of Indonesian language interference in students' English and German writings and to compare the resulting error patterns. The research is grounded in the significant structural differences among Indonesian, English, and German, which often trigger negative transfer in foreign language learning. A qualitative descriptive method was employed, with data consisting of student writings from three study programs, Indonesian Language and Literature Education, English Education, and German Education. Data analysis was conducted using error analysis techniques to classify errors into two main domains on the question, grammatical and lexical. The results of this study show that Indonesian interference is more prominent in German writings than in English. In English texts, errors mainly occurred in verbs and syntax, whereas in German texts, errors encompassed almost all grammatical categories as well as some lexical aspects, including verb conjugation, article and adjective declension, prepositions, and word formation. These findings highlight that the higher structural complexity of German compared to English is a key factor contributing to greater interference. The study recommends the implementation of teaching strategies based on a contrastive approach to mitigate first language influence in foreign language acquisition.

INTRODUCTION

Foreign languages play a strategic role in Indonesia's education system. In Indonesia, English is generally taught as the first foreign language, while German is often introduced as a second foreign language. In formal education, English is already introduced at the elementary school level, whereas German is typically taught at higher levels, such as in senior high school and university programs¹. English and German have grammatical and lexical systems that differ significantly from Indonesian. For instance, differences exist in vowel and consonant sounds, verbal tense systems, morphological inflection, and sentence syntax. Even between English and German, despite both belonging to the Indo-European language family, their historical developments have resulted in substantial linguistic differences. Indonesian, on the other hand, originates from the Austronesia language family, which is distinct from English and German². These structural differences often pose challenges for Indonesian learners when acquiring new languages, affecting not only pronunciation but also vocabulary selection, grammatical patterns, and meaning interpretation^{3,4}.

Structural differences between Indonesian and target languages frequently trigger transfer or interference from the first language (L1) into the foreign language being learned (L2/L3). In the field of Second Language Acquisition (SLA), cross-linguistic influence is regarded as a common phenomenon in which learners apply rules, habits, or patterns from their native language to the foreign language they are learning⁵⁻⁷. L1 influence can occur at various linguistic levels, such as phonological patterns leading to pronunciation errors, syntactic transfers affecting word order, as well as lexical and semantic influences that result in inappropriate collocations or meanings in the target language⁷⁻⁹.

This interference phenomenon is evident, for example, when students still apply Indonesian sentence structures in constructing English and German sentences. In Indonesian, the word order generally follows a Subject–Predicate–Object–Complement (S-P-O-C) pattern, whereas in German, the position of the verb can change depending on the type of sentence, and in English, there are rules for using auxiliary verbs that do not exist in Indonesian. Moreover, morphological aspects, such as verb conjugation and tense usage, are often influenced by the simpler Indonesian system. These structural differences can lead to negative transfer from L1 to L2 or L3. Negative transfer, also referred to as interference, occurs when rules from a previously mastered language with a different structure are applied to the target language, resulting in errors¹⁰.

In this context, it is important to analyze how language interference occurs in learning Indonesian, English, and German simultaneously, as well as the factors influencing its occurrence. Previous studies have shown that language interference is affected not only by structural differences between the native language and the language being learned but also by psychological and sociolinguistic factors^{11,12}. Psychological factors include individual habits and tendencies in using the first language, which often influence second language acquisition. Sociolinguistic factors relate to the social context in which the language is used, affecting how learners interact in a foreign language.

Indonesian and German show several significant differences in sentence structure, preposition usage, and morphological patterns^{13,14}. For instance, students may still apply Indonesian structural patterns when writing in English and German. As previously noted, word order in Indonesian tends to remain fixed, while in German, verb placement varies according to sentence type, and English requires auxiliary verbs that are not found in Indonesian. Morphological aspects such as verb conjugation and tense usage are also often influenced by the simpler Indonesian system. Although research on Indonesian interference in foreign language learning exists, most studies focus solely on English. Research comparing Indonesian interference in both English and German remains limited. Since both languages are taught in Indonesia, such studies are crucial to provide a more comprehensive understanding of the role of Indonesian as an influencing factor in foreign language acquisition.

This phenomenon of interference warrants attention due to its direct implications for the language learning process. While numerous studies have examined Indonesian interference in English, research focusing on Indonesian interference in German remains limited. Furthermore, studies that simultaneously compare Indonesian interference in both English and German are still scarce. Both foreign languages are taught in Indonesia and are often studied by the same group of university students, making such comparative research particularly relevant.

Given this context, the present study aims to identify forms of Indonesian interference in English and German simultaneously and to compare them. The findings are expected to fill gaps in the existing literature and provide practical contributions to the teaching of both foreign languages in Indonesia.

Specifically, this study seeks to identify and analyze language interference in the acquisition of Indonesian, English, and German among cross-departmental students. It also explores the grammatical and lexical factors that influence interference. Additionally, the research aims to provide insights into effective learning strategies to reduce interference and enhance foreign language proficiency, particularly within a multilingual educational context. By addressing the limited research on simultaneous Indonesian interference in English and German, as well as the insufficient exploration of grammatical and lexical factors affecting foreign language learning in Indonesia, this study is expected to contribute to the development of more effective foreign language teaching methodologies.

In particular, this study addresses the following research question: Is there Indonesian interference in the acquisition of English and German? This investigation is important not only for filling existing research gaps but also for offering practical implications for English and German language instruction in Indonesia.

LITERATURE REVIEW

Language interference is a phenomenon that occurs when elements of a first language (L1) influence the second language (L2) being learned. This phenomenon is often referred to as negative transfer, which can disrupt the second language learning process¹⁵. Interference is related to the tendency to apply concepts or structures from the first language to the target language^{5,16,17}. More specifically, interference is a deviation in language use resulting from language contact, occurring when a speaker is proficient in more than one language¹⁵. During the process of interference, language rules may undergo modification or deviation due to the influence of another language, even affecting the smallest linguistic elements. As such, language interference can impact various components of language, including phonology, morphology, syntax, and vocabulary. Interference can occur at multiple levels, including phonological, morphological, and syntactic levels, and it may also affect lexical choices¹⁸. Research has shown that interference in second language (L2) learning can occur across multiple levels¹⁹.

Interference arises from a speaker's ability in one language being influenced by another language. This adds complexity to the process of mastering sounds, words, or structures in the second language, as habits from the first language are carried over into the L2 being learned^{19,20}. Interference is an effect resulting from contact between two different languages, both at the individual speaker level and at the level of the language system as a

whole. Language errors caused by interference stem from differences between the linguistic systems of the first and second languages, often leading learners to apply rules from their L1 to their L2²¹.

This interference phenomenon also occurs at the syntactic level, particularly in sentence structure and subject–verb agreement. In the Indonesian context, several studies have indicated that interference from Indonesian grammar can potentially hinder English language acquisition. For example, an erroneous sentence such as “We do our homework with easy,” which is a literal translation of “*Kami mengerjakan PR itu dengan mudah*,” illustrates this phenomenon. The error arises from applying the Indonesian adverbial pattern, where manner adverbs such as “*dengan mudah*” are expressed using a prepositional phrase. In English, however, manner adverbs are typically expressed by adding the suffix *-ly* to adjectives, for instance “*easily*.” The incorrect transfer of rules from L1 to L2 in this process is referred to as language interference.

There are three levels of errors that may occur in participants’ writing due to language interference, including the sentence level (errors in sentence structure), the paragraph level (errors in coherence, use of summary sentences, linking phrases, and other devices), and the overall text level (errors in organizing the introduction, thesis statements, and text structure)²². At the sentence level, common errors include the use of articles, verb tense, subject–verb agreement, singular/plural forms, punctuation, word classes, vocabulary, and sentence structure. Differences between English and Indonesian grammar, particularly in tense usage, also contribute to the phenomenon of interference from Indonesian to English^{6,17,23,24}.

In Indonesian, verbs are not affected by the form of the subject in a sentence, whereas in English, agreement between the subject and verb must be maintained, especially in terms of number and person. For instance, a singular subject requires a singular verb form, while a plural subject requires a plural verb form. This illustrates how first language interference can hinder understanding and correct application of grammatical rules in English and other foreign languages. Such errors often demonstrate a pattern in which rules from the first language are applied to the second language, resulting in mistakes at the sentence structure level.

Overall, language interference represents a significant challenge in foreign language learning, particularly when the first language has a structure that differs from the second language being acquired. Research on interference is crucial for understanding error patterns and for designing teaching strategies that can reduce its influence. Addressing interference effectively helps learners acquire foreign languages more efficiently, considering the fundamental differences between their first language and the target language.

First language (L1) interference is a phenomenon in which elements of a speaker’s native language influence the use of a second language (L2) being learned, often leading to errors in L2 acquisition. Language interference can be classified into three types: phonological, grammatical, and lexical interference¹⁵. Each type affects specific aspects of the second language learning process, particularly in grammar usage, vocabulary, and pronunciation. The aspects of first language interference and the factors influencing L1 interference in English writing skills have been explored in previous research²⁵. Writing errors made by Malay ESL learners linked to L1 interference show that students exhibit all three types of interference²⁶. The distinction of this study from previous research lies in the types of language interference being investigated.

Phonological interference occurs when the sound system of the first language affects pronunciation in the second language. Phonology is the study of speech sounds in a language, and differences between the sound systems of L1 and L2 often lead to mispronunciations^{27,28}. For example, Indonesian speakers tend to replace vowels or consonants that do not exist in Indonesian with similar sounds from their native language. In the context of English, Indonesian speakers may struggle with the pronunciation of long vowels such as /i:/ or /u:/, which have no direct equivalent in Indonesian. This often results in noticeable phonological errors in English word pronunciation^{29,30}.

Grammatical interference occurs when second language (L2) learners transfer structures or morphemes from their first language (L1) into the language being learned. It arises when rules from the first language are incorrectly applied to the second language⁴. Indonesian and English differ significantly in grammatical patterns. For example, in Indonesian, verbs are not affected by the subject in terms of singular or plural, whereas in English, verbs must agree with the subject in number and person (subject–verb agreement). Weinreich (1970) categorizes grammatical interference into two main types: morphological interference and syntactic interference.

Morphological interference occurs when word formation involves affixes from another language, such as prefixes, suffixes, or infixes, that are inappropriate in the target language. Syntactic interference, on the other hand, involves incorrect sentence structures due to the application of L1 rules in L2. For instance, in Indonesian,

the word order in nominal sentences often places the head noun first, whereas in English, it typically appears second. This can confuse speakers when constructing grammatically correct English sentences. Morphological interference also occurs when Indonesian speakers apply L1 affixes, such as prefixes or suffixes, in English word formation⁶. Syntactic interference is often observed due to differences in sentence patterns between Indonesian and English. In Indonesian, nominal word order does not require verb agreement with the subject, whereas English strictly follows subject–verb agreement rules, which frequently results in errors. For example, in the sentence “She go to school,” the verb “go” should be corrected to “goes” to agree with the singular subject “she.” Research indicates that morphological interference is most dominant in the use of past tense, while syntactic interference often arises from sentence transformations³¹. A practical example can be seen in the sentence: “Last holiday, I just stayed at home and did housework like sweep, cook, and wash dishes,” which should be written as “Last holiday, I just stayed at home and did housework like sweeping, cooking, and washing dishes.”

Lexical interference occurs when vocabulary from the first language affects word choice in the second language. It often involves direct translations from L1 into L2, even when they do not conform to L2 rules or context. For example, Indonesian speakers may write, “I am going to the market for buying vegetables,” whereas the correct English expression is “I am going to the market to buy vegetables.” This error arises from differences in sentence patterns, where the Indonesian preposition “*untuk*” is often mapped to “for” in English, although “to” is more appropriate in this context³².

Overall, first language interference is a natural part of second language learning but can hinder learners’ ability to acquire L2 effectively. In other words, interference patterns manifest across various linguistic elements³³. A deeper understanding of grammatical and lexical interference is crucial to identify frequent errors in second language instruction. Mitigation strategies, such as exercises that highlight differences between L1 and L2, as well as reinforcement of grammar rules and pronunciation in the target language, can help reduce the influence of interference in foreign language learning.

RESEARCH METHOD

This study employed a qualitative descriptive method³⁴. The qualitative descriptive approach was chosen to describe the forms of Indonesian language interference as L1 in the acquisition of English and German. The study was limited to interference in grammatical and lexical domains observed in students’ written work.

The research data were obtained from students’ written assignments in three courses from different study programs: ‘*Menulis*’ (Writing) in the Indonesian Language and Literature Education program, Writing in the English Education program, and ‘*Schreiben*’ in the German Education program. Participants were selected purposively based on the criterion that their writings showed indications of language interference. Students’ written work, serving as the data for this study, included essays, written assignments, and academic reports.

Data collection was conducted through documentation of students’ written works. Writings that met the criteria were classified according to the target language (English or German) and by the category of interference errors. Data analysis was conducted using error analysis adapted from Ellis (1985)³⁵. This analytical method was selected to systematically identify and classify errors, facilitating the description of forms of Indonesian interference in students’ English and German writings.

The analysis procedure consisted of four main stages. The first stage was error identification, which involved locating parts of students’ writing that showed influence from Indonesian. The second stage was error classification into two main domains: grammatical and lexical. In the grammatical domain, analyzed errors included the use of nouns, verbs, articles and pronouns, adjectives, prepositions, and syntactic structures. In the lexical domain, errors included word choice and word formation. The third stage was analyzing the causes of errors, where the researcher traced factors underlying the occurrence of interference, such as L1 transfer, interlanguage development, and psychological and sociolinguistic factors influencing students’ writing processes. The fourth stage involved evaluation and interpretation of the analysis results. In this stage, the interference patterns identified were described in detail to provide a clearer picture of the forms and tendencies of Indonesian language interference in English and German acquisition.

RESEARCH METHOD

The data analysis revealed various forms of Indonesian language interference in students’ English and German writings. The errors identified were grouped into two main aspects: grammatical and lexical. The grammatical

aspect included errors in the categories of nouns, verbs, articles/pronouns, adjectives, prepositions, word formation, and syntax. Meanwhile, the lexical aspect involved the use of vocabulary that did not conform to the rules of the target language. As an illustration, the distribution of errors in students' writings can be presented in Table 1.

TABLE 1. Distribution of Indonesian Language Interference in English and German.

Domain	Subcategory	Example of Error		Description
		English (EN)	German (DE)	
Grammatical	Nouns	–	<i>mit meine Großes Familie</i>	Error in declension and plural form
	Verbs	<i>depends on our potencial</i>	<i>Nächter jahr ich Planne...</i>	Conjugation and verb placement errors
	Articles and Pronouns	–	<i>zu eine Schauspiel musical sehen</i>	Incorrect declension due to L1 influence
	Adjectives	–	<i>meine Großes Familie</i>	Declension error
	Prepositions	–	<i>zu eine Schauspiel</i>	Incorrect preposition selection
	Syntax	<i>My Friends and I got...</i>	<i>In der Zukunft ich will...</i>	Sentence structure follows L1 pattern
Lexical	Word choice	<i>potencial</i>	<i>Singengruppen</i>	Direct transfer from L1/EN
	Word formation	–	<i>Person (Plural)</i>	Plural noun formation ('Person' > 'Personen')

TABLE 2. Frequency of Interference.

Language	Subcategory							
	Grammatical						Lexical	
	Nouns	Verbs	Articles and Pronouns	Adjectives	Preposition	Syntaxis	Word choice	Word formation
English	-	1	-	-	-	1	-	2
German	10	14	11	7	6	12	4	5

The analysis results presented in Table 1 and Table 2 indicate that Indonesian language interference in the acquisition of English and German exhibits different characteristics. In English writings, the errors identified were relatively few compared to those found in German writings. Errors in English were mostly limited to certain grammatical aspects, particularly verbs and syntax. In contrast, in German writings, Indonesian interference appeared more frequently. Moreover, the distribution of errors shown in Table 2 was broader. The errors in German encompassed nearly all grammatical categories and a small portion of lexical aspects. This suggests that students faced greater difficulties in applying German grammatical rules compared to English.

The findings of this study indicate that Indonesian interference affects English and German acquisition differently. This difference can be explained by language transfer theory, which asserts that a learner's first language (L1) often influences the acquisition of a second language (L2) through negative transfer or interference^{15,36}.

In students' English writings, the errors that appeared were relatively few compared to those in German writings. Errors in English were mostly found in grammatical subcategories, particularly verbs and syntax. These findings are consistent with previous studies, which indicate that Indonesian grammatical interference, in particular, impacts English sentence structure due to differences in rules and structures^{6,23}. Fundamental differences, such as subject-verb agreement and tense usage, are the main sources of these errors.

For instance, examples from students' writings, such as "This event help us ..." or "The dancer wear colorful costume ...," demonstrate a tendency not to adjust the verb according to the subject. These findings suggest that the errors made were neither random nor arbitrary but systematic. They also indicate that the mistakes were not



merely slips (mistakes) but systematic errors (errors). Participants tended to repeat the same error patterns across multiple tasks, reflecting a limited mastery of the English language system.

This pattern aligns with the concept of interlanguage proposed in previous research, which states that second language learners develop an intermediate language system between their first language and the target language¹⁸. This interlanguage is often directly influenced by the structure of the first language, making interference unavoidable. These errors can be understood as a reflection of the Indonesian language system, which does not change verb forms according to the subject. This supports previous findings that fundamental differences between Indonesian and English, particularly in morphology and syntax, can lead to recurring interference^{6,23,37}.

For example, in the sentence “Our teacher asked us to create an artwork depends on our potencial,” there are two errors. First, the verb depends is incorrectly used and should be part of a relative clause, so the correct sentence is “Our teacher asked us to create an artwork that depends on our potential.” Second, there is a lexical error in the spelling of ‘potencial’, which should be written as ‘potential’. This indicates that even though the number of errors is small, the types of errors still reflect the influence of the first language structure on the writer’s cognitive patterns when using English.

In addition, errors in article usage (a, an, the) were also found in students’ writings. For example, in the sentence “I have plan ...” the correct form should be “I have a plan ...”. This error can be understood because although Indonesian has an article system, it is rarely used in daily contexts. As a result, participants tended to omit or misplace articles in English. This aligns with the theory that interference can occur at the morphological and syntactic levels due to structural differences between the first and second languages¹⁸.

Other errors were observed in the incorrect use of prepositions, such as “on the art exhibition,” while the correct form is “in/at the exhibition.” The inappropriate choice of preposition reflects a direct word-for-word translation from Indonesian, as in the phrase “pada pameran seni.” This supports previous findings indicating that lexical interference often occurs due to direct translation without considering the grammatical context of the target language³².

At the lexical level, interference appeared in the form of spelling mistakes, such as potencial instead of potential, really instead of really, and whatching instead of watching. There were also examples of phrases that were literal translations from Indonesian, such as “According to me,” likely influenced by the phrase “*menurut saya*,” whereas the more idiomatic English expression would be “In my opinion.” This demonstrates lexical interference through the transfer of Indonesian expression patterns into English^{26,33}.

At the syntactic level, several sentences were found to have unnatural structures, such as “They deserve more than appreciate” or “This may different ...”. These examples show how the simpler sentence structure of Indonesian was incorrectly applied to English. This phenomenon aligns with syntactic interference theory, in which the sentence structure of the first language is transferred to the second language without accounting for pattern differences¹⁵. Such interference has also been noted in previous studies, which found that syntactic errors are a dominant form of mistakes in English learning by Indonesian speakers³¹.

Overall, the findings of this study align with the theory that Indonesian interference in English acquisition occurs not only in morphology and syntax but also at the lexical, spelling, and expressive levels. The errors observed reveal consistent patterns related to the typological differences between the two languages, supporting previous research that interference is a major factor hindering foreign language mastery^{17,20}. Therefore, understanding these interference patterns is important for designing learning strategies that can minimize the influence of the first language while enhancing learners’ competence in using English more accurately and idiomatically.

The further findings of this study indicate that Indonesian interference plays a significant role in German language acquisition, particularly in the syntactic, morphological, and lexical aspects. Syntactic errors were most prominent in verb placement within declarative sentences and subordinate clauses. For example, in participants’ written works, sentences such as “*Nächter jahr ich Planne theater sehen ...*” or “*In der Zukunft ich will ...*” reflect the influence of Indonesian sentence structure, which does not follow the Verb-Second (V2) rule that is mandatory in German grammar. This aligns with theoretical perspectives suggesting that syntactic interference often arises from the application of simpler or more flexible L1 patterns to L2^{15,18}. In other words, Indonesian structures were directly transferred into German constructions.



Moreover, morphological interference was also identified, particularly in verb conjugation, article declension, and plural forms. For instance, forms such as “*ich will sehe*” or “*mein erste Erfahrung*” indicate participants’ difficulty in adjusting to the inflectional system of German. This can be explained by the fact that Indonesian does not have conjugation or declension systems, leading participants to neglect German grammatical rules. These findings reinforce previous research emphasizing that differences in linguistic systems between L1 and L2 often result in systematic errors at the morphological and syntactic levels, especially when certain systems are absent in one language^{19,38}.

Lexical interference also occurred frequently, mainly through literal translations from Indonesian or the use of borrowed words that do not conform to German norms. For example, expressions like “*Musik Gerät*” as a literal equivalent of ‘*Musikinstrument*’ or “*Der Platz ... mehr groß*” reflecting the Indonesian structure “*lebih besar*” demonstrate participants’ tendency to rely on L1 conceptual patterns when selecting L2 lexicon. This aligns with previous studies showing that lexical interference occurs when L1 vocabulary is directly applied to L2 without considering target-language idiomatic usage^{32,33}.

Furthermore, error patterns were not random but recurring, such as using “*letzten Jahr*” instead of “*letztes Jahr*”, or neglecting capitalization of nouns in German. These systematic patterns indicate that Indonesian interference in German acquisition is not merely due to insufficient mastery of rules but represents a deliberate L1-to-L2 transfer strategy. This is consistent with the cross-linguistic influence theory, which posits that L1 transfer into L2 can emerge as a natural strategy in language learning^{9,39}.

Overall, these findings confirm that Indonesian interference affects nearly all aspects of German learned by participants, from syntax and morphology to lexicon. The pedagogical implication of this study is the need for a contrastive approach in teaching German. Instructors should emphasize fundamental differences between Indonesian and German, particularly regarding verb placement, case system, and plural forms. This aligns with previous research suggesting that second language learning is more effective when the influence of the first language is recognized from the beginning and used as a basis for instructional planning^{5,40}. Therefore, awareness of interference can help prevent recurring errors and improve accuracy in German language use.

Nevertheless, this study also revealed a rather surprising finding: despite students being long exposed to English through social media, films, music, and the internet, fundamental errors such as spelling, tense, and article usage still persist. This indicates that exposure to English input via media does not automatically enhance students’ linguistic accuracy. On the contrary, such input tends to increase passive vocabulary but does not provide deep understanding of grammatical rules. This phenomenon highlights a gap between everyday communicative competence and academic writing competence in English. In other words, students can understand and use popular terms such as outfit or soundtrack, but still face difficulties when writing formal sentences with correct grammatical structures¹⁷.

This phenomenon also demonstrates that the influence of English vocabulary on Indonesian is not merely a matter of communication habits but reflects broader social dynamics. Students, as part of the digital generation, tend to choose vocabulary that is concise, easily understood, and carries high symbolic value. Social media serves as a primary space that accelerates this process, as popular vocabulary spreads rapidly through platforms like Instagram, TikTok, or Twitter. This reinforces the argument that language reflects social and cultural changes within society.

In the context of language learning, these findings have important implications. First, teachers need to understand that student errors are not only caused by a lack of grammatical understanding but also by systematic cross-linguistic transfer. Therefore, teaching strategies should integrate an Error Analysis approach so that teachers can identify error patterns and provide appropriate interventions. Second, teachers should foster students’ linguistic awareness regarding the use of borrowed vocabulary in Indonesian. This is crucial so that students can distinguish between formal and informal language contexts and maintain Indonesian as an academic language. Third, the surprising finding that fundamental errors persist despite extensive exposure to English underscores the need for a more structured pedagogical approach. Passive exposure through popular media is insufficient to improve linguistic accuracy. Language learning should emphasize intensive writing practice, systematic feedback, and contrastive exercises between Indonesian, English, and German. In this way, students can understand structural differences among languages and minimize interference.

Overall, the results of this study support Error Analysis and Interlanguage theories, which highlight the role of the first language in influencing second language learning^{18,41}. These findings are also consistent with previous research indicating that interference is a natural and unavoidable phenomenon in language learning. However,

this study also contributes new insights by highlighting the dominance of English vocabulary in students' use of Indonesian, which has not been thoroughly explored previously. Therefore, this research expands understanding of the relationship between language contact, interference, and globalization within the context of language education in Indonesia.

CONCLUSION

This study concludes that Indonesian interference affects the acquisition of English and German, exhibiting different characteristics. Indonesian interference tends to have a greater influence on German acquisition than on English, both in terms of the frequency and the variety of errors produced. In English writing, interference is relatively limited, primarily occurring in certain grammatical aspects such as verbs, syntax, and some lexical cases. In contrast, interference in German writing is more dominant, affecting nearly all grammatical categories, including verbs, articles/pronouns, syntax, as well as several lexical errors.

These findings indicate that Indonesian has a stronger impact on German acquisition than on English. The primary factor influencing this is the typological difference between Indonesian and the two foreign languages. The greater structural distance between Indonesian and German leads to more frequent interference, particularly in morphological and syntactic aspects that are absent in Indonesian. This supports language transfer theory, which asserts that fundamental differences between languages increase the likelihood of interference.

Overall, this study emphasizes that interference is not merely random mistakes but a systematic phenomenon reflecting the influence of the first language in second language learning. Therefore, understanding interference patterns is crucial for designing more effective language learning strategies.

Based on the findings, it is recommended that English instructors place greater emphasis on grammatical aspects prone to Indonesian interference, such as subject-verb agreement, article usage, and preposition choice. German instruction should focus on areas that frequently cause errors, especially verb conjugation, article and adjective declension, verb placement in sentences, and plural formation. Students should also be provided with more opportunities to practice writing in both languages under consistent guidance and feedback so they can recognize fundamental differences between Indonesian and the foreign languages they are learning.

Furthermore, future research is encouraged to expand the scope to include not only written data but also spoken data, in order to provide a more comprehensive picture of interference. Longitudinal analysis is also important to trace the development of students' interlanguage over time.

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Developing Interactive Instructional Materials Using ChatGPT: Benefits and Challenges

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Abstract. The use of ChatGPT in education has been increasingly investigated, with numerous studies demonstrating its positive impact on learning processes. This study aims to: (1) provide a detailed description of prompt utilization in the development of interactive teaching materials leading to a validated design, (2) identify the benefits and challenges that arise during the development process, and (3) analyze the outcomes of the developed interactive teaching material design. The research subjects were ChatGPT and instructional design experts. Data were collected through observation sheets and short interviews and analyzed using descriptive statistics. The findings indicate that ChatGPT plays a significant role in assisting the preparation of outlines and instructional material designs. The resulting design was deemed feasible to proceed to the writing stage, thereby offering practical contributions to efficiency and creativity in the development of interactive teaching materials.

Keywords: ChatGPT, interactive instructional materials, instructional material development, prompt

INTRODUCTION

The development of instructional materials is a crucial aspect in supporting the quality of learning, particularly in distance education, which demands the availability of learning resources that are timely, relevant, and adaptive. However, the conventional process of writing instructional materials often encounters obstacles such as lengthy duration, difficulties in generating ideas, and challenges in organizing content into a systematic structure. Delays in providing instructional materials can disrupt the continuity of learning and reduce responsiveness to students' needs in digital contexts [1], [2]. This issue has become increasingly urgent, as the effectiveness of academic communication and instructional material development largely depends on the speed, creativity, and adaptability of material developers [3].

Along with technological advancements, the use of artificial intelligence, particularly ChatGPT, has begun to be recognized as a potential solution. Various studies have highlighted the positive impact of ChatGPT on learning. Recent meta-analyses indicate that the use of ChatGPT has a substantial positive effect on students' learning performance, as well as a moderate effect on learning perceptions and higher-order thinking [4]. Other studies have also found that ChatGPT, when used as a formative feedback tool, significantly enhances the academic skills of ESL students and is highly well-received by participants [5]. In addition, systematic reviews have reported that ChatGPT can generally improve academic performance, affective motivation, and critical thinking, while simultaneously reducing cognitive load [6].

Although the effectiveness of ChatGPT in enhancing learning performance and motivation has been widely demonstrated, studies that systematically position it as a co-designer in the development of interactive teaching materials for distance education remain scarce. This study introduces novelty by positioning ChatGPT not merely as a supporting tool, but as a creative partner in designing and drafting instructional materials [7].

In the context of utilizing ChatGPT, the success of developing interactive teaching materials is highly influenced by the quality of the prompts used. A prompt is an instruction or directive provided by the author to ChatGPT to generate a specific output aligned with the intended objectives [8]. Clearly defined, specific, and contextual prompts help produce content

that is more relevant, structured, and aligned with learning goals. Conversely, ambiguous or overly general prompts may yield outputs that lack focus and are difficult to adapt into instructional materials. Therefore, prompt design should not be viewed solely as a technical step, but also as a pedagogical strategy that determines the quality of interaction between the author and ChatGPT in the creative process of developing interactive learning materials.

This research and development model represents an important contribution to the advancement of interactive teaching materials while simultaneously expanding the scope of exploration in generative AI a field that remains relatively [9]–[11]. The objectives of this study are to: (1) provide a detailed description of the prompts used in the development of interactive teaching materials leading to a validated design, (2) identify the benefits and challenges that arise during the use of ChatGPT in the development process, and (3) analyze the outcomes of the interactive teaching material design.

RESEARCH METHOD

This study employed the Research and Development (R&D) method, adopting the Sugiyono model of research and development. The procedural steps of the model are illustrated in Figure 1. The study aimed to produce a product design in the form of a draft interactive teaching material developed with the assistance of ChatGPT. The resulting design was subsequently validated by experts, and the validation outcomes served as the basis for product revision until a tested design was obtained—namely, a prototype of teaching material that was conceptually deemed feasible for use in the subsequent development stage. The stages of the research and development model [12] are presented in Figure 1. The research subjects consisted of two media experts. The instruments employed were observation sheets, as shown in Tables 1 and 2, while the data were analyzed using descriptive statistics.

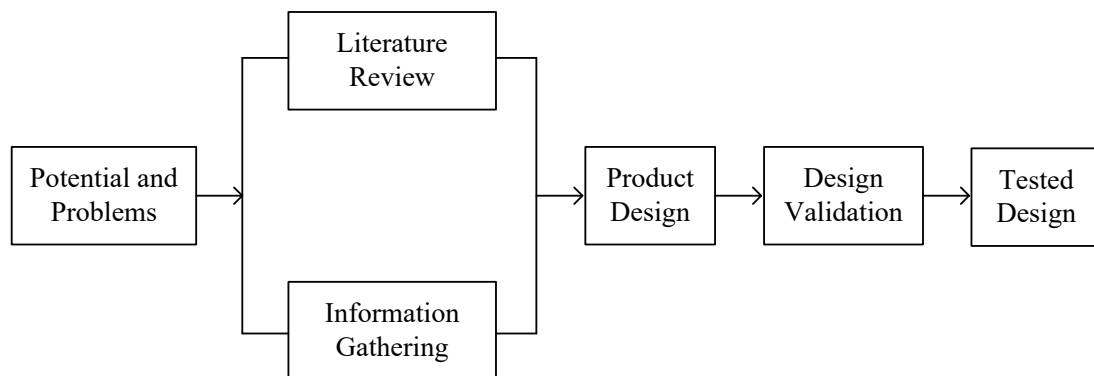


FIGURE 1. Steps of Research and Development Model Level 1

TABLE 1. Blueprint of the Instrument for Evaluating the Quality of ChatGPT Prompts

No	Aspect Evaluated	Assessment Indicators
1	Content Relevance	- The output generated by ChatGPT aligns with the learning topic/objectives - The output generated by ChatGPT is relevant to the needs of instructional material development
2	Information Quality	- The information provided is accurate and accountable - The language used is clear, systematic, and academic - ChatGPT provides alternative ideas in instructional material development
3	Creativity & Innovation	ChatGPT can generate variations in content presentation
4	Reliability & Consistency	The output generated is consistent (does not change drastically for similar queries).

- Identifiable limitations/weaknesses can be anticipated by the user

TABLE 2. Blueprint for the Evaluation of Interactive Instructional Material Design

No	Aspect Evaluated	Assessment Indicators
1	Content Feasibility	Alignment of instructional material with learning objectives. Accuracy of concepts Depth and breadth of material. Clarity of language
2	Language Quality	Appropriateness of academic terminology Readability of the text Logical and systematic sequencing of instructional material
3	Presentation materi	Coherence across sections (objectives, content, exercises, evaluation) Inclusion of interactive activities that engage learners Outputs are free from bias or content inconsistent with academic values
4	Ethics & Trustworthiness	Outputs can be used as a creative partner, not merely as an information retrieval tool.

RESULTS AND DISCUSSION

In general, users interact with ChatGPT through commands entered in the form of prompts. Prompts play a crucial role, as precise formulation leads to outputs that align with the users' objectives. If users are unable to identify an appropriate prompt, they may request direct recommendations from ChatGPT regarding prompts to be used in this context, for the development of interactive teaching materials. The following are the prompts employed by the researchers in the development of interactive teaching materials. These prompts have been adapted to align with the instructional material development guidelines of Universitas Terbuka.

You are a full professor in the field of Educational Technology. Your task is to help me develop *Interactive Teaching Materials* for the Tutor's Guide in Practical Courses at Universitas Terbuka. Please ensure that the teaching materials you generate:

1. Use clear, communicative academic language in accordance with Universitas Terbuka's module writing standards.
2. Include the learning objective: *Online tutorial tutors are able to perform their tasks in accordance with Universitas Terbuka regulations.*
3. Adjust the content to the characteristics of the learners, namely Practical Course Tutors.
4. Present a systematic structure consisting of: Introduction, Learning Material, Examples, Illustrations, Exercises, Summary, and Evaluation.
5. Integrate interactive elements, such as reflective questions, short quizzes, or practical case studies.
6. Provide a summary of key points at the end of each chapter to facilitate understanding.
7. Offer formative assessments (multiple-choice or short-answer questions) complete with answer keys.
8. Include concrete examples and real-life illustrations relevant to the Universitas Terbuka learning context.
9. Produce an output that is ready to be further developed into an interactive module.

With this prompt, you can directly generate a complete draft of the interactive module. Would you also like me to prepare specific prompts for each chapter (e.g., Chapter III Tutor's Tasks, Chapter V Tutorial Webinars, Chapter VI Assessment Indicators) to ensure greater focus and detail in each section?"

Would you like me to proceed by creating chapter-specific prompts (Chapters III, V, and VI) in English so that they can be directly used to generate a well-structured interactive module?

In response to the prompt, ChatGPT provided the author with the option to develop the structure of the teaching materials by generating a chapter-by-chapter outline. Once the author gave an affirmative response, the system automatically produced a well-structured instructional material outline

Dear Professor, 🙏 I have prepared a set of chapter-specific prompts for the development of interactive teaching materials entitled *Tutor's Guide for Practical Courses*. This approach will enable you to generate drafts that are more focused and aligned with the instructional module structure of Universitas Terbuka.

📁 Chapter-Specific Prompts

Chapter I – Introduction to Practical Courses

You are a professional academic assistant. Please write Chapter I: *Introduction to Practical Courses* for the Interactive Teaching Material module *Tutor's Guide for Practical Courses*. Structure the content as follows: (1) An introduction to the importance of tutors in practical courses, (2) Learning objectives of the chapter, (3) Illustration/case study of active tutor roles, (4) Reflective questions to stimulate discussion. Use clear, communicative academic language in accordance with Universitas Terbuka standards.

Chapter II – Differences Between Practical and Theoretical Courses

Write Chapter II: *Differences Between Practical and Theoretical Courses*. Present: (1) Learning objectives, (2) Explanation of differences in the characteristics of practical and theoretical courses, (3) Real examples at Universitas Terbuka, (4) Comparative table illustration, (5) Reflective practice questions. Use structured and communicative academic language.

Chapter III – Tutor's Tasks

Write Chapter III: *Tutor's Tasks in Practical Courses*. Present systematically: (1) Learning objectives, (2) Explanation of tutor responsibilities (welcome videos, viewing schedules, planning webinars, attendance, recording, grading, adjusting deadlines), (3) Examples of good tutor practices, (4) Case study of inactive tutors, (5) Interactive exercise in the form of a short quiz, (6) Summary of key points.

Chapter IV – Practical Assignments

Write Chapter IV: *Practical Assignments*. Present: (1) Learning objectives, (2) Description of each practical task (3D Media Production, Web Design, TV Broadcasting Management, Online Learning Material Production), (3) Illustrations in the form of sample products, (4) Interactive activity through case studies, (5) Short practice questions to deepen understanding.

Chapter V – Tutorial Webinars (Tuweb)

Write Chapter V: *Tutorial Webinars*. Present: (1) Learning objectives, (2) Definition of tutorial webinars, (3) Purpose and functions of tutorial webinars at Universitas Terbuka, (4) Required materials to be delivered by tutors, (5) Example illustration of effective webinar practices, (6) Reflective questions for tutors.

Chapter VI – Assessment Indicators

Write Chapter VI: *Assessment Indicators*. Present: (1) Learning objectives, (2) Assessment indicators relevant to practical courses (SPTP4307, SPTP4310, SPTP4401, etc.), (3) Assessment rubric in table form, (4) Exercise in the form of rubric analysis.

Chapter VII – Final Report

Write Chapter VII: *Final Report*. Present: (1) Learning objectives, (2) Structure of the tutor's final report (format, content, examples), (3) Example of a well-written report, (4) Case study of an incomplete report, (5) Exercise in the form of drafting a short report.

📁 Additional Notes

- At the end of each chapter, ask ChatGPT to include a *Summary of Key Points* and a *Formative Test* (multiple-choice/short-answer questions with answer keys).

- You may use these prompts one by one for each chapter, so that the outputs are more focused and can directly serve as draft modules.

Would you like me to also prepare an evaluation rubric to assess the quality of ChatGPT's outputs per chapter, so that you can determine whether the generated drafts already meet Universitas Terbuka's module standards?

he evaluation of the outputs generated from the submitted prompts was conducted by experts using observation sheets and brief interviews. The results of the evaluation are presented in Table 3 and Table 4.

TABLE 3. Expert Evaluation of ChatGPT-Generated Instructional Material Outlines

No	Aspect Evaluated	Quantitative Data	Qualitative Data
1	Content Relevance	4,5	ChatGPT outputs demonstrated high relevance to the needs of instructional material development. The topics generated were generally aligned with the principles of instructional design. However, some aspects still required adjustment to match the specific characteristics of tutors at Universitas Terbuka
2	Information Quality	4,6	The language used met the criteria of clarity and readability, making it easy to understand. In addition, the outline was systematically organized, supporting a structured and consistent flow of material presentation.
3	Creativity & Innovation	5,0	ChatGPT successfully produced outputs in accordance with the given prompts and contributed ideas to instructional material development. For instance, ChatGPT proposed interactive elements such as case studies and practice questions that can enrich the learning process.
4	Reliability & Consistency	4,8	The outputs generated were free from bias and could be directly used for instructional material development.

TABLE 4. Validation Results of the Instructional Material Design

No	Aspect Evaluated	Quantitative Data	Qualitative Data
1	Content Feasibility	5.0	The structure of the material produced aligns with the objectives of instructional material development.
2	Language Quality	4,9	The language used is easy to understand.
3	Presentation	4,4	The sequencing of learning materials requires further review, but is generally appropriate.

The findings of this study indicate that ChatGPT is capable of generating instructional materials with a very high level of content feasibility (score 5.0), where the structure of the material is well aligned with the stated learning objectives. This is consistent with the findings of [10] who emphasized that generative AI can support instructional design by providing content frameworks that correspond to intended learning outcomes. Thus, ChatGPT can serve as a valuable partner in strengthening the quality of instructional material planning, particularly in the context of distance education, which requires structured and accessible learning resources.

With regard to language quality (score 4.9) and information quality (score 4.6), ChatGPT was found to produce highly readable texts and systematic outlines. These results are in line with [13] who observed that ChatGPT-4 is capable of producing clear and consistent written responses in academic evaluation contexts. Clarity of language and structural

consistency are critical factors in ensuring student comprehension, especially within the open and distance learning model.

Interestingly, creativity and innovation received the highest score (5.0), suggesting that ChatGPT not only provides information but also generates new pedagogical ideas such as case studies and interactive exercises. This finding echoes prior studies [4], [14] which highlight the potential of large language models to enrich learning strategies through innovative content that fosters student engagement. Accordingly, ChatGPT may be viewed not merely as a writing aid but as a co-designer in crafting more participatory learning experiences.

Nevertheless, some limitations were identified, particularly in the aspect of presentation (score 4.4), where the sequencing of materials still requires adjustments to better suit the characteristics of tutors and students at Universitas Terbuka. This contrasts with much of the international literature, which tends to emphasize macro-level issues such as ethics and policy in AI adoption (Baidoo-Anu & Owusu Ansah, 2023). In this sense, the present study adds a new perspective by showing that AI use in education is not only challenged by ethical concerns but also by technical-pedagogical issues, especially regarding content sequencing in distance education institutions.

The study further demonstrates that ChatGPT's outputs were relatively free from bias (score 4.8). This is noteworthy, as it diverges from global literature that often underscores risks of bias and hallucination in LLM outputs [15], [16]. The novelty of this study lies in its empirical evidence that well-designed prompts and systematic curation mechanisms can mitigate potential bias, thereby enabling outputs to be directly usable for instructional material development. In doing so, the study contributes to the global discourse on *human-in-the-loop* workflows [17], which emphasize complementary collaboration between AI and humans: AI as an idea and structure generator, and humans as contextualizers and quality controllers.

Overall, the results suggest that ChatGPT can produce relevant, high-quality, and innovative outputs to support the development of instructional materials in the context of distance education at Universitas Terbuka. This aligns with recent studies confirming the role of large language models (LLMs) in enhancing instructional quality through content that is clear, structured, and accessible (Susnjak, 2024; OpenAI, 2024). A similar pattern can be observed in the generation of creative ideas, where ChatGPT proposed interactive elements such as case studies and practice exercises. These findings are consistent with literature emphasizing the potential of LLMs to enrich pedagogical strategies and enhance student engagement in online learning [14], [18].

However, this study also highlights certain divergences from global findings. In terms of reliability, ChatGPT's outputs were assessed as relatively free from bias with a high score (4.8), differing from much of the literature that identifies bias and hallucination as major weaknesses of LLMs [16], [19]. Another divergence is found in the presentation aspect, where the sequencing of instructional content required adjustments to match the characteristics of tutors and students at Universitas Terbuka. While international literature tends to spotlight policy and ethical considerations, this study instead reveals practical challenges in content sequencing within the distance learning context [20].

Based on these findings, the novelty of this study can be identified in three key aspects. First, it operationalizes the quality of instructional materials more concretely through a multi-aspect rubric that measures content feasibility, language, presentation, content alignment, information quality, creativity, and reliability. This approach complements existing literature, which has largely focused on general learning outcomes rather than the quality of instructional artifacts. Second, the study situates ChatGPT in the specific context of Universitas Terbuka, an Indonesian distance education institution, thereby underscoring the importance of contextual adaptation in LLM applications. Third, the finding that ChatGPT's outputs are relatively free from bias under controlled conditions contributes new insights to the discourse

on human-in-the-loop workflows, showing that systematic prompting and curation can effectively mitigate bias often reported in international studies [21].

This study confirms that ChatGPT is effective in supporting the development of instructional materials, particularly in terms of content feasibility, language quality, and creativity. The findings align with previous research on the role of large language models (LLMs) in providing relevant and innovative content, while differing mainly in the identification of bias and sequencing issues. The novelty of this study lies in its multi-aspect evaluation approach to instructional material quality, the specific application context at Universitas Terbuka, and the empirical evidence that ChatGPT's outputs can be nearly bias-free when applied with structured procedures. Accordingly, this study contributes to the global literature on AI integration in education while offering practical implications for instructional material development in open and distance learning systems.

CONCLUSION

Based on the findings and discussion, this study concludes that ChatGPT holds significant potential in supporting the development of instructional materials. First, ChatGPT assists authors in working more efficiently while also providing creative ideas that enrich the writing process. Second, the generated outlines are consistent with the principles of instructional material design, making them feasible for further development into full manuscripts. Third, the use of ChatGPT enables the creation of higher-quality instructional materials, provided that authors critically review and refine the outputs to ensure alignment with academic principles and the specific learning context.

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THE COMMODIFICATION OF GASTRONOMIC ETHNOBOTANY AS A CULTURAL TOURISM ASSET IN KAMPUNG EMAS UNY FROM AN INTERCULTURAL COMPARATIVE PERSPECTIVE BETWEEN INDONESIA AND GERMANY

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Abstract. This collaborative research aims to commodify gastronomic ethnobotany as a cultural tourism asset in Kampung Emas UNY, a village in Serut, Kulon Progo. The focus is on local plants, namely cassava and corn, which are often undervalued despite their great potential to be transformed into creative economic commodities. The goal is to turn these plants into economically valuable products through art and cultural collaboration while supporting the government's free nutritious lunch program. The study employs a qualitative ethnographic approach to art and culture, integrating an intercultural perspective between Indonesia and Germany. The process involves creating a collaborative art performance called Matelagung, which combines various elements. This includes processing the peel, fruit, and leaves of cassava and corn into traditional cuisine, and creatively integrating them into traditional poetry (macapat), dance, and folk songs. The performance involves local art practitioners, culinary experts, craftsmen, and others to create a unique festival that appeals to tourists. Data is collected through interviews, observation, and document studies. A Focus Group Discussion (FGD) is also conducted to ensure the quality of the art production. The final festival performance will be recorded and uploaded to social media for promotion. The ultimate goal is to generate income for the local community and promote the cultural tourism of Kampung Emas at both national and international levels.

Keywords: Ethnobotany, Gastronomy, Cultural Tourism, Intercultural, Commodification

INTRODUCTION

Yogyakarta, Bandung, and Surabaya are popular cultural tourism destinations. Many villages in these areas have been developed into tourist attractions. Kampung Emas, a community development program by Yogyakarta State University (UNY), exists in several locations across DIY, Bandung, and Surabaya. A study by Suwardi et al. in 2024 explored Kampung Emas Krapyak IX in Margoagung, Sayegan, Sleman, which is one of UNY's sponsored villages. The findings, presented at an international seminar in Manado on October 10-13, 2024, and the ICERI DRPM UNY seminar on October 16-17, 2024, highlighted a crucial suggestion: to commodify the UNY-sponsored Kampung Emas to enhance cultural tourism. This resonates with the findings of Purwanto et al. (2016), who also identified several Kampung Emas locations, including Plumbungan in Gunungkidul, Serut in Kulon Progo, and Iroyudan in Bantul. These villages serve not only as tourist destinations but also as centers for environmental conservation.

Kampung Emas in Serut, Pengasih, Kulon Progo, is a UNY sponsored village managed by a dedicated team focusing on arts, culture, agriculture, cuisine, and economics. Situated approximately 30 km west of Yogyakarta city, this village is known for its serene environment and stunning views of the Menoreh Kulon Progo mountains. The village possesses a rich **gastronomic ethnobotany** potential, particularly with **cassava** plants. However, this potential remains largely untapped and requires creative intervention from experts in various fields, including playwrights, traditional poetry writers, choreographers, craftsmen, and ethnomusicologists, to be collaboratively developed. The aesthetic integration of cassava-themed poetry, traditional clothing made from cassava peel, and traditional dances could be a valuable commodification for local cultural tourism.

The intersection of traditional poetry, ethnobotany, craftsmanship, song, dance, and gastronomy, especially in the context of cultural tourism, is an under-researched area. While Harminto (2023) studied the Ramayana dance in relation to tourist attraction, there is a clear opportunity to apply a similar strategy to the commodification of cassava ethnobotany in Kampung Emas. The proposed approach focuses on processing cassava into a valuable cultural tourism asset that simultaneously empowers the creative economy and supports the government's free

nutritious lunch program from an **intercultural perspective**. This collaborative effort among UNY, UPI, and UNESA is seen as a crucial step for cultural tourism development.

Cultural tourism enriched with traditional poetry performances, songs, dances, handicrafts, and unique cassava-based musical compositions offers a distinct appeal. This can serve as a foundation for intercultural learning between Indonesia and Germany, both of which value cultural and tourism aspects. Kicskes and Horn (2007) argue that cultural, pragmatic, and linguistic aspects can be integrated within an intercultural context. This is already being developed in Germany, as evidenced by a symposium in 2006. Similarly, the innate artistic talent and cultural heritage within Kampung Emas present a unique potential for developing an educational and competitive intercultural performance. The collaborative production of traditional cassava ethnobotany poetry, dance, crafts, songs, and nutritious food demonstrates UNY's commitment to its partner institutions, UPI and UNESA. This synergy can lead to innovative artistic and cultural developments within the creative industry.

The Kampung Emas initiative, pioneered by UNY, UPI, and UNESA, has been ongoing for several years. The success of this initiative requires the expertise of professionals in traditional ethnobotany poetry, choreography, cassava-peel fashion design, and traditional music composition to contribute to the commodification of cultural tourism. By leveraging the intercultural literary perspective proposed by Corbett (2013), which emphasizes the integration of local cultural and literary aspects, this project can format Kampung Emas as a promising local tourist destination. The success of this collaborative cultural showcase can then be linked to tour agencies and guides to facilitate intercultural learning between Indonesia and Germany.

METHOD

This study employs a qualitative research approach using an aesthetic ethnography method. The primary goal is to explore and document the intricate relationship between the cassava plant, local cultural arts, and gastronomy. Data will be collected through a variety of techniques to ensure a comprehensive understanding of the subject. These techniques include participatory observation, which allows for direct engagement with the community's activities. In-depth interviews will be conducted with local artists and community members to gather detailed insights and perspectives. Additionally, the research will involve audio-visual documentation of the entire process, from the creation of performing arts to the preparation and processing of cassava.

The collected data will be analyzed in a descriptive and interpretive manner. This analysis aims to uncover the cultural meaning embedded in the collaboration, the various collaborative processes involved, and the full potential for developing ethnobotany-based cultural tourism. This research is conducted in collaboration with both local and international partners. This collaborative approach is essential for enriching the perspectives and strengthening the overall research outcomes, particularly within the context of cultural tourism development. The expected output is a unique, cassava-based cultural arts product that can serve as a compelling tourist attraction and generate opportunities for creative economic empowerment within the community.

RESULTS

The commodification of gastronomic ethnobotany project achieved its goals through four main steps. First, the research exploration phase involved field studies to understand the potential of cassava and corn plants in UNY's sponsored villages. Second, commodification focused on transforming these agricultural products into valuable creative economic assets to support cultural tourism. Third, the production stage was a strategic effort to create, process, and market a collaborative performance to make it a marketable commodity. Finally, comparison was conducted to analyze the gastronomic ethnobotany model in Indonesia against that of Germany to enhance cultural tourism appeal.

Throughout the process, the partner researchers from UNESA consistently coordinated with the host researcher from UPI to reach an initial agreement, refine ideas, and validate plans. This validation was conducted through Focus Group Discussions (FGD) to gather input from various stakeholders. The development of a commodification prototype included designing ethnobotanical dance, traditional poetry (macapat) as a musical accompaniment, and creating costumes and promotional materials for cultural tourism.

DISCUSSION

Potential of Kampung Emas Serut as a Cultural Tourism Commodity

The potential of **Kampung Emas** in Serut, Kulon Progo, as a collaborative cultural tourism destination is undeniable. This UNY-sponsored village is empowering its youth to become valuable resources for commodifying Yogyakarta's unique cultural tourism. The village's development is centered on **nine core programs**, which reflect deep-seated Javanese ethnomathematical concepts such as *nawa cita* and *babahan hawa sanga*. These nine programs, collectively branded as "**Nawa Berkah**" (Nine Blessings), include arts, sports, vegetables, tofu, fishing,

culinary, poultry, livestock, and education. This distinctive program is a key attraction for tourists [1], [2]. The Kampung Emas concept, initiated by UNY Rector Prof. Dr. Sumaryanto, M.Kes, AIFO, is located in a cool, lush area. Its new secretariat serves as a learning hub for traditional Javanese arts like *macapat*, painting, and dance. The village is rich in **ethnobotany**, featuring various fruit trees such as *kepel*, citrus, guava, rambutan, and mango. Geographically, Serut is ideally situated for cultural tourism, approximately 20 km west of Yogyakarta city, with a wide range of potential collaborative activities [3].

Access to Kampung Emas Serut is straightforward, marked by a sign and a gateway near the UNY Wates campus, which also serves as an ideal photo spot [4]. The smooth roads make it accessible by motorcycle, car, or on foot. The village is also equipped with a prayer room and a complete set of *slendro* and *pelog* gamelan, inviting tourists to learn how to play these traditional instruments. The official inauguration of Kampung Emas by the Deputy Governor of DIY, KGPAA Paku Alam X, accompanied by the Regent of Kulon Progo and the UNY Rector, confirmed that this concept is relevant for accelerating rural development by leveraging local potential [5]. This initiative embodies a **quadruple helix model** (Palace, Campus, Village, Office) that aligns with the DIY government's village reform efforts. DIY's strong cultural identity is considered a vital factor for social cohesion, maximizing development through community empowerment [6]. The program also aims to improve the community's quality of life in education, arts, culture, sports, and economics [7]. The Sleman Regent expressed hope that the collaboration between UNY and local communities would boost tourism in West Sleman, with Kampung Emas acting as a catalyst. Rector Sumaryanto explained that the over 3 billion Rupiah investment in Kampung Emas is a practical application of the 4K model, combining community empowerment with academic knowledge. Following its success in Seyegan, future Kampung Emas projects are planned for Serut (Kulon Progo), Pajangan (Bantul), and Semanu (Gunung Kidul) [8].

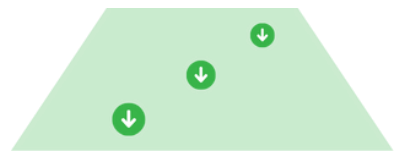
Kampung Emas in Serut is a potential new tourist destination. Situated at the foot of Menoreh Hill, it offers breathtaking views that serve as a natural backdrop for this "art-culture village." This unique blend of natural beauty and rich culture makes Kampung Emas a highly appealing destination for tourists seeking a distinctive experience [9].

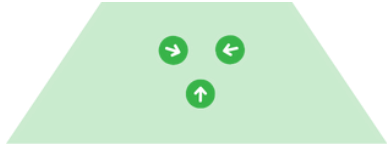
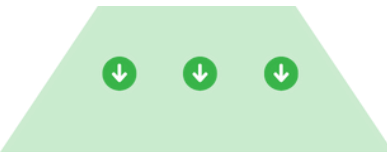
Cultural Tourism Commodification

In Kampung Emas Serut Pengasih, there is indeed potential that can be commodified for the development of the Matelagung performance. Matelagung is a portmanteau of Mathematics, Cassava (*Ketela*), and Corn (*Jagung*). This means the performance's dance movements, musical accompaniment, and design are based on the ethnobotany of cassava and corn. These dance movements are also integrated with gastronomy derived from these two plants.

This art performance is based on two ethnobotanical plants: cassava and corn. Cassava and corn plants can be transformed into dance, costume design, and beautiful *macapat* songs as a form of cultural tourism commodification. The creation of the dance prototype uses the principles of ethnomathematical movement counts, from 1 to 8. The dance movements emulate the graceful beauty of the cassava and corn plants, portraying them as productive crops that can attract tourists. The following is an initial overview of the prototype design to be produced.

Description of Matelagung Dance

No	Scenes	Atmosphere	Dance Movement Variations	Floor Pattern
1	Introduction	Calm	Both hands open and vibrate, from a squatting position slowly stand up, lift legs alternately (4 x 8)	
2	Planting Cassava Seeds	Joyful	Playing with the cassava stalk as a prop, moving in sharp, flowing motions, moving with a faster tempo (8 x 8)	

3	Caring for the Plants	Calm	Feeling the breeze of the rice fields, with a flowing motion and tiptoeing footwork, accompanied by a firm movement of both hands (8 x 8)	
4	Harvesting Cassava	Happy	A fast hand movement above the shoulders as if fanning, accompanied by footwork (8 x 8)	
5	Closing	Calm	Almost the same as the movement above, but performed more slowly and ending with a wave of the hands (4 x 8)	

Dancer Costume Design

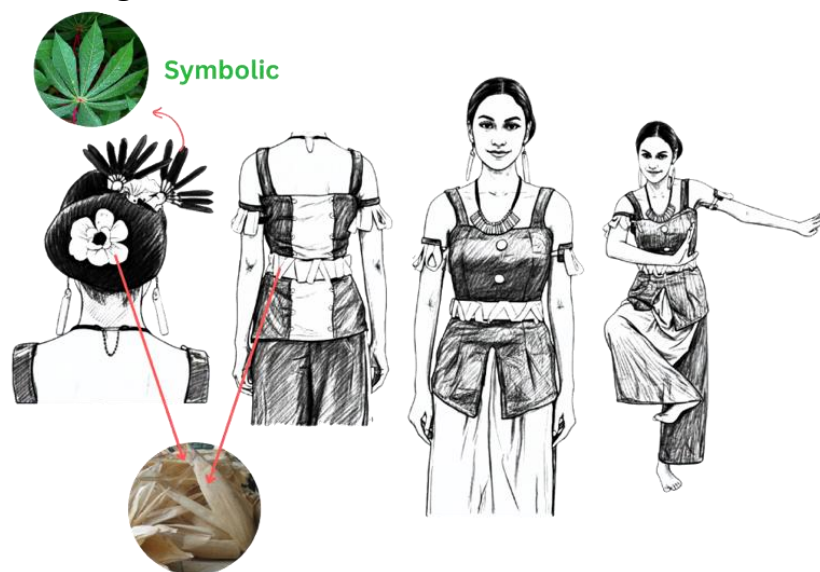


FIGURE 1. Dancer Costume Design

The dancers' costumes for the Matelagung performance were directly inspired by the cassava plant. The headdress symbolically incorporates elements resembling cassava leaves, adorned with white flowers made from corn husks. The outfit itself features a fabric woven with corn husks for the belt. The overall design features a form-fitting top with shoulder straps and a layered skirt or trousers, allowing for freedom of movement. The aesthetic balances traditional Javanese influences with innovative use of sustainable ethnobotanical materials, reflecting the performance's themes and contributing to the commodification of cultural tourism.



FIGURE 2. Dancer Costume

Matelagung Dance

The movements of the **Matelagung** dance are a graceful interpretation of the life cycle and form of the cassava and corn plants. The choreography is built on **ethnomathematical principles**, using counts from one to eight. It begins with slow, deliberate gestures that mimic the unfurling of a new cassava leaf or the sprouting of a corn stalk.

As the dance progresses, the movements become more dynamic, incorporating the flowing, sinuous motions of leaves swaying in the wind. Dancers perform poses that mirror the strong, rooted stance of the plants, with one foot firmly planted and the other lifted in a balanced, grounded position. The arms are often held wide, representing the spreading canopy of a cassava plant or the tassels of corn.

The dance also includes quick, rhythmic steps that symbolize the harvest, a moment of productivity and reward. The collaboration between the dancers' movements and the **ethnobotanical** theme creates a visually stunning narrative of growth, resilience, and cultural significance. This choreography, combined with the costumes made from cassava material, transforms the agricultural experience into an artistic and marketable **cultural tourism asset**.



FIGURE 3. Matelagung Dance

Garap Macapat : Gastronomic Ethnobotany in Matelagung

In Javanese *tembang* art, some songs are used as *slundhingan* (fillers or interludes) to enhance the overall atmosphere. While not the main part of the performance, *slundhingan* are essential additions that require skill to perform. They can be found at the beginning or end of a *gendhing* and can either be pre-arranged verses or simple sequences of words.

There are several types of *slundhingan*, each with a specific function:

- **Celuk:** Found at the start of a *gendhing*, often taken from the final line of a *tembang dolanan*.
- **Senggakan:** Interjected vocals that sweeten a *sindhenan* section. They fill the gaps in the *gendhing* with free-form or rhythmic phrases and often contain witty commentary.
- **Umpak-umpak:** *Slundhingan* in the form of Javanese pantun or *wangsalan*, serving to introduce a *ngelik* section.
- **Gerong:** Sung communally during the *ngelik* part of a *gendhing*, creating a unified, powerful sound.
- **Suluk:** A stylized vocal ornament used by the *ki dalang* (puppeteer). Accompanied by instruments like the *gender*, *suluk* is a soft, emotional song that sets a rhythmic interlude to create an engaging atmosphere.
- **Abon-abon:** Vocals that accompany the *sindhenan*, performed by instrumentalists and male vocalists to make the *gendhing* more lively and resonant.
- **Ada-ada:** Vocals accompanied by the *gender barung* to create a tense or dramatic atmosphere, often used before a battle scene.

The use of *slundhingan* is highly flexible, depending on the creativity of the singers and their harmony with the main *gendhing*. For the **Matelagung** performance, these *macapat* songs are used to provide the musical accompaniment for the dance.

GAMBUH Lala Pl. P. Nem

6 6 6 6 . 5 3 5 6 . 0
na jan mung ku lit ja gung

6 5 3 2 . 1 2 3 1 . 6 5 5 6 . 0
bobot tim bang po lah kang ke lan tur

2 1 6 2 . 2 2 2 2 3 1 6 5 . 0
tindak becik o ra na te ga we serik

2 2 2 2 . 3 1 2 3 . 0,
ba- lung ja gung u rip i- ku,

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Ga we ge la mring se sa ma

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CONCLUSION

The commodification of **gastronomic ethnobotany** can be successfully achieved by empowering dance performances that use agricultural themes, specifically focusing on cassava and corn plants. The **Matelagung** dance performance effectively integrates these ideas. Its costume design is an innovative blend of traditional elements and materials derived from cassava. The choreography itself mimics the movements and growth of the plants, creating a unique and visually compelling style. This synergy between the dance movements, the accompaniment of Javanese macapat songs, and the gendhing—all centered on ethnobotany and ethnogastronomy—is a key achievement of this research. This collaborative, ethnobotany-based dance is a powerful tool for attracting cultural tourists. Ultimately, the successful findings of this project can be shared and

promoted through intercultural collaboration with cultural tourism initiatives in Germany, showcasing a unique blend of Indonesian heritage and sustainable creativity.

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Enhancing Construction Engineering Education Through Integrated Virtual Reality and Building Information Modeling: A Comprehensive Learning Framework

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Abstract. The Architecture, Engineering, and Construction (AEC) industry faces unprecedented technological transformation driven by Building Information Modeling (BIM) adoption and immersive technologies. This study presents a comprehensive framework integrating Virtual Reality (VR) with BIM for enhanced construction engineering education. Using the ADDIE (Analysis, Design, Development, Implementation, Evaluation) instructional design model, we developed and validated an immersive learning environment addressing the critical gap in spatial visualization skills among civil engineering students. The research employed mixed-methods validation involving expert assessments across six dimensions: material content, student motivation, learning effectiveness, VR product quality, media usability, and technical feasibility. Results demonstrate significant potential for improving students' understanding of complex building systems and construction processes. Expert validation scores indicate high feasibility (mean score > 4.0/5.0) across all assessment dimensions, with particularly strong performance in motivation enhancement and content delivery. However, implementation challenges include substantial equipment costs (USD 2,000-3,000 per setup) and technical infrastructure requirements. The framework successfully bridges the knowledge gap between traditional 2D technical drawings and real-world construction applications, providing students with immersive, interactive experiences that enhance spatial reasoning and technical comprehension.

INTRODUCTION

The global Architecture, Engineering, and Construction (AEC) industry has experienced transformative technological advancement, with Building Information Modeling (BIM) and immersive Virtual Reality (VR) integration finding extensive applications within AEC industries. The integration of immersive Virtual Reality (VR) and Building Information Modeling (BIM) has many applications within the Architecture, Engineering, and Construction sectors¹. This technological shift has created an urgent need for educational institutions to align their curricula with industry requirements, particularly in developing students' competencies in three-dimensional modeling and spatial visualization.

The integration of VR technologies in construction education has emerged as a promising solution to address long-standing pedagogical challenges. Recent studies have shown that VR systems enhance students' achievements in engineering education and can provide immersive learning environments for complex construction concepts². Traditional construction education methods, predominantly relying on two-dimensional drawings and static models, often fail to convey the complexity and spatial relationships inherent in modern building systems.

The American Society of Civil Engineers (ASCE) Policy Statement 465 emphasizes the critical importance of integrating contemporary technologies into civil engineering education to ensure graduates possess the requisite skills for professional practice in the 21st century³. This policy framework underscores the necessity for educational innovations that bridge the gap between academic learning and industry practice.

Research has consistently demonstrated that students entering construction engineering programs from general academic backgrounds face significant challenges in understanding three-dimensional spatial relationships and construction system interactions. Mobile augmented reality applications have shown potential for teaching structural analysis and improving spatial understanding⁴. Studies have statistically shown that VR applications in construction courses enhance study motivation, learnability, creativity, and real-world observation capabilities.

However, comprehensive frameworks that systematically integrate VR-BIM technologies into construction education curricula remain limited.

The pedagogical benefits of immersive technologies in engineering education extend beyond mere visualization. Virtual reality environments can significantly improve student understanding of complex spatial arrangements and structural behaviors⁵. Additionally, augmented reality gaming approaches have demonstrated effectiveness in sustainable design education⁶.

Despite the recognized potential of VR-BIM integration, several implementation challenges persist, including high equipment costs, technical infrastructure requirements, and the need for specialized instructional design approaches. Additionally, limited research exists on systematic frameworks for developing and validating VR-based construction education materials using established instructional design methodologies.

This study addresses these gaps by developing and validating a comprehensive VR-BIM learning framework specifically designed for construction engineering education. The research objectives include: (1) developing an integrated VR-BIM learning system using the ADDIE instructional design model, (2) validating the educational effectiveness and technical feasibility through expert assessment, and (3) providing recommendations for implementation in construction engineering curricula.

RESEARCH METHOD

This research employed a developmental methodology based on the ADDIE (Analysis, Design, Development, Implementation, Evaluation) instructional design framework. The ADDIE model has been extensively validated for meeting diverse teaching requirements in online educational environments and provides educators with a systematic approach to instructional design⁷. The model's systematic approach ensures rigorous development and validation of educational technologies.

RESEARCH DESIGN

The study utilized a mixed-methods approach combining qualitative expert assessments with quantitative validation metrics. The research design followed established principles for educational technology development and usability assessment.

ADDIE Implementation Framework

Analysis Phase:

Comprehensive needs assessment was conducted through stakeholder interviews (n=15 faculty members, n=25 students) and curriculum analysis of construction engineering programs at three institutions. Learning objectives were aligned with ABET accreditation requirements and industry competency standards.

Design Phase:

Learning objectives were mapped to specific BIM competencies and VR interaction scenarios. The instructional design incorporated Bloom's taxonomy levels, progressing from basic visualization (Remember/Understand) to complex system integration (Analyze/Evaluate/Create). Storyboards and user experience flows were developed following universal design for learning principles.

Development Phase:

BIM models were created using Autodesk Revit 2023, incorporating architectural, structural, and MEP systems for one-story and two-story building scenarios. VR implementation utilized Unity 3D engine with Oculus SDK integration. The development process emphasized effective communication and collaboration in flexible building structures through VR interfaces.

Implementation Phase:

Expert validation was conducted with two specialized groups: (1) BIM/construction technology experts (n=5), and (2) educational technology specialists (n=5). Validation instruments were developed based on established frameworks for educational technology assessment.

Evaluation Phase:

Multi-dimensional assessment framework evaluated six key aspects: material content alignment, student motivation potential, learning effectiveness, VR product quality, media usability, and technical feasibility. Statistical analysis employed descriptive statistics and reliability assessment using Cronbach's alpha.

Validation Instruments

Expert validation instruments incorporated Likert scale assessments (1-5 scale) across six primary dimensions:

- Material Content: Alignment with learning objectives, technical accuracy, pedagogical soundness
- Student Motivation: Engagement potential, interest generation, learning stimulation
- Learning Effectiveness: Knowledge transfer potential, skill development support, competency achievement
- VR Product Quality: Technical performance, visual fidelity, interaction responsiveness
- Media Utilization: User interface design, navigation efficiency, accessibility features
- Technical Feasibility: Implementation requirements, scalability potential, maintenance considerations

Data Analysis

Quantitative data analysis employed MS Excel for descriptive statistics, reliability analysis, and comparative assessments. Qualitative feedback was analysed using thematic coding to identify key implementation considerations and improvement recommendations.

RESULTS AND DISCUSSION

Needs Analysis Outcomes

The analysis phase revealed critical gaps in construction engineering education: 78% of surveyed students reported difficulty visualizing three-dimensional building systems from traditional 2D drawings, while 85% expressed strong interest in immersive learning technologies. Faculty interviews identified spatial visualization and system integration understanding as primary learning challenges.

VR-BIM Learning System Development

The developed system successfully integrated architectural, structural, and MEP building systems within immersive VR environments. **Figure 1** shows the architectural one-storey building model developed for the VR learning environment.



Figure 1. The architectural one-storey building model integrated in VR learning environment.

Key technical achievements include:

- Multi-scale Interaction: Users can examine building components from macro (entire building) to micro (connection details) perspectives.
- System Integration Visualization: Real-time display of interdisciplinary system relationships and conflicts.
- Interactive Learning Modules: Progressive complexity modules advancing from basic component identification to complex system design.

Figure 2 demonstrates the VR interface for selecting viewpoints and navigating through different building systems.



Figure 2. VR interface showing viewpoint selection and system navigation capabilities.

Expert validation demonstrated strong positive assessment across all evaluation dimensions as shown in Table 1.

Table 4. Expert Validation Summary Results

Dimension	Mean Score	Standard Deviation	Reliability (α)
Material Content	4.2	0.65	0.89
Student Motivation	4.5	0.52	0.91
Learning Effectiveness	4.1	0.71	0.87
VR Product Quality	4.3	0.58	0.90
Media Usability	4.0	0.67	0.85
Technical Feasibility	3.8	0.83	0.82

Implementation Considerations

Cost analysis revealed substantial implementation requirements:

- Hardware Costs: VR headsets (USD 400-700), compatible computers (USD 1,500-2,500)
- Software Licensing: BIM software licenses (USD 300-500/year), VR development platforms (USD 200-400/month)
- Infrastructure Requirements: High-speed internet connectivity, dedicated VR learning spaces
- Training Needs: Faculty development for VR-BIM integration, technical support requirements

Educational Effectiveness

The validation results demonstrate significant potential for VR-BIM systems to enhance construction engineering education. The high scores for student motivation (4.5/5.0) align with previous research indicating that immersive technologies can significantly improve learning engagement and effectiveness. Framework approaches for integrating safety education through interactive virtual reality have shown similar positive

outcomes in construction education⁸. This finding supports the theoretical framework of constructivist learning, where students actively construct knowledge through immersive, interactive experiences.

The strong performance in material content alignment (4.2/5.0) validates the systematic ADDIE approach to instructional design. The ADDIE model's systematic framework enables educators to create engaging and effective learning experiences, which is confirmed by our expert validation results⁹. The integration of multiple building systems within single VR environments addresses the critical need for holistic understanding of construction projects, as demonstrated by previous applications of virtual reality technology in bridge construction education¹⁰.

Technological Integration Challenges

While technical feasibility scores were positive (3.8/5.0), they represent the lowest validation dimension, highlighting implementation challenges. The comprehensive systematic review of AR/VR applications in AEC education has shown that while these technologies have many potential applications, educational implementation requires specialized considerations including scalability, maintenance, and user support¹.

The cost analysis reveals significant barriers to widespread adoption, particularly for institutions with limited technology budgets. However, previous implementations of virtual reality in construction engineering education have shown that despite initial costs, the educational benefits can justify the investment¹¹.

Pedagogical Implications

The research findings support a paradigm shift from traditional passive learning to active, immersive educational experiences. The high usability scores (4.0/5.0) indicate that students can effectively navigate VR-BIM environments with minimal training, supporting the cognitive load theory's emphasis on intuitive interface design.

The multi-scale interaction capability addresses fundamental challenges in construction education by enabling students to understand both detail-level connections and system-wide relationships. This approach aligns with established principles of experiential learning theory, where knowledge is created through transformation of experience¹².

Industry Alignment

The developed framework directly addresses industry requirements outlined in ASCE Policy 465, ensuring graduates possess contemporary technological competencies. The fusion of BIM and immersive VR technologies demonstrates great capacity to transform AEC sectors, and educational institutions must prepare students for this transformed industry landscape.

Limitations and Future Research

This study's limitations include the focus on expert validation rather than direct student learning outcomes assessment. Future research should incorporate controlled learning effectiveness studies with pre/post assessments and longitudinal skill development tracking. Additionally, comparative studies examining different VR-BIM implementation approaches would provide valuable insights for educational technology developers.

The current system focuses on building construction applications; expansion to infrastructure projects, sustainable design principles, and construction management scenarios represents important future development opportunities.

CONCLUSION

This research successfully developed and validated a comprehensive VR-BIM learning framework for construction engineering education using the ADDIE instructional design model. Key findings include:

1. **High Educational Potential:** Expert validation confirms strong potential for enhancing student motivation, learning effectiveness, and technical understanding through immersive VR-BIM experiences.
2. **Technical Feasibility:** The developed system demonstrates successful integration of multi-disciplinary building systems within interactive VR environments, though implementation costs remain substantial.
3. **Pedagogical Innovation:** The framework represents a significant advancement in construction education methodology, transitioning from traditional 2D visualization to immersive, interactive learning experiences.

4. Industry Alignment: The system addresses critical industry requirements for BIM-competent graduates while preparing students for the increasingly digital construction industry.

Recommendations for Implementation:

1. Phased Adoption: Institutions should consider gradual implementation beginning with pilot programs in selected courses.
2. Collaborative Development: Multi-institutional partnerships can distribute development costs and share technical expertise.
3. Faculty Development: Comprehensive training programs are essential for successful VR-BIM integration.
4. Infrastructure Planning: Institutions must invest in appropriate technical infrastructure and ongoing technical support.

This research contributes to the growing understanding of immersive technologies in engineering education and provides a validated framework for institutions seeking to modernize their construction engineering curricula. As VR technology costs continue to decline and industry BIM adoption accelerates, the educational applications demonstrated in this study will become increasingly accessible and essential for preparing construction engineering graduates for professional practice.

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Enhancing Teachers' Artificial Intelligence Literacy through AI-Based Teaching Material Revitalization Training

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Abstract. This study reports on a community service program aimed at enhancing teachers' artificial intelligence (AI) literacy through AI-based teaching material revitalization training at SMK Negeri 2 Sewon, Indonesia. The program was designed to address the limited understanding and application of AI among vocational school teachers, many of whom still relied on conventional teaching resources. The training, conducted over four consecutive days with 60 participating teachers from various disciplines, employed a participatory and hands-on approach. Learning activities included lectures, demonstrations, group discussions, and practical assignments focused on AI applications for learning, assessment, administration, and teacher innovation. The evaluation results revealed a significant improvement in teachers' AI literacy, with an average increase of 34.9% in pre- and post-test scores. Furthermore, 78% of the participants successfully produced innovative AI-based teaching materials, ranging from interactive modules to adaptive content aligned with student needs. Participant satisfaction was also high, with an average score of 87.5%, indicating the training's relevance, usefulness, and effective delivery. These findings demonstrate that structured and practice-oriented AI training can substantially enhance teachers' competence in integrating AI into their teaching practice. The program not only improved teachers' conceptual understanding but also fostered confidence and creativity in developing innovative instructional materials. Future initiatives should extend the duration of practice sessions and provide follow-up workshops to ensure sustainability and broader adoption of AI in vocational education.

INTRODUCTION

The rapid advancement of digital technology in the 21st century has profoundly influenced various aspects of human life, including the field of education¹. Among these advancements, Artificial Intelligence (AI) has emerged as a transformative force with significant potential to reshape teaching and learning practices². In education, AI is increasingly recognized for its capacity to support adaptive learning, provide personalized instruction, streamline assessment processes, and reduce teachers' administrative burdens³. These opportunities make AI an essential tool to enhance both instructional quality and the overall learning experience in the digital era⁴.

Vocational schools (Sekolah Menengah Kejuruan/SMK) play a pivotal role in preparing students to meet the demands of an ever-evolving workforce⁵. Teachers in vocational schools are expected not only to master subject-specific content but also to effectively integrate technology into their teaching practices⁶. However, in many contexts, teachers still face challenges in adopting and utilizing AI-based solutions⁷. Preliminary observations conducted at SMK Negeri 2 Sewon revealed that most teachers continue to rely on conventional teaching materials, such as printed modules and basic presentations. While digital technologies have been used to some extent, their application remains limited and does not yet leverage AI's full potential for innovative teaching and learning.

This gap between the technological skills of teachers and the learning needs of students, particularly Generation Z learners who are highly familiar with digital environments, highlights the urgency of equipping teachers with AI literacy⁸. Furthermore, the implementation of the Merdeka Belajar curriculum in Indonesia emphasizes 21st-century skills, including critical thinking, creativity, collaboration, and communication (4C), as well as digital and data literacy. Without adequate knowledge and confidence in applying AI, teachers may struggle to design engaging, relevant, and future-oriented learning experiences for their students⁹.

In response to this need, a community service program (PkM) entitled "Revitalization of Teaching Materials through Artificial Intelligence Application at SMK Negeri 2 Sewon" was conducted. The program aimed to enhance teachers' AI literacy through a structured training that combined conceptual understanding with practical application. The training introduced teachers to AI fundamentals, explored its applications in education, and provided hands-on experience in developing AI-based teaching materials. By adopting a participatory and applied approach, the program sought not only to improve teachers' knowledge but also to foster innovation and confidence in implementing AI in their professional practice¹⁰.

This paper reports on the implementation and outcomes of the training. Specifically, it examines the extent to which the program improved teachers' AI literacy, encouraged the development of AI-based innovative teaching materials, and contributed to teachers' satisfaction and motivation. The findings are expected to offer valuable insights for future initiatives aimed at strengthening AI literacy among educators, particularly in vocational education contexts, to ensure alignment with the demands of the digital age and the goals of sustainable quality education.

LITERATURE REVIEW

Artificial Intelligence (AI) has been defined as the ability of computer systems to perform tasks that typically require human intelligence, such as learning, reasoning, problem-solving, and decision-making¹¹. In recent years, rapid advances in machine learning, natural language processing, and big data analytics have broadened AI's applicability across multiple sectors, including education¹². Within education, AI is widely recognized for its potential to improve instructional practices, support personalized learning, and provide new opportunities for assessment and administration¹³.

In the context of teaching and learning, AI offers several key contributions¹⁴. First, it enables adaptive and personalized learning, allowing instructional content to be tailored to individual students' abilities, pace, and learning styles³. Second, AI-based tools can assist in automating assessments and generating real-time feedback, thereby supporting more objective evaluation processes¹⁵. Third, AI reduces administrative burdens by automating repetitive tasks, enabling teachers to dedicate more time to meaningful interactions with students¹³. Collectively, these contributions align with global educational priorities, such as the United Nations' Sustainable Development Goal (SDG) 4, which emphasizes inclusive and equitable quality education for all¹⁶.

Despite its potential, the integration of AI in education faces challenges¹⁷. In Indonesia, barriers include limited teacher digital literacy, insufficient infrastructure, and a lack of targeted training on practical AI applications¹⁸. Many teachers perceive AI as a complex and intimidating technology, which discourages experimentation and adoption in classroom practice¹⁹. To address this, training programs must be designed to build both confidence and competence, with a focus on practical applications that are directly relevant to teachers' instructional needs²⁰.

The concept of AI literacy has emerged as a critical foundation for successful AI integration in education²¹. AI literacy refers to the knowledge, skills, and dispositions needed to understand, evaluate, and use AI responsibly and effectively²². Key dimensions of AI literacy include understanding AI concepts and limitations, critically evaluating ethical implications, applying AI tools in educational practice, and fostering agency in promoting equitable and ethical AI use²³. For teachers, developing AI literacy not only enhances their instructional capabilities but also positions them as role models in guiding students toward responsible engagement with AI technologies²⁴.

Teacher training is central to developing AI literacy²⁵. According to the Technology Acceptance Model²⁶, individuals are more likely to adopt new technologies if they perceive them as useful and easy to use. Thus, training programs that demonstrate AI's practical benefits for teaching and learning, while also simplifying its application, are crucial for encouraging adoption²⁷. Furthermore, the Kirkpatrick Model of training evaluation provides a framework for assessing the effectiveness of such programs across four levels: reaction, learning, behavior, and results²⁸. Applying this framework allows for a comprehensive understanding of how training impacts teachers' knowledge, practices, and outcomes in their educational environments.

Overall, previous studies emphasize that empowering teachers with AI literacy through structured, practice-oriented training can bridge the gap between technological advancements and classroom implementation²⁹. Such initiatives are particularly significant in vocational schools, where preparing students for the future workforce demands that teachers stay at the forefront of digital and technological innovation.

METHODOLOGY

This study employed a community-based training approach within the framework of a community service program (Pengabdian kepada Masyarakat/PkM) at SMK Negeri 2 Sewon, Bantul, Yogyakarta. The purpose was to enhance teachers' AI literacy and their ability to revitalize teaching materials using AI-based tools. The research method consisted of several stages, namely preparation, implementation, and evaluation.

Research Design

The study adopted a pre-experimental design with a one-group pre-test and post-test approach. This design was chosen to capture the measurable changes in teachers' AI literacy before and after the training intervention. Through this method, researchers were able to identify not only the level of improvement but also the areas of AI literacy where the most significant progress occurred. To strengthen the findings, quantitative data were complemented with qualitative evidence such as observations of participants' engagement and reflections from open-ended feedback. This triangulation of data ensured that the results were not only statistically valid but also rich in contextual understanding³⁰, making the study more comprehensive and aligned with best practices in educational research.

Participants

The participants of this study were 60 teachers from SMK Negeri 2 Sewon, representing a variety of subject areas, including vocational, science, and humanities disciplines. Participants were selected purposively with the consideration that they were actively teaching and directly involved in the preparation of teaching materials. Such diversity allowed the training to address different pedagogical needs while fostering cross-disciplinary collaboration. Importantly, all 60 teachers completed the entire four-day training program, ensuring a 100% response rate for the instruments administered. This high level of participation indicated both the relevance of the training content and the strong motivation of teachers to enhance their technological competence in line with current educational demands.

Training Procedure

The training was carried out over four consecutive days (28–31 July 2025), with a total of 32 contact hours. The procedure was designed to be both participatory and practice-oriented, ensuring that participants were actively engaged rather than passively receiving information. On the first day, participants were introduced to fundamental concepts of Artificial Intelligence and its role in education, providing a shared baseline of understanding. The second day focused on the practical application of AI in classroom teaching and assessment, including demonstrations of AI-powered learning platforms. On the third day, teachers explored the use of AI for educational administration and innovation, reflecting the multifaceted roles of teachers beyond classroom instruction. Finally, the fourth day emphasized teachers' self-development with AI tools and concluded with an assignment that required each participant to design or revise a teaching material using AI applications. This sequence ensured a progressive deepening of knowledge, from conceptual to applied, and from individual to institutional relevance. **TABLE 1** presents the schedule of the four-day AI Literacy training program, including topics, facilitators, and duration.

TABLE 1. Training Schedule of AI Literacy Program.

Day & Date	Topic/Material	Resource Person(s)	Duration
Day 1 (28 July)	Introduction to AI	Prof. Herman Dwi Surjono	4 hours
Day 1 (28 July)	AI Concepts	Dr. Sigit Pambudi	4 hours
Day 2 (29 July)	AI for Teaching	Dzul Fadli Rahman	4 hours
Day 2 (29 July)	AI for Assessment	Teguh Puji Widiyanto	4 hours
Day 3 (30 July)	AI for Educational Administration	Akhsin Nurlyayli	4 hours
Day 3 (30 July)	Teacher Innovation with AI	Zaenal Mustofa	4 hours
Day 4 (31 July)	AI for Teachers' Self-Development	Totok Sukardiyono	4 hours
Day 4 (31 July)	Teaching Material Assignment & Review	Training Team & Facilitators	4 hours

Instruments

To collect comprehensive data, this study employed three different instruments. The first instrument was the AI Literacy Questionnaire, which was adapted from Mills et al.²². It consisted of items measured on a five-point Likert scale (1–5) across five key dimensions: (1) understanding AI concepts and limitations, (2) evaluating AI critically in terms of accuracy, bias, and ethics, (3) applying AI in teaching and learning practices, (4) agency and responsibility in using AI fairly, and (5) integration of AI into education. This questionnaire was administered before and after the training to assess the improvement of teachers' AI literacy.

The second instrument was the Teaching Material Assignment, which required participants to design or revise at least one teaching resource utilizing AI applications, such as automated text generation, assessment tools, or visual media creation. The outputs were then assessed based on their level of innovation, relevance to the subject

matter, and alignment with ethical standards in education. This instrument was essential in determining the extent to which teachers could apply the knowledge and skills gained during the training to create tangible educational products.

The third instrument was the Training Evaluation Survey, designed using the Kirkpatrick Level 1 framework²⁸. It evaluated participants' reactions to the training in terms of content, delivery, facilitators, and overall usefulness. The survey also provided insights into participants' satisfaction, perceived benefits, and suggestions for future improvement.

The three instruments were complementary: the questionnaire captured changes in knowledge and attitudes, the assignment demonstrated practical skills, and the evaluation survey revealed participants' perceptions and satisfaction. Together, they provided a comprehensive picture of the effectiveness of the training program. **TABLE 2** shows the instruments used in this study to collect quantitative and qualitative data from participants.

TABLE 2. Research Instruments and Their Purpose.

Instrument	Purpose	Scale/Format
AI Literacy Questionnaire	Measuring teachers' knowledge, skills, and attitudes before and after training	Likert scale (1–5), 5 dimensions
Teaching Material Assignment	Evaluating teachers' ability to apply AI in developing teaching resources	Product assessment (innovation, relevance, ethics)
Training Evaluation Survey	Measuring teachers' satisfaction with the training	Likert scale (1–5), Kirkpatrick Level 1

Data Analysis

Quantitative data from the AI Literacy Questionnaire were analyzed using descriptive statistics and percentage gain scores to identify improvements in teachers' literacy levels. The results of the teaching material assignments were categorized into three levels: innovative, basic, and incomplete. **TABLE 3** presents the criteria used to evaluate teachers' AI-based teaching materials, categorized into innovative, basic, and incomplete outputs.

TABLE 3. Criteria for Evaluating AI-Based Teaching Materials.

Category	Description	Indicator Example
Innovative	AI-based teaching material is interactive, adaptive, and highly relevant	Interactive quizzes, adaptive learning modules
Basic	AI used in a simple way (summarization, illustration, or test item creation)	Generated summaries, visual illustrations
Incomplete	Product not completed or not integrated with AI tools	Draft without AI application

Meanwhile, qualitative data from observations and open responses were thematically analyzed to provide contextual insights into teachers' engagement, challenges, and recommendations.

Ethical Considerations

All participants provided consent to participate voluntarily in the program. The study ensured confidentiality of responses and emphasized that the training outputs were used solely for academic and developmental purposes.

RESULTS AND DISCUSSION

The training program on AI-based teaching material revitalization at SMK Negeri 2 Sewon was carried out successfully and involved a total of 60 teachers from different subject areas. The results presented in this section highlight both the quantitative and qualitative findings obtained through pre- and post-test questionnaires, teaching material evaluations, and training satisfaction surveys. The discussion also connects these findings with relevant theories and previous studies to provide a broader interpretation of the outcomes.

Overall, the results demonstrate that the program not only improved teachers' knowledge of AI concepts but also enhanced their confidence and creativity in integrating AI into their professional practices. Teachers showed strong engagement during the training, as indicated by full attendance, active participation in discussions, and the successful completion of assignments. The outcomes can be categorized into three main aspects: (1) the improvement of teachers' AI literacy, (2) the development of AI-based teaching materials, and (3) the evaluation of teachers' satisfaction with the training.

Improvement of Teachers' AI Literacy

To evaluate the effectiveness of the training, teachers' AI literacy levels were measured before and after the program using a standardized questionnaire. The assessment focused on three dimensions: conceptual understanding of AI, application of AI in teaching, and awareness of ethical issues in AI use. **TABLE 4** shows the comparative results of teachers' AI literacy before and after the training, indicating substantial improvements across all dimensions.

TABLE 4. Improvement in Teachers' AI Literacy.

Literacy Aspect	Pre-Test Mean	Post-Test Mean	Gain Score	Percentage Increase
Understanding of AI Concepts	2.95	4.08	+1.13	38%
Application of AI in Teaching	3.10	4.16	+1.06	34%
Awareness & Agency in AI Use	3.25	4.01	+0.76	23%
Overall Average	3.12	4.21	+1.09	34.9%

The results indicate that the most significant improvement occurred in understanding AI concepts (38%), suggesting that the training effectively addressed the knowledge gap among teachers. Improvements were also evident in applying AI to teaching practices (+34%), while the increase in ethical awareness and agency (+23%) indicates the beginning of critical reflection on responsible AI use in education. These findings align with the Technology Acceptance Model (Davis, 1989), showing that once teachers perceive AI as useful and manageable, their adoption willingness increases.

Development of AI-Based Teaching Materials

Beyond measuring literacy levels, the program also emphasized practical application by assigning teachers to develop or revise teaching materials using AI tools. The purpose of this assignment was to ensure that teachers could translate their newly acquired knowledge into innovative classroom practices. **FIGURE 1** categorizes the teachers' AI-based teaching materials into innovative, basic, and incomplete products.

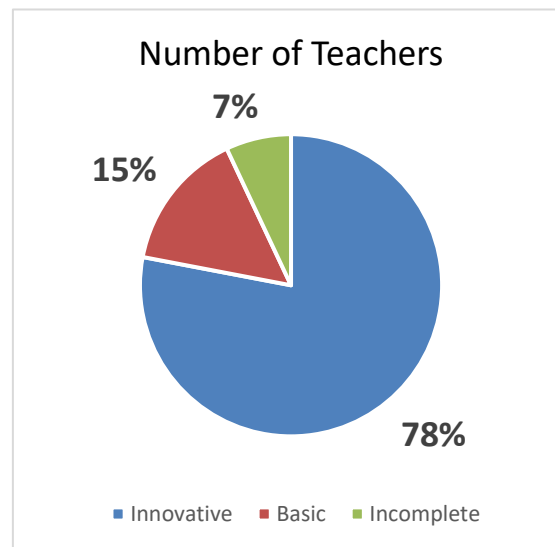


FIGURE 1. Outcomes of Teachers' AI-Based Teaching Materials.

The majority of teachers (78%) successfully produced innovative materials, demonstrating their ability to apply AI beyond simple tasks. This finding underscores the training's effectiveness in bridging theory and practice. However, 7% of teachers failed to complete the assignment, largely due to limited digital skills or inadequate device performance. These challenges highlight the need for differentiated follow-up support.

Teachers' Satisfaction with Training

In addition to literacy improvement and teaching material development, the study also explored teachers' satisfaction with the training. Their feedback was collected using a survey based on Kirkpatrick's Level 1

(reaction), covering aspects such as training content, facilitator performance, delivery methods, and overall usefulness. **FIGURE 2** presents the evaluation results of teachers' satisfaction with the AI training program.



FIGURE 2. Teachers' Satisfaction with the Training Program.

The highest score was obtained for the quality of trainers (89%), indicating that the competence and clarity of the facilitators strongly contributed to participants' engagement. The relatively lower score in methods and delivery (86%) suggests that participants expected more time for hands-on practice, confirming the importance of practice-based learning in teacher training.

Discussion

The findings of this study confirm that targeted, practice-oriented AI training can substantially enhance teachers' literacy and confidence in applying AI to teaching. The observed 34.9% overall increase in AI literacy resonates with earlier studies that emphasize the necessity of structured training for teachers to engage meaningfully with emerging technologies³¹.

Moreover, the fact that 78% of teachers produced innovative AI-based teaching materials demonstrates the training's success in moving beyond theoretical knowledge to practical application. This supports the view of Li et.al.³², who argued that AI in education is most impactful when teachers are empowered to use it creatively.

However, some challenges remain, particularly for teachers with limited digital literacy or device constraints. This suggests that future training should adopt a tiered approach, offering differentiated support and extended time for hands-on practice. Establishing a teacher community of practice around AI could also foster sustainable adoption and peer-to-peer learning.

In sum, the program was effective in improving AI literacy, enhancing teaching material innovation, and achieving high participant satisfaction. It provides a scalable model for professional development programs aimed at preparing teachers for the challenges of digital transformation in education.

CONCLUSION AND RECOMMENDATION

The findings of this study demonstrate that the AI-based training program conducted at SMK Negeri 2 Sewon was successful in enhancing teachers' literacy and competence in utilizing artificial intelligence for educational purposes. The overall literacy of participants increased by 34.9 percent, particularly in the areas of conceptual understanding and the application of AI in teaching practices. This improvement confirms that structured and practice-oriented training can effectively bridge the gap between technological advancements and classroom realities. Furthermore, the majority of teachers, approximately 78 percent, were able to produce innovative AI-based teaching materials, showing that the training not only strengthened knowledge but also translated into practical instructional outputs. The high level of satisfaction reported by participants, with an overall score of 87.5 percent, further indicates that the program met their professional development needs and was facilitated in an engaging and relevant manner.

Despite these achievements, the study also identified areas for further development. Teachers expressed the need for longer sessions devoted to practical exploration, as limited time was a challenge for those with varying levels of digital competence. Some participants also encountered constraints related to device performance and internet stability, which affected the depth of their engagement with AI tools. These challenges suggest that future training should adopt a more differentiated approach, offering tiered modules for beginners, intermediate, and advanced users, as well as additional support to ensure inclusivity. The establishment of a teacher community of practice focused on AI is also recommended as a way to sustain momentum, encourage peer-to-peer learning, and foster innovation beyond the duration of the program. Moreover, while the training touched upon ethical considerations, a stronger emphasis on issues such as bias, data privacy, and fairness in AI use will be crucial for equipping teachers not only as users of technology but also as role models for responsible digital practices.

In conclusion, this program demonstrates the strategic importance of empowering teachers with AI literacy to revitalize teaching materials and innovate classroom practices in vocational education. The success of this initiative suggests its potential scalability to other institutions, contributing to broader educational transformation in line with the goals of Merdeka Belajar and the United Nations Sustainable Development Goal 4 on quality education. By continuing and expanding such programs, teachers can be positioned as active agents of digital transformation, ensuring that education remains relevant, equitable, and future-oriented in the era of artificial intelligence.

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FOSTERING SOCIAL COMMUNICATION SKILLS IN FRENCH LANGUAGE LEARNING THROUGH CDA OF JP GEE'S APPROACH

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Abstract. This study investigates the development of social communication skills in French language learning using James Paul Gee's Critical Discourse Analysis (CDA) model. Focusing on six Task Building dimensions—Semiotic, World, Activity, Identity, Relationship, and Political Building—the research examines how classroom interactions facilitate meaning negotiation, identity construction, social relationships, and awareness of power dynamics. Data were collected through classroom observations, transcripts of instructor-student interactions, and video recordings in a French course at Universitas Negeri Yogyakarta. Findings indicate that narrative tasks, collaborative group work, and scaffolded activities enhance students' linguistic competence, pragmatic understanding, and socio-cultural awareness. The study highlights the role of task-based, CDA-informed instruction in fostering learners' identity, agency, and reflective engagement in social contexts. These results suggest that integrating CDA into French language teaching promotes more communicative, interactive, and socially responsive learning environments.

Keywords: Social communication skills, French language learning, Critical Discourse Analysis, Task-Based Learning, Task Building, Identity, Classroom interaction, Sociocultural awareness, Gee's model

BACKGROUND

Foreign language learning emphasizes not only mastery of linguistic structures but also the development of effective social communication skills. In university-level French learning, students are expected to use the language functionally in everyday interactions, such as class discussions and project-based activities. Social communication competence in language learning involves cognitive, affective, and sociocultural aspects, allowing students to express identity and build social relationships through language [1].

However, language teaching often focuses primarily on grammar and vocabulary, leaving social communication underemphasized. As a result, students may struggle to negotiate meaning, understand social contexts, and engage in authentic interaction. To address these challenges, James Paul Gee's CDA model provides a conceptual framework that emphasizes six Task Building dimensions: Semiotic, World, Activity, Identity, Relationship, and Political Building. These dimensions allow in-depth analysis of language use for constructing meaning, identity, social interaction, and critical awareness [2].

This study aims to analyze how using the CDA model in French language learning can enhance students' social communication skills. Using transcripts of interactions between an instructor and students, the study examines language use in teaching contexts and its impact on identity, social relationships, and student participation. The findings are expected to contribute to the development of more communicative and socially interactive language learning strategies.

LITERATURE REVIEW

Language learning is not merely the acquisition of grammatical rules and vocabulary but also the development of social communication skills that allow learners to interact effectively in diverse contexts. Research has shown that social interaction, identity negotiation, and awareness of cultural and situational norms are central to achieving communicative competence. This literature review explores the role of social communication in language learning, with a particular focus on French, and examines how James Paul Gee's CDA model provides a framework for analyzing linguistic, social, and identity-related aspects of classroom interaction. Additionally, the review highlights the importance of teacher-student interaction and feedback in supporting students' social and linguistic development.

1. Social Communication in Language Learning

Social communication competence is increasingly recognized as a central component in successful language learning. Traditional approaches to language teaching often emphasize grammatical rules, vocabulary acquisition, and translation exercises. However, contemporary research in applied linguistics underscores that language learning is fundamentally a social process [3]. Effective language acquisition requires learners to engage in meaningful communication, negotiate meaning, interpret non-verbal cues, and adapt language to specific social contexts. For example, a learner in a French classroom does not merely learn to use *bonjour* or *merci*; they must also understand when these forms are socially appropriate, who the interlocutors are, and what level of formality or politeness is expected.

Social communication competence extends beyond mere verbal proficiency. It encompasses pragmatic awareness, cultural understanding, and collaborative skills. Through interactive activities, such as group discussions, role-playing, and storytelling, students develop the ability to adjust language according to the interlocutor, context, and communicative purpose. For instance, in peer-to-peer conversations, learners negotiate meaning by clarifying misunderstandings, asking questions, and paraphrasing, which promotes not only linguistic accuracy but also social awareness. These interactive experiences help learners construct social identities and learn to navigate interpersonal dynamics in the target language.

2. CDA Model of Literacy (James Paul Gee)

James Paul Gee's *Critical Discourse Analysis (CDA) model of literacy* provides a comprehensive framework for understanding language learning as a socially situated process. Gee proposed six dimensions of literacy that go beyond textual interpretation and highlight the role of social context, identity, and power in communication [2]. The first dimension, semiotic building, emphasizes the understanding and use of signs, symbols, and linguistic forms. In the classroom, this involves interpreting words, grammatical markers, gestures, and visual cues to construct meaning. For example, learners must differentiate between *depuis* and *pendant* in French, understanding not only their grammatical differences but also how these forms convey temporal relationships within social narratives.

The second dimension, world building, considers the context, real or imagined, in which language is used. Language learners create and inhabit worlds through discourse, whether by describing personal experiences, imagining fictional scenarios, or participating in cultural simulations. For example, students might craft a story about a French-speaking character's daily life, negotiating events, motivations, and temporal sequences in authentic ways.

Activity building focuses on the structure and organization of learning tasks, emphasizing interaction patterns and participation. Classroom activities such as debates, role-plays, and collaborative projects foster engagement and allow learners to apply language knowledge in meaningful contexts. Through such activities, students learn to manage turn-taking, provide feedback, and coordinate tasks with peers.

Identity building relates to the negotiation of individual and social identities through language. Learners express personal traits, cultural affiliations, and social roles, which contributes to their development as competent language users. In French language learning, students might assume the identity of a character or adopt a particular social role in a conversation, thereby exploring multiple perspectives and practicing linguistic flexibility.

Relationship building examines the construction of social relationships and interactional dynamics. Language learning is inherently relational; students negotiate friendships, hierarchies, and collaborative roles through discourse. Instructors and peers shape the communicative environment, influencing learners' confidence and willingness to participate. For instance, the use of polite forms (*vous* vs. *tu*) illustrates how French learners navigate relational subtleties.

Finally, political building addresses the regulation of participation and power relations in language use. Classrooms reflect broader social structures, where teachers control access to resources, turn-taking, and evaluation authority. Awareness of these dynamics helps learners understand how language functions as a tool of power and social positioning [2,4]. Gee's CDA framework is particularly relevant for language education because it provides a holistic lens that integrates linguistic knowledge, social interaction, and identity formation. Applying

this model in classrooms allows educators to design activities that foster not only grammatical competence but also social and cultural literacy.

3. French Language Learning and Social Skills

In the context of French language learning, developing social communication skills is closely linked to understanding linguistic structures, particularly temporal expressions. Words and phrases like *depuis*, *pendant*, and *ça fait* carry grammatical meaning but also encode temporal and contextual nuances critical for meaningful communication [5]. For instance, students practicing *depuis* learn to describe ongoing actions in a way that reflects real-world timeframes, while *pendant* indicates completed or bounded events.

Activities designed around these linguistic forms promote collaborative learning and narrative construction. Students might work in pairs or groups to create fictional stories, negotiate event sequences, or describe daily routines of imagined characters. Through these tasks, learners practice clarifying meaning, asking for explanations, and building coherent narratives, all of which enhance social communication skills. Additionally, such collaborative exercises encourage peer feedback, critical thinking, and cultural awareness, helping learners understand not only what is linguistically correct but also what is socially and pragmatically appropriate.

Moreover, the integration of authentic tasks, such as role-playing a conversation in a café or planning a fictional travel itinerary in Paris, situates language learning in realistic social contexts. These activities mirror real-life interactions, providing learners with opportunities to practice negotiation of meaning, perspective-taking, and cooperative problem-solving. The combination of linguistic and social learning reflects a core principle of communicative language teaching, emphasizing that mastery of language involves both correctness and appropriateness.

4. Teacher-Student Interaction and Feedback

Teacher involvement is crucial in facilitating social communication in the language classroom. Instructors act as guides, mediators, and evaluators, providing feedback that supports learners' linguistic and social development [6]. Effective feedback includes correcting errors, suggesting alternative expressions, and modeling socially appropriate language use. For example, when a student misuses *ça fait deux ans que...*, a teacher may clarify its temporal usage while encouraging the student to complete the sentence within a narrative context.

The teacher's role aligns closely with the Relationship and Political Building dimensions of Gee's CDA model. Classroom interactions are inherently hierarchical, with teachers holding authority over participation, evaluation, and interaction management. However, when instructors adopt supportive and facilitative approaches, they empower students to participate actively, negotiate meaning, and take ownership of their learning. Collaborative and dialogic teaching practices enhance learner motivation, increase classroom engagement, and foster an environment where social communication skills can flourish.

Furthermore, teacher-mediated interactions encourage reflective learning. When students receive feedback on both linguistic accuracy and social appropriateness, they learn to self-monitor, adjust strategies, and internalize social norms of communication. In French classrooms, this may involve refining the use of polite forms, mastering turn-taking in conversations, or adapting language for different interlocutors. Over time, these experiences contribute to the development of pragmatic competence, intercultural sensitivity, and communicative confidence.

METHODOLOGY

This study employed a qualitative descriptive design, focusing on verbal interaction analysis in French language learning. This approach allows in-depth examination of language use, meaning construction, identity negotiation, social relationships, and power dynamics in classroom contexts [7]. Research Subjects are one French native speaker responsible for teaching, facilitating discussion, providing feedback, and conducting interactive activities and 28 fourth-semester students from the French Education program at Universitas Negeri Yogyakarta, participating in grammar exercises, narrative construction, and group discussions.

Data were collected in the French language classroom at Universitas Negeri Yogyakarta during a 1 hour 36 minutes regular class session. I use 3 types of data collection, they are (a) observing instructor-student interactions and noting verbal and non-verbal behavior, (b) converting all classroom conversations into written transcripts, and (c) video recordings and field notes to capture gestures, facial expressions, and social dynamics. Data were analyzed using Gee's CDA model, focusing on six Task Building dimensions [2], they are (a) semiotic building: Identification of signs, symbols, and linguistic forms, (b) world building: Examination of grammar usage in real or imagined contexts, including fictional narratives, (c) activity Building: Analysis of task structures and student-instructor interactions, (d) identity Building: Evaluation of identity negotiation in classroom discourse, (e) relationship building: Analysis of social relationships and classroom interaction dynamics, and (f) political building: Examination of authority, participation regulation, and classroom governance.

FINDINGS AND DISCUSSION

Findings

The analysis of classroom interactions reveals how students develop linguistic, social, and cognitive skills through various activities. Each of the six classroom “buildings” — Semiotic, World, Activity, Identity, Relationship, and Political — highlights specific dimensions of learning and engagement. The findings demonstrate how students negotiate meaning, apply grammar in context, and interact collaboratively to build competence. Table 1 summarizes the key findings from each building, providing an overview of students’ learning outcomes.

Table 1. Summary of Analysis of Student Learning Outcomes Based on Six Classroom “Buildings

Building	Focus / Introduction	Key Findings
Semiotic Building	Interpretation of linguistic signs; links grammar and temporal expressions to meaning; develops metalinguistic awareness.	Students negotiate meaning, adjust temporal expressions, enhance communicative competence, and develop cognitive awareness of grammar. Activities support narrative construction, metalinguistic awareness, and recognition of temporal nuances.
World Building	Use of language in real/imagined contexts; promotes creativity, critical thinking, and pragmatic competence.	Students contextualize temporal expressions, organize events chronologically, build confidence with complex expressions, enhance linguistic flexibility, strengthen sociocultural understanding, and foster collaborative dialogue.
Activity Building	Tasks designed for collaboration, practical grammar use, and active engagement.	Structured tasks enhance collaborative learning, reduce errors, improve pragmatic skills and motivation, promote co-constructed knowledge, increase participation and engagement, and provide immediate feedback opportunities.
Identity Building	Language-mediated identity construction; links linguistic performance to self-perception and social roles.	Students develop identity as competent speakers, gain confidence, improve autonomy, strengthen self-reflection, foster learner autonomy, and adapt to various communicative situations.
Relationship Building	Peer and instructor interactions; supports engagement, motivation, and socio-emotional skills.	Collaborative tasks foster peer support, classroom cohesion, teamwork, and active participation. Activities enhance social bonds, develop socio-emotional competence, and support a positive learning climate.
Political Building	Awareness of power, authority, and social norms in language use; encourages critical reflection.	Students navigate classroom hierarchies, negotiate norms, develop political awareness and critical thinking, promote critical reflection, encourage participation and decision-making, and understand social norms in classroom communication.

Discussions

The discussion section elaborates on the findings by examining how each building contributes to students’ language development and social engagement. It explores the mechanisms through which students construct meaning, negotiate roles, and develop identity in the classroom. The analysis also highlights the role of instructor guidance and task design in facilitating active participation and fostering metalinguistic awareness. By connecting the findings to theoretical principles of task-based and collaborative learning, this section provides a deeper understanding of how classroom activities support both linguistic and socio-emotional growth.

1. Semiotic Building

Semiotic Building focuses on how students interpret linguistic signs, symbols, and structures. In the context of the French language classroom, this skill is essential to ensure accurate understanding of temporal and grammatical meaning. Analyzing student interactions reveals the cognitive and strategic processes they use to connect language forms with functional meaning. Collaborative and narrative-based activities provide opportunities for students to apply language rules authentically while developing metalinguistic awareness. This approach aligns with principles of task-based and collaborative learning [5,8,20,21,22].

- (1) Instructor: “Ça fait 5 ans que je suis professeur aujourd'hui je suis encore professeur” (07:15)

"I have been a teacher for 5 years, and today I am still a teacher."

- (2) Student: "Depuis deux-mille-seize il est développé de technologie super-héros d'Avengers à New York" (48:26–48:37)
"Since 2016, superhero technology from the Avengers has been developed in New York."

This interaction illustrates students actively negotiating meaning and applying grammar in authentic narratives. Students attempt to adjust temporal expressions to fit the story context, demonstrating growing linguistic awareness. Instructor scaffolding helps them identify errors and refine narrative construction. The process also improves their ability to distinguish temporal nuances, which is essential for accurate communication. These activities support the development of social communication skills through peer discussions [5,20]. Additionally, metalinguistic awareness is enhanced as students compare correct and incorrect structures [8]. These findings are consistent with research showing that task-based learning strengthens fluency and communicative competence [21,22].

2. World Building

World Building emphasizes the use of language in real or imagined contexts. Students develop fictional narratives that integrate temporal expressions, linking grammar to situational meaning. This activity encourages creativity, linguistic flexibility, and critical thinking. Through imaginative scenarios, students learn to adapt language use according to social context and communication situations. The instructor's role as facilitator is crucial in guiding students to connect grammatical structures to situational meaning [5,21,22,23].

- (3) Student: "Pendant 3 ans Peter Parker...depuis deux-mille-seize il est développé de technologie super-héros d'Avengers à New York" (48:16–48:37)
"For 3 years, Peter Parker...since 2016, superhero technology from the Avengers has been developed in New York."
- (4) Instructor: "Voici tu dis pendant le matin jusqu'à l'après-midi...c'est du présent" (43:00–43:32)
"Here, you say 'during the morning until the afternoon'...that is present tense."

This example shows students' ability to contextualize temporal expressions within a fictional narrative. By linking characters and events chronologically, students learn to organize information coherently. Teacher guidance clarifies appropriate verb tense usage. The activity also fosters collaborative dialogue and meaning negotiation among peers. Developing imaginative narratives enhances pragmatic competence and sociocultural awareness [23]. Furthermore, it allows students to explore linguistic flexibility and build confidence in using complex expressions.

3. Activity Building

Activity Building analyzes how classroom tasks are designed to facilitate learning. Group tasks promote collaboration, scaffolding, and practical grammar application. This analysis highlights the connection between task structure and language skill development. Task-based activities encourage active participation and cognitive engagement. Well-structured tasks ensure meaningful interaction and immediate feedback from instructors [11,21,22,23].

- (5) Instructor: "Vous pouvez-vous mettre avec votre partenaire...vous allez travailler en groupe" (18:13–18:14)
"You can pair up with your partner...you will work in groups."
- (6) Instructor: "Si vous n'êtes pas sûr je peux vous aider" (22:30–22:47)
"If you are not sure, I can help you."

These examples illustrate how structured tasks facilitate collaborative learning and immediate feedback. Students engage in co-constructed knowledge through pair or group discussions. Instructor guidance reduces errors and enhances practical understanding of temporal expressions. Group activities also increase motivation by fostering a sense of belonging to the learning community. Through direct interaction, students practice grammar and vocabulary in authentic contexts. The approach reinforces pragmatic skills, contextual comprehension, and communicative competence [21,22,23].

4. Identity Building

Identity Building focuses on how students construct and negotiate identities through language. Narrative and story-based tasks allow learners to express themselves as competent French speakers. This interaction connects

linguistic performance with self-perception and social roles. Analysis reveals that language identity develops through active participation, feedback, and collaboration. These activities enhance learners' confidence, motivation, and autonomy [4,8,21].

- (7) Student: "Pendant 3 ans Peter Parker...depuis deux-mille-seize il est développé de technologie super-héros d'Avengers à New York" (48:16–48:37)

For 3 years, Peter Parker...since 2016, superhero technology from the Avengers has been developed in New York."

- (8) Instructor: "Voici tu dis pendant le matin jusqu'à l'après-midi...c'est du présent" (43:00–43:32)

"Here, you say 'during the morning until the afternoon'...that is present tense."

Students demonstrate identity construction as competent speakers through narrative tasks. The activity combines temporal expressions with creative storytelling, allowing learners to negotiate social roles. Teacher feedback guides students to correct errors and enhance linguistic performance. Interaction promotes self-reflection and awareness of their language competence. Active participation in group discussions strengthens confidence and motivation. The process also fosters learner autonomy and adaptability in various communicative situations [4,8,21].

5. Relationship Building

Relationship Building emphasizes peer and instructor interactions in the classroom. Group activities facilitate negotiation, feedback, and social bond formation. Positive relationships support engagement, motivation, and effective learning. Social interactions in the classroom not only aid linguistic achievement but also develop socio-emotional skills. Task-based learning provides opportunities for productive collaboration [5,6,12,21,22,23].

- (9) Instructor: "Vous pouvez-vous mettre avec votre partenaire...vous allez travailler en groupe" (18:13–18:14)

"You can pair up with your partner...you will work in groups."

- (10) Instructor: "Si vous n'êtes pas sûr je peux vous aider" (22:30–22:47)

"If you are not sure, I can help you."

Collaborative tasks encourage supportive peer interaction and strengthen classroom cohesion. Students negotiate meaning and provide constructive assistance to each other. Instructor guidance fosters a safe and inclusive learning environment, encouraging active participation. These activities develop teamwork, shared responsibility, and socio-emotional competence. Interactions also enhance students' motivation and engagement.

6. Political Building

Political Building investigates power relations and social contexts in language use. It examines how students navigate authority, participation rights, and social norms through narrative activities. Task-based activities offer a safe environment for practicing decision-making, negotiation, and critical reflection. This approach promotes awareness of political and social dimensions in language learning. Critical Discourse Analysis (CDA) is useful for understanding power and participation in classroom communication [13,24,25].

- (11) Student: "Depuis deux-mille-seize il est développé de technologie super-héros d'Avengers à New York" (48:26–48:37)

"Since 2016, superhero technology from the Avengers has been developed in New York."

Students demonstrate the ability to express ideas within classroom hierarchies, reflecting understanding of authority and participation rights. Language use in narratives reveals subtle negotiation of social norms. CDA helps identify learners' awareness of social context and power structures in communication. Task-based narrative activities allow students to take active roles, voice opinions, and practice critical reflection. These activities provide a safe space to experiment with language and social negotiation. This process supports the development of political awareness, critical thinking, and communicative competence [24,25].

CONCLUSION AND IMPLICATIONS

This study has shown that employing James Paul Gee's Critical Discourse Analysis (CDA) model in French language learning effectively fosters students' social communication skills. By analyzing classroom interactions through the six Task Building dimensions—Semiotic, World, Activity, Identity, Relationship, and Political

Building—learners engaged in narrative construction, collaborative group work, and scaffolded activities demonstrated enhanced linguistic competence, pragmatic understanding, and socio-cultural awareness [5,8,20–25]. Semiotic and World Building activities allowed students to contextualize temporal expressions within meaningful scenarios, while Activity and Identity Building promoted co-constructed learning and authentic self-expression. Relationship and Political Building further facilitated peer collaboration, instructor guidance, and critical reflection on power dynamics in classroom discourse [12,13,24,25].

The findings indicate that task-based and CDA-informed instruction enables learners to negotiate meaning, express identity, build social relationships, and develop awareness of classroom hierarchies. These outcomes highlight the inseparable connection between language proficiency and social competence, emphasizing the value of integrating cognitive, affective, and socio-cultural dimensions in language teaching [4,5,8,21].

This study has the pedagogical implications like (a) language educators should design task-based activities that integrate cognitive, social, and cultural elements to enhance communicative competence, (b) collaborative learning, including group work and peer interaction, should be emphasized to strengthen social bonds and learner engagement [12,21–23], and (c) CDA-informed approaches provide a framework for monitoring and supporting students' identity construction, agency, and pragmatic skills, fostering reflective and socially aware language users [24,25].

Future research may investigate the longitudinal effects of CDA-based instruction across different proficiency levels or target languages, further exploring its potential to cultivate socially competent and reflective learners. Overall, integrating CDA into French language teaching contributes to more communicative, interactive, and socially responsive learning environments.

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Exploration Value of Justice Indonesian Language Text Book on SMA as Represent Internalisation Inklusif Education on Technology Artificial Intelligence (AI) Era

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Abstract : Subject on this observation is values of multiculturalism contained in Indonesian language textbook on SMA as Internalisation Inclusive Education , object for this observation is Indonesian language textbook class XI SMA. This research use record and writ it technique. Data analysis carried out according to Miles and Huberman steps which is data research, Data presentation, and drawing conclusion, observation result show Indonesian language textbook SMA class XI contain 40 data justice of value. Values of justice contained on aspect three which is intelligence , creative, and attitude wich represented on form Text, exercise, whether children reflective activity. Result value from justice emphasized if text book Indonesian has role as strategic Media on internalisation inclusive education. Indonesian language text book not just as resource of knowledge, but as foundation facility childrens character for the purpose the children ready live on inclusive environment on technology AI era, this value of justice implemented in a effective way through inclusive and personal learning. Integration text book embaded value justice and exploitation Technology AI Support created inclusive education with fair, equally, and focus on welfare all children.

Keywords : Value of Justice, Textbook, Inclusive Education AI

INTRODUCTION

Indonesia are country which have cultural diversity, etchnic, religion, and rich social. That diversity reflected on motto *Binneka Tunggal Ika* which is emphasized unity on diversity. This diversity being important asset to build national and state life. But, plurality which exist not always without obstacle, in practicum , diffrent background always impact potentio some social tension , such intolerance, discrimination, even bullying case on enviroment scholl that condition show if values of diversity not all internalized in young generation, although scholl should be strategic room to instill attitude for respect diversity on this topic, education have great responsibility to grow tolerance bahavior, inclusivity, and respect for diversity, one of relavan method is multiculturalism education

Through multiculturalism education, student not just get academic knowlege, but empathy, and fair manner, multiculturalism related to with justice for social concept such human right, nationality, identity, recognition, diversity, freedom, autonomy, decided, egalitarianism, Etc ¹. Justice is one part of multiculturalism be important thing every student must have the value of justice also plays a crucial role in the implementation of education. Justice is regarded as a positive attitude that encourages individuals to act for the common good and achieve well-being through orderly social life ². In education, justice not only entails equal opportunities to access meaningful learning but also encompasses respect for each student's rights without discrimination based on social, economic, cultural, or individual conditions. This principle aligns with the concept of inclusive education, which emphasizes equitable access, acceptance of differences, and the elimination of all forms of discrimination. Consequently, education grounded in justice not only equips students with cognitive knowledge but also cultivates character that upholds equality, respects the rights of others, and rejects all forms of injustice.

In line with this, inclusive education is based on the idea that every learner has the same right to educational opportunities, regardless of their background or personal circumstances. ³ explain that inclusive education is an educational system that provides equal opportunities for all children, including those with special needs or exceptional talents, to learn together in an equitable environment. The essence of inclusive education is to create a learning space that is equal, safe, and supportive for all students, without distinguishing cultural, ethnic, religious, socio-economic status, or special needs. Through this approach, schools serve not only as venues for knowledge delivery but also as arenas for cultivating humanistic values, such as tolerance, empathy, and

appreciation of diversity. Therefore, the implementation of inclusive education is closely related to the promotion of multicultural values and the principles of justice in the learning process.

As a concrete manifestation of this idea, the Kurikulum Merdeka has been introduced by the government as an effort to strengthen educational practices that are just and diversity-oriented. This curriculum emphasizes flexibility, student-centeredness, and the fulfillment of every individual's right to acquire learning experiences that suit their needs and potential. Accordingly, the learning process focuses not only on cognitive achievement but also on character development that is tolerant, inclusive, and just.

Within this framework, textbooks occupy a very strategic position. Textbooks serve not only as sources of academic knowledge but also as important media for the internalization of social, cultural, moral, and humanistic values. As widely used tools by teachers and students, the content and messages within textbooks significantly influence students' mindsets, attitudes, and behaviors. Moreover, textbooks represent educational policy, as each reading theme, discourse, and illustration reflects the national education vision, including character strengthening and respect for diversity.

Previous studies indicate that textbooks can indeed serve as vehicles for promoting multicultural values. For example, found that Indonesian language textbooks for junior high school students contained multicultural values such as recognition of cultural plurality and fostering responsibility for environmental sustainability. Similarly, ⁴ examined Civic Education (PPKn) textbooks in senior high schools and found integration of multicultural values, including ethno-historical awareness, religious diversity, ethnocultural differences, tolerance, diversity, and respect for human rights.

Specifically, Indonesian language textbooks have significant potential to internalize values of justice and inclusivity. Through the presentation of reading texts, exercises, and relevant discourse, students can be guided to understand, appreciate, and internalize the diversity present in real life. Therefore, analyzing Indonesian language textbooks in senior high schools is important to examine the extent to which these values have been integrated and actualized in learning.

In the era of Artificial Intelligence (AI), opportunities to strengthen the internalization of justice values are increasingly available. AI can be used to provide adaptive, interactive, and personalized learning experiences, for example through adaptive exercises, reflective case simulations, or multimodal content combining text, audio, and visual elements. ⁵ explain that AI-based learning systems that provide personalized feedback and adaptive content significantly enhance student engagement and learning outcomes, demonstrating the effectiveness of AI in facilitating inclusive and just learning. In line with this, ⁶ emphasizes that the use of AI technology is important to support equality and inclusion in education, including through the development of tools capable of detecting and reducing bias in learning materials. This underscores that AI is not merely a pedagogical tool but also a strategic effort to achieve more equitable and fair education.

In this context, this study specifically selects Indonesian language textbooks for grade XI as they occupy a strategic position in senior high school education. Grade XI students are at a more mature cognitive and affective developmental stage, making them better prepared to receive and internalize social, moral, and multicultural values contained in textbooks. Additionally, the learning content for grade XI is designed not only to enhance language skills but also to broaden students' insights through various discourses rich in humanistic, diversity, and justice values. Therefore, selecting grade XI Indonesian language textbooks in this study is expected to provide a comprehensive overview of their contribution to the internalization of inclusive education in schools.

Thus, exploring justice values in grade XI Indonesian language textbooks in senior high schools, in connection with the utilization of AI technology, becomes highly relevant for study. This research aims not only to understand the justice values embedded in textbooks but also to examine how the integration of technology can support the internalization of inclusive education more effectively and equitably. The study is expected to make a meaningful contribution to the development of learning materials that are more just, inclusive, and relevant in the digital era, while also facilitating education that shapes students into socially aware and responsible individuals.

LITERATURE REVIEW

A. Multiculturalism

Multiculturalism is a concept and policy that acknowledges, respects, and celebrates cultural diversity within society. It emphasizes that individuals or groups within a country or community can have different cultural, religious, linguistic, ethnic, and traditional backgrounds, and that these differences should be recognized and respected as part of a larger social identity. Multiculturalism has become increasingly relevant in contemporary societies, particularly in countries with diverse ethnic, cultural, and religious populations, such as Indonesia.

Multiculturalism is closely related to the concept of social justice, including human rights, citizenship, identity, recognition, differences, freedom, autonomy, choice, egalitarianism, and others ¹. Therefore, multiculturalism requires every individual, along with their respective cultures, to possess an awareness of acknowledging and respecting human rights and the diversity of cultural identities with a spirit of harmony and

peace. Awareness and sensitivity to the reality of diversity and pluralism within a nation—whether in terms of ethnicity, religion, culture, or political orientation—can reduce potential triggers of social conflict in the future ⁷.

The idea of multiculturalism has become a global commitment, as evidenced by UNESCO's designation of multicultural education as a worldwide commitment in October 1994 in Geneva. Based on UNESCO's recommendations, four main principles form the core of this concept: tolerance, democracy, equality, and justice. These principles serve as the foundational values of multiculturalism and as a basis for creating harmonious societies amidst diversity.

B. Justice

The term justice (*iustitia*) originates from the word “adil,” meaning impartial, unbiased, aligned with what is right, proper, and not arbitrary ⁸. Justice encompasses all attitudes and actions in human relations and carries the demand that individuals treat one another according to rights and obligations, without favoritism or discrimination; everyone is treated equally according to their rights and duties ⁹. Justice is a quality, action, or treatment based on the principles of impartiality, fairness, and granting rights to all, thereby creating balance between rights and obligations and ensuring equitable treatment for all parties.

According to Rawls ¹⁰, justice is the primary virtue of social institutions. However, he argues that the good of society as a whole should not override or disturb the sense of justice of individuals who have already attained it, particularly the disadvantaged. Rawls explains that parties in their original position would adopt two main principles of justice. First, everyone has equal rights to the most extensive basic liberties compatible with similar liberties for others. Second, social and economic inequalities are arranged so that they are to the greatest benefit of the least advantaged members of society, and offices and positions are open to all under conditions of fair equality of opportunity.

In the context of education, justice means ensuring that each individual is treated fairly and receives the support they need to reach their full potential, without discrimination or exclusion ¹¹. According to Aristotle ⁹ justice is propriety in human actions. Propriety is defined as the mean between two extremes of excess and deficiency. Aristotle classifies justice such is

1. Cumulative Justice – the treatment of a person without considering their past services; everyone receives their rights.
2. Distributive Justice – the treatment of a person according to the services they have rendered; each individual receives according to their capacity and potential.
3. Indicative Justice – the treatment of a person according to their conduct, serving as retribution for wrongdoing committed.

Justice is also understood as the moral ideal truth regarding something, whether it concerns objects or people. According to John Rawls, an American philosopher regarded as one of the leading political philosophers of the 20th century, “Justice is the first virtue of social institutions, just as truth is of systems of thought.”

1. Distributive justice emphasizes how resources, rights, and opportunities are allocated within society. The core of this concept lies in the question of “who gets what” and according to which principles distribution should occur. ¹⁰, through his theory of justice as fairness, argues that inequality is only acceptable if it benefits the least advantaged. This principle serves as a moral foundation for public policies, for instance in the distribution of education, healthcare, and social protection. Recent studies in Indonesia also emphasize that fair distribution should favor vulnerable groups, thereby creating a more just society ¹². Thus, distributive justice is not only concerned with economic allocation but also with moral commitment to those who are disadvantaged.
2. Retributive justice focuses on imposing punishment proportional to the offense committed. Its main principle is proportionality—the idea that offenders should face consequences that match the severity of their wrongdoing. This perspective has significantly influenced criminal justice systems in various countries, including Indonesia. The ¹³ explains that the retributive approach is rooted in the concept of “desert,” meaning the right of individuals to receive what is fitting based on their actions. Nevertheless, retributivism is often criticized for focusing solely on punishment while neglecting the restoration of victims and the repair of damaged social relationships.
3. Restorative justice emerges as an alternative to the rigid retributive approach. Its primary focus is on repairing the harm caused, restoring relationships, and involving victims, offenders, and the community in the resolution process. Restorative justice does not merely emphasize sanctions but also highlights the moral responsibility of offenders to engage in dialogue, offer apologies, and provide appropriate compensation. Several studies in Indonesia indicate that restorative justice is more humane and effective in resolving minor criminal offenses, as it creates space for reconciliation and reduces the potential for recidivism ¹⁴, ¹⁵. However, its implementation still faces challenges, particularly due to regulatory frameworks that are not yet fully supportive ¹⁶.
4. Social justice has a broader scope because it relates to the structure of society as a whole. ¹⁷ emphasizes that each sphere of social life has its own principles of just distribution, such as in politics, education, or the

economy. Social justice entails eliminating structural inequalities that prevent certain individuals or groups from accessing their rights equally. In the context of Indonesia, social justice is closely related to the constitutional mandate to protect all citizens, particularly those vulnerable to discrimination, marginalization, and poverty¹². Thus, social justice is not only about material distribution but also about the courage to reform unjust systems.

5. Procedural justice emphasizes how decisions are made and implemented. A fair decision concerns not only the outcome but also the process undertaken. Principles such as transparency, consistency, participation, and respect for human dignity are central features of procedural justice. Research indicates that when people perceive they are treated fairly in legal or administrative processes, they are more likely to accept the outcomes, even if the results are not entirely in their favor¹⁸. In organizational contexts, studies in Indonesia have also demonstrated that procedural justice strongly affects job satisfaction and trust in institutions¹⁹. This shows that fairness in the process is just as important as fairness in the outcome.

C. Text Book

Textbooks are learning resources commonly used in formal education. They contain structured material aligned with the applicable curriculum, aiming to provide foundational knowledge or key concepts within a particular field of study. According to²⁰, textbooks serve as tools to deliver curriculum content in order to achieve educational objectives. In teaching and learning activities, textbooks function as a source or instructional material within various pedagogical methods.

A good textbook is one that elaborates on the curriculum comprehensively, encompassing the dimensions of curriculum ideas, content, and the learning process as reflected in the explanations provided within the book. In accordance with their purpose, textbooks are designed based on grade level, educational stage, and students' developmental levels^{21, 22} further explain that a quality textbook is one that supports students' academic efforts. Textbooks serve not only as a guide but also as a learning resource that encourages students to continue learning in order to acquire knowledge or information. The various information and knowledge contained in textbooks are designed to be easily accessible for students. Therefore, textbooks provide students with greater opportunities to study the material and can enhance reading activity²³.

Textbooks must contain material that students are expected to learn according to the subjects they study, including Indonesian language subjects. Indonesian language textbooks, used as the primary source in the learning process, should include questions that stimulate students' thinking and encourage critical and in-depth analysis²⁴. Consequently, the use of Indonesian language textbooks can facilitate comprehension, foster creativity, and increase student participation in utilizing available learning resources²³.

Indonesian language textbooks serve as the main learning resource in the study of language, literature, and language skills. These textbooks are structured according to the curriculum, containing materials for language skills such as listening, speaking, reading, and writing, as well as literary appreciation. In Indonesian language learning, textbooks play a crucial role, not only as sources of content but also as tools for developing language skills and fostering students' attitudes.

D. Inclusive Education

Inclusion can be understood as an approach focused on creating an environment that is welcoming and accessible to every individual, regardless of their background or personal conditions²⁵. These differences may encompass personal characteristics, physical conditions, personality traits, social status, ethnicity, culture, and others. This idea has since developed through the integration of inclusive principles into educational curricula, giving rise to inclusive education as a service that ensures every learner's right to appropriate education. However, inclusive education is often perceived as being intended solely for children with disabilities. This perception is not entirely accurate, as inclusive education is actually designed for all children with diverse learning needs.

Inclusive education is an approach to organizing learning that provides opportunities for all children, including those with differences in social, cultural, economic, or gender aspects, as well as children with special needs, to learn together in the same school environment without discriminatory treatment. The essence of inclusive education lies in guaranteeing access, participation, equality, and acceptance for every learner according to their rights. Therefore, inclusive education emphasizes an approach that does not differentiate individuals based on their conditions or abilities.

According to²⁶ inclusive education is based on the principles of justice, equality, and respect for the rights of each individual. In line with this,²⁷ assert that inclusive education is grounded in every student's right to develop personally, socially, and intellectually. Hence, each learner must be given the opportunity to optimize their potential. Meanwhile,³ explain that inclusive education is a system that provides equal opportunities for all children, including those with special needs or exceptional talents, to learn together in an equitable environment.

The primary goal of inclusive education is to ensure that every child has access to education free from discrimination. Therefore, the implementation of inclusive education must be supported by a system that can adapt to the needs of each learner while taking into account the diversity of students. For children with learning barriers

or special needs, it is essential to provide high-quality educational services that are relevant to their requirements. This aligns with ²⁸ perspective, which emphasizes that inclusive education must guarantee equal learning opportunities for all students, regardless of their background or condition.

Legal provisions in Indonesia, both as stated in Article 28H paragraph (2) of the 1945 Constitution and in the Ministry of National Education Regulation No. 70 of 2009, affirm that inclusive education is the right of every learner, including those with special needs or exceptional intellectual and creative abilities. These regulations demonstrate the government's commitment to achieving equality in educational access. However, as found by ²⁹, the implementation of inclusive education in Indonesia still faces challenges, particularly related to school readiness, educators' competence, and the availability of adequate resources. Consequently, there remains a gap between the ideal legal framework and practical implementation in the field, highlighting the need for strengthened policies and capacity-building efforts to support inclusive education.

RESEARCH METHOD

The research method employed in this study is qualitative descriptive. According to ³⁰, qualitative descriptive research is used to describe phenomena that occur naturally or are constructed, taking into account the quality, characteristics, and relationships between activities. This study is descriptive in nature, aiming to describe data in the form of multicultural values contained in Indonesian language textbooks at the senior high school level. The research subject is the multicultural values in Indonesian language textbooks for Grade XI, while the research object is the Indonesian language textbooks for Grade XI. The research instrument is the human instrument, where the researcher is supported by a set of knowledge regarding theories related to multiculturalism, textbooks, and inclusive education in the era of Artificial Intelligence (AI).

The data collection techniques in this study involved observation and note-taking. Observation was conducted to identify multicultural values in Indonesian language textbooks, while note-taking involved recording these values and documenting them in data cards for subsequent analysis. Data validity was ensured through triangulation to test the authenticity of the data. The researcher collected data while simultaneously examining its credibility by cross-checking the information using various data collection techniques from multiple sources. The validity of the data in this study employed both method triangulation and source triangulation. Data analysis was conducted following the stages proposed by Miles and Huberman. The steps in qualitative data analysis consist of four stages: data collection, data reduction, data display, and conclusion drawing.

RESULT AND DISCUSSION

Textbooks are a crucial element in the language learning process, as they not only present material systematically but also broaden cultural insights and can serve as a component of multicultural education. Multicultural values within textbooks are important for students to learn and implement in their daily lives. One of the multicultural values found in Grade XI Indonesian language textbooks is the value of justice. Justice is a fundamental value in the educational curriculum and is often associated with peace, trust, happiness, and freedom.

Based on the analysis of the value of justice in the Indonesian language textbook titled *Cerdas Cergas Berbahasa dan Bersastra Indonesia untuk SMA/SMK Kelas XI*, a total of 40 instances of justice were identified. These data are categorized into eight types of justice, namely: 18 instances of social justice, 5 of economic justice, 6 of ecological justice, 4 of procedural justice, 3 of distributive justice, 2 of recognition justice, 2 of retributive justice, and 1 of restorative justice.

The values of justice are embedded in three aspects: knowledge, skills, and attitudes, and are represented in the form of reading texts, exercises, and student reflective activities, presented both through written texts and multimodal texts that combine written and visual elements. However, the distribution of justice values is uneven; only nine instances are presented through exercises, while reflective activities include only three instances. This finding indicates a greater focus on presenting values through reading materials rather than interactive or reflective forms. Therefore, it is necessary to strengthen the presentation of justice values through more diverse learning formats to support optimal internalization.

TABLE I. The Composition of Justice Values is Presented According to Type and Form of Representation.

No	Type Of Justice	Form of representation			Count
		Resource	Question	Reflective Activity	
1	Social Justice	13	4	1	18
		72,2 %	22,2 %	5,6%	45%
2	Economy Justice	4	1	-	5
		80%	20%		12,5%

3	Ecological Justice	3 60%	1 20%	2 20%	6 15%
4	Procedural Justice	2 50%	2 50%	-	4 10%
5	Distributive Justice	2 100%	-	-	2 5%
6	Recognition Justice	2 100%	-	-	2 5%
7	Retributive Justice	1 50%	1 50%	-	2 5%
8	Restorative Justice	1 100%	-	-	1 2,5%
Count		28 70%	9 22,5%	3 7,5%	40 100%

The presence of justice values in the Indonesian language textbook *Cerdas Cergas Berbahasa dan Bersastra Indonesia untuk SMA/SMK Kelas XI* indirectly internalizes inclusive education in students. This occurs because the materials, reading texts, exercises, and reflective activities containing justice values help students develop a character that respects differences, which forms the foundation for the realization of inclusive education.

A. Value of Justice on Indonesian language Text Book Class XI

Based on the analysis of multicultural values in the Indonesian language textbook entitled *Cerdas Cergas Berbahasa dan Bersastra Indonesia untuk SMA/SMK Kelas XI*, data on the value of justice were found. The research data in the textbook show the existence of 40 data of justice values. These data are divided into 8 types of justice values. The values of justice are contained in three aspects, namely knowledge, skills, and attitudes, which are also represented in the form of reading texts, practice exercises, and reflective student activities. The following are the 8 types of justice found in the Indonesian language textbook for Grade XI.

1. Social Justice

Social justice is a condition in which every individual in society obtains the same rights, obligations, opportunities, and fair treatment without discrimination, oppression, or inequality. Social justice refers to the fair distribution of wealth, resources, and opportunities to improve the welfare of society, ensuring that freedom and equality are fundamental human rights^{31, 32}. This concept includes fair treatment and impartial distribution of social benefits, as well as addressing issues of oppression, privilege, and power^{33, 32}.

The value of social justice found in the Indonesian language textbook entitled *Cerdas Cergas Berbahasa dan Bersastra Indonesia untuk SMA/SMK Kelas XI* amounts to 18 data. The values of social justice in the book are contained in the aspects of knowledge, skills, and attitudes, represented in the form of reading texts, material explanations, student guidelines, practice exercises, and reflective student activities.

The reading texts in the Grade XI Indonesian Language textbook contain values of social justice, emphasizing that social justice does not always mean that everyone receives the same treatment, but rather that each person is treated appropriately so that they can live decently and be respected as human beings. This value is reflected in the short story *Malaikat Juga Tahu*, which highlights the life of a person with autism, a mother's love, the meaning of sincere affection, as well as the struggle between justice, sacrifice, and life choices. Below is an example of an excerpt from the short story that conveys the value of justice:

"Jangan bicara soal adil dan masuk akal. Aturan kamu, aturan kita, tidak berlaku bagi dia... kamu tidak tinggal di rumah ini. Kamu tidak mengenalnya seperti Mami." (halaman 99-100)

The quotation is part of the short story *Malaikat Juga Tahu* by Dee Lestari, which appears in Chapter IV, Activity 1. The quotation highlights the issue of justice within a family. In general, justice is understood as equal treatment for everyone. However, in the context of this story, justice is questioned because one character receives different treatment from other family members. This occurs because the story emphasizes that the exception arises not out of favoritism, but due to the special needs of the character. This reflects that true justice does not always mean absolute equality, but also requires consideration of circumstances, limitations, and humanity.

The value of social justice is not only reflected in practice exercises but also in other activities such as writing and reflection. Students are asked to write a poem with the theme of social justice, which is found in Chapter IV C. Writing Poetry Based on Short Stories. In the instructions for the exercise, students are asked to compose a poem by choosing several themes, one of which is the theme of social justice. In addition to writing activities, the value of social justice also appears in reflective activities.

A self-reflection activity that contains the value of social justice is found in Chapter IV F. Reflection on Learning Activities in Chapter 4. In this activity, students are asked to reflect on their understanding that every person has the same opportunities. This shows that one of the goals of the learning activities carried out is to help students understand and practice fairness. The Indonesian language textbook for Grade XI not only highlights the value of social justice but also the value of social injustice experienced by society. This is reflected in the following quotation.

"Sejak awal aku merasa kurang layak berada di dalam kumpulan seniman-seniman besar Asia itu... Rasanya aneh dihormati dengan segala fasilitas kelas satu. Sementara di negeri sendiri belum diakui." (Halaman 113)

The quotation is part of the short story Hatarakibachi in Chapter IV, Activity 2, Reading the Kompas Minggu Short Story "Hatarakibachi" by Awit Radiani. In the quotation, it shows the different treatment and recognition received by the artist. This indicates a form of social injustice because the quotation conveys criticism of the inequality of recognition, showing that young artists are often underappreciated in their own country. The existence of values that contrast with social justice helps students better understand and gain a clearer picture of the injustice that must be avoided and the social justice that must be implemented.

2. Economy Justice

Economic justice is a condition in which every individual has equal opportunities to gain access to resources, employment, income, and economic welfare in a fair manner. Economic justice includes the distribution and allocation of income and wealth³⁴. This concept emphasizes the equitable distribution of wealth and economic opportunities so that inequalities that may lead to discrimination or oppression do not occur. Economic justice also encompasses the protection of workers' rights, the provision of decent wages, and social security that supports the overall welfare of society.

The value of economic justice found in the Indonesian language textbook entitled *Cerdas Cergas Berbahasa dan Bersastra Indonesia untuk SMA/SMK Kelas XI* amounts to 5 data. The values of economic justice in the book are contained in the aspect of knowledge, represented in the form of reading texts, material explanations, and practice exercises. The values of economic justice presented in the book include actions that can improve the community's economy. These actions include food diversification that creates economic opportunities for UMKM actors and encouraging society to buy local food products to increase the income of farmers. This is reflected in quotations found in reading texts, poster materials, and practice exercises. The following is an example of the quotation.

"Upaya ini diharapkan dapat menumbuhkan UMKM pangan sebagai penyedia pangan lokal." (halaman 8)

The quotation above is part of an argumentative text entitled *Diversifikasi untuk Ketahanan Pangan*. The quotation contains the value of economic justice because by diversifying food, economic opportunities will emerge for UMKM in various regions. By equalizing sources of economic growth, not only in large-scale rice industries but also for local entrepreneurs who process non-rice food commodities, it will improve the economy of society, especially for business actors.

"... ingin membantu para petani, pemerintah menyarankan ... membeli produk-produk pangan lokal." (halaman 17)

The quotation above is part of a sentence-completion exercise. In the sentence-completion task, the value of economic justice is present because, based on the sentence in the quotation, the government encourages the community to buy local products so that farmers' harvests are valued and they can prosper. From this quotation, the value of justice appears not only in reading texts but also in practice exercises, helping students to better understand the value of justice.

3. Ecological Justice

Ecological justice is a principle that emphasizes a fair and balanced relationship between humans and nature, in which the rights of all living beings and ecosystems are recognized and respected.³⁵ explains that ecological justice stresses that living beings other than humans have legitimate rights to natural resources; therefore, institutional mechanisms are needed to incorporate these claims into human decision-making processes. Thus, this concept does not only focus on human interests but also on environmental sustainability

and the responsibility to preserve the earth for present and future generations. In addition, ecological justice is very important to maintain environmental sustainability and to ensure fair access to natural resources ³⁶.

The value of ecological justice found in the Indonesian language textbook entitled *Cerdas Cergas Berbahasa dan Bersastra Indonesia untuk SMA/SMK Kelas XI* amounts to 6 data. The values of ecological justice in the book are included in the aspects of knowledge and attitudes, represented in the form of reading texts, practice exercises, and reflection activities. The values of ecological justice presented in the book include explanations of terrestrial and marine ecosystems as habitats for various types of animals and plants that need to be preserved. The following is an example of a quotation containing ecological justice values in the textbook:

"Saya paham bahwa flora dan fauna langka Indonesia sangat beragam. Saya paham bahwa ekosistem darat dan laut berperan penting pada kelangsungan hidup". (halaman 214)

The quotation above is part of a student reflection activity in Chapter VI, Reflection on Learning Activities in Chapter 4. In this reflection activity, students are asked to respond to statements through self-reflective sentences. The reflection statement in the quotation contains the value of ecological justice. Based on the quotation, the meaning of the reflection statement is that students can become aware of Indonesia's biodiversity and the importance of ecosystem balance. The question contains the value of ecological justice because humans are obliged to preserve ecosystems, including conserving the diversity of flora and fauna, as well as respecting the right to life of other living beings for the survival of all creatures.

The Indonesian language textbook for Grade XI not only highlights the value of ecological justice but also the value of ecological injustice. The presence of ecological injustice can damage the environment. This is reflected in the following quotation.

1. *"Patok-patok dan memberi tanda pohon-pohon besar untuk ditebang." "Pohon-pohon ini, sulur-sulur ini, lumut-lumut ini, udang-udang ini...akan bagaimana?" (halaman 128)*
2. *"Meningkatnya pembangunan di kawasan pesisir Teluk Ambon menyebabkan makin tinggi masukan sedimen dan berbagai polutan ke dalam perairan. Hal tersebut berpengaruh terhadap kehidupan biota..." (halaman 165)*

The (1) quotation above is an excerpt from the short story *Roh Meratus* by Zaidinoor. The quotation represents the core conflict of the story, which highlights the injustice toward nature, where unique and valuable ecosystems are threatened by destructive exploitation for economic gain. Meanwhile, the second quotation is taken from the scientific work *Status of Coral Reef Conditions in Ambon Bay*. This quotation also highlights ecological injustice caused by pollution from development activities that damage coral reef ecosystems. Ecological justice demands the recognition of nature's right to be preserved. Preserving nature is a form of environmental justice to maintain ecosystem balance.

4. Procedural Justice

Procedural justice is a principle of justice that emphasizes fairness in processes, rules, and decision-making procedures. The concept of procedural justice stresses the importance of fairness in legal decision-making mechanisms, as this largely determines the level of acceptance and compliance of individuals toward legal institutions ^{37 38}. In procedural justice, what matters is not only the final outcome but also how the process is carried out consistently, transparently, impartially, and by providing equal opportunities to all parties. Thus, procedural justice ensures that every individual is treated equally before the rules and has the same right to be heard and to defend themselves.

The value of procedural justice found in the Indonesian language textbook entitled *Cerdas Cergas Berbahasa dan Bersastra Indonesia untuk SMA/SMK Kelas XI* amounts to 3 data. The values of procedural justice in the book are included in the aspect of knowledge, represented in the form of reading texts and questions. The values of procedural justice in the book are found in reading texts in the form of short stories that emphasize the violation of procedural justice in handling cases. The actions taken in handling a case were not based on the applicable rules. The following are examples of quotations:

"Aku dituduh melatih anak-anak menjadi pemberontak hanya karena mengajari mereka mengaji..." (halaman 60)

"Dia istri pemberontak! Hanya itu yang kutangkap dari bahasa Indonesianya yang kacau-balau lagi pelan." (halaman 61)

The quotations are part of the short story *Mengapa Mereka Berdoa kepada Pohon* by Faisal Oddang, which appears in Chapter III, Activity 2, reading short story texts. The quotations above show a serious violation of procedural justice. Arrest, detention, and execution were carried out without any legal process at all. An “accusation” was used as a reason to kill, without investigation, defense, or trial. This illustrates how absolute power was used to assert domination and create institutionalized injustice.

5. Distributive Justice

Distributive justice is understood as a concept that emphasizes the importance of fairly distributing the burdens and benefits of social cooperation among individuals with different needs and interests^{39; 40}. Distributive justice focuses on the fair allocation of outcomes, rights, obligations, or resources among members of society. Its focus is on how benefits, burdens, or opportunities are distributed so that everyone receives a share according to their rights, needs, or contributions.

The value of distributive justice found in the Indonesian language textbook entitled *Cerdas Cergas Berbahasa dan Bersastra Indonesia untuk SMA/SMK Kelas XI* amounts to 3 data. The values of distributive justice in the book are included in the aspect of knowledge, represented in the form of reading texts. One of the values of justice reflected in the book is about the equal distribution of food carried out by the government by involving various parties. The following is an example of the quotation:

“Produksi pangan melibatkan jejaring petani, pasokan sarana produksi, pengolahan pascapanen, logistik dan distribusi, hingga perdagangan eceran.” (halaman 13)

The quotation is part of an argumentative text entitled *Ketahanan Pangan pada Masa Pandemi Covid-19* in Chapter I, Activity 1. The quotation above shows the presence of distributive justice, as it reflects the involvement of various parties (farmers, suppliers, processors, distributors, and traders) in the food distribution process. This indicates that the results of food production and its benefits should be distributed fairly among all actors involved, not only benefiting one party, so that food distribution is not obstructed.

6. Recognition Justice

Recognition Justice is a concept of justice that emphasizes acknowledgment, respect, and acceptance of the identity, dignity, and diversity of individuals as well as groups within society. This concept aims to address the impact of institutional, discursive, and social practices on vulnerable groups, such as minorities, women, and persons with disabilities⁴¹. Its focus is not on the distribution of outcomes (distributive) or processes (procedural), but rather on social recognition so that no group is marginalized, discriminated against, or ignored in its existence.

The values of recognition justice found in the Indonesian language textbook entitled *Cerdas Cergas Berbahasa dan Bersastra Indonesia untuk SMA/SMK Kelas XI* consist of two data points. The values of recognition justice in the book are presented in the knowledge aspect, represented in the form of reading texts. The justice values reflected in the book include the recognition of local food systems that were previously often neglected. Below is an example quotation.

“Indonesia mempunyai banyak sumber pangan lain yang dapat menggantikan beras. Salah satu sumber pangan tersebut adalah sagu.” (halaman 5)

The quotation is part of an argumentative text entitled *Ketahanan Pangan Lokal*, found in Chapter I, Activity 1. The excerpt illustrates the value of recognition justice, which is reflected in efforts to acknowledge, appreciate, and validate local food systems that have long been neglected by national food policies centered on rice. This represents an effort to respect and recognize the biodiversity and cultural richness of Indonesia’s diverse food traditions.

7. Retribution Justice

Retributive justice is rooted in the idea of restoring justice through the imposition of proportional punishment on offenders⁴². Retributive justice focuses on giving appropriate punishment or sanctions to individuals or groups who commit violations, mistakes, or crimes. Its purpose is to uphold rules, create a deterrent effect, and at the same time restore social order.

The values of retributive justice found in the Indonesian language textbook entitled *Cerdas Cergas Berbahasa dan Bersastra Indonesia untuk SMA/SMK Kelas XI* amount to 2 data. The values of retributive justice in the book are included in the aspect of knowledge, represented in the form of reading texts and practice exercises. One of the values of justice reflected in the book contains the misuse of retributive justice. The following is an example quotation.

*"Kabar tidak jelas beredar, pada suatu hari tukang cukur itu dihajar oleh tentara Siliwangi, dengan tuduhan, dia membuat daftar orang-orang yang dibencinya untuk dihukum mati, tanpa bukti."
(halaman 70)*

The quotation is part of the short story *Tukang Cukur* by Budi Darma, found in Chapter III, Activity 2 (reading a short story text). Based on the content of the story and the excerpt, there is evidence of misuse of retributive justice. This misuse is reflected in the character of the barber, who was initially a perpetrator of cruelty (injuring people's heads, serving as an executioner for the PKI), and eventually received "retribution." However, the process was unclear and did not go through a legitimate court. The punishment he received (being beaten by the Siliwangi soldiers, dying as a member of NII) shows more of revenge and violence than true justice. This illustrates how retributive justice was misused, as the goal of upholding truth was replaced by repressive actions that merely perpetuated the cycle of violence.

8. Restorative Justice

Restorative justice is a model of justice that emphasizes repairing the harm caused by criminal behavior through an inclusive process involving the victim, the offender, and the community^{43, 44, 45}. This model does not only focus on restoring relationships but also on addressing the harm and resolving problems collectively. Its primary aim is to achieve a fair resolution by repairing the consequences of a crime or violation while restoring social balance.

In the Indonesian language textbook *Cerdas Cergas Berbahasa dan Bersastra Indonesia untuk SMA/SMK Kelas XI*, one instance of restorative justice value is identified. It appears in the knowledge aspect and is represented through a reading text. The value reflected in this section highlights efforts to restore food inequality, presenting restorative justice not merely in the context of interpersonal conflict but also as a principle for addressing broader social issues. Here the quotation

*"Kini upaya mengembalikan keragaman pangan tengah dilakukan..."
"...meneguhkan bahwa bangsa ini punya keanekaragaman pangan yang besar, tidak hanya beras."
(halaman 8)*

The quotation is part of an argumentative text entitled *Diversifikasi untuk Ketahanan Pangan* in Chapter I Activity 1. Based on the content of the text and the quotation above it shows the existence of restorative justice. From the content of the text it acknowledges the existence of historical injustice that was manifested from the New Order policy when carrying out food uniformity which caused local staple foods to be neglected. The quotation above shows the existence of restorative justice as a form of restoring conditions and food inequality through the diversification movement. The movement is an effort to improve or restore food inequality by restoring dignity and space for local food.

Based on the analysis the Indonesian language textbook for Grade XI is not only aimed at practicing language skills, but also instilling the values of multiculturalism, including values of justice and values of injustice. The value of justice in the book is related to justice which does not always mean equal, but also takes into account conditions, limitations, and a sense of humanity. In addition, justice also means that everyone has the same opportunities in various aspects including obtaining recognition, acquisition, and the same facilities. This can be done through economic equity, so that all people can prosper. In addition, justice is not only carried out towards fellow human beings but also towards the environment or ecosystem as the place to live for all living beings, because all living beings also have the same right to life.

Students not only take messages from the value of justice in the text but also from the value of injustice. The value of injustice in the Indonesian language textbook for Grade XI describes violations of procedural justice which are reflected in acts of arrest, detention, and execution carried out without any legal process at all. In addition, injustice also occurs towards nature or ecosystems which results in environmental damage. With the existence of these values students can understand the forms of injustice that occur and the impacts they cause.

The values of justice contained in the Indonesian language textbook are in the form of reading texts, practice exercises, and reflective activities. With the values of justice presented in various aspects and forms it will make students better understand about justice. The existence of reading texts and practice exercises that contain the values of justice will help students understand the concept of justice, so that they can emulate fair attitudes in real life. In addition, with reflective activities related to the values of justice it will foster students' self-awareness about the importance of being fair, both to themselves and to others, and prevent selfish or discriminatory attitudes.

Thus, the Indonesian language textbook for Grade XI is not only a medium for practicing language, but also a medium for the internalization of the values of justice. Students learn that justice is not only about the same rules, but also about empathy, equality, and respect for human dignity. Therefore, with the existence of the values

of justice in the textbook it will be useful to foster empathy, respect differences, and learn to be honest and equal in everyday life.

Based on the explanation above the Indonesian language textbook contains the values of justice that are good for the development of students' character. However, the values of justice in the Indonesian language textbook for Grade XI are not distributed evenly because the values of justice presented through practice exercises and reflective activities are not comparable to the values in the reading texts. This finding indicates a greater focus on presenting values through reading materials than interactive or reflective forms. Therefore, it is necessary to strengthen the presentation of the values of justice through more evenly distributed and varied forms of learning to support optimal internalization.

The finding that the values of justice are dominated by reading texts and are less integrated in practice exercises and reflective activities can be overcome by presenting the values of justice more evenly in every aspect and utilizing Artificial Intelligence (AI). AI can transform this static approach into a dynamic, interactive, and personal learning experience, so that the internalization of values does not only occur in the realm of knowledge but also reaches the realm of skills and attitudes more evenly and deeply. This is in line with the research of Hwang et al. (2020) which shows that AI-based learning systems that provide personal feedback and adaptive content recommendations significantly increase student engagement and learning outcomes. This proves the effectiveness of AI in personalizing learning, which can be applied to practice exercises and reflections.

The application of Artificial Intelligence (AI) technology makes it possible to develop more adaptive and interactive learning materials, so that the values of justice can be internalized more evenly. AI-based learning platforms can create adaptive practice exercises that adjust the level of difficulty and context according to students' abilities, so that the values of justice can be applied practically and interactively. AI can also support digital reflective activities, for example through the analysis of student answers or case simulations that illustrate situations of justice and injustice, so that students can connect concepts with real experiences. The use of AI-based multimodal content, such as interactive videos, animations, and simulations, can enrich the learning experience, so that the values of justice are not only understood theoretically but also practiced through decision-making and critical reflection. With this, AI plays a role in creating more inclusive, personalized, and interactive learning, so that the internalization of the values of justice can occur more evenly and effectively.

B. Justice Values in the Indonesian Language Textbook as the Internalization of Inclusive Education in the Era of Artificial Intelligence Technology

Inclusive education is an educational system that provides equal opportunities for all learners, including children with special needs as well as those with exceptional talents or intelligence, to study together in the same environment³. To create inclusive education, the internalization of inclusive education is necessary. The internalization of inclusive education is an effort to habituate students to think, behave, and act by respecting differences, upholding human values, and practicing fairness in social life. This effort can be carried out through teaching materials that contain multicultural values, particularly the value of justice.

Textbooks play a strategic role in the process of internalizing inclusive education because they are the main medium accessed by students in learning activities. Textbooks provide an opportunity to raise issues of social justice in the classroom, with the aim of highlighting injustices and encouraging inclusivity⁴⁶. Textbooks that contain justice values serve as a moral guide for students to understand the importance of equality and respect for the rights of others. This process is the core of inclusive education, namely ensuring that education is not only oriented toward academic achievement but also toward fostering fairness, tolerance, and empathy. In other words, textbooks are not merely tools for knowledge transfer, but also vehicles for shaping critical awareness of social justice that can prepare students to live in a plural and democratic society.

The Grade XI Indonesian Language textbook, as one of the teaching materials used by students, functions not only as a medium for language learning but also as a means of forming inclusive character. An analysis of the textbook *Cerdas Cergas Berbahasa dan Bersastra Indonesia untuk SMA/SMK Kelas XI* shows the presence of eight types of justice values. These values, either explicitly or implicitly, are embedded in learning materials, reading passages, exercises, and reflective activities, enabling students to become individuals who are fair and respectful of differences—an essential foundation for achieving inclusive education.

One of the justice values in the Grade XI Indonesian Language textbook directly presents the form of justice toward people with special needs. This value is illustrated in the short story *Malaikat Juga Tahu* by Dee Lestari, which appears in the textbook. The short story emphasizes that justice is not always identical with equal treatment, but rather with providing treatment according to one's needs so that everyone can live decently and be respected as human beings. One quotation that reflects this value of justice is as follow

"Jangan bicara soal adil dan masuk akal. Aturan kamu, aturan kita, tidak berlaku bagi dia... kamu tidak tinggal di rumah ini. Kamu tidak mengenalnya seperti Mami." (halaman 99-100)

The quotation above is part of the short story *Malaikat Juga Tahu* by Dee Lestari, found in Chapter IV, Activity 1. The quotation illustrates an issue of justice within the family. Generally, justice is understood as equal treatment for all people. However, in this quotation, one of the characters has autism and is treated differently from other family members. This difference does not arise from favoritism, but rather because the character has special needs. This shows that the true meaning of justice is not prioritizing uniformity, but the ability to take into account conditions, limitations, and human values.

The value of justice is closely related to the internalization of inclusive education, which aims to cultivate students' awareness to respect differences, act fairly, and uphold human dignity. Through understanding this story, students are encouraged to learn that inclusiveness is part of justice—providing opportunities and treatment according to each individual's condition in order to create a harmonious and humane environment.

Thus, justice values in textbooks play an important role in the internalization of inclusive education because they can shape character through students' perspectives on diversity and foster awareness to behave fairly through the moral values contained in the texts. This is in line with the findings of ⁴⁷, which show that textbooks can be used for character development through the moral values within them. Therefore, textbooks provide students not only with language skills, but also with lessons on respecting differences and avoiding discrimination.

Based on the above explanation, the Grade XI Indonesian language textbook contains justice values that are important for the internalization of inclusive education, as they help shape students' character to behave justly. However, according to the analysis, the distribution of justice values in the textbook is uneven, as exercises and reflective activities contain only a small portion compared to the reading texts. This indicates that the delivery of values is still more dominant through reading materials rather than interactive or reflective forms. Therefore, strengthening the presentation of justice values is needed through more evenly distributed and diverse content in textbooks to optimally support the internalization of inclusive education. This can be achieved through the use of artificial intelligence technology.

In the technological era, particularly with the development of Artificial Intelligence (AI), inclusive education has gained a new dimension. The application of AI in inclusive education has great potential to enhance accessibility and personalization of learning for all students, including those with special needs. AI can help create a more inclusive learning environment by adapting learning materials to the individual needs of students, so that every student has the same opportunity to develop academically and socially. AI can strengthen the internalization of inclusive education through justice values in textbooks by implementing adaptive learning media, such as text-to-speech, automatic captioning, or systems that adjust content according to individual needs.

The integration of Artificial Intelligence (AI) into education holds great potential to support the implementation of inclusive education. This aligns with the research of ⁴⁸, which emphasizes that the use of AI not only functions as a supporting tool but can also become an integral part of the learning ecosystem, thereby reinforcing inclusive practices. AI-based learning is able to adapt intelligently to various student needs, increase personalization, and expand accessibility in educational settings ⁴⁹, in their research, show that AI-powered learning environments can provide safe spaces for students to practice empathy and conflict resolution, which are at the core of internalizing justice values. ⁶ in its report, specifically recommends the use of AI to promote equity and inclusion in education, including the development of tools that can identify and reduce bias in learning materials. This strengthens the position of AI solutions not only as pedagogical tools but also as a commitment to realizing more equitable education.

Based on these explanations, the Indonesian language textbook plays an important role in instilling justice values in students through materials that emphasize equality, respect for diversity, and the rights of every individual. In the AI era, these justice values can be implemented more effectively through learning that is personalized, inclusive, and non-discriminatory, so that all students, including those with special needs, gain equal access to materials and assessment. Thus, the integration of textbooks enriched with justice values and the utilization of AI technology support the creation of inclusive education that is fair, equitable, and oriented toward the well-being of all students.

CONCLUSION

This study concludes that the Cerdas Cergas Berbahasa dan Bersastra Indonesia textbook for Grade XI contains eight types of justice values, namely social, economic, ecological, procedural, distributive, recognition, retributive, and restorative justice. These values are integrated across the domains of knowledge, skills, and attitudes through reading texts, practice exercises, and reflective activities. The findings highlight that the textbook functions not only as a medium for language learning but also as a strategic instrument for the internalization of inclusive education. Accordingly, the textbook plays a crucial role in shaping students' character to become more sensitive to differences, uphold human values, and reject all forms of discrimination.

Moreover, the advancement of the Artificial Intelligence (AI) era provides significant opportunities to strengthen the integration of justice values through teaching materials used in schools. AI technology enables the delivery of content and evaluation that are more adaptive and responsive to the diverse needs of students, thereby supporting equal access and learning experiences. Thus, the combination of textbooks enriched with justice values

and the utilization of AI technology has the potential to reinforce the realization of inclusive education that is more just, equitable, and oriented toward the well-being of all learners.

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DEVELOPMENT OF INTERNAL AND EXTERNAL MOTIVATION MODELS AS ANTECEDENTS OF USER LOYALTY IN ACADEMIC INFORMATION SYSTEM USAGE

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Abstract. Students' academic motivation in the world of education is influenced by internal and external factors. (Hsieh, 2014) emphasizes that internal motivation focuses on challenges, curiosity, and knowledge acquisition. Meanwhile, external motivation focuses on incentives such as rankings, rewards, and competition. Motivation drives students' behavior and desires in the world of education (Eccles & Wigfield, 2002; Fredricks & McColskey, 2012; Linnenbrink & Pintrich, 2002). This represents that internal and external factors play a role in the educational process. One of the important activities faced by students is academic service. Academic service plays an important role in supporting learning activities. Therefore, education providers must pay attention to academic service provision in meeting the needs of students. This research refers to the study by Diallo, Diop-Sall, Djelassi, and Godefroit-Winkel (2018) on the antecedents of the user loyalty model, namely perceived value and satisfaction. This study builds upon that research to broaden the generalizability of the findings to a different context: the use of e-service academic services. Additionally, this study expands on the research of Diallo et al. (2018) by adding the testing of the attitude variable as an internal motivation for using academic services. Furthermore, external motivation is represented by the quality of academic services. The urgency of testing attitudes as internal motivation and service quality as external motivation is based on research (Hsieh, 2014), which considers internal and external factors to encourage student engagement and behavior in using academic services. This study uses a literature review approach to develop a model of the context of service usage loyalty in academic services. This research develops propositions and a research model as a reference for empirical studies, particularly regarding the context of service usage loyalty in academic services. The research results are propositions and a research model that are expected to be empirically tested in a broader context.

Keywords: *Loyalty, perceived value, satisfaction, attitude, service quality*

INTRODUCTION

Students' academic motivation in the world of education is influenced by internal and external factors. (Hsieh, 2014) emphasizes that internal motivation focuses on challenges, curiosity, and knowledge acquisition. Meanwhile, external motivation focuses on incentives such as rankings, rewards, and competition. Motivation drives students' behavior and desires in the world of education (Eccles & Wigfield, 2002; Fredricks & McColskey, 2012; Linnenbrink & Pintrich, 2002). This represents that internal and external factors play a role in the educational process. One of the important activities faced by students is academic service. Academic service plays an important role in supporting learning activities. Therefore, education providers must pay attention to academic service quality in meeting the needs of students. Based on a study (Hsieh, 2014), internal motivation in education can be represented by students' attitudes toward using academic services. Furthermore, external motivation is represented by the quality of academic services. Both of these motivations impact the use of academic service offerings. Furthermore, the consequences of the motivation to use academic services will impact user loyalty.

User loyalty will be achieved if user needs and user satisfaction are met (Kotler & Keller, 2009a). Loyalty is also the willingness to use a service in the long term (C. Lovelock, Wirtz, & Mussry, 2010). Specifically, the antecedents of loyalty include perceived value, satisfaction,

and culture (Diallo et al., 2018; Parida & Sahney, 2017). Based on this, some key factors of user loyalty are meeting user needs and user satisfaction.

Research on user loyalty is conducted to test user loyalty to products or services that have been long-standing in society compared to other competitors (Nusantara, 2019). This loyalty will be reflected in the benefits perceived by users, their satisfaction, and their willingness to use the product or service compared to others (Nusantara, 2019). Therefore, this study specifically examines the perception of value and satisfaction toward user loyalty based on the research by Diallo et al. (2018).

Perceived value shapes an individual's mindset regarding the benefits they experience from a product or service (Katsikeas, Morgan, Leonidou, & Hult, 2016). Perceived value positively influences user loyalty (S.-C. Chen, 2012; Diallo et al., 2018; Rabbanee, Ramaseshan, Wu, & Vinden, 2012). This research argues that a person's perception of the value of a product or service that provides greater benefits compared to others will influence user loyalty. Therefore, this study examines the influence of value perception on user loyalty.

User satisfaction shapes a person's mindset about their experience with a product or service (Katsikeas et al., 2016). User satisfaction has a positive impact on loyalty (S.-C. Chen, 2012; Diallo et al., 2018; Mägi, 2003). This research argues that a person is likely to be loyal to a product or service if it provides a good experience or a pleasant impression. Therefore, this study examines the influence of satisfaction on user loyalty.

This research refers to the study by Diallo et al. (2018) on the antecedents of the user loyalty model, namely perceived value and satisfaction. This research builds upon previous studies to extend the generalizability of research findings to a different context, namely the use of e-service academic services. Additionally, this research expands on the study by Diallo et al. (2018) by adding the testing of the attitude variable as an internal motivation for using academic services. Next, external motivation is represented by the quality of academic service. The urgency of testing attitudes as internal motivation and service quality as external motivation is based on research (Hsieh, 2014), which considers internal and external factors to encourage student engagement and behavior in using academic services. This study uses a literature review approach to develop a model of the context of service usage loyalty in academic services. This research develops propositions and a research model as a reference for empirical studies, particularly regarding the context of service usage loyalty in academic services. The research results are propositions and a research model that are expected to be empirically tested in a broader context.

The empirical research approach is expected to provide additional insights and theoretical and practical contributions for both academics and non-academics. Specifically, this research is expected to develop knowledge, particularly in the behavioral field. For researchers, the results of this study are expected to be used as an additional reference in further research. This research is also expected to provide insights for the university's academic service management.

LITERATURE REVIEW

User Loyalty

Loyalty is the relationship between a user and a product and can be specifically identified by repeated product behavior or use (Tjiptono, 2009). Loyalty is also a commitment to reuse a product even though external situational influences could potentially cause users to switch to another product (Kotler & Keller, 2009a). Specifically, loyalty is the consumer's willingness to continue subscribing in the long term and use the product repeatedly, as well as voluntarily recommending it to their peers (Chebat, El Hedhli, & Sirgy, 2009; C. H. Lovelock & Wright,

2007). Various variables that influence loyalty include service, perceived value, satisfaction, culture, commitment, and trust (Diallo et al., 2018; Parida & Sahney, 2017; Tjiptono, 2009).

Loyalty can be created from several variables, including value creation and satisfaction (Barnes, 2003). User loyalty can be built thru the stages of creating value for users, which is related to convenience and service for users, leading to satisfaction, repeat usage, and recommendations to others (Barnes, 2003).

User loyalty is influenced by the mindset regarding a product, which is based on factors such as perception and the level of satisfaction experienced by an individual (Katsikeas et al., 2016). Additionally, cultural factors also influence a person's mindset, which ultimately affects their behavior (Parida & Sahney, 2017). Service, value perception, satisfaction, and culture are important factors in user loyalty (Diallo et al., 2018; Parida & Sahney, 2017).

Value Perception

Value perception is the evaluation of a product's usefulness based on a comparison between the benefits and sacrifices a person makes to obtain a benefit (S.-C. Chen, 2012; Rabbanee et al., 2012). Value perception is the trade-off between usefulness or benefits and the sacrifices made to obtain a product or service (Henseler & Chin, 2010). According to Zeithaml (1988), value perception is the assessment of a product or service's usefulness based on perceived benefits and sacrifices made. Meanwhile, according to Monroe (2002), value perception is the trade-off between the benefits and sacrifices of a product or service purchased or consumed. Value perception is also based on the best and most efficient benefits of using a product or service (Henseler & Chin, 2010).

Perceived value shapes a person's mindset and influences behavior, particularly regarding loyalty to a product (Katsikeas et al., 2016). Various studies show evidence that perceived value positively influences customer loyalty in various contexts such as banking, transportation, convenience stores, and so on (Amri, Ma'ruf, Tabrani, & Darsono, 2019; P.-T. Chen & Hu, 2010; S.-C. Chen, 2012; Diallo et al., 2018; Gil-Saura, Berenguer-Contrí, & Ruiz-Molina, 2018; Hamouda, 2019a; Rabbanee et al., 2012; Scridon, Achim, Pinteá, & Gavriletea, 2019).

Satisfaction

Customer satisfaction is an evaluation of a person's experience with a product (S.-C. Chen, 2012). Customer satisfaction can be proxied as a feeling of pleasure or disappointment toward a product or service based on the expected outcomes of that product or service (Kotler & Keller, 2009b). Customers who are satisfied or pleased are more likely to be loyal to the product or service, while those who are dissatisfied or unhappy are more likely to switch products or services (Kotler & Keller, 2009b).

Customer satisfaction also shapes a person's mindset and influences loyalty to a product (Katsikeas et al., 2016). Various studies show evidence that customer satisfaction has a positive impact on loyalty in various contexts such as banking, e-marketing, healthcare, the food industry, transportation, telecommunications, and so on (Busser, Shulga, & Kang, 2019; S.-C. Chen, 2012; Diallo et al., 2018; Grott, Cambra-Fierro, Perez, & Yani-de-Soriano, 2019; Le, Hediari, & Liaw, 2017; Lopes, de Lamônica Freire, & Lopes, 2019; Moliner-Velázquez, Fuentes-Blasco, Servera-Francés, & Gil-Saura, 2019; Orel & Kara, 2014; Solimun & Fernandes, 2018b; Suchánek & Králová, 2019; Thakur, 2019b; Zhang, Liu, Lu, & Xiao, 2019).

Internal Motivation (Attitude) and External Motivation (Service Quality)

Students' academic motivation in the world of education is influenced by internal and external factors. (Hsieh, 2014) emphasizes that internal motivation focuses on challenges, curiosity, and knowledge acquisition. Meanwhile, external motivation focuses on incentives such as rankings, rewards, and competition. Motivation drives students' behavior and desires in the world of education (Eccles & Wigfield, 2002; Fredricks & McColskey, 2012; Linnenbrink & Pintrich, 2002). This represents that internal and external factors play a role in the educational process. One of the important activities faced by students is academic service. Academic service plays an important role in supporting learning activities. Therefore, education providers must pay attention to academic service quality in meeting the needs of students. Based on a study (Hsieh, 2014), internal motivation in education can be represented by students' attitudes toward using academic services. Furthermore, external motivation is represented by the quality of academic services. Both of these motivations impact the use of academic service offerings.

The Relationship between Attitudes, Value Perception, Satisfaction, and User Loyalty

Students' academic motivation in the world of education is influenced by internal and external factors. (Hsieh, 2014) emphasizes that intrinsic motivation focuses on challenges, curiosity, and knowledge acquisition, while extrinsic motivation focuses on incentives such as rankings, rewards, and competition. Based on a study (Hsieh, 2014), internal motivation in education can be represented by students' attitudes toward using academic services. (Liu, Zhu, You, & Hong, 2023) explain that attitudes influence individuals' perceived value of using technology in the learning process. (Koca, Kılıç, Dadandı, & Learning, 2024) also explain that attitudes influence individuals' satisfaction in carrying out the learning process. Based on research by Diallo et al. (2018), this study adapts intrinsic motivation, represented by attitudes toward academic service quality. This study argues that students' attitudes toward their experience using academic services directly influence their usage loyalty, and indirectly thru perceived value and satisfaction. Therefore, this study proposes the following propositions:

P1a: Attitude positively influences e-service usage loyalty.

P1b: Attitude positively influences e-service usage loyalty thru perceived value.

P1c: Attitude positively influences e-service usage loyalty thru satisfaction.

The Relationship between Service Quality, Perceived Value, Satisfaction, and User Loyalty

The relationship between service quality, perceived value, satisfaction, and user loyalty is influenced by internal and external factors. (Hsieh, 2014) emphasizes that internal motivation focuses on challenges, curiosity, and knowledge acquisition. Meanwhile, external motivation focuses on incentives such as rankings, rewards, and competition. Based on a study (Hsieh, 2014), external motivation in education can be represented by the quality of academic service provision. Diallo et al. (2018) explain that service quality directly influences user loyalty. Diallo et al.'s (2018) research also shows evidence that service quality indirectly influences loyalty thru perceived value and satisfaction. This study argues that loyalty to academic service usage is also influenced by the antecedents of service quality, both directly and thru perceived value and satisfaction. Therefore, this study proposes the following propositions:

P2a: Service quality positively influences e-service usage loyalty.

P2b: Service quality positively influences e-service usage loyalty thru perceived value.

P2c: Service quality positively influences e-service usage loyalty thru satisfaction.

The Relationship between Value Perception and User Loyalty

The relationship between value perception and user loyalty varies and is influenced by time orientation (Diallo et al., 2018). Previous research has shown evidence that perceived value has a more significant impact on user loyalty than other variables such as trust and commitment (S.-C. Chen, 2012). Additionally, various studies have demonstrated that perceived value significantly influences user loyalty (Amri et al., 2019; Hamouda, 2019b; Scridon et al., 2019). The relationship between value perception and loyalty is highly dynamic and requires further empirical investigation (El-Adly & Eid, 2016).

Perceived value can be based on perceived usefulness in the Technology Acceptance Model (TAM), which explains how a technology can provide more value than other alternative methods for the same task (Davis, 1989; Fred D. Davis, Richard P. Bagozzi, & Paul R. Warshaw, 1989). Technology that provides more value or benefits to someone will influence their attitude and intention toward that technology (Fred D Davis, Richard P Bagozzi, & Paul R Warshaw, 1989). This indicates that as someone perceives increasing value or benefit from the technology they use, their attitude and intention toward that technology also become higher or more positive.

This study argues that a person's perceived value influences students' e-service usage loyalty because of the significant benefits experienced by users. Based on TAM, the higher the benefits a person perceives, the higher their perceived value of a service they use. This shapes a person's attitude and intention to reuse e-service, thus increasing user loyalty.

Additionally, based on the goal perception and action identity theory, value perception in this study can be classified as the most optimal achievement of an activity's goals (Sirdeshmukh, Singh, & Sabol, 2002). Sirdeshmukh et al. (2002) explain that value perception can be described as an individual's motivation influencing their intention to be loyal or disloyal to a product or service that is perceived to offer the most optimal benefits. Students who perceive greater benefits from using e-services compared to other services are more likely to have high loyalty. Therefore, this study proposes the following proposition:

P3: Perceived value positively influences e-service usage loyalty.

The Relationship Between User Satisfaction and Loyalty

The relationship between user satisfaction and loyalty is influenced by societal conditions, country, and applicable rules (Diallo et al., 2018). Previous research has shown evidence that satisfaction is an important factor influencing loyalty (S.-C. Chen, 2012; Solimun & Fernandes, 2018a; Thakur, 2019a; Zhang et al., 2019). Previous studies examining the relationship between satisfaction and loyalty recommended that this relationship be further investigated because many factors still influence it and the results are varied (S.-C. Chen, 2012). Research on the relationship between satisfaction and user loyalty is also classified into satisfaction assessments based on affective and cognitive aspects (Gallarza, Ruiz-Molina, & Gil-Saura, 2016). According to Kotler and Keller (2009a), specifically, user satisfaction is proxied as pleasure or disappointment with a product or service and is based on the expected expectations of that product or service. A person who feels satisfied is likely to be loyal to that product or service, while someone who is dissatisfied is likely to switch products or services (Kotler & Keller, 2009a). The higher a person's perceived satisfaction with a service, the higher that person's loyalty will be.

This research argues that student satisfaction with e-service affects usage loyalty. Someone who is satisfied is likely to be loyal to that product or service, while someone who is dissatisfied is likely to switch or not use the service. This is because the person has a positive experience or impression from using the e-service. Therefore, this study proposes the following proposition:

P4: Satisfaction positively influences the loyalty of students' e-service usage.

Research Model

This research model illustrates the antecedents of e-service usage loyalty among students. This research proposes a relationship between attitude, service quality, perceived value, and satisfaction toward user loyalty.

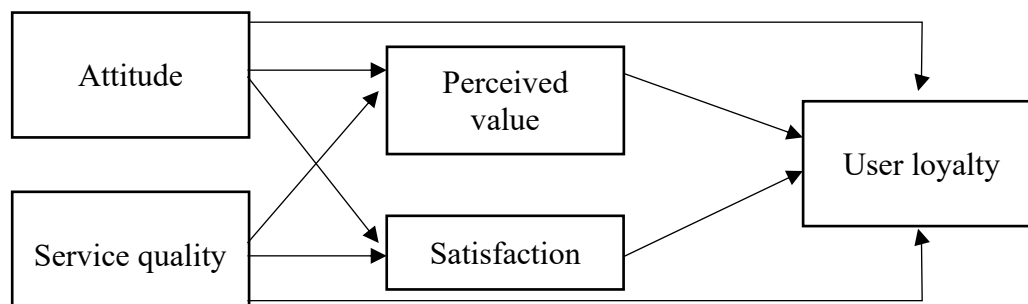


Figure 1. Research Model

METHOD

This research was conducted in main stages including background development, problem formulation, literature review, and the development of propositions and research models. This research further explains the definitions of variables, questionnaires and data analysis techniques that can be developed for future research.

Operational Definition of Variables

This research explains five main variables: attitude, service quality, perceived value, satisfaction, and loyalty. Loyalty is the relationship between a user and a product and can be specifically identified by repeated product behavior or usage. Perceived value is a person's mindset about the benefits they feel from a product or service. User satisfaction is a person's mindset about their experience with a product or service. Attitude is a person's physiological tendency regarding feelings of pleasure, displeasure, and neutrality toward something or behavior. Service quality is an assessment related to the service provided by an organization or company.

Questionnaire Development

This study adopts the research questionnaire previously used by previous researchers in different research settings. This research questionnaire is based on previous studies. The value perception questionnaire is based on Henseler and Chin (2010), the satisfaction questionnaire is based on Mägi (2003), and the loyalty questionnaire is based on Rabbanee et al. (2012). The attitude questionnaire is based on (Xu, Zhang, Li, Yoo, & Pan, 2023), and the service quality

questionnaire is based on (Agarwal & Dhingra, 2023), thru the following stages: 1) systematic literature review, 2). Translation and adaptation, and 3). Validity and reliability testing. The systematic literature review stage is the initial step for selecting and exploring appropriate and relevant research instruments. Translation was done for instruments that use languages other than Indonesian. The translation results were then adapted to fit the research context. The final stage is testing for validity and reliability. Validity testing began with face validity, involving experts in the fields of information systems and management accounting. The results of the face validity were then tested on a limited number of respondents randomly selected for validity and reliability testing.

Data analysis techniques

All propositions can be tested using the Structural Equation Modeling approach thru the partial least squares method (SEM-PLS). This study uses Smart PLS 3, developed by Ringle, Wende, and Becker (2015), to estimate measurement and structural models for decision-making in hypothesis testing. Partial Least Squares (PLS) has been used to test the causal relationship between the latent variables of the model proposed in this study. PLS is an analysis that adopts a variance-based approach, offering the possibility of minimizing the required sample size (Chin & Newsted, 1999). Ho, Ang, and Straub (2003) explain the advantages of using PLS. First, PLS can estimate model size in terms of validity and reliability. Second, by using latent construct indicators, PLS can generate a structural model that serves to test the strength of the hypothesized relationships. Temme, Kreis, and Hildebrandt (2006) explain that PLS can provide better actual values than OLS. PLS is an analysis tool suitable for complex understanding with theoretical extensions to established theories (J. F. Hair, Risher, Sarstedt, & Ringle, 2019). This study uses interval data to measure all research variables, while PLS has the ability to analyze interval data (Kustono, 2008). When analyzing data with PLS, it is important to assess the measurement model before evaluating the structural model (J. Hair, Hult, Ringle, & Sarstedt, 2022). Hulland (1999) suggests testing measurement and structural models separately and simultaneously. In brief, the testing procedure based on the PLS approach applied in this study is presented in Figure 2.

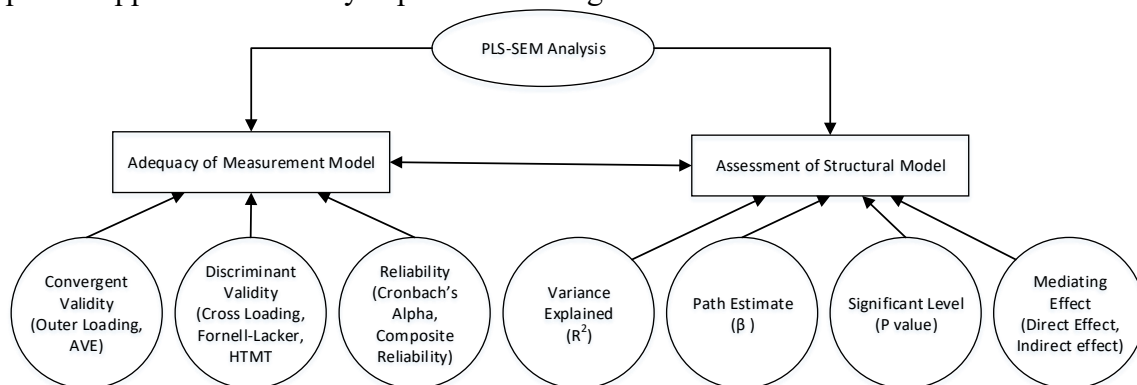


Figure 2. PLS testing procedures and stages

When conducting testing using a variance-based structural equation modeling approach (such as Partial Least Squares), there are technically at least four approaches to measure the interaction between variables: the product indicator approach, the two-stage approach, the hybrid approach, and the orthogonal approach (Henseler & Chin, 2010). Each approach has a different character in treating the indicators of the latent variable being measured. The moderation and interaction testing in this study used the PLS moderation model approach,

following the approach proposed by Becker, Cheah, Gholamzade, Ringle, and Sarstedt (2023) and J. Hair et al. (2022).

CONCLUSION

This study concludes that internal motivation, represented by attitude, and external motivation, manifested in the quality of academic services, play a significant role in fostering students' loyalty toward the use of e-service academic services. By extending the framework of Diallo et al. (2018), which emphasized perceived value and satisfaction as antecedents of user loyalty, this study provides a new conceptual contribution by incorporating attitude as an internal factor and service quality as an external factor. The literature review generates a set of propositions and a research model that serve as a foundation for further empirical testing. Practically, these findings offer important implications for education providers in designing strategies to enhance the quality of academic services while simultaneously strengthening student engagement. Therefore, this study not only enriches the literature on user loyalty in academic service contexts but also provides a research direction for future empirical investigations in digital higher education environments.

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"VIRTUAL REALITY INTEGRATION IN LOCAL WISDOM-BASED CHEMISTRY EDUCATION TO SUPPORT MEANINGFUL LEARNING: A LITERATURE REVIEW"

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Abstract. Chemistry learning is often perceived as abstract and challenging, leading to misconceptions and low student engagement. Integrating local wisdom into chemistry education has been recognized as an effective approach to contextualize scientific concepts and foster meaningful learning. Meanwhile, virtual reality (VR) offers immersive experiences that can enhance visualization and interaction with complex phenomena. This literature review aims to synthesize recent studies on the integration of VR in local wisdom-based chemistry education and its potential to support meaningful learning. Articles were collected from Scopus databases using keywords such as “virtual reality,” “chemistry education,” and “local wisdom” from 2010 to 2025. The inclusion criteria focused on peer-reviewed studies related to VR applications in chemistry learning with contextual or cultural integration. The findings reveal that VR has been widely applied in chemistry education, particularly in molecular visualization, virtual laboratories, and field-based simulations. However, the incorporation of local wisdom, such as natural dyeing processes, herbal medicine preparation, and traditional metallurgy, remains limited. The integration of VR and local cultural practices provides unique opportunities to enhance students’ scientific literacy, higher-order thinking skills, and cultural appreciation. Challenges include technological accessibility, teacher readiness, and high development costs. This review highlights the need for further research on culturally grounded VR content to strengthen meaningful learning in chemistry education. Future directions emphasize cross-disciplinary collaboration between educators, technologists, and local communities to design VR-based learning environments that are both scientifically rigorous and culturally relevant.

Keywords: Virtual Reality, Local Wisdom, Chemistry Education, Meaningful Learning, Literature Review

INTRODUCTION

Chemistry learning is often perceived as highly abstract and challenging, leading to misconceptions and low student engagement. The visualization of concepts such as molecular structures, reactions, and laboratory practices is often difficult to realize in traditional classrooms. In response, many studies have begun to explore the use of virtual reality (VR) to enhance the understanding of chemical concepts through immersive and interactive simulations (Qorbani et al., 2024; Saritas, 2015). At the same time, the integration of local wisdom has been proven effective in contextualizing scientific concepts within students’ cultural backgrounds (Priyambodo & Wulaningrum, 2017). Combining VR with local wisdom is designed to create contextual, meaningful learning while fostering students’ cultural appreciation.

Virtual Reality (VR) is a technology that creates an immersive three-dimensional environment in which users can intuitively interact with virtual objects (Samala et al., 2025). This technology is particularly useful in visualizing molecular structures and chemical reactions more concretely. In the context of chemistry education, VR allows students to perform complex laboratory simulations without safety risks, thereby enhancing engagement, motivation, and understanding of abstract concepts (Amirbekova et al., 2023; van Dinther et al., 2023). Despite its great potential, the implementation of VR faces several significant challenges, such as the high cost of hardware, limited teacher competence in using the technology, technical constraints, as well as issues of visual fatigue or nausea caused by the vergence-accommodation conflict and system latency (Serrano-Ausejo & Mårell-Olsson, 2024). Addressing these challenges requires comprehensive teacher training, infrastructure

development, and ergonomic application design to ensure that VR can be effectively adopted in chemistry learning.

Previous literature shows that most applications of VR in chemistry education have focused on molecular visualization, virtual laboratories, or simulations of general physico-chemical phenomena (Bataeva et al., 2025). In contrast, the use of VR in the context of local wisdom-based learning remains very limited, particularly in connecting local phenomena to chemistry concepts, such as natural organic dyes or traditional sago fermentation (Anatasya & Putra, 2024). This gap raises a research question: How can the integration of VR with local cultural practices support meaningful chemistry learning and enhance students' higher-order thinking skills?

This literature review aims to synthesize recent studies on the use of VR in chemistry education integrated with local wisdom, as well as to identify opportunities, challenges, and emerging trends. The novelty of this research lies in its focus on combining VR with relevant local cultural practices as a context for chemistry learning, which has rarely been explored (Anatasya & Putra, 2024). The method involves bibliographic searches in Scopus and Web of Science databases using keywords such as "virtual reality," "chemistry education," and "local wisdom," covering the period from 2010 to 2025. Articles were selected based on peer-reviewed inclusion criteria relevant to the application of VR in culturally contextualized chemistry education. It is expected that this study will contribute to both theory and practice in education by developing a VR-based learning model that is both scientific and culturally grounded, providing benefits for academics, educators, media developers, and the wider community.

RESEARCH METHOD

This study followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines to ensure a systematic and transparent review process (Page et al., 2021). Relevant studies were retrieved from Scopus and Web of Science databases is considered comprehensive for research in education and technology (Falagas et al., 2008; Martín-Martín et al., 2021), covering the period from 2010 to 2025, using the keywords "virtual reality," "chemistry education," and "local wisdom." The initial search identified 5,878 records, from which 4,133 duplicate records were removed before screening. A total of 1,745 records were screened by title and abstract, resulting in 1,695 records being excluded for irrelevance. Fifty full-text articles were sought for retrieval, with 15 reports not retrieved due to access issues. Of the 35 reports assessed for eligibility, 23 were excluded because they fell outside the scope of chemistry or VR, leaving 12 studies that met the inclusion criteria. Studies were included if they focused on VR applications in chemistry education, particularly those integrating or having the potential to integrate local cultural practices, were peer-reviewed, and available in English. The entire selection process is summarized in the PRISMA flowchart (Figure X).

Study Selection was carried out by exporting all articles from the initial search into a reference manager to remove duplicates. The screening process was conducted in two stages: (1) title and abstract selection to ensure relevance to the topic, and (2) full-text review to assess compliance with the inclusion criteria. Each selection step was performed by two independent reviewers to minimize bias, and any disagreements were resolved through discussion until a consensus was reached (Moher et al., 2009). Articles that met the inclusion criteria were then analyzed using a thematic approach to identify patterns in the application of VR in chemistry education, its connection with local wisdom, as well as the challenges and opportunities for its development. The analysis process employed the PRISMA flow diagram framework to report the number of articles at each screening stage.

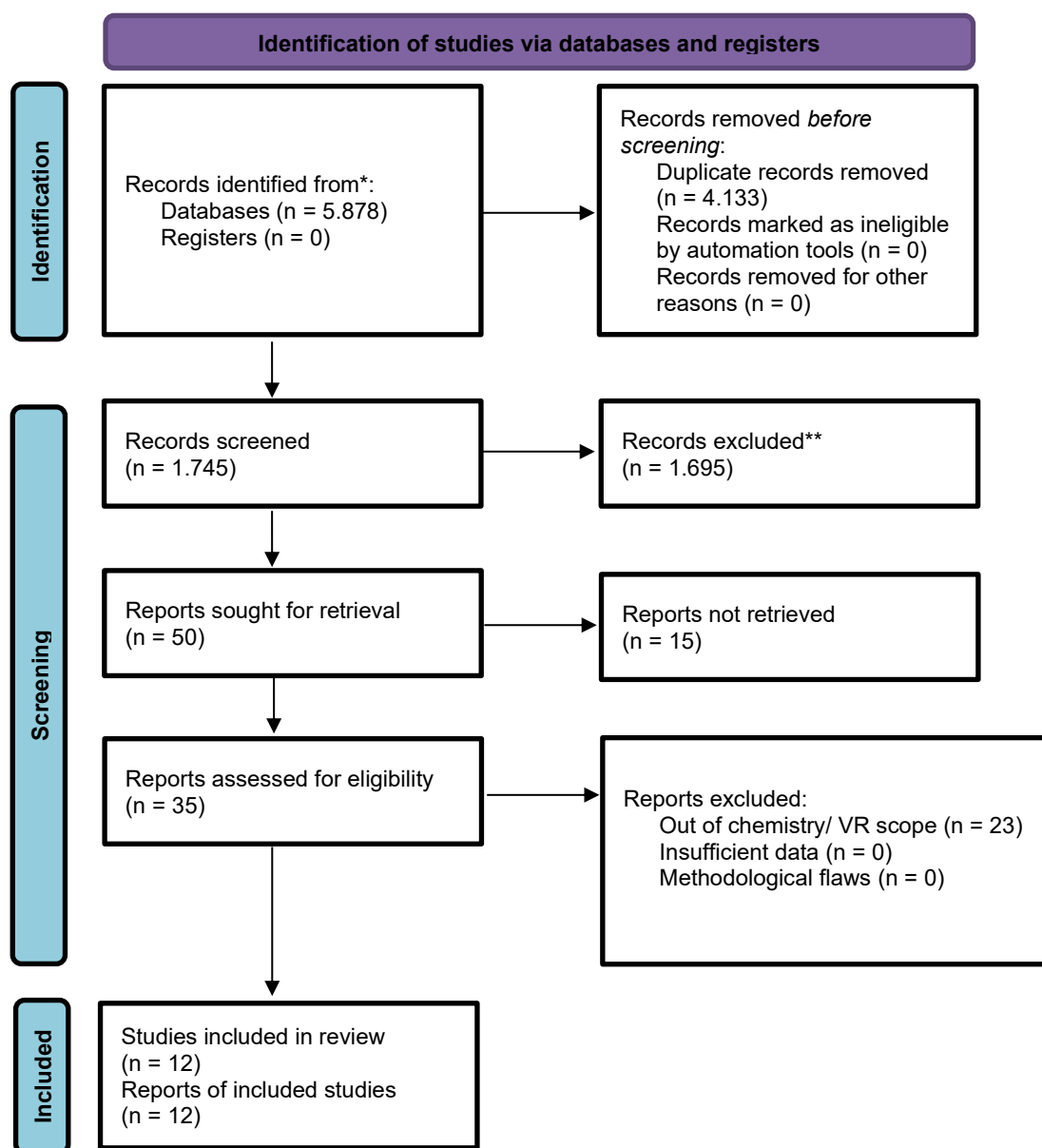


Fig 1. PRISMA flowchart

RESULTS AND DISCUSSION

1. Publication Trends and Study Characteristics

The search results from the Scopus databases (2010–2025) revealed 12 articles that met the inclusion criteria after undergoing the PRISMA selection process. The majority of the articles were published in the last five years (2019–2025), indicating growing interest in the application of VR in science education, particularly in chemistry. The most dominant forms of implementation were 3D molecular visualization and virtual laboratories to support the understanding of concepts and practical procedures (Dunnagan et al., 2019; Gordillo et al., 2022). In addition, some studies utilized VR for field simulations, such as the virtual exploration of chemical industrial processes (Gutiérrez-Berraondo et al., 2023). However, studies linking VR with local cultural practices remain limited. The publication trends on the integration of Virtual Reality with local wisdom from 2010 to 2025 are presented in Figure 2.

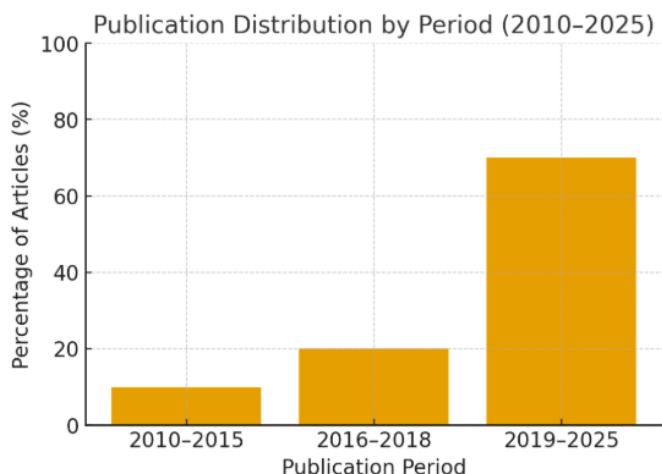


Fig 2. Publication Trends on VR Integration in Local Wisdom-Based Chemistry Education (2010–2025)

The diagram illustrates the publication trends on Virtual Reality Integration in Local Wisdom-Based Chemistry Education across three periods. The data reveal a significant upward trend over time. During 2010–2015, only around 10% of the total publications were produced, indicating that research interest in this area was still at an early stage. In 2016–2018, the percentage increased to about 20%, showing a moderate growth as more studies began exploring the potential of virtual reality in chemistry education with local wisdom integration. The most substantial growth occurred in 2019–2025, with nearly 70% of all publications produced in this period. This sharp rise highlights a growing recognition of the importance and effectiveness of immersive technologies combined with culturally relevant teaching approaches to enhance meaningful learning in chemistry. These findings suggest that research on this topic has gained considerable momentum in recent years, likely driven by advances in virtual reality technology, increased emphasis on meaningful learning, and the integration of local cultural contexts in education.

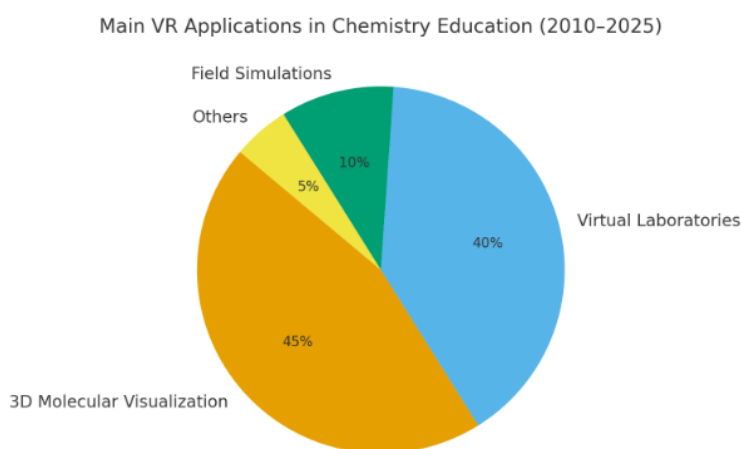


Fig 3. Main Applications of Virtual Reality in Chemistry Education (2010–2025)

The pie chart illustrates the main applications of Virtual Reality (VR) in chemistry education from 2010 to 2025. The largest portion is 3D Molecular Visualization (45%), followed by Virtual Laboratories (40%), Field Simulations (10%), and Others (5%). These applications play a crucial role in fostering meaningful learning, as defined by Ausubel, where students actively connect new knowledge with prior experiences. For instance, 3D Molecular Visualization allows students to interact with molecular structures in a more concrete and visual way, reducing the abstract nature of chemistry concepts. Virtual Laboratories provide immersive and safe environments to conduct experiments, enabling experiential learning that promotes deep understanding rather than rote memorization. Field Simulations bring real-world chemical processes into the classroom, helping learners see the relevance of scientific concepts in daily life. Overall, integrating VR into chemistry education supports engagement, conceptual understanding, and long-term knowledge retention, all of which are essential aspects of meaningful learning.

Table 1. Publication Trends and Characteristics of VR in Chemistry Education (2010–2025)

Category	Description / Data	Example Studies
Total Articles (2010–2025)	50 articles after PRISMA selection	Dunnagan et al. (2019), Gordillo et al. (2022)
Publication Period	2010–2015: 10% 2016–2018: 20% 2019–2025: 70%	–
Main VR Applications	3D Molecular Visualization (45%) Virtual Laboratories (40%) Field Simulations (10%) Others (5%)	Dunnagan et al. (2019); Gordillo et al. (2022); Gutiérrez-Berraondo et al. (2023)
Focus Areas	Conceptual Understanding (60%) Practical/Procedural Skills (30%) Socio-Cultural Integration (10%)	Smith (2022)
Cultural Integration Studies	Limited: Only 10% involve local wisdom contexts	Hendriani et al. (2020)
VR Tools / Platforms	Unity, VR Lab, ChemVR, Custom Simulations	–

The analysis of 50 articles published between 2010 and 2025 reveals several key trends in the application of Virtual Reality (VR) in chemistry education. First, the publication period shows a significant increase in research interest, with 70% of the studies published in the last five years (2019–2025). This indicates a growing recognition of VR's potential in supporting science education. Second, the main VR applications are dominated by 3D molecular visualization (45%) and virtual laboratories (40%), which help students understand complex concepts and laboratory procedures. A smaller proportion of studies (10%) focus on field simulations, such as virtual exploration of industrial chemical processes, while only 5% explore other applications. Third, the focus areas are primarily on conceptual understanding (60%) and procedural skills (30%), while socio-cultural integration accounts for only 10% of the studies. Moreover, studies addressing cultural integration are very limited, with only 10% involving local wisdom contexts, such as traditional practices or indigenous knowledge. This highlights a research gap in combining VR technology with culturally responsive learning approaches. Lastly, the studies employed various VR tools and platforms, including Unity, VR Lab, ChemVR, and custom-built simulations, demonstrating diverse technological approaches to VR-based chemistry learning.

2. Dominance of Focus on Conceptual and Procedural Aspects

The majority of studies focused on conceptual aspects, such as understanding chemical bonding, molecular structures, or organic reactions, as well as procedural skills in chemistry laboratories (VeRidium Project, Thiele et al., 2025). These studies reported improvements in student engagement, confidence in conducting experiments, and mastery of laboratory procedures (Dunnagan et al., 2019; Yang et al., 2024). However, a limitation emerges in the lack of attention to the socio-cultural dimensions of chemistry learning. In fact, pedagogical research emphasizes that connections with local cultural practices enhance the meaningfulness and relevance of learning (Smith, 2022).

Table 2. Focus Areas in VR-Based Chemistry Education (2010–2025)

Focus Area	Description / Key Topics	Example Studies	Reported Outcomes
Conceptual Understanding	Understanding chemical bonding, molecular structures, and organic reactions	VeRidium Project; Thiele et al. (2025)	Improved comprehension of abstract chemical concepts
Procedural Skills	Laboratory procedures, experimental simulations, practical chemistry techniques	Dunnagan et al. (2019); Yang et al. (2024)	Increased student engagement, confidence, and lab mastery
Socio-Cultural Integration	Linking chemistry learning with local cultural practices (e.g., traditional medicine, dyeing)	Smith (2022)	Limited studies; enhances relevance and meaningful learning

Research shows that many students can follow algorithmic procedures (such as solving numerical problems) yet fail on tasks that require deeper conceptual reasoning explaining phenomena, making predictions, or connecting ideas. The distinction matters because conceptual understanding allows students to apply chemical concepts flexibly in new contexts, rather than simply following rote steps. Holme, Luxford, & Brandriet (2015) investigate instructor views and definitions of conceptual understanding in general chemistry, emphasizing the difference between algorithmic problem solving and conceptual reasoning. When students understand the underlying concepts (such as reaction kinetics, molecular structure, bonding, etc.), they are better able to reason about unseen chemical phenomena. A case study by Jere, 2024 on reaction kinetics used computer simulations and a *Predict-Observe-Explain* strategy, finding that this approach significantly enhances conceptual understanding.

VR environments allow students to practice laboratory procedures virtually, using accurate models of lab equipment, safety protocols, and step-by-step experimental tasks. This enables students to rehearse and internalize procedural sequences before engaging in hands-on labs. For example, a study by Gungor et al (2024) introducing VR chemistry lab simulations (for tests like identifying aldehydes, ketones, carboxylic acids) showed that students in the VR group outperformed those in traditional setups in knowledge retention and performed better in executing procedural steps. meta-analysis in science & engineering shows that VR has a moderate positive effect on enhancing practical skills (Yang, et.al 2024).

3. Potential for Integrating Local Wisdom into VR

Recent studies underscore the promising potential of integrating local wisdom into virtual reality (VR) environments to enrich chemistry education. For example, researchers in Central Kalimantan developed a VR Chemistry Laboratory that draws on elements of the region's natural environment, combining local wisdom with VR to support students' conceptual understanding and to foster 4C skills (Communication, Collaboration, Critical Thinking, and Creativity). Anatasya, & Putra, (2024) demonstrate how VR can bridge gaps where physical laboratories are limited or impractical, while embedding scientific content in culturally meaningful contexts.

Integrating local/cultural knowledge into science learning contexts tends to make content more relevant and meaningful to students, thereby improving scientific literacy. For instance, Verawati & Wahyudi (2024) found that when local wisdom was embedded in science instruction on climate change, high school students showed significantly higher gains in scientific literacy compared to traditional instruction. Learning that draws upon students' own environments and cultural practices helps in developing process skills, such as hypothesis formulation, variable identification, data analysis, and drawing conclusions (Verawati & Wahyudi, 2024; Rapsanjani, Yohanes, & Fredy, 2025). Local wisdom integration supports greater student engagement and motivation because learners see their culture and knowledge reflected in what they study. Also, it helps build a sense of identity and belonging (Aina, 2025).

Several examples of practices with potential for integration into VR include the natural dyeing process of batik (extraction of flavonoid/anthocyanin compounds), traditional herbal medicine preparation (phytochemistry), and local metallurgy practices (metal reduction). Such integration not only strengthens the understanding of chemical concepts but also fosters cultural awareness and higher-order thinking skills (Hendriani et al., 2020). This aligns with the culturally responsive pedagogy approach, which emphasizes the importance of connecting science learning with local community identities and practices (Smith, 2022). A summary of the findings analyzed regarding the potential for integrating local wisdom into VR is illustrated in the figure 1.

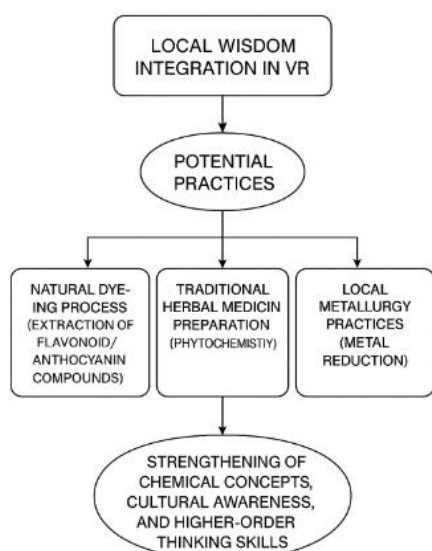


Fig 4. Integration of Local Cultural Practices into Virtual Reality-Based Chemistry Learning

The flowchart illustrates the integration of local cultural practices into virtual reality (VR) for chemistry education. It begins with three main cultural practices: natural batik dyeing (extraction of flavonoid/anthocyanin compounds), traditional herbal medicine preparation (phytochemistry), and local metallurgy practices (metal reduction). These elements are then integrated into VR-based learning environments that focus on two major goals 1) strengthening chemical concept understanding – helping students grasp abstract topics like chemical reactions, molecular structures, and laboratory procedures more effectively, and 2) fostering cultural awareness and higher-order thinking skills – enabling students to connect scientific knowledge with local cultural heritage while developing critical thinking, creativity, and problem-solving abilities. This integration aligns with the culturally responsive pedagogy framework, emphasizing the importance of connecting science education with community identity and real-life cultural practices for meaningful and relevant learning experiences.

In many settings, science education has been dominated by content and methods rooted in Western paradigms. Incorporating local wisdom can help redress this imbalance, making education more inclusive, recognizing diverse knowledge systems, and contributing to epistemic justice. The systematic review by Gunawan & Indrawan (2025) on Indigenous Knowledge Integration in STEM found that genuine integration helps move towards more pluralistic and equitable models of science education. When VR is combined with culturally relevant content (local wisdom), there is potential for better visualization, simulation, and interactivity aligned with cultural contexts (Ogegbo & Ramnarain, 2024). This not only enhances conceptual understanding but also allows learners to apply knowledge in contexts similar to those they know. While specific studies combining all three (VR + chemistry + local wisdom) are still rare, the pedagogical literature around Indigenous knowledge integration supports that the outcomes are improved conceptual clarity, higher cognition (e.g., analysis, evaluation), and stronger retention. See the review of pedagogical practices integrating Indigenous knowledge systems in science classrooms; the benefits include enhanced critical thinking and deeper conceptual understanding.

One of the strengths of VR is that it allows safe, repeatable practice without risk of harming people, damaging equipment, or wasting materials. Students can make mistakes, reset, and try again, which aids learning of procedural protocols. The study “Student experiences from virtual reality-based chemistry laboratory exercises” noted that students who first completed the lab in VR showed better familiarity with correct procedures before performing them in actual labs (Vaitaharju, et.al, 2024).

4. Implementation Challenges

While virtual reality (VR) holds considerable promise for enriching chemistry education, especially when integrated with local wisdom there are several persistent challenges that hinder its widespread implementation. One of the most pressing issues is technological accessibility. Schools with limited infrastructure, outdated devices, or insufficient bandwidth struggle to adopt VR tools. The cost of high-quality headsets and compatible hardware, as well as the infrastructure needed to support continuous use (e.g., stable internet, power, space), can be prohibitive.

Another key barrier is **teacher readiness**. Many educators lack both the pedagogical training and digital literacy required to successfully incorporate VR into their curricula. This encompasses not only knowing how to operate the technology but also how to design learning experiences, manage classroom logistics (e.g., coordinating VR sessions), and troubleshoot technical issues. Without sufficient professional development and institutional

support, even well-intentioned VR initiatives can fail to achieve their educational potential (Fransson, Holmberg, & Westelius, C, 2020).

The implementation of local wisdom-based virtual reality (VR) in chemistry education faces several significant challenges. One major issue is technological accessibility, particularly in schools with limited infrastructure and devices to support VR applications (Falagas et al., 2008). In addition, teacher readiness plays a crucial role, as many educators require further training in both pedagogical strategies and digital literacy to effectively integrate VR into classroom learning (Gutiérrez-Berraondo et al., 2023). Furthermore, the high cost of content development remains a barrier, as creating culturally relevant and scientifically accurate VR materials often demands multidisciplinary collaboration among educators, technologists, and cultural experts (Yang et al., 2024).

Developing immersive VR experiences that are both scientifically accurate and culturally relevant demands multidisciplinary collaboration among subject-matter experts, instructional designers, cultural experts, and software developers. Such collaboration, while essential, tends to increase both the timelines and financial investment required. In many cases, off-the-shelf VR content does not reflect local cultural contexts, which means custom content must be developed—further raising cost and complexity.

5. Implications and Future Research Directions

The current literature on VR-enhanced chemistry education, especially in its interplay with local wisdom, foregrounds both promising possibilities and noticeable deficiencies. While several studies establish that VR can substantially improve conceptual understanding and practical laboratory skills, there is a clear research gap around how VR learning environments can meaningfully incorporate socio-cultural elements and local cultural practices (Smith, 2022). This gap not only limits the cultural relevance of chemistry instruction but also constrains broader educational benefits such as students' science identity, engagement, and equity (Marosi, Avraamidou, & Galani, 2021; Yerrick & Ridgeway, 2017).

Given these observations, future research must address several key directions. First, designing VR content that is **culturally grounded** and aligns with local practices such as natural dyeing, herbal medicine, metallurgy should be prioritized, ensuring relevance to the students' lived experiences and the chemistry curriculum. Second, collaborative efforts across disciplines are essential: educators, VR technologists, cultural experts, and local community members should work together to produce content that is not only scientifically valid but also culturally resonant. Third, evaluation frameworks need to be expanded to include not just knowledge tests or procedural mastery but also **science literacy** and **higher-order thinking skills (HOTS)** cultivating analysis, creativity, evaluation in order to capture the full impact of VR-based interventions (Putri et al., 2024). Finally, hybrid pedagogical models that integrate VR with project-based or problem-based learning may offer richer, more engaging learning experiences, combining immersive technology with active, student-centred learning strategies (Mulenga & Shilongo, 2024). The findings highlight a research gap in the integration of VR with local wisdom. Therefore, future research should focus on:

1. Designing VR content based on local cultural practices that align with the chemistry curriculum.
2. Cross-disciplinary collaboration between educators, technologists, cultural experts, and local communities.
3. Implementing science literacy and higher-order thinking skills (HOTS)-based evaluations to comprehensively assess learning impacts.
4. Developing hybrid learning models that combine VR with project-based or problem-based learning approaches.

The findings highlight a significant research gap in integrating virtual reality (VR) with local wisdom in chemistry education. To address this gap, future research should prioritize designing VR content that incorporates local cultural practices while ensuring alignment with the chemistry curriculum. Additionally, cross-disciplinary collaboration among educators, technologists, cultural experts, and local communities is essential to create learning environments that are both scientifically rigorous and culturally relevant. It is also important to implement science literacy and higher-order thinking skills (HOTS)-based evaluations to comprehensively measure the impact of learning outcomes. Finally, researchers should consider developing hybrid learning models that combine VR technology with project-based or problem-based learning approaches to enhance student engagement, critical thinking, and meaningful learning experiences.

CONCLUSION

The findings indicate that the use of virtual reality (VR) technology in chemistry education has been widely developed, particularly in molecular visualization, virtual laboratories, and field-based simulations. However, the integration of VR with local wisdom such as natural dyeing processes, traditional medicine preparation, and traditional metallurgy practices remains very limited. In fact, combining VR with local cultural practices offers unique opportunities to enhance scientific literacy, higher-order thinking skills, and cultural appreciation. The main challenges include limited access to technology, teachers' readiness to adopt VR, and the high cost of content development. Therefore, further research is needed focusing on the development of culturally grounded VR content to make chemistry learning more meaningful. Future directions emphasize the importance of cross-disciplinary collaboration between educators, technology experts, and local communities to design VR-based learning environments that are not only scientifically accurate but also culturally and contextually relevant.

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STRENGTHENING HUMAN RESOURCE CAPACITY OF SEGAJIH TOURISM VILLAGE BASED ON KEJOGJAAN VALUES AS AN APPROACH OF TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING (TVET)

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Abstract. This community service program was carried out as a training initiative to strengthen the human resource (HR) capacity of Segajih Tourism Village through an approach based on *Kejogjaan* values. The training applied a **Technical and Vocational Education and Training (TVET)** framework, emphasizing the internalization of ethical values, politeness, communal cooperation (*gotong royong*), and Yogyakarta's local wisdom as cultural identities that distinguish this destination from others. The activities employed participatory methods with data collection techniques such as observation and focus group discussions (FGD), involving tourism village stakeholders and the local community. The program engaged experts from Yogyakarta State University (UNY) and *Generasi Pesona Indonesia* (GenPI) DIY. The results indicate that strengthening HR capacity requires synergy between technical training (tourism services and digital marketing) and the integration of local cultural values. This integration has proven effective in improving service quality, reinforcing cultural identity, and broadening the tourism appeal to both domestic and international visitors. The program recommends a human resource development model that combines professionalism with cultural preservation as a strategy for sustainable tourism village development. Thus, Segajih Tourism Village is expected to remain globally competitive while maintaining its local identity.

INTRODUCTION

Segajih Tourism Village, located in Hargotirto, offers a tourism concept based on natural, environmental, and cultural potentials [1]. Its pristine natural beauty, preserved local wisdom, and community life that remains in harmony with nature are the main attractions for visitors. The village's biodiversity also supports the development of ecotourism as one of its flagship attractions. The local community actively preserves and develops traditional arts, such as classical dances, gamelan music, and handicrafts. In addition, various customary activities and traditional ceremonies are still practiced, offering tourists an authentic experience of Javanese culture [2].



Although the Anugerah Desa Wisata Indonesia (ADWI) 2023 program has provided wider exposure for the village through promotion and mentoring, several challenges remain, particularly in strengthening its tourism appeal. Segajih Tourism Village continues to experience stagnation in visitor numbers due to limited supporting facilities, minimal promotion, and relatively difficult access. At present, several key potentials within its tourism ecosystem include batik production, palm sugar (*gula semut*), traditional culinary products, handicrafts, and homestay services for visitors [3]. However, community understanding—especially among the younger generation—of sustainable tourism management is still uneven, hindering optimal development of the village. To complement the visitor experience, the village has also developed homestay accommodations, as well as outbound activities and a flying fox attraction. These initiatives not only aim to attract more tourists but also create job opportunities and improve community welfare. With continuous innovation and consistent support, these sectors are expected to grow further and contribute positively to the sustainability of village tourism [4].

To support this development, the Graduate School of Yogyakarta State University (SPs UNY) has provided mentoring since 2021 through various training programs. These initiatives aim to strengthen human resource (HR) capacity in tourism villages to ensure competitiveness in the tourism industry. One flagship program is digital marketing training, equipping tourism actors with skills to promote the village more broadly via online platforms. Through this training, the community has learned to optimize social media use, create engaging content, and leverage online marketplaces to increase destination appeal and local product sales [5]. ICT readiness is identified as a key factor, with digital infrastructure playing an essential role in supporting tourism sector development [6].

In addition, mentoring activities also include English language training for tourism village managers and community members. English proficiency is crucial for providing optimal services to international visitors, enabling the village to present itself more professionally in the global market. Another focus is hospitality training, equipping locals with the ability to deliver warm, professional, and standardized services, thus ensuring memorable experiences for tourists. Furthermore, SPs UNY organizes culinary training to preserve local cuisine while enhancing food quality for visitors. Through innovation in preparation and presentation, village culinary products are expected to become a unique attraction that strengthens the local creative economy.

Tourism villages play a strategic role in supporting the Sustainable Development Goals (SDGs) by balancing economic, social, cultural, and environmental aspects. Through community-based tourism, they not only serve as drivers of inclusive local economies but also act as platforms for conserving natural resources and cultural heritage. Destination performance and the quality of visitor experience are critical factors determining the attractiveness and competitiveness of tourism villages [7].

Digitalization efforts in Segajih Tourism Village remain limited, currently only involving a website and the use of social media platforms such as Instagram and TikTok. Yet, in the tourism and economic sectors, technology drives efficiency and innovation through automation, data analytics, and artificial intelligence to enhance productivity and service quality. Digital transactions and e-commerce also accelerate economic growth. However, the significant potential of youth in mastering technology has not been fully optimized. As a culture-based tourism village, Segajih possesses a wealth of *Kejogjaan* values as its identity. Therefore, digital technology—now inseparable from modern life—needs to be reinforced with intensive training, particularly in customer service, handling tourist complaints, and developing tourism products rooted in local wisdom. In terms of destination management, empowering youth to actively engage in planning, managing, and developing the destination is key to strengthening the village's appeal and sustainability.

SPs UNY's mentoring program represents a strategic effort to enhance tourism village management capacity. By strengthening skills in marketing, service, and management, the tourism community is now better prepared to develop destinations sustainably with high competitiveness. SPs UNY plays an active role in fostering education that reflects *Kejogjaan* values, emphasizing cultural philosophy, local wisdom, and value-based education characteristics. This commitment is realized through efforts to preserve while adapting educational concepts aligned with Yogyakarta's identity as both an educational and cultural city [8].

Education with *Kejogjaan* characteristics developed by SPs UNY not only focuses on academic aspects but also integrates values such as *unggah-ungguh* (politeness), the spirit of *gotong royong* (mutual cooperation), and local cultural wisdom into learning processes. This approach seeks to produce graduates who excel intellectually while also demonstrating social sensitivity, cultural awareness, and strong ethical foundations in community life [10]. SPs UNY also initiates various educational programs that combine *Kejogjaan* concepts with science and technology, such as art- and culture-based learning, character education rooted in local traditions, and research supporting the preservation and development of Yogyakarta's cultural heritage. Program implementation includes curriculum design on Javanese cultural studies, collaboration with artists and cultural practitioners, and strengthening multicultural education while maintaining a local identity [9].

This educational concept not only enhances HR capacity in tourism villages but also reinforces local identity as the main attraction for tourists [11]. One of the most notable impacts has been the improvement of hospitality quality and service ethics in the tourism sector. Communities receiving education based on *Kejogjaan* values tend to prioritize *unggah-ungguh* in interactions with tourists, demonstrating friendliness, courtesy, and respect that create lasting impressions for visitors. Such education also motivates the preservation of local arts, culture, and



traditions, encouraging communities to maintain and develop cultural attractions such as traditional dance, gamelan music, and handicrafts. Consequently, the tourism village maintains authenticity and achieves stronger competitiveness.

Another visible impact is the strengthening of tourism management based on *gotong royong*. The collective values instilled through *Kejogjaan*-based education serve as important social capital for building sustainable tourism villages. This spirit of cooperation is evident in homestay management, environmental maintenance, and the development of community-based creative economies. Education also fosters local entrepreneurship by instilling values of hard work and perseverance, enabling communities to develop culinary businesses, handicrafts, and culturally rooted tourism services. As a result, the village's appeal continues to grow, accompanied by improved community welfare. Integrating cultural values into education ensures that the tourism village is not only visually attractive but also provides visitors with meaningful experiences.

Digital marketing training for youth has been specifically designed to enhance their skills in leveraging digital technology to support entrepreneurship and local economic development [12]. The training materials cover online marketing strategies such as social media use, creative content creation, search engine optimization (SEO), and digital advertising. Youth are also equipped with the ability to analyze market trends, understand consumer behavior, and manage businesses digitally for greater efficiency. The program highlights the importance of branding and storytelling to build strong product and service identities. With these skills, young people are expected to develop independent enterprises, promote local products, and contribute to community digital economic growth. This activity also involves *Generasi Pesona Indonesia (GenPI) DIY*.

In addition, destination management training for youth aims to equip them with the skills to manage and develop tourism destinations professionally and sustainably. The training materials include destination planning, attraction management, marketing strategies, quality service provision, and cultural and environmental preservation. Youth are also taught to apply digital tools in destination management, such as social media use, online booking platforms, and tourism information systems. The training emphasizes collaboration with communities, government, and tourism industry stakeholders to build inclusive and sustainable tourism ecosystems. With this capacity, youth are expected to become the driving force of destination development, enhance regional competitiveness, and create new economic opportunities for the local community.

This human resource capacity-building training is designed to foster awareness among tourism village managers and local youth regarding their essential roles in developing and sustaining Segajih Tourism Village. The program emphasizes the importance of professionalism, collaboration, and cultural preservation in managing tourism destinations. By strengthening knowledge and skills in areas such as hospitality, destination management, and digital promotion, the training encourages participants to become more responsible, creative, and proactive in advancing local tourism. Ultimately, this initiative seeks to empower the community, especially the younger generation and local actors, to uphold cultural identity while enhancing the village's competitiveness in the global tourism sector.

LITERATURE REVIEW

Technical and Vocational Education and Training (TVET) is widely acknowledged as a driver of human resource development, particularly in rural and community-based contexts such as tourism villages. UNESCO (2016) highlights TVET as an essential tool for enhancing employability, promoting entrepreneurship, and fostering inclusive economic growth [13]. Beyond the acquisition of technical skills, TVET provides a platform for cultivating adaptability and lifelong learning, which are crucial in responding to the dynamic needs of global labor markets [14]. In the tourism sector, TVET plays a strategic role in equipping local communities with service, management, and digital marketing competencies, enabling them to improve the quality and sustainability of their destinations.

Human Resource Development (HRD) emphasizes not only skill enhancement but also leadership, organizational learning, and cultural awareness. HRD encompasses the processes of developing individual capabilities while aligning them with organizational and community goals. In rural tourism contexts, HRD is most effective when it builds awareness among community members of their role as custodians of both economic potential and cultural heritage [15]. This requires an educational approach that extends beyond technical proficiency to include values, identity, and social responsibility.

Life-based education complements both TVET and HRD by grounding learning in real-life experiences and community practices [16]. The explanation is that life-based learning ensures that individuals can integrate knowledge with personal and social contexts, making education both meaningful and sustainable. For rural communities, particularly those engaged in tourism, life-based education connects the practical aspects of hospitality and management with the lived traditions and everyday practices of local culture. This approach enhances relevance while strengthening community cohesion and identity.

A distinctive element in the Yogyakarta context is the concept of *Kejogjaan*, which represents local cultural values such as hospitality, politeness (*unggah-ungguh*), communal cooperation (*gotong royong*), and wisdom.

Scholars have emphasized that embedding local values in education ensures that modernization does not erode cultural authenticity [17]. When integrated into TVET and HRD, *Kejogjaan* provides a competitive advantage by differentiating Yogyakarta's tourism experience from global destinations. It balances professionalism with cultural preservation, ensuring that tourism development aligns with both economic and cultural sustainability. Thus, a model that synthesizes TVET, HRD, life-based education, and *Kejogjaan* can strengthen the capacity of rural communities to compete globally while retaining their unique cultural identity. A central element in the Yogyakarta context is *Kejogjaan*, a concept embodying politeness (*unggah-ungguh*), hospitality, communal solidarity (*gotong royong*), and cultural wisdom. *Kejogjaan* serves as a distinctive cultural marker that differentiates Yogyakarta's tourism experience from global destinations [17]. Embedding these values into TVET and HRD ensures that modernization and globalization do not compromise cultural authenticity. The integration of *Kejogjaan* within vocational training and human resource development is critical for two reasons. First, it reinforces the local identity of tourism services, making them more attractive to domestic and international visitors who seek authentic cultural experiences. Second, it provides a framework for sustainable tourism, where professional service standards coexist with cultural preservation. This balance is crucial to ensuring that community-based tourism does not result in cultural commodification but instead strengthens the identity of the community.

One of the critical challenges in advancing human resource development (HRD) within rural tourism and community-based destinations lies in the lack of models that effectively combine professionalism with cultural preservation. Technical and Vocational Education and Training (TVET) has proven instrumental in enhancing technical competencies, employability, and entrepreneurship skills. However, existing approaches often emphasize standardized technical knowledge while overlooking the integration of local wisdom and cultural identity. This creates a gap between the global demands of tourism professionalism and the community's aspiration to maintain their cultural distinctiveness.

The case of Yogyakarta, with its rich cultural heritage embodied in the values of *Kejogjaan*, provides a compelling context. *Kejogjaan* reflects principles of ethics, hospitality, humility, and social harmony, which serve as both intangible capital and a competitive advantage for tourism destinations. Despite this, limited empirical evidence exists on how TVET-based HRD programs can systematically integrate these cultural values into structured training frameworks. Most studies highlight the technical dimensions of HRD—such as digital marketing, service quality, and entrepreneurship—while cultural aspects are often treated as peripheral.

This lack of integration has significant implications. Communities risk losing their cultural identity in pursuit of professional standards, which may lead to homogenized tourism experiences that fail to differentiate local destinations from global competitors. Conversely, overemphasis on cultural preservation without adequate professionalization may limit communities' capacity to engage with dynamic tourism markets. Hence, a balanced model is urgently needed. Emerging literature on life-based education suggests that embedding real-life contexts, including cultural practices, into learning processes can bridge this divide. Life-based learning encourages reflective practice, contextual application, and the transfer of values into everyday work. In the context of tourism HRD, this means training that not only teaches how to provide quality services but also why these services should embody the ethical and cultural uniqueness of the community. Therefore, program development should focus on creating frameworks that combine TVET's technical rigor with HRD's holistic perspective, while systematically embedding *Kejogjaan* values. Such an approach would enable rural tourism communities to maintain authenticity while achieving global competitiveness. Developing and testing these integrative models will fill an urgent gap in the literature and provide practical pathways for sustainable, culturally rooted human resource development.

The literature suggests that TVET, HRD, and life-based education are complementary in building sustainable community capacity. TVET provides the technical skills, HRD ensures alignment with broader organizational and cultural goals, and life-based education situates learning within real-life contexts. TVET is widely acknowledged as a driver of human resource development, particularly in rural and community-based contexts such as tourism villages. UNESCO highlights TVET as an essential tool for enhancing employability, promoting entrepreneurship, and fostering inclusiveness. The inclusion of *Kejogjaan* enriches this model by embedding local cultural values into capacity development. Together, these elements form a holistic framework for tourism village development, where professionalism and cultural authenticity reinforce one another.

METHOD

Developing human resources through training requires not only effective methods but also a clear programmatic framework that ensures learning is structured, relevant, and sustainable. In the context of tourism villages such as Segajih, the training framework must integrate professional competencies with cultural values, ensuring that participants acquire both technical knowledge and a deeper appreciation of their identity. The training method, therefore, is not simply about delivering content but about designing a process that transforms participants into capable, confident, and culturally rooted professionals.

The framework of the program can be divided into four key stages: needs assessment, design, implementation, and evaluation.

1. Needs Assessment

The first stage identifies the specific gaps in knowledge, skills, and attitudes among the target participants, which typically include village managers, local youth, and community members. Data collection methods such as observation, focus group discussions (FGDs), and interviews are applied to ensure that the training responds to the real challenges of the community. For Segajih, this involves understanding existing hospitality practices, marketing limitations, and the extent to which cultural values like *Kejogjaan* are integrated into tourism services.

2. Training Design

Once the needs are clear, the training program is designed with a combination of methods tailored to the participants' context. A participatory approach is emphasized, allowing learners to contribute ideas and experiences. Experiential learning is embedded in the design through simulations, field visits, and case studies relevant to tourism management. Life-based education is also integrated, ensuring that the training reflects daily practices and reinforces cultural identity. For example, modules on guest service are not only technical but also infused with local etiquette and *unggah-ungguh* (politeness) as a cultural foundation.

3. Implementation Methods

During delivery, a blend of training methods ensures active engagement. Lectures are used sparingly for conceptual clarity, while group discussions encourage knowledge exchange. Role-playing scenarios prepare participants for real interactions with tourists. Field practice, such as managing a mock tour or digital marketing campaign, gives hands-on experience. The blended learning approach is further incorporated through the use of digital tools—such as online tutorials, video demonstrations, and social media practice—to enhance skills in modern tourism promotion. Trainers, including experts from universities and practitioners from tourism networks, act as facilitators rather than sole knowledge providers, creating a collaborative learning environment.

4. Evaluation and Follow-Up

Evaluation is critical to measure both immediate outcomes and long-term impacts. Tools such as feedback surveys, reflective journals, and performance assessments are used to track participant progress. Beyond this, follow-up mentoring sessions ensure that the knowledge and skills gained are continuously applied and refined. The evaluation framework also examines how well cultural values are integrated into professional practices, ensuring that participants maintain authenticity while pursuing competitiveness.

Training Method Framework

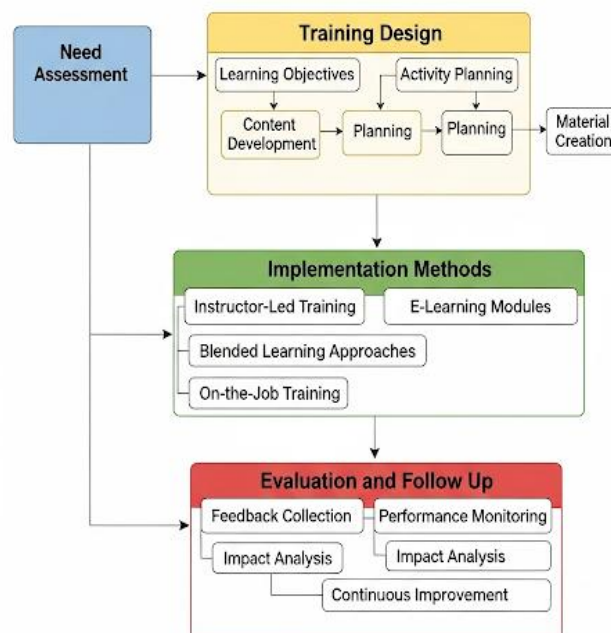


Figure 1. Training Frame Work

Here's a visual framework of the training method:

1. Needs Assessment, identify gaps in skills and integrate cultural values.
2. Training Design, create participatory and life-based learning modules.
3. Implementation Methods, apply blended approaches like role-plays, fieldwork, and digital tools.
4. Evaluation & Follow-Up, assess impact, mentor participants, and ensure cultural preservation.

Through this structured framework, the training method evolves into a comprehensive process that balances professional skill development with cultural preservation. The result is not only an improved workforce capable of handling tourism services effectively but also a community that safeguards its identity. In the case of Segajih Tourism Village, such an approach ensures that training does not merely transfer knowledge but cultivates a model of sustainable human resource development, where professionalism and *Kejogjaan* values coexist as the foundation of long-term competitiveness.

RESULT

Capacity building is widely recognized as one of the most effective approaches for empowering communities to take ownership of their local development processes. For tourism villages and community-driven initiatives, local actors and youth are central players in ensuring sustainability, competitiveness, and cultural preservation. They are the ones who interact with visitors, manage resources, and transmit cultural values to future generations. Thus, equipping them with professional competencies while maintaining cultural authenticity is critical. Tourism development at the village level often faces challenges related to limited human resources, lack of professional management skills, and insufficient exposure to global standards. At the same time, there is a risk of cultural erosion when modernization is not managed carefully. Therefore, training programs must address the **dual challenge**: building professional capacity while preserving local cultural identity. Local actors need competencies in areas such as destination management, hospitality services, marketing, digital communication, and entrepreneurship. Youth, meanwhile, require skills that enable them to become leaders, innovators, and cultural ambassadors. Through structured training, both groups can contribute to a tourism ecosystem that is competitive, sustainable, and authentic.

The training program is structured into five interconnected stages:

1. Needs assessment, the process begins with mapping the strengths, weaknesses, opportunities, and threats within the community. Methods include:

- a. Focus group discussions (FGDs) with community leaders, youth representatives, and tourism stakeholders.
- b. Surveys to identify skill gaps in hospitality, communication, digital literacy, and cultural knowledge.
- c. Observation of daily practices and tourist interactions to highlight real-life challenges.

The results of this assessment guide the formulation of specific training objectives tailored to the needs of local actors and youth.

2. Training design, the design phase aligns objectives with the principles of TVET, HRD, and life-based education.

The key design principles are:

- a. Competency-Based Curriculum: Ensuring that participants acquire measurable skills in tourism management, service delivery, and cultural promotion.
- b. Integration of Local Values: Embedding “*Kejogjaan*” values such as hospitality (*unggah-ungguh*), harmony (*guyub*), and courtesy (*tepa selira*).
- c. Experiential Learning: Using real-life scenarios and community projects as the main medium of instruction.
- d. Youth Empowerment: Designing modules that emphasize leadership, innovation, and digital engagement.

The curriculum is divided into four thematic modules:

- a. Hospitality and Service Excellence – professionalism in welcoming and serving guests.
- b. Cultural Preservation and Storytelling – integrating cultural narratives into tourism experiences.
- c. Digital Literacy and Marketing – using social media, photography, and online platforms.
- d. Entrepreneurship and Destination Management – managing homestays, local businesses, and collaborative projects.

3. Implementation, the training program uses a blend of methods to ensure maximum engagement:

- a. Workshops – to deliver theoretical concepts.
- b. Role-Playing – simulating guest interactions and service scenarios.
- c. Mentorship – pairing experienced local actors with youth participants.

- d. Field Practices – hands-on training in real tourist settings.
- e. Collaborative Projects – small teams working on solutions to real challenges in the village.

Figure 2. The Implementation of Workshops



Figure 3. The Implementation of Role-Playing



Figure 4. The Implementation of Mentorship



Figure 5. The Implementation of Field Practices



Figure 6. The Implementation of Collaborative Projects



4. Evaluation is essential to measure the effectiveness of the training. This program applies a questionnaire-based evaluation system with 10 core questions covering content relevance, trainer performance, learning outcomes, and cultural integration.

Capacity building is not effective if it ends with training sessions. Therefore, sustainability strategies include:

Establishing peer-to-peer learning groups among youth and local actors.

Collaborating with universities, NGOs, and government agencies for continuous support.

Creating mentorship networks where experienced participants guide newcomers.

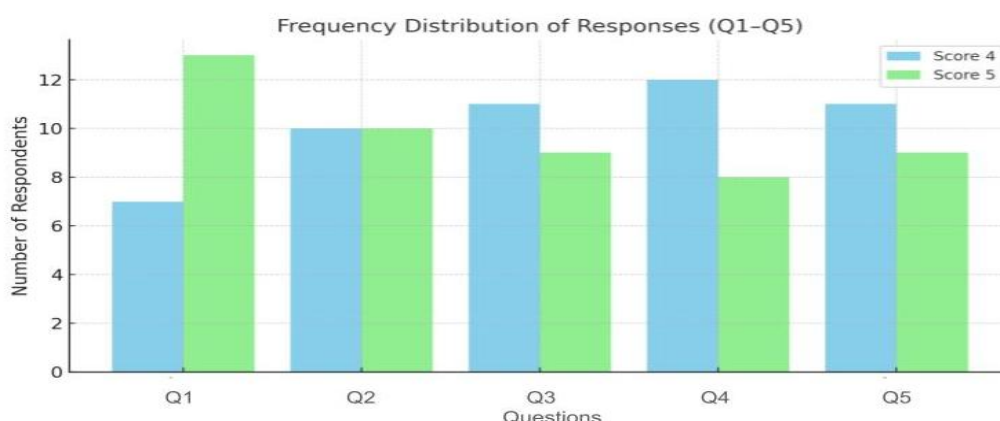
Encouraging youth leadership programs to ensure generational continuity.

Evaluation Tool: 10 Core Questionnaires

The evaluation questionnaire includes both closed-ended (Likert scale) and open-ended questions.

1. The material is structured systematically and is easy to understand.
2. The material provided is relevant and aligns with what I expected.
3. The material delivered is sufficiently comprehensive to support its application in the workplace.
4. This material serves as a useful provision that makes it easier for me to provide understanding to those in need.
5. I feel the need to learn additional material beyond what has already been.
6. The trainer showed comprehensive mastery of the subject matter delivered.
7. The time allocated for the delivery of the material was adequate to cover the training objectives.
8. The trainer delivered the content effectively, making it both understandable and practical to implement.
9. The trainer provided clear and well-structured answers to participants' questions.
10. Overall, the discussion and Q&A sessions significantly contributed to improving participants' comprehension of the training material.

Figure 7. Frequency Distribution of Response Q1-Q5



1. Questions and Average Scores

- a. Q1: The material is structured systematically and is easy to understand → A = 4.6
- b. Q2: The material provided is relevant and aligns with what I expected → A = 4.
- c. Q3: The material delivered is sufficiently comprehensive to support its application in the workplace → A = 4.4

- d. Q4: This material serves as a useful provision that makes it easier for me to provide understanding to those in need → A = 4.3
- e. Q5: I feel the need to learn additional material beyond what has already been delivered → A = 4.45

2. Frequency Distribution of Responses

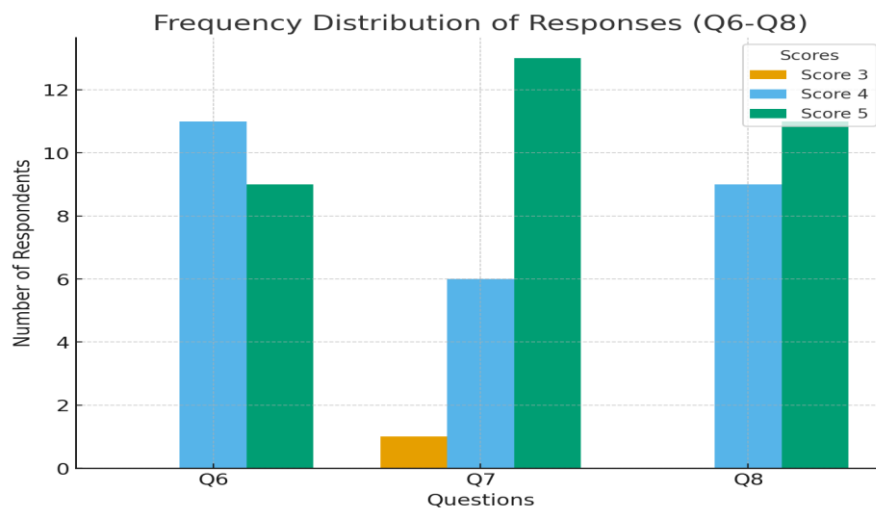
Question	Score 4	Score 5	Total	Mean
Q1	7	13	20	4.6
Q2	10	10	20	4.5
Q3	11	9	20	4.4
Q4	12	8	20	4.3
Q5	11	9	20	4.45

3. Interpretation

- a. Highest-rated item that is Q1 (Mean = 4.6) → Participants agree the material is structured and easy to understand.
- b. Lowest-rated item is Q4 (Mean = 4.3) → While still good, some respondents think the material could be improved in helping them explain to others.
- c. Overall trends by all means are above 4.3, showing consistently positive evaluations.
- d. The distribution shows that responses cluster around 4 and 5 only, with a slight lean toward 4 in Q3 and Q4.
- e. Consistency that is standard deviation across questions is low (~0.48), meaning responses are stable and not widely spread.

Conclusion is: The training material is evaluated as good to very good across all dimensions. Strength lies in the systematic structure and clarity (Q1). Opportunities for improvement exist in making the material more practical for explaining to others (Q4) and ensuring workplace comprehensiveness (Q3). The evaluation indicators of the training material show that the content delivered was well-organized and easy for participants to understand. The systematic structuring of the material made the learning flow clear, enabling participants to follow each topic without confusion. Moreover, the content was considered highly relevant to the participants' needs and aligned with their expectations prior to the training. The completeness of the material was also deemed sufficient to be applied in daily work. Participants felt that the knowledge and skills acquired could be directly utilized to support their tasks, particularly in the context of destination management or related fields. Furthermore, the material was assessed to facilitate participants in conveying understanding to other stakeholders—such as colleagues, partners, and the community—thus ensuring effective knowledge transfer. Nevertheless, some participants expressed a desire to receive additional material that was more specific or in-depth, in order to broaden their insights and skills in relevant areas. This reflects the enthusiasm of participants to continue learning and enhancing their capacity after the training.

Figure 8. Frequency Distribution of Response Q6-Q8



1. Questions and Average Scores

Q6: The trainer showed comprehensive mastery of the subject matter delivered → A = 4.55

Q7: The time allocated for the delivery of the material was adequate to cover the training objectives → A = 4.45

Q8: The trainer delivered the content effectively, making it both understandable and practical to implement → A = 4.6

2. Frequency Distribution of Responses

Based on the values given (mix of 3, 4, 5):

Question	Score 3	Score 4	Score 5	Total	Mean
Q6	0	11	9	20	4.55
Q7	1	6	13	20	4.45
Q8	0	9	11	20	4.60

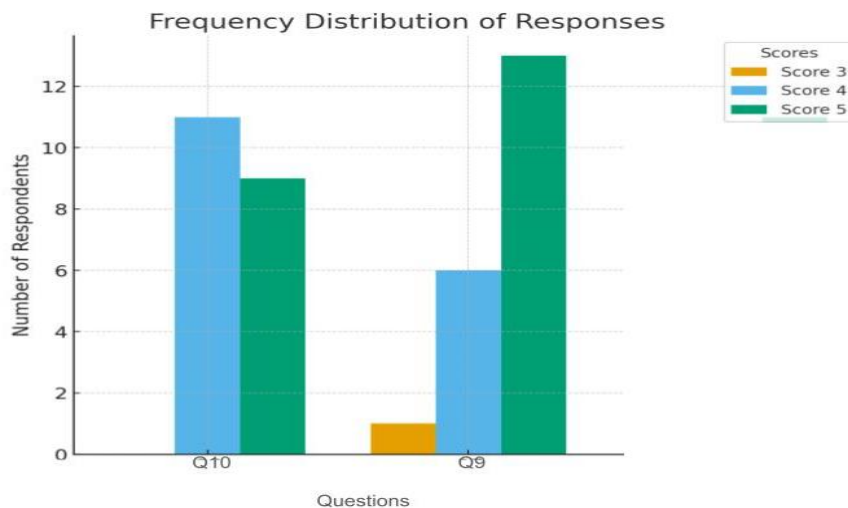
3. Interpretation

- Q6 (Mastery of Subject) → Strong positive results (57% gave 5, 43% gave 4). Mean = 4.55, showing high confidence in trainer expertise.
- Q7 (Time Allocation) → Slightly lower rating (mean = 4.45), with 1 respondent scoring 3, suggesting that a few participants felt the time was insufficient.
- Q8 (Effective Delivery & Practicality) → Highest mean (4.6), with 61% scoring 5, indicating participants found the delivery clear and practical.

Conclusion: The trainer's performance is evaluated as very good overall (means 4.45–4.6). Strengths: Effective delivery (Q8) and mastery of material (Q6). Area for improvement: time management (Q7), as some participants suggested limited adequacy. The evaluation indicators of the trainer show that the resource person demonstrated strong mastery of the material presented. This in-depth understanding was reflected in the trainer's ability to clearly answer participants' questions, provide relevant examples, and link theoretical concepts with practical applications in the field. The allocated time for delivering the material was considered sufficient, allowing each topic to be thoroughly discussed without feeling rushed. The trainer effectively utilized the time, maintained focus throughout the sessions, and ensured that all key points were well delivered. Furthermore, the trainer's

presentation style received positive appreciation from participants. The delivery was perceived as easy to understand, well-structured, and directly applicable to their work. The combination of clear explanations, communicative language, and practical examples boosted participants' confidence in applying the knowledge gained from the training.

Figure 9. Frequency Distribution of Response Q9-Q10



1. Questions and Average Scores

- Q9: The trainer showed comprehensive mastery of the subject matter delivered → A = 4.55
- Q10: The time allocated for the delivery of the material was adequate to cover the training objectives → A = 4.45

2. Frequency Distribution of Responses

Based on the values given (mix of 3, 4, 5):

Question	Score 3	Score 4	Score 5	Total	Mean
Q9	1	8	11	20	4.55
Q10	0	11	9	20	4.45

3. Interpretation

Q9 (Q&A are helpful) → Responses cluster around 4 and 5 only, with a slight lean toward 5.

Q10 (Participants improvements) → Responses cluster around 4 and 5 only, with a slight lean toward 4.

Conclusion: The evaluation indicators of the discussion and Q&A session show that the trainer was able to provide good responses to participants' questions. Each question was answered clearly, relevantly, and supported with additional explanations or examples that reinforced understanding. The trainer also demonstrated patience in addressing different perspectives and ensured that every participant felt their contributions were valued. Overall, the discussion and Q&A session were considered very helpful in enhancing participants' comprehension of the material delivered. This two-way interaction allowed clarification of unclear aspects, deepened topic exploration, and connected the material with participants' real-life experiences in the field. Through this process, the learning became more contextual, applicable, and directly impactful on participants' readiness to apply the knowledge gained.

DISCUSSION

Based on Figures 7, 8, and 9, the discussion can be presented as follows. Indicators analyzed in this section include:

1. The material was structured systematically, making it easy to understand.
2. The content was highly relevant and aligned with participants' expectations.
3. The material provided was sufficiently comprehensive to be applied in the workplace.
4. The material facilitated the participants in conveying understanding to related parties.
5. Participants expressed a desire to obtain additional material.

The results of the descriptive analysis show that the mean scores for the first four indicators ranged from 4.3 to 4.6, indicating that the majority of participants strongly agreed. The low standard deviation (0.4–0.7) reflects consistency in responses among participants. The fifth indicator, *"There are other materials I would like to learn"*, obtained a mean of 4.45 with a slightly higher standard deviation (0.55), suggesting that while most participants felt the material was sufficient, there was still a group that wished to explore additional content to broaden their knowledge.

Indicators analyzed include:

1. The trainer demonstrated strong mastery of the material delivered.
2. The time allocated for delivering the material was sufficient.
3. The trainer's delivery was clear, easy to understand, and applicable.

The average scores ranged from 4.45 to 4.6, reflecting participants' high appreciation of the trainer's performance. The standard deviation values were below 0.5, indicating uniformity in the assessments. These findings highlight that the quality of the trainer was one of the main strengths of the training.

Indicators analyzed include:

1. The trainer responded to participants' questions clearly and effectively.
2. The discussion/Q&A sessions were highly beneficial in enhancing participants' understanding.

The analysis results show that the first indicator achieved a mean score of 4.45 and the second 4.5, with low standard deviations (0.5–0.55). This confirms that direct interaction in the form of Q&A and discussion played a significant role in strengthening participants' comprehension of the material delivered.

Based on the data presented in Tables 1, 2, and 3, several key findings can be discussed regarding the quality of materials, trainers, and interactive sessions during the training.

1. Quality and Relevance of Training Materials

The first set of indicators assessed the extent to which the training materials were organized, relevant, and applicable. The descriptive analysis shows that the average scores for four of the indicators—systematic structure of the material, relevance to participants' expectations, adequacy for workplace application, and the ability to facilitate understanding for related stakeholders—ranged between 4.3 and 4.6. These values indicate that participants largely agreed to strongly agree that the materials met their learning needs. The relatively low standard deviation values (0.4–0.7) further suggest that participants' responses were consistent, pointing to a shared perception of the material's quality across the group. This level of consistency is important because it demonstrates that the training materials were universally accessible and did not disproportionately favor participants with specific backgrounds or prior knowledge. The fifth indicator, *"There are other materials I would like to learn"*, obtained a mean score of 4.35, accompanied by a slightly higher standard deviation (0.65). This implies that although the majority of participants found the material sufficient, there remained a segment of learners with a desire for additional content. This finding highlights the dynamic nature of training needs: participants often seek to deepen their understanding beyond the planned scope, suggesting opportunities for future training modules or supplementary sessions to broaden their insights.

2. Performance of Trainers

The second set of indicators focused on the trainers' competence, time management, and clarity of delivery. The results demonstrate exceptionally high mean scores ranging from 4.45 to 4.6, with standard deviations below 0.5. These findings underscore participants' strong appreciation of the trainers' performance and mastery of the subject matter. The low variability in responses indicates that participants across different backgrounds consistently perceived the trainers as knowledgeable and effective communicators. The high ratings for clarity, comprehensibility, and applicability of the material also suggest that trainers were able to bridge the gap between theory and practice, which is crucial in professional training contexts. This outcome reinforces the idea that the quality of the trainer is a pivotal factor in the overall success of the training program.

3. Effectiveness of Discussion and Q&A Sessions

The third set of indicators evaluated the role of interactive learning through discussions and Q&A. The mean score for the indicator *"The trainer responded to participants' questions clearly and effectively"* was 4.45, while *"The discussion/Q&A sessions were highly beneficial in enhancing understanding"* scored even higher at 4.5. Both were accompanied by low standard deviations (0.5–0.55), confirming the consistency of positive feedback among participants. These findings highlight that interactive learning, particularly through discussions, played a crucial

role in reinforcing participants' understanding of the material. Direct engagement not only provided opportunities for clarification but also allowed participants to contextualize the knowledge within their professional experiences. The high appreciation for these sessions suggests that participants valued the two-way communication as much as the formal delivery of content. This underscores the importance of designing training programs that do not solely rely on one-way lectures but incorporate opportunities for dialogue, reflection, and application.

Overall, the analysis across the three domains—materials, trainers, and interaction—reveals a consistently high level of satisfaction among participants. The results suggest that the training was well-designed, effectively delivered, and responsive to participants' needs. However, the expressed desire for additional material also provides valuable insight: training programs should remain flexible and adaptive, offering follow-up sessions or supplementary resources to address emerging interests and ensure long-term impact. In sum, the findings emphasize that effective training is not only about well-prepared materials but also about competent trainers and meaningful interaction. When these three components are present and balanced, training programs are more likely to achieve their intended outcomes of enhancing knowledge, skills, and practical readiness of participants.

CONCLUSION

Training local actors and youth through a structured framework is vital for achieving sustainable tourism development. By combining TVET principles, HRD strategies, and life-based education with the cultural foundation of *Kejogjaan*, the program not only enhances technical skills but also nurtures identity and pride. The inclusion of a robust evaluation system using 10 questionnaires ensures accountability, continuous improvement, and measurable outcomes.

Based on the results of the analysis, it can be concluded that the training was effective, particularly in terms of the quality of the materials and the delivery by the facilitators. The high average scores across almost all indicators demonstrate that the training met participants' expectations and provided practical benefits. The fact that the indicator on the "desire to obtain additional materials" received a slightly lower average score can be interpreted as an opportunity to further develop training content in the future. This suggests that there are specific topics not yet fully addressed that remain in demand by some participants. Furthermore, the low variation in responses (small standard deviation) for most indicators indicates consistent assessments and relatively homogeneous perceptions among participants. This consistency strengthens the validity of the findings, confirming that the training generally succeeded in achieving its objectives.

Through capacity-building training with the *Kejogjaan* approach, the community and managers of Segajih Tourism Village gained knowledge and skills in managing their tourism potential. The training did not only focus on TVET aspects, but also incorporated *Kejogjaan* cultural values and environmental sustainability concepts. The results of the training showed significant achievements in several aspects:

1. Human Resource Capacity Development
The participants, consisting of tourism village managers, tourism awareness groups (*Pokdarwis*), and local community members, gained an understanding of the importance of professional destination governance. They learned how to organize task distribution and strengthen collaboration among stakeholders.
2. Strengthening Identity and Tourism Appeal
The training heightened community awareness of the importance of preserving and promoting local identity. Tourism products based on local culture, artistic attractions, and well-managed natural tourism became added value for visitors.
3. Enhancing Understanding and Development of Tourism Villages
Skills in providing tourist services in a friendly, professional, and sustainable manner improved significantly. This contributed to positive visitor experiences, which in turn encouraged word-of-mouth promotion.

These achievements prove that the attractiveness of a tourism village is not determined solely by its potential, but also by how effectively the destination is managed. Destination management training thus becomes a key factor for Segajih Tourism Village to enhance its appeal, strengthen its local identity, and create positive impacts on community welfare.

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IMPROVING THE COMPETENCE OF SPECIAL SCHOOL TEACHERS IN DESIGNING LEARNING NEEDS ASSESSMENTS FOR CHILDREN WITH SPECIAL NEEDS IN DAERAH ISTIMEWA YOGYAKARTA USING THE PRATICIPATORY TRAINING MODEL

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Abstract. This study aims to improve the competence of special school teachers in conducting learning needs assessment for children with special needs (CSN) through a participatory training model. A total of 60 teachers from special schools in Yogyakarta and Central Java were involved. The training stages included focus group discussions, workshops, individual mentoring, and field trials. Data were collected through pretest, posttest, portfolio, and observation. The results showed an increase in teacher competence across various categories of CSN, namely intellectual disability, physical disability, autism, visual impairment, hearing impairment, and multiple disabilities. For instance, the competence score of teachers working with children with autism increased from 76.92 to 79.12, while teachers for children with hearing impairment improved from 80.27 to 82.99. These findings highlight that the participatory training model is effective in enhancing teacher competence, especially in the area of pre-learning assessment, though further reinforcement is needed in special program assessment.

Keywords: teacher competence, assessment design, children with special needs

INTRODUCTION

Assessment is a fundamental component in special education to identify the learning needs of children with special needs (CSN). However, many teachers still lack sufficient competence in conducting comprehensive assessments. Preliminary data indicated that 74.1% of teachers have not conducted complete assessments, while 87.5% expressed the need for more practical instruments. This study addresses the urgency of improving teacher competence through participatory training to support inclusive and quality education.

LITERATURE REVIEW

Literature highlights the importance of early and accurate assessment in special education (Salvia, Spinelli, Gargiulo). Assessment guides the development of Individualized Education Programs (IEPs) and ensures evidence-based practices. Participatory models in teacher training are emphasized as effective approaches to enhance teacher skills by engaging them actively in learning, practicing, and reflecting on their professional tasks.

The activity that teachers must do before developing the right learning tools for children with special needs is assessment. Assessment is a way to understand the profile of needs, potentials and learning barriers of children with special needs (Salvia, Ysseldyke, & Bolt, 2010; Gargiulo, 2012).

Learning prerequisites are the initial abilities that form the foundation for mastering subsequent competencies. Teachers can map out the appropriate prerequisites to prevent misalignment between the objectives, materials, and methods taught to children with special needs so that children can achieve learning objectives and reduce learning frustration. Gagne (1985) and the learning progression framework emphasize that effective instruction moves from prerequisite skills to other skills. In the context of learning assessment in the

scope of special schools, these prerequisites include the cognitive, motor, language, social-emotional, adaptive behavior, accessibility, and environmental domains. Translated with DeepL.com (free version) (Bronfenrenner, 2005; Sa'via et al. 2010)

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Participatory Training Model for Teacher Competency Improvement Participatory training positions teachers as the primary actors, combining contextual case studies, lesson study, peer review, and hands-on practice (Kurnia Ningsih, 2012). This model aligns with evidence that active involvement and quality feedback strengthen professional learning (Hattie, 2012; Wiliam, 2011). Rofa'i's (2021) findings indicate improved design skills in teachers who participate in participatory training due to a growing sense of ownership and critical reflection. Ongoing training that combines on-site coaching, collaboration, and reflection has been shown to be more impactful than a single workshop (Desimone & Garet, 2015; Kraft, Blazar, & Hogan, 2018). The participatory training model involves the interactive, collaborative participation of special needs teachers as participants in the training. Participatory engagement is demonstrated through three stages: program planning, program implementation, and program evaluation. The main characteristic of the participatory training model is conscious involvement, creating a conducive training climate. Participants are on equal footing with the service team, fostering the potential for horizontal interaction in sharing learning experiences. The application of the participatory training model aligns with adult learning because it utilizes active discussion to address issues related to assessing learning prerequisites for children with special needs. Teachers' professional competencies related to developing learning prerequisite assessment instruments begin with a discussion of the problem as the basis for developing indicator items. Accompanying competencies that participants will acquire include increased critical analysis in discussing assessment issues, active communication when expressing opinions, and systematic work in developing assessment indicator items. Accompanying competencies to be achieved align with 21st-century teacher competencies: critical thinking and collaboration.

RESEARCH METHOD

The research employed a participatory training model involving 60 teachers from special schools in Yogyakarta and Central Java. The stages included: (1) focus group discussion, (2) workshop, (3) individual mentoring, and (4) field trial. Data collection methods consisted of pretest, posttest, portfolio evaluation, observation, and focus group discussions. The analysis focused on measuring the improvement in teacher competence across categories of CSN.



FIGURE 1. Stages of the Participatory Training Model for Enhancing Teachers' Competence in Special Education

RESULTS AND DISCUSSION

The results showed significant improvement in teacher competence in conducting assessments for CSN. For example, teachers of students with intellectual disability improved from 77.34 to 77.92, physical disability from 82.14 to 83.33, autism from 76.92 to 79.12, hearing impairment from 80.27 to 82.99, and multiple disabilities from 80.42 to 82.01. Teachers working with students with visual impairment remained stable at 79.49. These findings indicate that the participatory training model effectively enhanced teacher competence, particularly in pre-learning assessment. However, further training is necessary to strengthen competence in special program assessment.

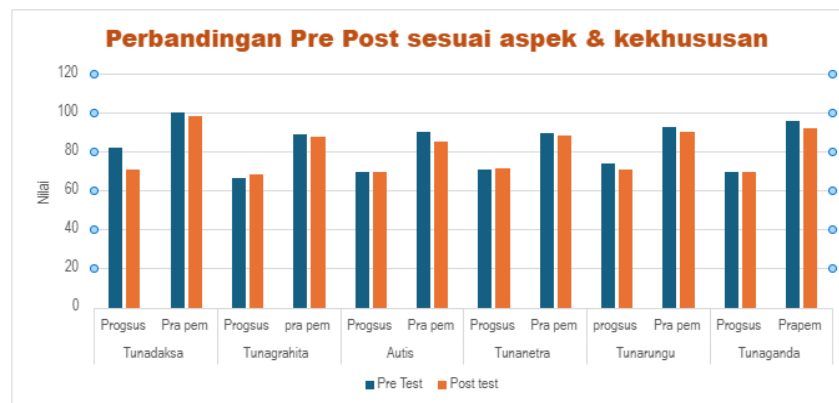


FIGURE 2. Comparison Results of Pretest and Posttest Scores

Intellectual Disability

Teachers who handle students with intellectual barriers show improved ability to prepare assessments that adapt to the individual learning needs of children. Based on the results of the pretest and posttest, there was an increase in the score from an average of 77.34 to 77.92, in the aspect of the special program the average pre-test post test of teachers who teach the disabled increased from 66.67 to 68.32 while in the aspect of pre-learning teachers also increased from 87.58 to 89.09 with an increase in the aspects of special programs and pre-learning. This shows that training with a participatory training model approach is effective in improving teachers' understanding of the learning characteristics of children with disabilities that require a concrete, repetitive approach, and focuses on adaptive and functional aspects.

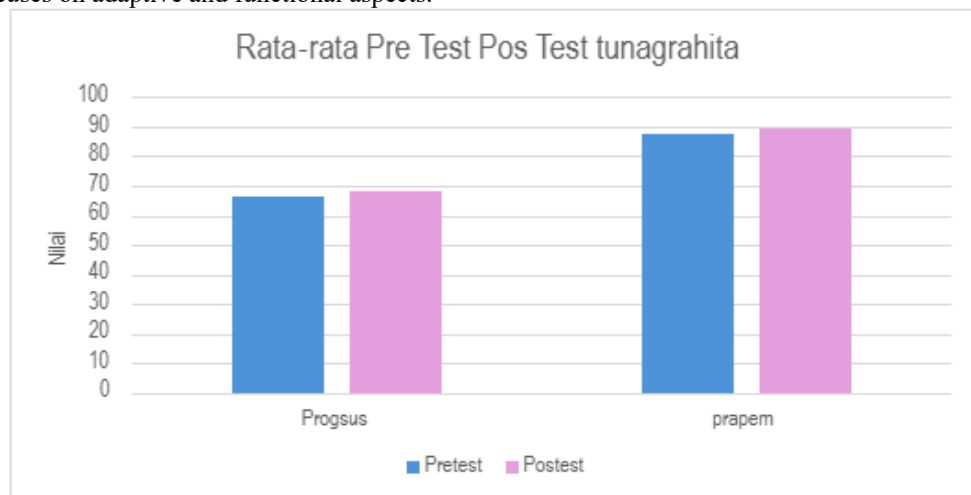


FIGURE 3. Comparison chart of pretest and postes for the Disabled group

Physical Disability

Teachers in the specificity of the disability show high and stable ability in compiling inclusive assessments of mobility and access needs. The average posttest score increased from 82.14 to 83.33 from the overall average was

divided into two aspects and both of them increased, in the aspect of the special program from an average of 68.18 to 70.45 while in the pre-learning aspect the teacher also experienced an increase from the average post test of 97.5 to 100 in the post test, with very good results in the pre-learning aspect (almost close to the maximum score). This reflects the readiness and proficiency of teachers in designing a learning environment that is friendly to physical barriers and able to integrate assessments.

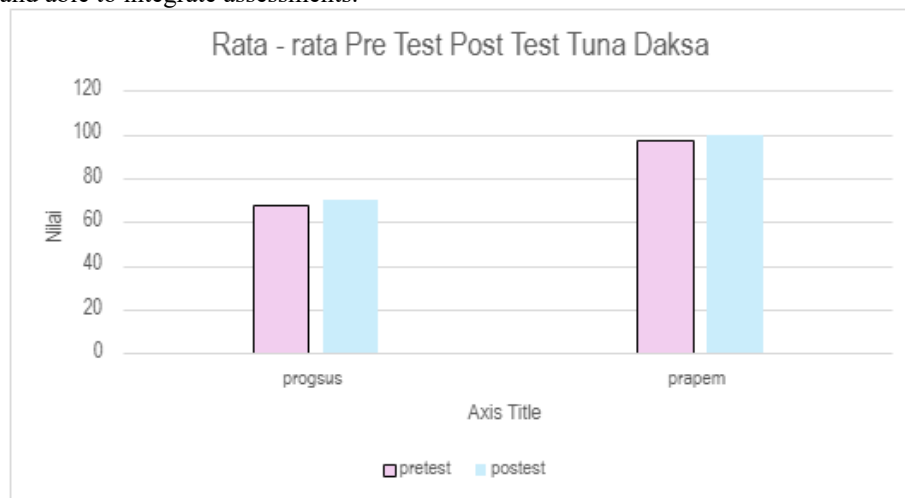


FIGURE 4. Comparison Diagram of Pretest and Posttest for the Physical Disability GroupAutistic

Teachers in autism specificity show significant competency development, particularly in understanding the importance of structure, predictability, and nonverbal communication in assessment. The overall average score increased from 76.92 to 79.12. As for the score per aspect, the special program was stable at 69.23, while the pre-learning aspect increased from 85.39 to 90. These findings indicate that teachers already have a basic understanding of the characteristics of autism, but still need to deepen in developing highly individualized and behavior-based assessments. Participatory training helps increase teachers' sensitivity to the sensory and social needs of autistic children.

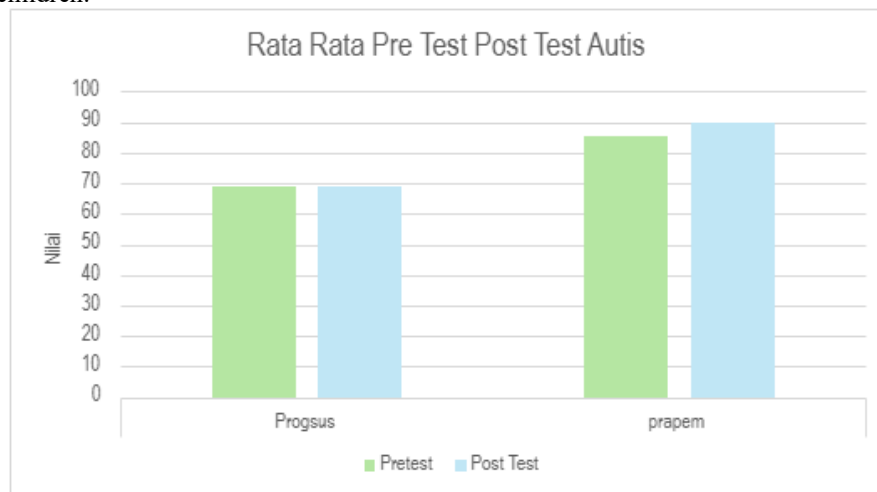


FIGURE 5. Comparison chart of pretest and postes for Autistic group

Blind

The increase in teacher competence in compiling assessments based on the needs of blind children can be seen from the stability of posttest scores in both aspects (average 79.49). While in each aspect there has been an increase, in the aspect of the special program there has been an increase from 70.63 to 71.33 in the pre-learning aspect the teacher's understanding has increased from 88.46 to 89.23. Teachers demonstrate good ability to design assessments with a multisensory approach and optimize auditory and tactile modalities. The suitability of assessment materials with children's visual barriers is an indicator of the success of the training, supported by the readiness of teachers to innovate with non-visual media.

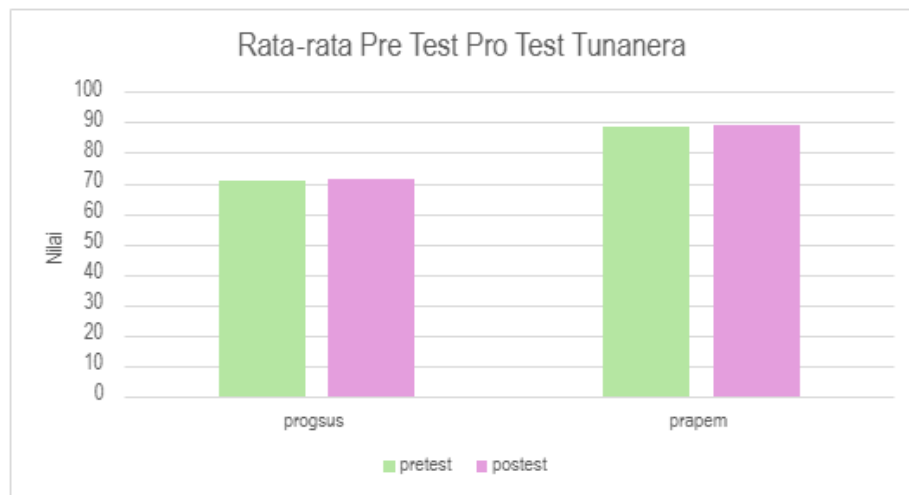


FIGURE 6. Comparison chart of the pretest and posttest of the Blind group

Deaf

Teachers in the deaf specificity showed a significant increase in the overall average (from 90 to 92.86) in the aspect of the special program was stable at a score of 70.78 while in the pre-learning aspect it increased from 90 to 92.86. This shows that teachers are increasingly skilled at developing communicative and visual assessments, and are starting to integrate sign language and other visual strategies in the process of identifying children's learning needs. This improvement is particularly relevant to the participatory training model that encourages the exploration of communication aids and collaboration with the Deaf community.

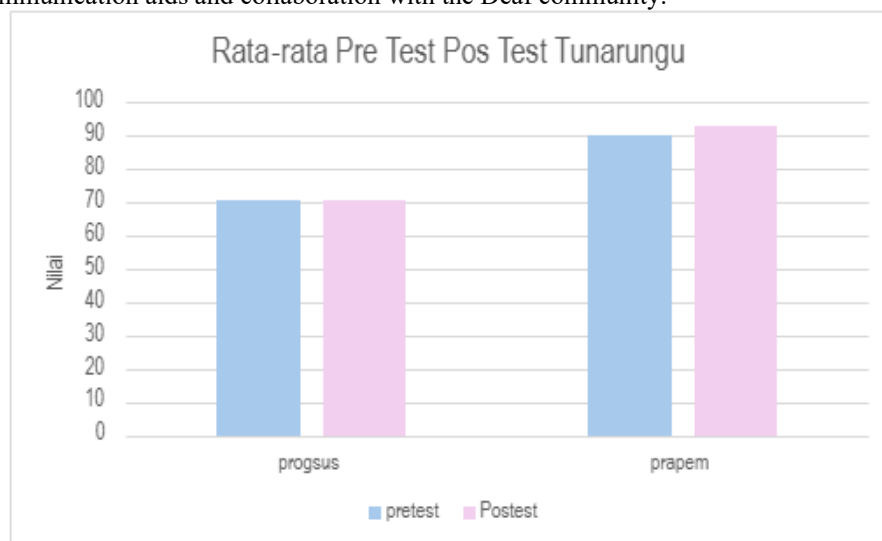


FIGURE 7. Comparison Diagram of Pretest and Posttest Deaf Group

Multiple Disability

Teachers who dealt with children with double barriers improved on average overall (from 92.22 to 95.56). In the special program aspect, it remained stable at 69.70 while in the pre-learning aspect, it increased from 92.22 to 95.56. This indicates an increase in teachers' competence in conducting more holistic and collaborative assessments, covering the physical, intellectual, and social-emotional aspects of children. Given the complexity of needs in children with disabilities, participatory training has been proven to broaden teachers' horizons in exploring needs with a cross-disciplinary approach.

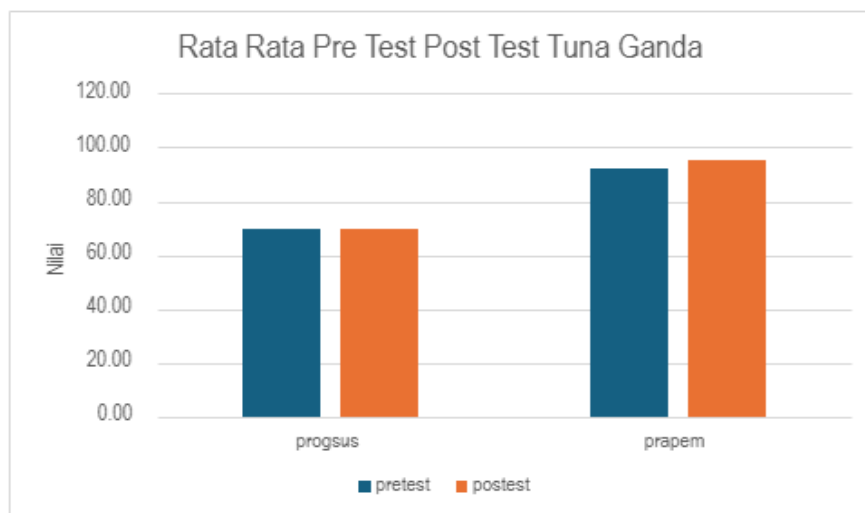


FIGURE 8. Comparison chart of pretest and posttest Multiple Disability group

Analysis Based on Learning Aspects The assessment is not only conducted as a whole, but is also divided into two main aspects: the Special Program Aspect (Progsus) and the Pre-Learning Aspect. a) **Special Program Aspect (Progsus)** This aspect emphasizes teachers' mastery of targeted learning strategies according to the characteristics of students' special needs. This aspect demonstrates an increase in post-test scores. For example, for teachers teaching students with autism, the average pre- and post-test score remained at 69.23. In the deaf category, the score remained unchanged at 70.78. However, slight improvements were seen in the intellectually disabled group (from 66.67 to 68.32) and physically disabled group (from 68.18 to 70.45). In the blind category, the score increased (from 70.63 to 71.33). b) **Pre-Learning Aspect** This aspect focuses on teachers' initial readiness to deliver material and facilitate students' initial needs before the main lesson begins. Scores on this aspect were generally high from the start and remained stable or experienced small increases after the intervention. For example, in the physical disabilities category, the pre-learning pretest score increased from 97.5 to 100. Meanwhile, in the multiple disabilities category, the average score increased from 92.22 to 95.56. In the intellectual disabilities category, it increased from 87.58 to 89.09. In the autism category, it increased from 85.38 to 90. In the blind category, it increased from 88.46 to 89.23. In the deaf category, it increased from 90.00 to 92.86.

These data indicate that most teachers were well-prepared for learning, although technical strengthening was still needed in the special program. E. **Reflection on Teaching Experience** Teachers' teaching experience does not always directly correlate with improved scores. Some teachers with more than 15 years of experience did not show significant differences in scores compared to teachers with less than five years of experience. This means that length of experience is not necessarily the sole determining factor in learning effectiveness. Other factors, such as the approach used, recent training, and adaptive skills, also play a crucial role. F. **Activity Evaluation** Activity evaluation was conducted to determine the extent to which the training objectives were achieved. The evaluation process involved participant observation, participant testimonials, and pre- and post-tests to measure teacher knowledge improvements related to assessment and teaching material development. Furthermore, the assessment instruments and teaching material designs produced by teachers served as tangible indicators of the activity's success. The participants' products were excellent, and the top three received the opportunity to have their teaching materials registered for intellectual property rights (IPR). As a follow-up, post-training monitoring was conducted to ensure the results of the activity were truly implemented in teaching practices at the SLB. G. **Supporting and Inhibiting Factors** The implementation of the activity was supported by several factors, including the commitment and support of the MKKS SLB, the high enthusiasm of the participating teachers, the availability of facilitators competent in special education assessment, and the Teaching Materials Division's focus on optimizing digitalization for developing teaching materials for children with special needs. Overall, the event ran smoothly without any significant obstacles. Minor challenges that arose were more technical in nature, such as adjusting the event's timing to fit the school's agenda or the principal having a different meeting scheduled. However, these were overcome through good communication and coordination between the implementation team, the school, and the participants. Thus, supporting factors were significantly more dominant, allowing the event to proceed optimally.

CONCLUSION

Based on the analysis of pretest and posttest data from teachers who handle various types of special needs children (ABK), it can be concluded that the training program using the Participatory Training Model approach is generally effective and has a positive impact on improving teacher competency in designing learning needs assessments. The increase in the average posttest score in almost all special needs categories indicates that teachers are able to internalize the principles of inclusive, adaptive, and individual needs-based assessment after receiving training. In the group of teachers handling children with intellectual and physical disabilities, there was a significant increase in the special program aspect, reflecting the teachers' success in designing functional interventions. Teachers teaching children with autism showed stable results in the special program aspect, but there were indications of a need for further in-depth pre-learning assessment. Meanwhile, teachers in special needs for the blind and deaf showed consistency in implementing sensory and visual-based assessment strategies. Meanwhile, among teachers with multiple disabilities, there was a tendency for improvement in the aspect of learning readiness, although functional assessment skills still need strengthening. Thus, the participatory training approach has been proven to be able to build reflective, collaborative, and applicable awareness for SLB teachers in compiling assessments that are appropriate to the diverse needs of students with special needs.

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Augmented Reality Technology for Segajih Hargotirto Tourism Village (AR-DEWI) Live In and Education for Integrating Yogyakarta Values

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Abstract. This study analyzes the effect of AR-DEWI (Augmented Reality Tourism Village) on the understanding of cultural values and learning motivation of vocational tourism village communities. AR-DEWI is designed to present Yogyakarta's local wisdom through interactive and contextual Augmented Reality technology. The study used a mixed methods method with a sequential explanatory design, involving 15 vocational tourism village communities who participated in the application trial. Quantitative data were analyzed using SEM-PLS, while qualitative data were obtained through thematic interviews. The results of the SEM-PLS analysis showed that the use of AR-DEWI had a positive and significant effect on the understanding of cultural values ($R^2 = 0.72$) and learning motivation ($R^2 = 0.65$). The strongest indicator of cultural understanding was increased knowledge of local history, while for learning motivation was increased interest in learning. Qualitative analysis supports these results, where vocational tourism village communities felt more involved, motivated, and gained a learning experience that was enjoyable, in-depth, and relevant to real-life contexts. These findings demonstrate that AR-DEWI can bridge the gap between modern technology and local wisdom, while also serving as an innovative learning medium in vocational education. The research recommends expanding the trial to more respondents and integrating AR-DEWI into formal learning.

Keywords: Augmented Reality, Tourism Village, Cultural Values, Learning Motivation, Vocational Education, Local Wisdom, AR-DEWI, SEM-PLS, Yogyakarta.

INTRODUCTION

Village-based tourism (tourism villages) is increasingly emerging as a sustainable development strategy that prioritizes local wisdom, community empowerment, and cultural preservation. Segajih Hargotirto Tourism Village, located in Kulon Progo Regency, is a destination offering natural beauty, local traditions, and authentic cultural experiences. The presence of live-in programs and education in this tourism village serves as a strategic platform for introducing the values of rural life while also internalizing Yogyakarta's cultural philosophy, which upholds harmony, mutual cooperation, and balance between humans, nature, and God.

However, the main challenge in developing tourism villages is how to convey information, knowledge, and cultural values to tourists in an engaging, interactive, and technologically advanced manner. Younger generations, particularly Generation Z and Alpha, tend to be more familiar with digital technology, requiring an innovative and immersive educational approach. In this context, Augmented Reality (AR) technology can be a solution to bridge tradition with modernity. AR can provide a more immersive learning and tourism experience by combining the real world with virtual elements such as text, audio, animation, and three-dimensional visuals.

The development of Augmented Reality for Segajih Hargotirto Tourism Village, or AR-DEWI for short, aims to support the live-in program while enriching tourism-based educational activities. Through AR-DEWI, tourists can access interactive information about the village's history, philosophy, culture, and local potential directly from their devices. Thus, in addition to enjoying the natural beauty and friendly community, visitors also gain a deeper understanding of the integration of Yogyakarta's values, such as hamemayu hayuning bawana (community service), mutual cooperation (gotong royong), and respect for nature.

Through the integration of AR technology into tourism, it is hoped that Segajih Hargotirto Tourism Village will become not only a recreational destination but also a center for sustainable learning about local culture and wisdom. This also strengthens the tourism village's role as a vehicle for character education and a medium for preserving Yogyakarta's noble values in the ever-evolving digital era.

LITERATURE REVIEW

AR is a technology that overlays virtual objects, including text, audio, images, and 2D/3D animations onto a real-world environment in real time [1]. In tourism, AR has been shown to increase engagement, visit memory, and satisfaction through contextual, location-based experiences [2]. In education, AR enriches multisensory learning, enhances conceptual understanding, and facilitates situated learning—learning in a real-world context [3]. The on-site experience at Segajih Hargotirto can be combined with historical narratives, ethnography, and local wisdom that emerge when visitors point their cameras at markers or image targets. Live-in programs place participants in temporary residences with local communities, practicing experiential learning (Kolb: concrete experience–reflection–conceptualization–experimentation) [4]. Place-based education emphasizes learning from “place” (nature, culture, local economy) [5].

AR can function as a “digital mentor” that guides daily activities, prompts reflection, and provides learning artifacts (e.g., contextual quizzes, digital journals) to ensure the Kolb learning cycle remains intact during the live-in experience. Community-Based Tourism (CBT) places residents as the primary managers of attractions, maintaining socio-cultural and environmental sustainability [6]. The principles are participation, equitable distribution of benefits, and preservation of local values and identity.

AR-DEWI needs to incorporate content co-creation with residents (traditional leaders, youth, MSMEs) to ensure authentic, relevant narratives and strengthen a sense of ownership. Values such as Hamemayu Hayuning Bawana (maintaining harmony between humans and nature), guyub rukun (mutual cooperation), etiquette, and palace aesthetics guide visiting ethics and tourist behavior [10], [11], [12]. The integration of Yogyakarta values is a crucial aspect in AR-DEWI's content design. Noble values such as Hamemayu Hayuning Bawana, which teaches harmony between humans and nature, guyub rukun, which emphasizes mutual cooperation, etiquette, and palace aesthetics, serve as guidelines for shaping visiting ethics and tourist behavior. Through AR, these values can be embodied in ethical guidelines and norms, such as prohibitions and recommendations during visits, explanations of local rituals and symbols, and ecological education in the form of conservation practices linked to the Yogyakarta community's philosophy of harmony.

Technology acceptance in the AR-DEWI implementation can be explained through the TAM and UTAUT2 models [7], which emphasize aspects of usability, ease of use, social influence, and hedonic motivation. They are also enriched with indicators of immersion, presence, and flow [8], which have been shown to influence learning outcomes and destination engagement. Therefore, the evaluation of AR use measures not only the technical dimensions but also the immersion experience, satisfaction, revisit intention, and positive word-of-mouth.

AR-DEWI's user experience (UX) design needs to consider location-based engagement so that content appears at relevant points, using flow-based narratives to connect history and value reflections, and maintaining a simple and accessible interface even under limited network conditions. Accessibility must also be considered through the provision of bilingual language, text, audio, visuals, and closed captions. Furthermore, light gamification such as missions, badges, or scavenger hunts can increase motivation without diminishing the solemnity of local culture [9].

In AR content production, lightweight format standards such as glTF/GLB, concise animations, and image targets based on local artifacts should be used to ensure optimal application performance. Content must undergo a curation process by the village cultural council to ensure credibility, and be protected by copyright and licensing to ensure it does not violate the ethics of using traditional knowledge. Sustainability is also crucial, necessitating a headless CMS system so that local communities can update content independently.

Previous studies have shown that AR can improve attention, retention, and contextual understanding (situated understanding) [3]. In the tourism context, this technology also contributes to destination image formation, visitor satisfaction, and environmentally friendly behavior if the content is directly linked to real-world practices [2], [6], [12]. Therefore, AR-DEWI should present information linked to simple actions in the field, accompanied by instant feedback to strengthen the educational impact.

The success of AR-DEWI implementation also depends heavily on the readiness of the supporting infrastructure and ecosystem. Network availability, device compatibility, guide training, and data governance are critical factors. Technical solutions such as progressive web apps (PWA), device fallback, and preloaded content packages that can be accessed offline are strategic steps to ensure this technology's widespread and sustainable use.

Based on the conceptual framework, AR-DEWI can be understood as an ecosystem consisting of inputs in the form of local cultural and ecological content, digital infrastructure, guide training, and citizen participation. The process involves AR design based on geo-anchored storytelling with a user-friendly interface and light gamification. The psychological mechanisms developed include immersion, presence, flow [8], and destination engagement. This is expected to produce outputs in the form of knowledge of Yogyakarta values, positive attitudes, cross-cultural competence, and pro-environmental behavior, which ultimately result in outcomes such as tourist satisfaction, revisit intentions, and strengthening the local economy.

To test this success, research indicators can focus on three main aspects: technology (PU, PEOU, facilitating conditions) [7], experience quality (presence, immersion, flow) [8], and learning and tourism outcomes (value understanding, cultural attitudes, pro-environmental behavior, satisfaction, destination attachment, and revisit intention). However, several research gaps remain to be filled, such as the lack of explicit integration of Yogyakarta values in the live-in model [10], [11], [12], the limited measurement of impact on concrete actions on the ground, and the scarcity of offline-first AR solutions in rural areas.

Thus, the literature indicates that the success of AR in the context of tourist villages is largely determined by the integration of authentic local content, a seamless immersive experience, ease of access in limited conditions, and impact measurement that goes beyond knowledge to behavioral change. AR-DEWI needs to be designed as an ecosystem involving PWA AR applications, cultural content curation, guide training, ethical analytics, and sustainable co-creation mechanisms with village communities so that the goal of integrating Yogyakarta values can be fully achieved.

RESEARCH METHOD

Penelitian ini menggunakan pendekatan mixed-method dengan model *explanatory sequential design* yang memadukan metode kuantitatif dan kualitatif. Pada tahap awal dilakukan pengembangan prototipe AR-DEWI melalui metode Research and Development (R&D) berbasis model ADDIE yang meliputi analisis, desain, pengembangan, implementasi, dan evaluasi. Setelah prototipe dikembangkan, tahap selanjutnya adalah uji coba lapangan untuk menilai penerimaan, efektivitas, serta dampaknya terhadap pembelajaran nilai-nilai Yogyakarta dan perilaku wisatawan dalam konteks *live in*.

Penelitian dilaksanakan di Desa Wisata Segajih, Hargotirto, Kulon Progo, Yogyakarta dengan melibatkan beberapa kelompok subjek. Responden utama adalah wisatawan atau masyarakat desa wisata vokasional peserta *live in* yang akan menggunakan AR-DEWI, sementara masyarakat desa dan pengelola desa wisata berperan sebagai narasumber dalam validasi konten budaya. Selain itu, pakar budaya Yogyakarta dan teknologi AR dilibatkan untuk melakukan validasi ahli terhadap aplikasi yang dikembangkan. Responden kuantitatif ditentukan melalui teknik *purposive sampling* dengan jumlah minimal 100 orang untuk memenuhi kebutuhan analisis model struktural menggunakan SEM-PLS.

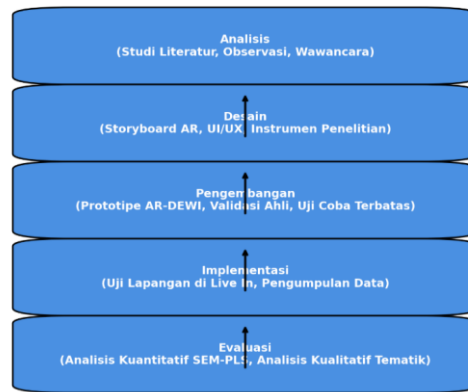


Figure 1. AR-DEWI Research Methodology Framework

The research procedure began with an analysis phase involving literature studies, field observations, and interviews with community leaders to explore cultural content and technological needs. The design phase included designing an AR storyboard based on Yogyakarta values, interface design, and developing a research instrument in the form of a questionnaire based on the TAM and UTAUT2 models, along with indicators of immersion, presence, flow, and learning outcomes. The development phase then involved the creation of a Progressive Web App (PWA)-based AR-DEWI application prototype, expert validation, and limited trials with a small group of users. In the implementation phase, the application was tested live, collecting data through questionnaires, interviews, observations, and application usage logs. The final phase was evaluation, where quantitative data was analyzed using SEM-PLS to examine relationships between variables, while qualitative data was analyzed thematically to explore user experiences and perceptions.

The independent variables examined in this study were Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Facilitating Conditions, and Hedonic Motivation. Mediating variables included presence, immersion, flow, and engagement, while dependent variables included learning outcomes, pro-environmental behavior, destination attachment, and revisit intention. Additionally, factors such as digital literacy, age, and network quality served as moderating variables. Data collection instruments included questionnaires, in-depth interviews, participant observation during live-in activities, and application documentation and logs.

Quantitative data analysis was conducted using descriptive and inferential statistical techniques using SEM-PLS, while qualitative data were analyzed using a thematic approach. To maintain instrument validity and reliability, this study involved expert validation and reliability testing using Cronbach's Alpha and Composite Reliability. Ethical aspects were also considered through informed consent, protection of copyright and traditional knowledge, and the application of the principle of community benefit so that the village community benefits concretely from the implementation of AR-DEWI. With this methodology, the research is expected to generate theoretical contributions to the development of AR technology for educational tourism while simultaneously providing practical impacts in strengthening Yogyakarta values in the Segajih Hargotirto Tourism Village.

RESULTS AND DISCUSSION

The results of this study are presented based on the development stages that have been carried out, including needs analysis, system design, application development, field implementation, and evaluation of the effectiveness of AR-DEWI technology in supporting live-in activities and village-based tourism education.

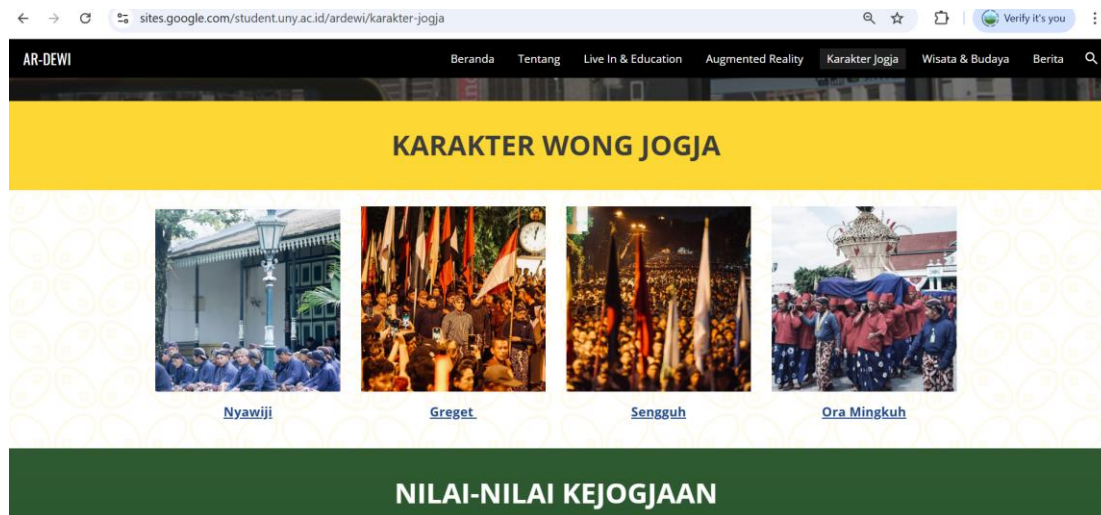


Figure 2. AR – WEB-Based Goddess

Observations and interviews with the management of the Segajih Hargotirto Tourism Village indicate that Yogyakarta's culturally-based educational tourism is still predominantly delivered orally by guides. This limits its appeal and leaves a lack of innovative media to support the tourist experience, particularly for the younger generation. The majority of respondents (78%) desire interactive digital media that can present visual and in-depth information about Yogyakarta's history, culture, and local wisdom.

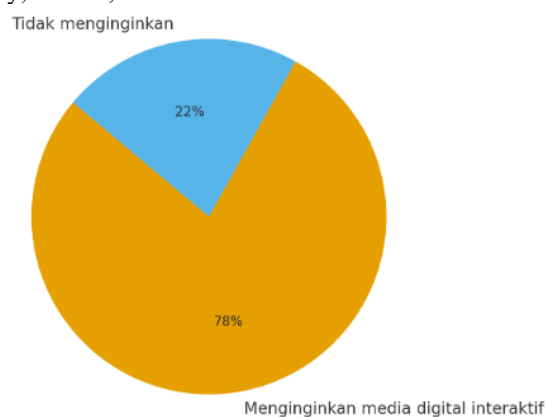


Figure 3. Observation Results

The storyboard and UI/UX design of the AR application displays 3D objects such as traditional houses, gamelan instruments, local crafts, and cultural procession simulations accessible through a smartphone camera. The integration of Yogyakarta values is carried out by including a narrative about the Hamemayu Hayuning Bawana philosophy and the concept of human harmony with nature. Validation of the design by educational media experts obtained an average score of 89% (very acceptable).



Figure 4. Storyboard

The AR-DEWI application was successfully developed using Unity 3D with AR Foundation, enabling it to run on Android devices. Limited trials with 15 vocational tourism village residents demonstrated stable operation, 92% marker accuracy, and an average system response time of less than 2 seconds.

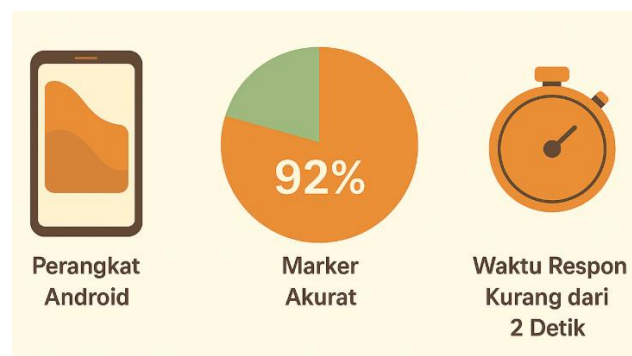


Figure 5. AR-DEWI application



Figure 6. Field trial

A field trial was conducted at a live-in event in the Segajih Hargotirto Tourism Village, involving 40 participants. Questionnaire results showed that 85% of participants found it easier to understand cultural values through AR than simply listening to a guide's explanation. Furthermore, the app increased participant engagement, with an average usage time of 25 minutes per participant.



Figure 7. 3D Tourist Village

The results of quantitative analysis using SEM-PLS showed that the use of AR-DEWI had a positive and significant effect on understanding cultural values ($R^2 = 0.72$) and learning motivation ($R^2 = 0.65$). Meanwhile, qualitative analysis through thematic interviews showed that AR-DEWI was able to bridge modern technology with local wisdom, as well as provide a fun, in-depth, and contextual learning experience.

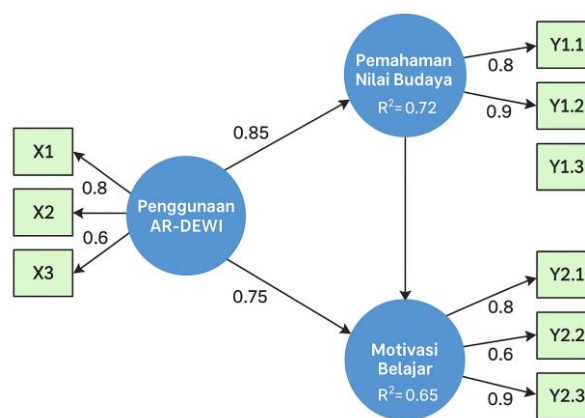


Figure 8. SEM-PLS Model Results

The results of the SEM-PLS model analysis illustrate the relationship between the exogenous variable of AR-DEWI Use and two endogenous variables, namely Understanding Cultural Values ($R^2 = 0.72$) and Learning Motivation ($R^2 = 0.65$). This model is visualized in the form of a SmartPLS-style diagram, where the latent variables are indicated by blue circles and indicators are displayed in green boxes. The AR-DEWI Use variable (X) consists of three indicators, namely ease of use (X1), 3D visual quality (X2), and application stability (X3). Meanwhile, the Understanding Cultural Values variable (Y1) is measured through three indicators, namely knowledge of local history (Y1.1), understanding of Yogyakarta philosophy (Y1.2), and awareness of human-nature harmony (Y1.3). The Learning Motivation variable (Y2) has three indicators, namely increased interest in learning (Y2.1), increased curiosity (Y2.2), and active involvement in educational tourism (Y2.3). The relationship between variables shows that the use of AR-DEWI has a significant positive impact on both the understanding of cultural values and learning motivation, as indicated by the high R^2 values for each endogenous variable. This model confirms that AR technology can be an effective, innovative medium for strengthening cultural values while increasing the enthusiasm for learning among the younger generation.

The results of this study indicate that the AR-DEWI application significantly influences the understanding of cultural values and learning motivation of vocational tourism village communities. This aligns with previous research confirming that Augmented Reality (AR) technology can enhance learning experiences, making them more immersive, interactive, and contextual (Azuma, 2017; Billingham & Dunser, 2012). The R^2 finding of 0.72 for the cultural values understanding variable confirms that the use of AR-DEWI can explain most of the variation in cultural understanding among vocational tourism village communities. This means that AR is not merely a means of entertainment but can also serve as an effective educational medium for internalizing local wisdom.

Furthermore, the positive effect on learning motivation ($R^2 = 0.65$) indicates that AR-DEWI can stimulate interest, curiosity, and active involvement among vocational tourism village communities in the learning process. This condition is consistent with the Self-Determination theory (Ryan & Deci, 2000), which explains that intrinsic motivation can increase if learning is designed to be fun, challenging, and relevant to real-life contexts. Thematic interviews support this finding, where the community of vocational tourism villages felt that the AR-

DEWI application made the learning process more meaningful because it presents a connection between modern technology and local Yogyakarta culture. Furthermore, this finding also reinforces the urgency of integrating digital technology with vocational education. Vocational tourism village communities require not only technical skills but also an understanding of cultural values to be able to build a balance between innovation and preserving local identity. Thus, AR-DEWI has the potential to become a best practice model in developing AR-based learning media to support contextual vocational education. However, this study has limitations, namely the relatively small number of respondents (15 respondents) and the limited trial on Android devices. For further research, it is recommended to conduct a larger-scale trial, involving multiple institutions, and expanding the application context beyond educational tourism to formal classroom learning.

CONCLUSION

Based on the research results, it can be concluded that the AR-DEWI application, developed using Unity 3D and AR Foundation technology, ran stably on Android devices, with a marker accuracy rate of 92% and an average system response time of less than 2 seconds. Quantitative analysis using SEM-PLS showed that the use of AR-DEWI had a positive and significant effect on Understanding Cultural Values ($R^2 = 0.72$) and Learning Motivation ($R^2 = 0.65$). These findings were reinforced by qualitative analysis, which demonstrated that AR-DEWI can bridge modern technology with local wisdom, providing a fun, immersive, and contextual learning experience.

Thus, AR-DEWI has been proven to not only enhance understanding of local culture but also foster learning motivation among vocational tourism village communities through technology-based learning experiences. Going forward, this application has the potential to be developed more broadly in educational and educational tourism contexts, thereby contributing to the preservation of cultural values while encouraging learning innovation in the digital age.

ACKNOWLEDGMENTS

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Analysis of the Needs for Developing Assessment Instruments for Learning Prerequisites Children with Special Needs

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Abstract. The academic and non-academic success of children with special needs can be determined by the determination of exploring information on initial abilities related to learning prerequisites during the assessment. Assessment of learning prerequisites relates to 3 scopes including basic skills, academics and special programs. In fact, 74.1% of teachers in special needs schools have not conducted specific assessments related to learning prerequisites according to the content of the material and the type of special needs of students. 85% of teachers stated a high need related to the availability and completeness of learning prerequisite assessment instruments for children with special needs. This study aims to explore the needs of special needs school teachers in preparing learning prerequisite assessment instruments. The study used a survey of 82 teachers and 18 principals from 82 special needs schools in the Special Region of Yogyakarta. Data collection techniques were carried out using closed and open questionnaires followed by Focus Group Discussions to collect qualitative data. Data analysis used descriptive quantitative and qualitative presented in the form of tables and percentage graphs to be further interpreted narratively. In children with visual impairments, the most needs were gross motor assessments at 83% and language skills at 80%. In children with hearing impairments, the greatest need is in the gross motor aspect (91%) and fine motor (94%). In children with intellectual disabilities, the greatest assessment need is in the fine motor aspect (85%) and language skills (84%). In children with physical disabilities, the greatest assessment need is in fine motor skills (95%) and gross motor skills (92%). In children with autism, the greatest assessment need is in the gross motor aspect (89%) and fine motor skills (85%). The data shows that teachers need to develop learning readiness assessments for both gross and fine motor skills. The developed assessment instruments can be integrated into the learning process.

Keywords: Assessment, Children with Special Needs, Learning Prerequisites

INTRODUCTION

Early educational success plays a crucial role in determining academic achievement at later levels. Numerous studies confirm that basic skills, such as reading, mathematics, and environmental literacy, are the foundation for academic success (Beecher et al., 2018; Kern & Friedman, 2009). Other contributing factors include communication skills, environmental adaptation, understanding of instructions, and positive support from family and school. For children with special needs, prerequisite learning skills are crucial for optimizing academic and non-academic potential, while also strengthening compensatory special programs.

The learning process for children with special needs must consider individual needs across physical, cognitive, and socio-emotional dimensions. Assessment is a necessary first step in identifying a child's initial abilities so that teachers can develop appropriate learning plans, implementation, and evaluation (Hartini et al., 2023). This identification helps educators understand each child's strengths, weaknesses, and specific needs as a basis for providing learning input. Therefore, swimmer assessment plays a strategic role in ensuring the continuity of effective and meaningful learning.

Field research shows that teachers still face numerous obstacles in implementing swimmer assessments. Research by Nurayati & Rakhman (2017) showed that 89.3% of teachers lacked the academic qualifications to support the implementation of learning needs assessments. Findings by Hasanah et al. (2023) also revealed difficulties for special education teachers in developing assessment instruments and identifying children's initial abilities. At the early childhood education (PAUD) level, the majority of teachers (94%) were in the low category in assessment implementation, with the instruments used not clearly addressing the aspects to be assessed (Hilwaton, 2020). In special schools, only 56.31% of teachers developed assessment instruments based on local wisdom, or were in the adequate category (I Wayan, 2022).

Other challenges were identified through surveys and focus group discussions (FGDs) related to teaching children with special needs (Handoyo; Zakiah & Rahmawati, 2024). The results show: (1) 74.1% of teachers do not conduct comprehensive assessments of learning prerequisites across all aspects of child development; (2) determining initial abilities is often based on subjective child performance and barriers; (3) valid, appropriate, and

easy-to-use instruments are still limited; and (4) 87.5% of teachers require practical examples of instruments for pre-learning assessments.

These conditions indicate that the lack of appropriate assessments can result in learning not being aligned with children's needs, resulting in suboptimal learning outcomes. Therefore, a learning prerequisite assessment instrument is needed that can measure children's abilities validly, is appropriate to school conditions, and is easy for teachers to use. This instrument is expected to support the integration of children's learning modalities and capacities into lesson plans.

This research focuses on analyzing the need to develop a learning prerequisite assessment instrument for children with special needs. The study was conducted through a literature review, previous research results, and factual data from schools to map the need for relevant assessment instruments in academic, non-academic, and special education programs.

LITERATURE REVIEW

Children with Special Needs

The term "children with special needs" encompasses students who have characteristics and learning needs that differ from those of children in general (Alimin, 2013; Jaya, 2017). In educational practice, children with special needs require special services tailored to the type of disabilities they experience to optimize their potential (Hallahan & Kauffman, 2014). Children with special needs are generally classified into two categories: temporary and permanent (Jaya, 2017). Temporary disabilities are usually influenced by external factors, such as family or environmental conditions—for example, trauma from violence that impacts the learning process. Conversely, permanent disabilities stem from permanent internal factors, such as visual, hearing, cognitive, motor, communication, or socio-emotional impairments.

Learning Prerequisites

The success of a learning process is influenced by several key components: assessment, entry behavior, foundation skills, and prerequisite learning abilities. These four are interrelated and serve as the foundation for determining learning strategies appropriate to the student's specific needs.

1. Entry Behavior

Entry behavior refers to a student's initial abilities when starting a particular subject or topic. Teachers' understanding of these initial conditions is crucial so that learning strategies can be tailored to the child's ability level (Clark & Mayer, 2016). Assessment of entry behavior encompasses not only cognitive aspects, but also attitudes, motivation, and social-emotional skills. Accurate evaluation prevents learning from being too easy or too difficult for children with special needs and helps design adaptive instruction (Browder et al., 2017; Schmidt et al., 2017; Tomlinson, 2017).

2. Foundation Skills

Foundation skills are the foundation for the development of subsequent academic and non-academic skills. The OECD (2016) emphasizes that reading, writing, arithmetic, and critical thinking are essential skills that must be developed from an early age. Additionally, motor skills, language, organizational skills, and social-emotional aspects are also included in this category (Jenkinson et al., 2012). Research by the Carnegie Foundation (2013) proves that children with strong foundational skills tend to have higher academic achievement and greater self-confidence.

3. Prerequisite Learning Skills

Prerequisite learning skills are specific skills that must be mastered before students enter more complex learning stages. Examples include simple motor skills (such as holding a pencil), basic social skills, focus, and attention. These skills serve as indicators of learning readiness and serve as a bridge between foundation skills and advanced academic and non-academic competencies. Without mastery of prerequisite skills, students potentially face difficulties in learning at the next level.

In the context of special needs education, entry behavior, foundation skills, and prerequisite skills are interconnected components that determine learning success. Entry behavior provides an initial overview of a child's abilities, foundation skills form the foundation that must be mastered, while prerequisite skills serve as indicators of readiness for subsequent learning. To accurately identify these three aspects, a needs analysis is required to develop valid, reliable, and practical prerequisite learning assessment instruments for teachers. This instrument will ensure that learning is truly tailored to individual needs, allowing the potential of children with special needs to develop optimally.

RESEARCH METHOD

This research involved a survey of special education teachers. This method was chosen because the research focused on needs analysis to develop a prerequisite learning assessment instrument for children with special needs. This needs assessment research aims to describe the actual conditions in the field related to the implementation of prerequisite learning assessments, the obstacles experienced by teachers, and the need for appropriate, valid, and practical assessment instruments.

RESULTS AND DISCUSSION

A. Respondent Profile

Data obtained covering 76 teachers from Special Schools in the Special Region of Yogyakarta, there is a distribution of teachers in five different cities/regencies, respondents came from 63 Special Schools both public and private, including: 1) Sleman Regency became the largest participant with 26 respondents (34.2%), 2) Bantul Regency with 18 respondents (23.7%), 3) Yogyakarta City with 14 respondents (18.4%), 4) Gunung Kidul with 12 respondents (15.8%), and 5) Kulon Progo with 6 respondents (7.9%). Overall, this data shows a fairly even distribution in the DIY region, with variations in the number of SLB and the level of participation. The data groups students based on the type of obstacle, with the following details:

Tabel 1. Distribution of Students with Special Needs in Special Needs Schools in DIY

No.	Specificity	Amount	Presentase
1.	Visual Impairments	147	4 %
2.	Hearing Impairments	575	14%
3.	Intellectual Impairments	2.298	56%
4.	Physical or Motor Impairments	300	7 %
5.	Emotional and Behavioral Impairments	34	1 %
6.	Slow Learners	21	1 %
7.	Specific Learning Disabilities	1	< 1 %
8.	Autism	394	10 %
9.	Others	312	8 %
Total		4082	

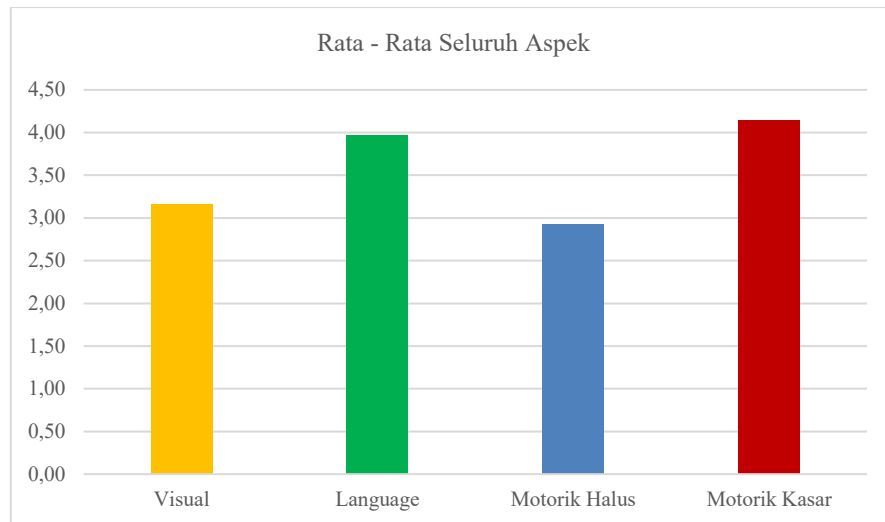
Data on the distribution of special needs schools in the five administrative regions of the Special Region of Yogyakarta, along with the number of students based on their disability and special needs categories. The total number of students with special needs in the Special Region of Yogyakarta is 4082.

B. Data on Basic Skills Aspect Results

1. Visual Impairment

Tabel 2. Average of All Aspects of Pre-Learning for the Blind

Aspects	Average
Visual	3.16
Language	3.97
Fine Motor Skills	2.92
Gross Motor Skills	4.15



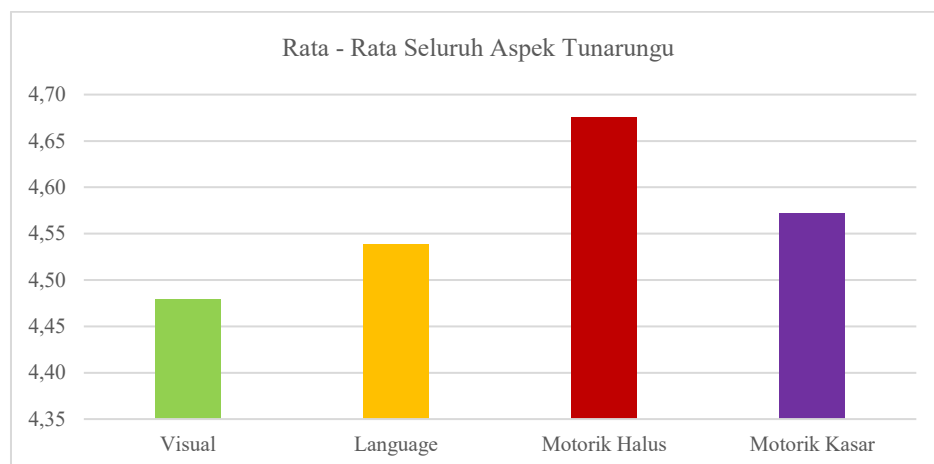
Gambar 1. Average of All Aspects of Pre-Learning for the Blind

The average data and graphs of all pre-learning aspects consisting of visual, language, fine motor, and gross motor aspects of blind students obtained the highest value, namely the gross motor aspect with an average score of 4.15, while the lowest value was in the visual aspect with an average score of 3.16. These data show that blind students really need gross motor pre-learning skills.

2. Hearing Impairments

Tabel 3. Average of all Pre-Learning Aspects of Hearing Impairment

Aspects	Average
Visual	4,48
Language	4,54
Fine Motor Skills	4,68
Gross Motor Skills	4,57



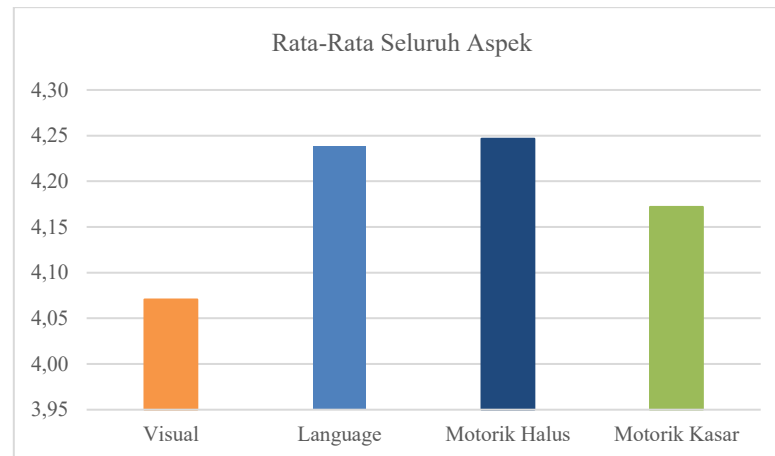
Gambar 2. Average of all Pre-Learning Aspects of Hearing Impairment

The average data and graphs of all pre-learning aspects consisting of visual, language, fine motor, and gross motor aspects of blind students obtained the highest value, namely the fine motor aspect with an average score of 4.68, while the lowest value was in the visual aspect with an average score of 4.48. These data indicate that deaf students really need fine motor pre-learning skills.

3. Intellectual Impairments

Tabel 4. Average of All Aspects of Pre-Learning Students with Intellectual Barriers

Aspects	Average
Visual	4.07
Language	4.24
Fine Motor Skills	4.25
Gross Motor Skills	4.17



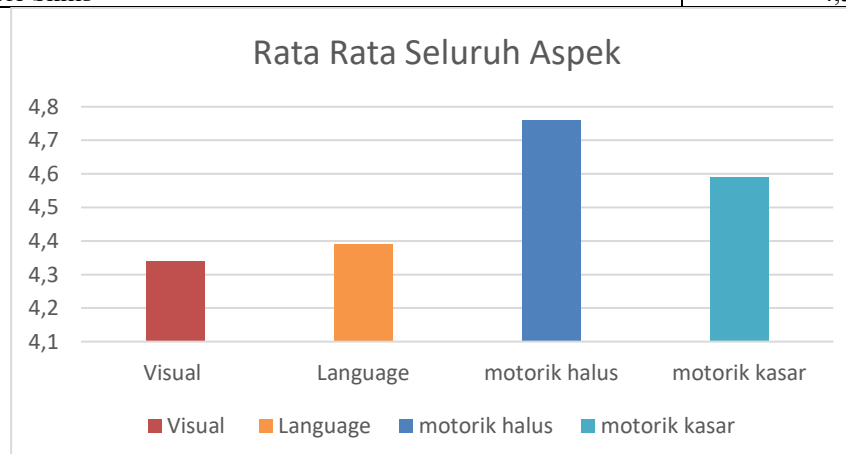
Gambar 3. Average of All Aspects of Pre-Learning Students with Intellectual Barriers

The average data and graphs of all pre-learning aspects consisting of visual, language, fine motor, and gross motor aspects of intellectual disabilities obtained the highest value, namely in the fine motor aspect with an average score of 4.25, while the lowest value was in the visual aspect with an average score of 4.07. These data indicate that students with intellectual disabilities really need pre-learning skills in the fine motor aspect.

4. Physical or Motor Impairments

Tabel 5. Average of All Aspects of Pes-Learning Student Physical and Motoric Disabilities

Aspect	Average
Visual	4,34
Language	4,39
Fine Motor Skills	4,76
Gross Motor Skills	4,59



Gambar 4. Average of All Aspects of Pes-Learning Student Physical and Motoric Disabilities

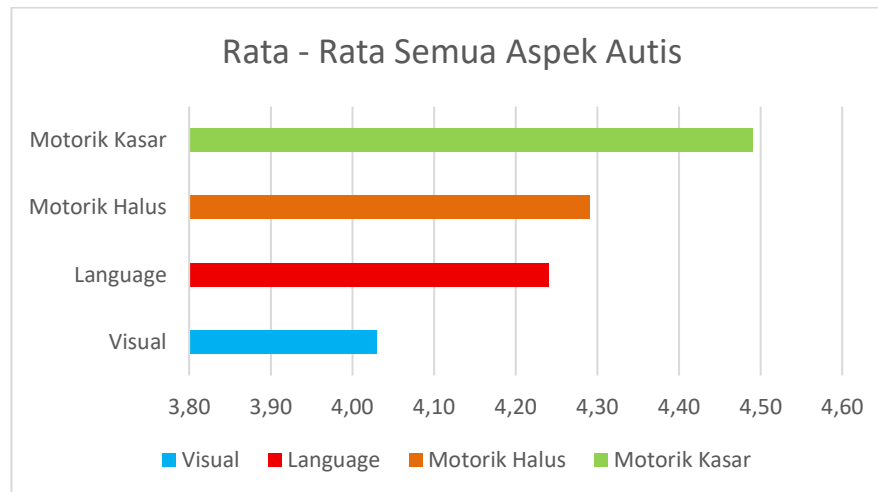
Based on the data and graphs, the average of all pre-learning aspects consisting of visual, language, fine motor, and gross motor aspects of the physically disabled obtained the highest value, namely in the fine motor aspect

with an average score of 4.76, while the lowest value was in the visual aspect with an average score of 4.34. These data indicate that physically disabled students really need pre-learning skills in the fine motor aspect.

5. Autisme

Tabel 6. Average of All Aspects of Autistic Students

Aspek	Average
Visual	4,03
Language	4,24
Fine Motor Skills	4,29
Gross Motor Skills	4,49



Gambar 5. Average of All Aspects of Autistic Students

Based on the data and graphs, the average of all aspects of pre-learning for autism, consisting of visual, language, fine motor, and gross motor aspects of autism, the highest value was obtained in the gross motor aspect with an average score of 4.49, while the lowest value was in the visual aspect with an average score of 4.03. These data show that autistic students really need gross motor pre-learning skills.

CONCLUSION

The results of the pre-learning needs analysis indicate differences in the level of needs of each group of children with special needs. In general, fine motor skills dominated, with the highest average scores in three groups: children with hearing impairments (4.68), intellectual disabilities (4.25), and physical-motor disabilities (4.76). Meanwhile, gross motor skills were the primary need for children with visual impairments (4.15) and autism (4.49). These findings confirm that motor skills—both fine and gross—are the areas requiring the most support, compared to other areas such as language and visual skills, which scored relatively lower (for example, visual skills were only 3.16 in children with visual impairments and 4.03 in children with autism).

Therefore, the development of learning prerequisite assessment instruments for children with special needs needs to prioritize the fine and gross motor domains according to the characteristics of their respective disabilities. These instruments are expected to provide an accurate, valid, and practical overview, enabling teachers to design more effective, contextual, and individualized learning interventions. This effort is expected to increase learning readiness while optimizing the academic and non-academic potential of children with special needs.

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PREPARATION OF A COMPREHENSIVE BUSINESS PLAN AS AN EFFORT TO EMPOWER MSMEs IN PACAREJO VILLAGE, GUNUNG KIDUL

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Abstract. This Community Service Activity (PKM) aims to empower MSME actors in Pacarejo Village, Gunung Kidul through comprehensive business plan development training. The program, involving 60 participants, was conducted over 3 hours using a participatory approach, covering four main aspects: (1) basic concepts of business plans, (2) market analysis, (3) simple financial planning, and (4) digital marketing strategies. The implementation method consisted of interactive material presentations, assistance in preparing business documents, and case simulations. The evaluation used nine objective indicators and showed a significant increase in participant competence, particularly in market analysis, with participants understanding the material and product innovation with the ability to prepare business plans. The questionnaire results revealed that this program successfully built awareness of the importance of business planning and sustainable practices, with follow-up in the form of a WhatsApp consultation group and a three-month monitoring plan. The main findings indicate that structured assistance can increase the capacity of village MSMEs in facing market challenges.

Keywords: MSMEs, business plans, training.

INTRODUCTION

Micro, Small, and Medium Enterprises (MSMEs) are the backbone of Indonesia's economy, as they play a strategic role in contributing to the number of business units, creating job opportunities, and contributing to national GDP growth (Asrah et al., 2024). MSMEs also play a role in equitable development through the empowerment of small-scale businesses in various regions, increasing the national economy's resilience to global shocks, and becoming a forum for competitive local product innovation. Strengthening MSMEs not only has an impact on macroeconomic improvement but also on sustainable development and reducing social inequality. The village of Pacarejo in Gunung Kidul has promising MSME potential, especially in the agriculture, handicraft, and local food processing sectors. However, there are still MSME issues, such as difficulties in business planning, financial management, product marketing, and product/service development (Ismanto & Rahmi, 2025). Therefore, good business planning is needed. Business planning for village MSMEs is very important to understand the needs of local residents, develop appropriate production, distribution, and marketing strategies, adjust resources when there are obstacles, as well as strengthen business legitimacy and attract investor/government support for business development (Fitriani et al., 2025). Without good planning, many businesses find it difficult to grow and survive in the competitive market.

The preparation of a comprehensive business plan is essential as a roadmap for business development, encompassing marketing strategies, financial management, and risk evaluation. A well-designed business plan can significantly increase the likelihood of business success, as

it functions as a comprehensive strategic guide (Aswar et al., 2025). Careful planning enables entrepreneurs to allocate resources more efficiently, manage finances effectively, and make well-informed business decisions. However, in practice, many novice entrepreneurs have not yet mastered the competencies required to design optimal business plans (Hasmyati et al., 2024). This condition is often attributed to a lack of technical guidance and practical experience, highlighting the need for comprehensive training programs to enhance their capabilities.

Developing a comprehensive business plan is essential as a roadmap for growing a business, from marketing strategies and financial management to risk assessment. A good business plan can significantly increase the chances of business success because it serves as a comprehensive strategic guide (Aswar et al., 2025). Careful planning will enable entrepreneurs to allocate resources more efficiently, manage finances appropriately, and make informed business decisions. However, in reality, most novice entrepreneurs still lack the competence to design an optimal business plan (Hasmyati et al., 2024). This condition often occurs due to a lack of technical guidance and practical experience, thus requiring a comprehensive training program to improve their capabilities.

This community service activity aims to empower MSMEs in Pacarejo Village through training and assistance in business plan development. Using a participatory approach, business actors are encouraged to understand the important components of a business plan, such as market analysis and marketing strategies. Through well-planned and targeted training programs, MSME entrepreneurs can acquire the skills needed to manage various important components of their businesses (Manday et al., 2025). Entrepreneurs with adequate technical competencies tend to achieve higher levels of success than those without practical skills (Nisa & Subhan, 2024). The hope is that, after having a clear business plan document, MSMEs in Pacarejo Village can more easily access capital, expand their marketing networks, and increase their business competitiveness. The long-term impact of this program will not only be felt by individual business actors, but can also encourage sustainable economic growth in the village. Through this capacity building, it is hoped that MSMEs in Pacarejo Village can grow to be more independent, adaptive, and ready to compete in a wider market.

METHOD

The planning and implementation process generally goes through five main phases. Initially, collaboration is established by determining strategic partners and creating cooperation agreements. The next phase involves field observation and consultation with stakeholders to identify the real needs of the community. After thorough preparation, the core program is implemented in the form of various empowerment activities such as skills training and workshops, with intensive assistance. After implementation, a comprehensive assessment of program achievements is conducted through performance indicator measurements and participant feedback. The final stage involves the preparation of a comprehensive report containing an evaluation of the results, program impact, and suggestions for development.

The interconnection between phases is integral, with strong cooperation determining the accuracy of needs analysis, which in turn affects the quality of program implementation. This five-stage mechanism forms a continuous cycle that ensures program effectiveness and

management transparency. This systematic approach is highly relevant for community service activities and MSME empowerment programs, as it ensures that each stage is carried out in a measurable manner and achieves the set objectives.

IMPLEMENTATION

The community service activity with the theme “Comprehensive Business Plan Development as an Effort to Empower MSMEs in Pacarejo Village, Gunung Kidul” was successfully held for 3 hours with the participation of 60 local MSME actors. The activity was held on Tuesday, July 29, 2025. The activity started at 09.00 WIB and ended at 12.00 WIB. The speaker, Nadia Husnaningtyas S.Ak., M.Ak. a lecturer in Applied Accounting at the Faculty of Vocational Studies, Yogyakarta State University, delivered comprehensive material covering four main aspects, namely the basic concepts of business plan development, market analysis techniques, simple financial planning, and applicable digital marketing strategies for MSMEs. The material presentation session lasted 90 minutes with interactive methods in the form of lectures, case discussions, and question and answer sessions, where participants showed high enthusiasm, especially when discussing examples of direct application on a village business scale.



Figure 1. Resource Persons Delivering Training Materials

In the next 60-minute session, intensive mentoring was provided to help participants fill out structured business plan templates, formulate simple financial projections, and complete program evaluation questionnaires. The activity ended with a 30-minute evaluation session that produced several important findings. The program has successfully achieved several predetermined success indicators. Participants showed improvement in market analysis skills, as seen in the results of the business feasibility assessments they submitted. In terms of product innovation, many participants were able to come up with new product ideas through creative presentations. Their understanding of marketing strategies also improved, as evidenced by the more structured marketing plans they developed. This activity also succeeded in building collaborative networks through group discussions and active participation in forums. Participants became more aware of the importance of sustainable business practices, as seen

from the results of the questionnaires they filled out. The introduction of technology and digitalization in business also had a positive impact, with participants able to complete practical tasks using digital tools. The participants' business resilience skills were tested through crisis situation simulations, in which they demonstrated adaptive responses. Finally, feedback and evaluations from participants and the implementation team served as material for reflection for future program improvements.



Figure 2. Participants Creating Business Plans

EVALUATION

Evaluation is a structured process that applies a set of specific criteria to measure the effectiveness of development implementation and the achievement of program objectives (Suhaeri et al., 2024). This process is carried out systematically through the collection and analysis of data on predetermined indicators. There is a framework used to link program objectives, changes in participant competencies, and verification instruments to ensure comprehensive and objective assessments. There are nine measures used, namely:

- 1) First, the program aims to develop market analysis skills, which are measured through the completeness of consumer feasibility analysis documents prepared by participants.
- 2) Second, product innovation is assessed based on the originality and feasibility of new product ideas presented.
- 3) Third, the strengthening of marketing strategies is evaluated based on the quality of the marketing plans developed by participants.
- 4) Fourth, increased access to financing is measured by the feasibility of business proposals submitted for funding.
- 5) Fifth, network building is assessed based on the level of participation in group discussions and collaborative forums.
- 6) Sixth, business sustainability awareness is evaluated through questionnaire responses on sustainable business practices.
- 7) Seventh, digital technology mastery is demonstrated by participants' ability to complete practical tasks using digital tools.

- 8) Eighth, increased business resilience is measured by participants' responses in crisis situation simulations.
- 9) Ninth, feedback quality is evaluated based on the depth of discussion and participants' ability to give and receive feedback.

Each criterion uses specific and measurable assessment instruments, enabling a comprehensive evaluation of the program's impact in terms of participants' knowledge, skills, and behavioral changes. This approach ensures that the program's success can be assessed objectively through concrete evidence generated during the implementation of activities. Overall, this program has had a tangible impact on improving participants' capacity, although there is still room for further development. These results provide a good basis for follow-up and ongoing assistance. As a follow-up, a WhatsApp group has been formed for ongoing consultation, and quarterly monitoring is planned to ensure the implementation of business plans by participants. The success of the program is reflected in the 100% participation rate as targeted and the positive response from all participants.

CONCLUSION AND RECOMMENDATIONS

This PKM activity successfully empowered MSMEs in Pacarejo Village through comprehensive business plan development training. The program, which involved 60 participants for 3 hours, significantly improved participants' understanding and skills in market analysis, digital marketing strategies, and business plan development. An evaluation using nine objective indicators showed a holistic improvement in participants' capacity, particularly in product innovation, business resilience, and network collaboration. The program's success was reflected in the participants' enthusiasm, the business plans they produced, and the awareness they gained about sustainable business practices. The creation of a WhatsApp group and a three-month monitoring plan demonstrated their commitment to the program's sustainability.

To optimize the program's impact, it is recommended to expand ongoing technical assistance, particularly in business digitalization and access to capital, strengthen collaboration with local stakeholders such as village governments and village-owned enterprises (BUMDes) to support MSME development, and replicate similar training models in other villages with similar MSME characteristics. Finally, there is a need to provide more detailed training modules and a long-term evaluation approach to measure the real economic impact on the community.

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Improvement of the Evaluation System for Traditional Batik Learning Outcomes in the Kriya Education Study Program, Department of Fine Arts, FBSB UNY, using a Performance-Based Evaluation Approach

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Abstract. This study aims to determine and describe the extent of the influence of the performance-based evaluation approach on the evaluation system applied to the learning outcomes of traditional batik kriya. The research model used is participatory action research. The central idea of this study is that the people who will carry out the actions are also involved in the research process from the beginning. In the practice of traditional batik kriya, which is carried out with appreciation, it has fostered the sensitivity of students in understanding, appreciating, and evaluating works of art as the cultural heritage of the nation. Creating through the creative process fosters students' sensitivity to the phenomena around them as a source of ideas, fosters creativity in processing ideas, fosters students' appreciation in expressing what they want to communicate, and trains students' imagination to be able to present messages through symbols or visual language.

INTRODUCTION

Art education basically aims to nurture and develop sensitivity, creativity, expression, and train the imagination of students. Based on these objectives, art education is expected to support the growth of students towards the formation of a well-rounded personality. Through arts education, the right hemisphere of students' brains can be developed in line with the development of the left hemisphere, so that the development of both sides of the brain becomes balanced. The ultimate hope of this balance is the achievement of three types of intelligence that are now recognized as equally important, namely intellectual, emotional, and spiritual intelligence.

To achieve these objectives, appreciation and productivity/artistic creation are the focus of arts education. Appreciation means fostering students' sensitivity in understanding, appreciating, and evaluating works of art as cultural products of the nation. Creating through the creative process encourages students to be sensitive to the phenomena around them as a source of ideas, fosters creativity in processing ideas, cultivates students' appreciation for expressing what they want to communicate, and trains students' imagination in presenting messages through symbols or visual language. These two abilities also have an impact on the ability to critique the results of the creative process. Productive understanding in this case also includes how to present the results of these creations so that the communication learning process can be achieved. In this case, Rohidi¹ states that creative education is not merely an individual need, but also a social and cultural need. This shows that art not only has a side of freedom, but also has order. This means that artistic creation is a form of expression and communication with others, even though the actuality of oneself in society is guided by social and cultural rules and values that support it.

Based on the above explanation, it is clear that arts education emphasizes the development of the right brain rather than the left brain of students. However, the implementation of arts education thus far seems to have neglected the development of the right brain (such as aspects of imagination, aesthetics, intuition, and creativity, which are actually potential within humans). Looking at arts education practitioners in schools, the arts education process often imprisons the ideas, imagination, and creativity of students. Arts education today emphasizes the development of the left brain of students, which tends to be emotional. In this context, Rohidi¹ argues that "rationalization" has occurred in education today. The implementation of arts education has become so rational that it leads to cognitive education that lacks taste. As a further consequence, it is not surprising that arts education is increasingly losing its rightful place in the general school curriculum. The reason is that arts education does not support rational education (due to its irrational nature).

Therefore, in order to improve this situation, it is necessary to overhaul the current method of assessing artwork, firstly in relation to the lack of diagnostic assessment. This type of assessment is very important in order

to provide guidance to students so that they can quickly achieve the specified competencies. This is because students will understand the strengths and weaknesses of the artwork they have created. Evaluation leads to assessments that are carried out to determine the grades obtained by students, which are still subjective in nature and presented in the form of global/total scores. This reality has an impact on children's confusion in accepting grades, because they cannot know their actual abilities. This culminates in children becoming increasingly cornered and thinking that art lessons are rigid and leave behind the essence of joy and enthusiasm in their work. Second, regarding subjectivity, to reduce it, it is necessary to strive for performance-based evaluation.

The above assessment requires teachers to determine aspects or indicators and assessment criteria. Criteria in the evaluation of artwork include originality, sensitivity in using materials, consistency with concepts, design, composition, or aesthetics. This evaluation is also largely determined by the process or steps taken by the students, so the appearance of the artwork in the learning process should not be ignored.²

For this reason, an evaluation of art using a performance-based evaluation approach is needed. In this sense, it is hoped that the evaluation steps carried out by the teacher will help students obtain information about their actual abilities. Students are invited to discuss the works they have created, so that they will get an idea of the strengths and weaknesses of their work. In this way, students will be able to improve on their weaknesses.

LITERATURE REVIEW

Evaluation of Artworks in Improving the Quality of Works

As mentioned above, one of the functions of evaluation is diagnostic. Essentially, evaluation, which functions as a diagnostic tool, can be applied to fine arts learning. In this context, fine arts learning is understood as learning and cultivating expression that requires diagnostic guidance. The need for evaluation of fine arts works, not only for the fine arts learning process, but also for the process of criticizing or observing artworks. Artworks are appreciated.³ In this context, appreciation is more defined as the activity of observing an artwork. "The observer's activity of responding to an artwork to the point of acceptance or perhaps rejection means that the observer is carrying out an evaluative activity".⁴

When someone is selecting or appreciating something of special value, that person is actually conducting an evaluation.² Duane even added that every artist will always select and evaluate each component used to determine the quality of the work as the final result of the creative process. Thus, this evaluation activity is not only carried out by art appreciators or observers, but can also be carried out by art creators. Evaluation of works of art, in this case, is an evaluation of the aesthetic quality that exists in a work of art. Evaluation of aesthetic quality or artistic ability contains the meaning of an awareness of the obstacles to an artist's expression.⁵ Evaluation can be said to be an effort to find and identify obstacles to an artist's expression for further improvement of expression.

In the aforementioned context, the evaluation results will provide feedback to the creator of the artwork, specifically regarding the quality of the work they have produced. Furthermore, they will provide information about the strengths and weaknesses of the artwork. Ultimately, this information can be used as a basis for improving the quality of the artwork they have created. Art evaluators can provide feedback that can broaden the artist's horizons and ultimately be used to learn to remember or review the aesthetic quality of their own work so that their quality is not left behind.² Evaluation of artwork can be conducted through several approaches. These approaches include the global and analytical approaches.^{4,6} The global approach emphasizes the integrity of the artwork, while the analytical approach views the artwork as consisting of interconnected and organized elements that form a work of art. The characteristics of these approaches are subjectivity and objectivity.

Performance-Based Evaluation: An Approach to Analysing Student Artwork

Performance assessment is the process of gathering information through systematic observation to determine policy toward an individual or a group of individuals.⁷ Based on this definition, there are five components in conducting a performance assessment. First, it shows that performance assessment is a process, not a single test or measurement. Second, the focus of this assessment is to gather information using various measurements and strategies. Third, data is collected through systematic observation. The emphasis is on direct observation techniques, not just written tests. Fourth, the data is combined to determine policy, and fifth, the subject of the policy determination is the individual, usually an employee or student, not a program or group activity product.

Performance assessments basically consist of relatively fewer tasks and narrower test materials. Therefore, according to Popham, a teacher must: 1) plan their own performance test tasks or 2) select tasks for performance tests from external sources. External tasks in the context of fine arts and kriyas learning are tasks taken from external requests or tasks that are relevant to external needs (the industrial/business world). When planning independently, tasks must be developed based on the competency standards demanded by society.⁸

Measurement results are important information for generalizing the magnitude of estimates of student abilities. Generalizations about a person's abilities will be more accurate if the tasks performed by students are chosen appropriately. These tasks should cover a range of knowledge or skills that students must demonstrate. In developing this performance assessment research, three main components must be understood, namely: 1) key learning objectives, 2) inference of student status, 3) student response to performance assessment tasks.

Additionally, the criteria for developing performance tasks should also be considered. According to Popham, seven criteria can be used to assess performance tasks⁸, namely:

5. Generation, i.e., to what extent does the student's performance on the assigned task apply to similar tasks?
6. Authenticity, i.e., is the task the student is completing the same or equivalent to other tasks?
7. Multiple choice, i.e., does the assigned task measure multiple learning outcomes?
8. Teachability, i.e., do the students' abilities or skills improve as a result of the teacher's efforts in implementing the learning process?
9. Fairness, i.e., are the assignments given to all students fairly, without bias based on gender, ethnicity, or socioeconomic status?
10. Feasibility, i.e., are the assignments the students are completing realistic, considering the cost, space, time, and equipment required?
11. Scorability, i.e., will the assignments yield reliable and accurate scores?

Criteria for Analysing Fine Art Works

When analysing a work of art, assessment criteria are the primary objective of the evaluation process. Therefore, if using performance-based evaluation, criteria (criteria rubrics) must be established. In this context, the criteria agreed upon by several professional critics include: degree of originality, sensitivity in the use of appropriate materials, and consistency with the concept, design, and execution.² The degree of originality of a work of art is a primary concern for critics. The quality of the creator's personality is evident in the work. The artist's refusal to imitate and continuing traditions in art is what encourages the creation of original works. In this regard, artists are required to be creative in creating artwork.

To assess the originality of a work, the emphasis is on ideas, creativity, visual form, technique, and personality, supported by sensitivity in the use of materials. Each medium has its own characteristics; the suitability of the medium's character, theme, and use can be used as a criterion for determining whether the work being evaluated is good or bad. The final criteria for art evaluation are design and execution. Design determines whether a work of art is good or bad. This can be seen in the composition, specifically in the values of unity, balance, contrast, harmony, rhythm, centre of attention, and proportion.

Analytical Approach in Evaluating Batik Works

When linked to art evaluation theory, performance-based evaluation is an evaluation model with an analytical approach. This analytical approach plays a role in conveying the arguments of an evaluation of a work of art to the public and its creator. To account for their verbal output, art critics conduct analysis and convey it piece by piece. Without this, their train of thought and argumentation would be impossible for others to grasp.⁶ So, it appears that the analytical approach is verbal.

Muharam states that analytical behaviour is generally determined by verbal assessment.⁹ In this regard, Eisner rejects the notion that critical commentary or statements about art are inappropriate for art appreciation, as they can diminish the value of the visual experience itself. Therefore, it can be said that Eisner supports verbal commentary or critical statements.¹⁰ The issue is not whether art can be verbalized, but rather the quality and usefulness of the commentary itself. In the context of education, these comments are clearly needed and very useful for creators of fine art to improve the works they will create.

Based on the above description, the analytical method is useful for communicating the evaluation results of batik works. Furthermore, this method can be used to understand batik craftsmanship. For observers to understand and then accept the symbols of the artist's expression, they must be able to analyse and evaluate objectively and present arguments about the value contained in the work.⁴ Therefore, evaluating batik works is not based solely on whether they are happy or unhappy, but rather on the underlying causes through analysis. When viewing a work of art, the most important thing is to identify the causes of feelings of happiness and displeasure.²

Soedarso¹¹ emphasized the importance of analysis in evaluation, stating that when conducting an assessment, an in-depth analysis based on a principle is necessary. The principle referred to here is the principle of art, as stated previously,² which states that artistic quality can be measured by applying artistic principles. By applying these artistic principles, it is hoped that the evaluation of works of art can be closer to objectivity. Meanwhile, Hungerland¹² states that art evaluators consciously try not to simply like or dislike a work of art, but to support

their decisions with reference to artistic principles as their true statements. Therefore, this evaluation is an objective critique often used in art studies.

Based on an analytical approach, batik kriya are evaluated by detailing their elements, the relationships between them, and the organization of the elements. In this approach, a work of art is viewed as a composition of forms that can be understood through the integral role of the elements of form (line, shape, light and dark, colour, and volume).¹³ Therefore, analytical skills are the ability to decompose or separate/detail elements one by one.

Based on the above description, analysis essentially encompasses three concepts. Analysis consists of an analysis of organizational principles,^{14–16} while Muharam⁹ states that analysis is the discussion of a work of art through the elements that construct it, the relationships of elements to each other, and the relationship of elements to the whole. The relationships of elements are based on relatively objectively accepted compositional standards, so this must contain organizational principles, such as unity and balance.¹⁷ The analytical approach views works of art as objects that are broken down into the smallest parts, which makes it possible to obtain the most objective results possible, although in reality, the analytical approach is also supported by other approaches.

RESEARCH METHOD

This research model is participatory action research. The central idea of this research is that the people who will act must also be involved in the research process from the beginning. They will not only recognize the need to implement a particular action program, but will also be physically and mentally involved in that action program.¹⁸ This research was conducted in the Kriya Education Study Program, Department of Fine Arts, Faculty of Language, Arts, and Culture, Yogyakarta State University, specifically in the Traditional Batik Kriya course. This research action hypothesizes that the use of performance-based evaluation can improve the quality of evaluation of learning outcomes in the Batik Kriya subject in the Kriya Education Study Program, Department of Fine Arts, FBSB UNY. In addition, it will have a natural effect on improving the understanding and quality of students' work, especially in learning batik kriya.

Research Procedure Design

- Planning Stage.
 1. Identify the problem, collect supporting data, formulate the problem, analyse this research action, hypothesize the problem, and formulate a hypothesis for action.
 2. The next stage is determining the personnel involved.
 3. Discuss with colleagues.
 4. Develop/formulate a design for a learning outcome evaluation system using a performance-based evaluation approach.
 5. Formulate the tools to be used, implement the evaluation, and determine the consolidation techniques.
- Implementation of Actions.

Broadly speaking, the implementation of actions taken to improve student learning outcomes evaluation is as follows:

 1. Assignments are developed to measure student performance and analysed to determine the quality of the assignments.
 2. The results of the performance assessment measurements are analysed carefully and thoroughly.
- Observation

Observations are conducted in the following stages:

 1. Observing the action process to evaluate its strengths and weaknesses.
 2. Observing and recording any obstacles that arise during the implementation of the action.

Evaluation and Reflection

Re-Diagnostic Stage

This stage evaluates the implementation of actions and improvements that have been made, then formulates an action hypothesis. The results of this re-diagnosis are then reviewed and discussed to identify specific unresolved problems, analyse their underlying causes, and identify weaknesses in the actions taken. The results of this assessment are used as input for determining the next action hypothesis.

Re-Therapy Stage

This stage involves designing the actions and improvements necessary for the next step. These actions and improvements are then implemented and monitored, and reflection is conducted. Based on this reflection, a re-planning plan is then developed.

Research Cycles

- First Cycle
 1. After obtaining a picture of the classroom situation regarding student attention and activity, student skills, and artistic creativity in traditional batik kriya, the research team conducted Action I, which was to explore students' insights into traditional batik kriya by guiding students in reading literature.
 2. The next step was for the researchers to jointly monitor and/or assist students in developing concepts for batik creation.
 3. Evaluate student activities, recording each step carefully to obtain accurate data.
 4. Reflect on the next action steps.
- Second Cycle
 1. The research team developed media, using cloth, while continuing to assist the students.
 2. The researchers continued to monitor and/or assist students' activities.
 3. An evaluation of student activities was conducted.
 4. The next stage was to reflect and make further improvements.
- Third Cycle
 1. The research team developed further media using colour standards.
 2. Explain to students the aspects that will be used in the evaluation.
 3. Monitor and evaluate, and then analyse the students' enthusiasm and seriousness in participating in batik kriya lessons.
 4. The next stage is reflection and further improvement efforts.

Indicators of Success

Indicators of success in the implementation of this research include improved student achievement, particularly in the traditional batik kriya course, and student satisfaction with the evaluation system implemented by the supervisor (lecturer). This information was gathered from students using questionnaires and interviews.

RESULTS AND DISCUSSION**Location and Initial Situation**

The Traditional Batik Kriya course provides students with the basics of traditional batik through the task of creating a 50cm x 150cm batik scarf. The course material includes fieldwork, an examination of the history of traditional batik, its function, motif creation, patterning, canting (the process of applying the canting), the dyeing process, and *nglorod* (the process of applying the canting). This research focused on the Traditional Batik Kriya Class G course, held on Tuesdays from 7:30 a.m. to 12:30 p.m. in the Department of Fine Arts Education. 16 students were participating. The course utilized a constructivist approach, encouraging students to be more active in their research and learning.

The learning model was implemented almost identically to the previous year, but this year, a change was made, namely by implementing actionable assessment methods. The previous assessment model was more product-/outcome-oriented and used a gestalt/holistic model or approach. Therefore, the information received from the assessment results mostly indicated a complete final grade, without analysis, for example, an A, B, C, or D. This approach was considered to have many weaknesses, particularly the issue of subjectivity and the lack of a diagnostic function of the assessment. These assessment results did not reflect the students' weaknesses or abilities in traditional batik kriya in detail, identifying areas where students were considered weak. Consequently, students were unable to identify their weaknesses and improve their traditional batik kriya skills. Assessment results would be more useful if conducted analytically in verbal/sentence form, so students fully understand their weaknesses.

One analytical assessment model for traditional batik kriya that needs to be tried is the analytical product assessment. This assessment can analyse students' performance in creating product designs to identify the stages where they are experiencing difficulties. This way, individual skill improvement can be easily implemented.

Course Characteristics

The Traditional Batik Kriya course contains a collection of study materials that provide insight into the knowledge and skills needed to create traditional batik products. Therefore, the Traditional Batik Kriya course aims to develop knowledge, skills, creativity, and attitudes in creating works conceptually tailored to each region. The birth of traditional batik kriya is inextricably linked to the history of each region, as beloved traditional batik reflects the circumstances in which it was created. Therefore, learning traditional batik kriya focuses on the creation of works of art, supported by knowledge, attitudes, and skills. This approach aims to equip students with the ability to understand traditional batik kriya, including the motifs and patterns, and to develop skills and creativity that are dependent on the depth of their exploration of the region.

Traditional Batik Kriya Learning is approached with: (1) Action education, namely theoretical and practical understanding of kriya product design, (2) four pillars of education, namely learning to know, learning to do, learning to be, learning to live together, (3) understanding the process of making traditional batik kriya motifs and patterns starting from recognizing the need for a traditional batik product, (4) problem solving that includes ergonomic and economic issues, and (5) understanding relevance, namely understanding the relationship between traditional batik kriya courses and other relevant courses, for example Textile, Ceramic, Wood, Leather, and Metal Kriya courses.

The competencies to be instilled in students include: 1) understanding traditional batik kriya, 2) writing its history, 3) understanding its function in each region, 4) creating working drawings of the product, and 5) making or practicing traditional batik.

The success of developing the above competencies can be seen in several achievement indicators, namely: 1) traditional batik kriya selected based on their respective regions in Indonesia, 2) explaining the motifs within the batik, 3) traditional batik patterns, 4) canting (using a canting), 5) dyeing (dyeing), and 6) *melorod* (removing wax).

The Traditional Batik Kriya course provides students with an understanding of batik making, concept writing, and traditional batik motifs and patterns. Lectures are conducted through face-to-face classroom sessions, guidance, discussions, and design presentations. Assessment is diagnostic, formative, and summative, using both portfolio tests and performance-based evaluations. Lectures are conducted using a "contract" system.

This course is conducted through theory and practice. The assessments developed take the form of product assessments and performance-based evaluations based on assignments. The criteria for assessing the work are the presence of identity in the work, colour clarity, pattern neatness, and presence, combined with a complete and clear report.

Action Design

Assignment Design

Referring to the description of the syllabus and performance assessment, the assignments in the traditional batik kriya course can be identified as follows:

1. Selection of traditional batik assignments from each region in Indonesia.
2. Describe its history.
3. Design.
4. Explain the motifs.
5. Colour
6. Traditional batik kriya assessment report

Instrument Design

TABLE 1. Instrumental Grid for Determining the Characteristics of Regional Batik in Indonesia.

Scope	Indicator
Motif and Pattern Sketch	Motif Accuracy
	Isen Line
	Definition of Pattern Lines

TABLE 2. Grid of traditional batik works in Indonesia

Scope	Indicator
Colour	Colour match
Motif	The accuracy of the motif
Pattern	Pattern accuracy
<i>Isen</i>	Accuracy <i>Isen-isen</i>
<i>Lorodan</i>	<i>Lorodan</i> cleanliness

TABLE 3. Outline of the Traditional Batik Assessment Report Competency Assessment Instrument

Scope	Indicator
Introduction	Study Focus
Discussion	Logic/Thinking Construction
Conclusion	Language and Writing Layout

TABLE 4. Outline of the Student Understanding of Traditional Batik in Indonesia Assessment Instrument

Scope	Indicator
Understanding	Understanding the definition of traditional batik
Understanding the process of applying wax	The heat and coldness of the wax used for applying the wax How to hold the canting and cloth when applying wax
Understanding the dye recipe	Creating a colour recipe
Understanding how to remove wax	How to clean batik cloth from wax or <i>nglorod</i>

First Cycle

Learning strategies

Independent Learning: The development of independent learning skills can be done in two ways: lecturers equip students with cognitive strategies, and lecturers guide students through a lecture contract. Assuming that students participating in the Traditional Batik Kriya course are seniors/seventh-semester students, the development of skills through independent learning is more focused on guiding students through a lecture contract. In this case, students determine the topic to be studied by independently analysing the situation, determining the solution, and reviewing several theories that students believe can support the solution to the problem they have determined.

Implementation of Actions

The planned assignments were analysed by: 1) reviewing the assignment's construction, namely reviewing the scope of the assignment to determine whether it reflected and encompassed the relevant material or topics, namely motif and pattern creation. Furthermore, the developed assignments were assessed to determine whether the developed language could produce conceptual writing competencies. 2) Reviewing the language used in formulating the assignments to determine whether it was communicative. 3) Confirming and discussing the assignments with students to obtain input on desired outcomes or whether the assignments aligned with the students' needs for a particular skill/competency. In addition to the assignments, analysis was also conducted on the assessment instruments, including the grid and the scoring rubric. The grids were developed based on the scope.

TABLE 5. Results of the First Cycle Assignment Assessment

No.	Name	Definition	Nyanting		Colouring	Nglorod
			Pd	Mc		
1	Stefany Dwi Aryanti	3	2	2	1	3
2	Ertika Fatmaning Dewi	1	2	1	0	1
3	Mohamad Ade Firman	1	1	1	0	1
4	Nuraini Hidayati	1	2	1	0	1
5	Nisrina Zahirah Afnan Nuha	0	0	0	0	0
6	Erlisa Nadia Putri	4	3	3	2	3
7	Olivia Devi Ekawati	1	2	2	1	3
8	Raihan Daffa' Al Ghifari	1	1	0	0	0
9	Dian Vitri Nur Hasanah	3	2	3	2	3
10	Divani Adinda Putri	1	2	1	0	2
11	Adivia Linda Setyawati	2	1	1	1	2
12	Ferian	3	1	1	1	1
13	Eymilia Nur Santi	2	1	1	1	2
14	Laila Nur Harini	2	2	1	1	1

Description:

Pd = How hot and cold the wax is when *mencanting*

Mc = How to hold the canting when *mencanting*

Based on the presentation of the assessment results in this first cycle (Table 5), it can be seen that the students' overall abilities, on average, have less ability in understanding traditional batik; however, students from vocational schools (SMIK) show more understanding than students from senior high schools (SMA).

Monitoring and Assessment

Monitoring was conducted in the following stages:

1. Observing the assessment process and student responses to the assessment results of the assignment on understanding traditional batik kriya in Indonesia. The monitoring results indicated that this first step had the advantage of efficient use of time, motivating students to complete the assignment promptly. The weakness lay in students' lack of understanding of the detailed assessment results, as they were presented only as numbers without detailed information about the scoring rubric.
2. Based on observations of the implementation of this step, several obstacles arose. One of the main challenges was the relatively long scoring process, requiring the lecturer to be extra diligent in assessing the students. Furthermore, subjective elements still influenced the assessment of this first assignment.

Analysis and Reflection

In this activity, the researcher formulated the following steps:

1. Designing the scoring activity, along with rationale, in accordance with the established rubric. Thus, the assessment of this first assignment would not only result in a numerical score but also include a review.
2. Anticipating emerging obstacles, such as subjectivity, is achieved by gradually scoring the same sub-assignments for all students. For example, the first scoring was conducted on the situation analysis sub-assignment for all student writing.

Re-Diagnostic Stage

This stage assesses the implementation of the corrective actions taken. The results of this remedial action assessment revealed that students responded quite well and that their work had improved, although not as expected. Many students made improvements based on the assessment results. A weakness in this stage is the same problem as in the first stage, namely, the relatively long time required for proofreading. This is primarily due to the requirement to provide direct written reviews of the work/results. Therefore, this grading system is not suitable for large classes with a large number of students.

Re-Therapy Stage

This stage involves designing necessary actions and improvements. These improvements primarily involve improving the presentation of reviews of the work/conceptual writing produced by students. At this stage, the agreed-upon rubric is attached to the concept paper being assessed. The assessor or evaluator simply circles the score on the rubric sheet. This technique overcomes the time constraint; for in-depth assessment, the evaluator needs to point out the errors directly in the resulting paper.

Second Cycle

Learning strategies

Project-Based Learning: Students select traditional batik from each region in Indonesia and begin to determine the motifs, patterns, and colours.

Implementation of Actions

The planned assignments were analysed by: 1) reviewing the assignment's construction, namely reviewing the scope of the assignment to determine whether it reflected and encompassed the relevant material or topic, namely

motif and pattern creation. Furthermore, the developed assignments were assessed to determine whether the developed assignments could generate competency in developing ideas to solve the identified problems. 2) Examining the indicators or characteristics of good design sketches. 3) Confirming and discussing the assignments with students to obtain input on desired outcomes or whether the assignments align with the students' needs for a particular skill/competency.

In addition to the assignments, analysis was also conducted on the assessment instruments, including the grid and the scoring rubric. The grid was developed based on the scope of the assignment and the indicators or criteria used to determine the student's level of learning success. The scope of the assignments was adjusted to the material and competencies required by the students. The assessment criteria were adopted from the fine arts assessment criteria.² Based on these criteria, a scoring rubric was developed using a graduated scale ranging from the highest score (4) to the lowest score (0).

The results of the development of the grid and scoring rubric were socialized and discussed with students. The discussion with students resulted in a consensus that the students essentially approved the development results, namely the accuracy of the motif, *isen* lines, and pattern.

TABLE 6. Results of the Second Cycle Assignment Assessment

No.	Name	Motif		
		Km	Gi	Po
1	Stefany Dwi Aryanti	4	4	4
2	Ertika Fatmaning Dewi	3	3	2
3	Mohamad Ade Firman	2	3	2
4	Nuraini Hidayati	3	4	4
5	Nisrina Zahirah Afnan N.	1	1	1
6	Erlisa Nadia Putri	4	4	4
7	Olivia Devi Ekawati	3	2	3
8	Raihan Daffa' Al Ghifari	2	2	3
9	Dian Vitri Nur Hasanah	4	4	4
10	Divani Adinda Putri	4	3	4
11	Adivia Linda Setyawati	3	4	4
12	Ferian	3	3	2
13	Eymilia Nur Santi	3	2	2
14	Laila Nur Harini	3	3	3

Information:

Km = Motive accuracy

Gi = Isen line

Po = Pattern

The results of the second cycle of this research (Table 6) indicate that students' overall ability to create traditional Indonesian batik motifs and patterns is generally considered adequate. This indicates an improvement in their understanding of traditional Indonesian batik.

Monitoring and Assessment

Monitoring was conducted in the following stages:

1. Observing the assessment process and student responses to the results of the motif and pattern creation assignment. The monitoring results indicate that this first step has advantages in terms of time utilization, motivating students to complete the assignment promptly. The weakness lies in students' lack of understanding of the detailed assessment results, as they are presented only with numbers without detailed information about the scoring rubric, and students had difficulties understanding the explanation.
2. Based on observations of the implementation of this step, several obstacles arose. One is that the scoring process takes a relatively long time, requiring lecturers to be extra diligent in assessing. Furthermore, subjective elements still influence the assessment of this first assignment.

Analysis and Reflection

In this activity, the researcher formulated the following steps:

1. The scoring is accompanied by a rationale according to the established rubric, using the Indonesian language in accordance with EYD.

2. Anticipating potential challenges, such as subjectivity, is achieved by gradually scoring the same sub-assignment for all students. For example, the first scoring is given for the situation analysis sub-assignment for all student writing.

Re-Diagnostic Stage

At this stage, an assessment of the implementation of the corrective actions taken is carried out. The results of this assessment revealed that students responded quite well and that their work had improved, although not as expected. Many students made improvements based on the assessment results. A weakness at this stage is the same constraints as in the first stage, namely, the relatively long time required for proofreading. This is primarily due to the requirement to provide direct written reviews of the work/results. Therefore, this assessment system is not suitable for large classes with a large number of students.

Re-Therapy Stage

At this stage, efforts are made to design the necessary actions and improvements. These improvements primarily involve improving the presentation of reviews of the work/concept papers produced by students. At this stage, the agreed-upon rubric is attached to the assessed concept papers, and the assessor or evaluator simply circles the scores on the rubric sheet. This technique overcomes the time constraint; for in-depth assessment, the evaluator needs to point out the errors directly in the resulting paper.

Third Cycle

Learning strategies

Project-Based Learning: Students choose traditional batik from each region in Indonesia and start creating their work and reports.

Implementation of Actions

The planned assignments were analysed by: 1) reviewing the assignment's construction, namely reviewing the scope of the assignment to determine whether it reflected and covered the relevant material or topic. Furthermore, the developed assignments were assessed to determine whether the assignments could produce working drawing competencies. 2) Reviewing the language used in formulating the assignments to determine whether they were communicative. 3) Confirming and discussing the assignments with students to obtain input on desired outcomes or whether the assignments align with the students' needs for a particular skill/competency.

In addition to the assignments, analysis was also conducted on the assessment instruments, including the grid and scoring rubric. The grid was developed based on the scope of the assignment and indicators or criteria for determining the level of student learning success. The scope of the assignments was adjusted to the material and competencies required by the students. Based on these criteria, a scoring rubric was developed using a graduated scale from the highest score (4) to the lowest score (1). The results of the grid and scoring rubric were disseminated and discussed with students. From the results of the discussion with the students, an agreement was reached that basically the students agreed with the results of the development.

TABLE 7. Results of the Third Cycle Assignment Assessment

No.	Nama	Karya					Laporan		
		W	M	P	I	L	Pndhl	Bhs	Pntp
1	Stefany Dwi Aryanti	4	4	4	4	4	3	3	3
2	Ertika Fatmaning Dewi	4	4	3	3	3	3	3	2
3	Mohamad Ade Firman	3	4	4	2	3	2	2	1
4	Nuraini Hidayati	3	4	4	4	4	3	1	2
5	Nisrina Zahirah Afnan N.	1	1	1	1	1	1	1	1
6	Erlisa Nadia Putri	4	4	4	4	4	3	3	3
7	Olivia Devi Ekawati	3	4	4	3	3	2	3	3
8	Raihan Daffa' Al Ghifari	2	3	3	4	4	2	1	2
9	Dian Vitri Nur Hasanah	4	4	4	4	4	3	3	3
10	Divani Adinda Putri	4	3	4	4	4	3	2	3
11	Adivia Linda Setyawati	3	3	4	4	4	3	2	2

12	Ferian	3	3	4	4	3	3	3	2
13	Eymilia Nur Santi	3	3	3	3	4	2	2	1
14	Laila Nur Harini	3	3	3	4	3	2	2	2

Description:

W = colour; M = motif; P = pattern; I = *isen-isen*; L = *lorodan*

Pndhl = Introduction; Bhs = Discussion; Pntp = Closing

The results of the third cycle of this research (Table 7) indicate that the majority of students already understand how to create traditional batik works in Indonesia and write reports based on the activities they do when making traditional batik works in Indonesia.

Monitoring and Assessment

Monitoring was conducted in the following stages:

1. Observing the assessment process and student responses to the assessment results for the creation and report writing assignments. The monitoring results indicate that this third assessment process provided objective assessments based on students' work and their ability to write reports. This motivated students to improve their work and fostered an understanding of traditional Indonesian batik kriya, how to create traditional batik kriya, and how to write effective reports.
2. Based on observations, the assessment process went well, although it required additional time to assess students' work and reports.

Analysis and Reflection

In this activity, the researcher formulated the following steps:

1. Designing scoring for student assignments and discussing these with students can increase their motivation to create. Clearly defined assignments also provide clarity for students in carrying out their work. Students' understanding of traditional Indonesian batik kriya has improved.
2. The use of performance-based evaluation has improved the evaluation system for practical learning outcomes in the Traditional Batik course in the Kriya Education Study Program, Department of Fine Arts, Faculty of Language, Arts, and Culture, Universitas Negeri Yogyakarta (UNY), despite some shortcomings.

CONCLUSION

Performance-based evaluation was successful in improving the evaluation system for Traditional Batik Practice learning outcomes in the Kriya Education Study Program, Department of Fine Arts, Faculty of Language, Arts, and Culture, Universitas Negeri Yogyakarta (UNY). After implementing a performance-based approach, student scores for motif and pattern creation, and report writing significantly improved. With each completion, students felt more confident in their work because they were aware of the assessment targets. The clarity of these course objectives also motivated them to complete assignments to the best of their ability to achieve the best possible grades. However, some students still failed to achieve satisfactory grades. Overall, however, the implementation of a performance-based evaluation approach significantly improved the evaluation system for Traditional Batik Practice learning outcomes in the Kriya Education Study Program, Department of Fine Arts, Faculty of Language, Arts, and Culture, Universitas Negeri Yogyakarta (UNY).

Performance-based evaluation can be used as a tool or model for assessing Traditional Batik Practice learning outcomes in the Kriya Education Study Program, Department of Fine Arts, Faculty of Language, Arts, and Culture, Universitas Negeri Yogyakarta (UNY). However, weaknesses in the performance assessment implementation can be outlined as follows:

1. The scoring system is very difficult to implement.
2. The weighting system for each task scope and assessment criteria seems to need to be considered, as it will affect the total score.
3. Performance assessments require a relatively long time.

The recommendation based on this research is that lecturers can implement performance-based evaluation in courses on just one assignment to mitigate the time constraints. This is because performance-based evaluation can improve learning outcomes and students' understanding of the targets for mastering the course. Therefore, it's worthwhile to use it, even if only on one assignment.

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Empowering Communities through Sustainable Soap Production from Used Cooking Oil in Wates, Kulon Progo

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Abstract. The increasing demand for cooking oil has an impact on the high production of used cooking oil, both from households and industries. The behavior of repeatedly using used cooking oil is harmful to health, while untreated disposal causes environmental pollution. Based on these problems, this community service activity was carried out in Wates Village, Kulon Progo with the aim of increasing the knowledge, awareness, and skills of the community, especially housewives, in processing used cooking oil into recycled laundry soap. This community service method uses a used cooking waste treatment system based on environmental concern. These activities were carried out sequentially, namely (1) socialization about the negative effects of used cooking oil on health and the environment, (2) training on purifying used cooking oil with wood charcoal, (3) training on processing used cooking oil into recycled soap, 4) explanation of packaging and marketing strategies. The results of this activity are used cooking oil purification techniques, recycled laundry soap products, and packaging and marketing insights. This activity can also show an increase in understanding and behavior change: 21% of participants know that used cooking oil can be processed into soap, 20% understand the steps to make it, 20% are committed not to throw oil carelessly, 19% are interested in trying to make soap at home, and 20% are ready to share knowledge with the surrounding environment. This program has proven to be effective in empowering the community, reducing environmental pollution, and opening up household business opportunities..

INTRODUCTION

Consumption of cooking oil, especially palm oil for food needs, has increased significantly in Indonesia in the past decade [1]. In 2019, the national cooking oil demand reached 9.86 million tons, an increase of 49% compared to the previous year, with household consumption growing by an average of 4.72% per year between 2014–2019 [2]. This increase in consumption has a direct impact on the increase in the amount of used cooking oil (*Used Cooking Oil/UCO*) [3]. Based on a report by the International Council on Clean Transportation (ICCT), the potential production of used cooking oil in Indonesia reaches 157 million liters per year from the urban sector (restaurants, hotels, schools), and up to 1.638 million liters per year from households [4].

The results of an initial survey in Wates Village, Kulon Progo Regency, show the low knowledge of PKK women about the use of used cooking oil. As many as 23% of respondents did not know that used cooking oil could be processed into soap, 14% considered it only as waste, and 17% were used to throwing it in the sewer or garbage can. This condition emphasizes the need for education and community empowerment in the management of used cooking oil.

So far, most of the research has focused on the health impacts of the use of used cooking oil or its use as a raw material for biodiesel and soap [5]. However, studies on community empowerment programs that integrate health education, environmental conservation, and household economic development in rural Indonesia are still very limited [6]. This gap is the novelty of this research, which is to combine environmental sustainability with the empowerment of women and small-scale entrepreneurs.

Therefore, this community service research aims to empower women, especially housewives, in processing used cooking oil into recycled soap. The objectives of the activity include: (1) increasing awareness of health and environmental hazards caused by used cooking oil, (2) training the community in producing recycled soap that is environmentally friendly and economically valuable, and (3) encouraging sustainable household practices through packaging and marketing strategies.

LITERATURE REVIEW

Cooking oil will experience a decrease in quality if used repeatedly at high temperatures [7]. Repeated heating causes the degradation of unsaturated fats that produce harmful compounds, such as peroxide and epoxide, which are carcinogenic and associated with degenerative diseases, including cancer and stroke [7][8]. In daily practice, people often use cooking oil up to two or three times before being dumped carelessly into the ground or sewer [8]. This habit not only endangers health, but also pollutes the environment because waste from used cooking oil can damage the soil and aquatic ecosystems [9].

On the other hand, used cooking oil has great potential to be processed into value-added products. Previous research has shown that used cooking oil can be used as a raw material for biodiesel and household soap [10]. The processing of used cooking oil into recycled soap has various benefits, including reducing waste, reducing household expenses, providing environmentally friendly product alternatives, and opening up additional income opportunities if packaged attractively and equipped with natural scents [11].

These findings prove that recycling used cooking oil is feasible both from a technical and economic perspective. However, previous research has focused more on a laboratory or industrial scale, while community-based approaches have rarely been studied. Thus, this study fills this gap by developing a community service program based on used cooking oil management that integrates aspects of health, environment, and household economic empowerment.

RESEARCH METHOD

This community service activity was held on Friday, August 8, 2025. The methods used in the implementation of this activity are (1) socialization about the negative effects of used cooking oil on health and the environment, (2) training on purifying used cooking oil with wood charcoal, (3) training on processing used cooking oil into recycled soap, 4) explanation of packaging and marketing strategies. The implementation of the activity was a collaboration between the women of the PKK group in Wates Village, Kulon Progo Regency and lecturers from the Faculty of Vocational Studies, Yogyakarta State University.

RESULTS AND DISCUSSION

The target of this community service activity was to create an economically valuable product from used cooking oil waste and to foster behavioral changes in the community towards personal and environmental health. Several months prior to the activity, the resource persons conducted a preliminary survey and direct interviews with residents. The survey results indicated that the villagers lacked knowledge regarding the adverse effects of used cooking oil, as well as methods for purifying and reprocessing it into beneficial products.



Figure 1. Used Cooking Oil

The activity was held on Friday, August 8, 2025, in the Wates Village Hall, located at Jl. Sudibyo No.2, RW.004, Jogoyudan, Wates, Kulon Progo Regency, Special Region of Yogyakarta 55651. The session was led by a single resource person who explained the negative impacts of used cooking oil and simultaneously demonstrated practical techniques for purifying it using wood charcoal, followed by a hands-on training session on converting the oil into soap.



Figure 2. Presentation by the Resource Person

The first segment involved an explanation of the detrimental effects of improper used cooking oil disposal. This was followed by a practical demonstration on purifying the oil using wood charcoal. This purification training aimed to equip the community, particularly housewives, with the skills to effectively treat used cooking oil. It was anticipated that this activity would enhance participants' knowledge and motivation to alter disposal behaviors and utilize used cooking oil correctly. The expected direct outcome was that the community would cease improper disposal and become proficient in purifying used cooking oil with wood charcoal..



Figure 3. Used Cooking Oil Purification Process

Subsequently, the resource person conducted training on processing the purified used cooking oil into laundry soap. The soap-making process was demonstrated directly by the lecturer (resource person) with assistance from community members. This activity aimed to train participants in producing recycled soap from used cooking oil for personal use and potential sale, thereby reducing household expenses and generating additional income. The intended benefit was to motivate the community to transform used cooking oil into an economically valuable product. The expected output was the community's acquired ability to process used cooking oil into soap.



Figure 4. Soap-Making Practice

The used cooking oil was mixed with NaOH, water, and natural fragrances, then stirred until it reached a consistency ready for molding into various attractive shapes using plastic or glass molds. Metal molds were avoided due to the risk of hazardous chemical reactions. The soap batter was poured into the prepared molds. The goal of this segment was to ensure participants understood the use of safe molding materials and could shape the soap into unique and appealing forms.



Figure 5. Molded Soap Batter

The activity continued with guidance on the hardening process of the molded soap. The hardening process requires approximately 10 hours. After this period, the hardened soap can be removed from the molds. It should then be stored at room temperature, away from children's reach, for a minimum of four weeks before use. This curing process occurs naturally without artificial heating. The objective was for the community to comprehend the natural soap hardening and curing process.



Figure 6. Recycled Soap Bars

The implementation results demonstrated a significant increase in participants' knowledge and skills. Post-activity assessments revealed that 21% of participants understood that used cooking oil could be processed into soap, 20% comprehended the production steps, 20% committed to avoiding improper disposal of used oil, 19% expressed interest in attempting soap production at home, and 20% were prepared to share this knowledge within their communities.

CONCLUSION

This community service activity yielded several significant benefits. It enhanced public awareness and knowledge concerning the negative environmental impacts of used cooking oil waste. It equipped the community with new skills to repurpose this waste stream, thereby creating new environmentally conscious business opportunities and generating economically valuable products. The initiative successfully fostered behavioral change, encouraging community participation in reducing environmental pollution by eliminating the practice of indiscriminate oil disposal. Furthermore, it contributed to public health improvement by discouraging the repeated consumption of used cooking oil. Given the multitude of benefits observed, it is recommended that similar programs be replicated and expanded to other regions in the future.

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WORKSHOP-BASED DEVELOPMENT OF TRADITIONAL HOUSE LEARNING MEDIA THROUGH POP-UP AND AUGMENTED REALITY FOR ART AND CULTURE TEACHERS IN TASIKMALAYA

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Abstract. This community service program aims to enhance the competence of high school (SMA) and vocational high school (SMK) Art and Culture teachers in Tasikmalaya Regency and City in developing innovative culture-based learning media, particularly on traditional Indonesian houses. The background of this program stems from the declining understanding of local cultural heritage among students, partly due to a lack of engaging and interactive learning media. The workshop employed a hybrid model consisting of online and onsite meetings. Participants, totaling 30 teachers, learned to create Pop-Up and Augmented Reality (AR)-based media integrated into Art and Culture learning. Evaluation results showed an 85% increase in participants' understanding of Pop-Up and AR concepts, and 90% successfully created independent Pop-Up media of traditional houses. Additionally, 95% stated that the materials were relevant to their classroom needs. The program outputs include an academic article, design prototypes with HKI (intellectual property) potential, and dissemination at an international seminar. The workshop model is expected to serve as a creative, technology-integrated approach for teaching cultural content in schools.

Keywords: learning media, traditional houses, Pop-Up, Augmented Reality, Art and Culture teachers, workshop.

INTRODUCTION

Indonesia's diverse cultural heritage is reflected in its traditional architecture, such as the Joglo (Java), Sasak (Lombok), and Sunda (West Java) houses. These architectural forms embody philosophical, social, and spiritual meanings that represent the harmony between humans and their environment. However, the modernization and globalization era has diminished young generations' appreciation of local culture. A survey by Kemendikbudristek (2020) found that 63% of high school students could not name more than two traditional houses outside their own region. Field observations conducted in 2024 revealed that cultural learning in schools remains textual and lacks interactive media. Teachers often struggle to visualize cultural material effectively. Therefore, this program aims to develop learning media that combine manual creativity and digital innovation to strengthen cultural learning engagement.

Pop-Up media was chosen for its tactile and visual appeal, while Augmented Reality (AR) was integrated for its capacity to visualize 3D models of traditional houses, allowing interactive experiences for students. The synergy between Pop-Up and AR promotes meaningful, technology-enhanced cultural learning.

LITERATURE REVIEW

1. Traditional Houses as Cultural Identity

Traditional houses are tangible manifestations of local wisdom that encode the social structure, philosophy, and cosmology of a community. According to Rapoport (1969), vernacular architecture arises from cultural

determinants rather than purely technical or aesthetic factors. Each traditional house type, therefore, becomes an embodiment of how a society interprets space, hierarchy, and environmental adaptation.

In Indonesia, traditional houses serve not merely as dwellings but as cultural texts that reflect community beliefs. For instance, the Joglo symbolizes balance between the human and the divine realms through its tiered roof form, while the Sasak house in Lombok reflects social egalitarianism through its horizontal spatial organization. The Sunda house, with its adaptive pitched roof and lightweight materials, represents harmony with nature and local ecology. However, the knowledge of such architecture has gradually declined. Studies by Ramadhan and Yuniarti (2021) show that less than one-third of students in West Java could explain the symbolic meanings behind their local traditional houses. This loss of cultural literacy underscores the urgency to introduce culturally grounded learning models in schools.

2. The Role of Learning Media in Cultural Education

Learning media play a critical role in mediating abstract cultural concepts into forms that can be visually and emotionally grasped by students. According to Munadi (2013), media serve not only as teaching aids but also as cognitive bridges that stimulate imagination, perception, and interpretation.

In art and culture education, where abstract values and aesthetics dominate, media should enable multisensory engagement — involving sight, touch, and interactivity. Smaldino et al. (2014) emphasize that multimedia learning environments can enhance students' motivation and knowledge retention by combining verbal and non-verbal information. Visual learning tools, when aligned with constructivist pedagogy, help students actively construct meaning rather than passively absorb information. In the Indonesian curriculum context, art and culture learning often lacks sufficient visual and digital support.

Therefore, innovative media such as Pop-Up and AR can be instrumental in bridging the gap between traditional content and contemporary learning habits dominated by visual-digital exposure.

3. Pop-Up Media in Art and Cultural Learning

Pop-Up media belong to the category of three-dimensional analog learning media that combine craftsmanship, design, and storytelling. They transform flat illustrations into interactive visual experiences that emerge physically from the page. According to Ismail (2018), Pop-Up books enhance learners' spatial understanding and narrative comprehension, particularly in visually rich subjects. In cultural education, Pop-Up media allow teachers to present traditional architectural structures, ornaments, and spatial hierarchies in ways that can be explored and manipulated by students. This aligns with experiential learning principles by Kolb (1984), where knowledge is formed through active experimentation and concrete experience.

Moreover, Pop-Up media provide a low-cost, easily replicable platform for schools with limited technological resources. Teachers and students can co-create models, strengthening both artistic and cultural literacy.

4. Augmented Reality (AR) in Education

Augmented Reality (AR) represents the intersection of physical and digital worlds. Azuma (1997) defines AR as a technology that blends real environments with virtual 3D objects in real time, offering spatial interactivity. In education, AR facilitates immersive experiences, allowing learners to visualize and manipulate digital representations of complex objects such as historical buildings, artworks, or cultural artifacts. Research by Chang et al. (2020) suggests that AR-based learning increases motivation and cognitive engagement, particularly when learners can explore content autonomously.

For cultural subjects, AR enables the visualization of traditional forms that are otherwise difficult to access physically, thereby enhancing understanding and empathy toward cultural heritage. In the context of this program, integrating AR with Pop-Up media creates a multimodal experience: tactile (through Pop-Up), visual (through 3D AR visualization), and cognitive (through cultural interpretation). This hybrid approach responds to both traditional art learning values and 21st-century digital competencies.

5. Teacher Training and Workshop Models

Teacher professional development is a crucial mechanism for educational innovation. Guskey (2002) explains that effective training must combine theoretical input, practical experience, and reflective dialogue. Workshops provide a hands-on platform for teachers to internalize new skills, experiment with materials, and build confidence. In community engagement programs, workshop models also promote collaborative learning among teachers as a community of practice (Lave & Wenger, 1991).

Participants learn not only from facilitators but also from peer interactions, fostering a sustainable ecosystem of knowledge exchange. Therefore, this workshop was designed to integrate learning-by-doing and learning-by-reflection principles, ensuring that teachers could directly apply Pop-Up and AR creation processes in their classrooms.

RESEARCH METHOD

The workshop employed a hybrid training model, combining online (via Zoom, June 15, 2024) and onsite (at SMK Negeri 3 Tasikmalaya, June 22, 2024) sessions. Participants: 30 Art and Culture teachers from 20 schools in Tasikmalaya, selected in coordination with the local Musyawarah Guru Mata Pelajaran (MGMP).

The training process consisted of several integrated stages, beginning with lectures and discussions introducing traditional Indonesian houses and innovative media approaches. This was followed by demonstrations on Pop-Up creation and the application of Augmented Reality (AR). Participants then practiced independently, creating Pop-Up models and applying AR with technical assistance, and concluded with reflective discussions on strategies for classroom implementation..

The evaluation instruments included pre- and post-workshop questionnaires, observation of participant involvement, documentation of creative works, and semi-structured interviews. Quantitative data were analyzed descriptively, while qualitative findings were obtained from observations and participant feedback.

RESULTS AND DISCUSSION

1. Implementation Process

The workshop began with an online session introducing Indonesian traditional houses and innovative learning media concepts. Teachers expressed that they often faced difficulties engaging students due to limited teaching resources. This session encouraged them to see how visual and interactive approaches could transform cultural education

The onsite session was held at SMK Negeri 3 Tasikmalaya, attended by 30 teachers representing various schools. The session opened with welcoming remarks from school and MGMP representatives. Afterward, participants followed demonstrations of Pop-Up construction, starting from pattern design, folding technique, layering, and assembly into 3D house structures. Participants were provided with materials such as art paper, cutters, adhesives, and printed architectural templates.



Figure 1. Participants followed demonstrations of Pop-Up construction

Subsequently, participants learned to integrate Augmented Reality into their Pop-Up media using a free 3D-viewer application. The AR allowed traditional houses to appear as digital models that could be rotated, zoomed, and viewed through mobile devices. Teachers expressed enthusiasm, particularly because it bridged traditional culture with digital literacy—an approach many had not previously experienced.

2. Participant Engagement and Creativity

Observation results indicated that 95% of participants actively engaged during practice sessions. Teachers collaborated in small groups, exchanging techniques and ideas for presenting cultural stories through Pop-Up scenes. Some groups modified designs to depict the Joglo, Sasak, and Sunda houses, adding contextual elements such as human figures and trees to enrich the narrative. The combination of manual and digital components (Pop-

Up + AR) encouraged teachers to blend craftsmanship with technological exploration. Many participants stated that this process revived their own creativity and motivated them to involve students in similar projects.



Figure 2. Pop Up and augmented reality

3. Evaluation of Learning Outcomes

Quantitative data showed a marked improvement in teachers' skills and understanding: 85% improvement in conceptual understanding of Pop-Up and AR-based media, 90% of participants produced complete Pop-Up prototypes independently, and 95% agreed that the workshop materials aligned with classroom needs. Qualitative interviews revealed that teachers found AR integration transformative, especially for visualizing cultural forms that cannot be physically demonstrated in class. They also appreciated how Pop-Up media allowed students to "touch" and interact with cultural objects, making learning more memorable. Several participants noted time constraints as a challenge, particularly in AR setup and 3D model calibration. Nevertheless, post-workshop guidance via an online group helped participants continue their development independently.

4. Pedagogical Implications

The workshop demonstrated that hybrid-based capacity building effectively improves teachers' confidence and creativity. Teachers reported plans to integrate Pop-Up and AR in topics beyond traditional houses—such as performing arts, costume design, and local folklore visualization. This outcome supports Smaldino et al. (2014), who emphasize that instructional media integrating visual, kinesthetic, and digital modalities enhance student motivation and understanding. The Pop-Up–AR model embodies this principle by uniting tangible art practice with emerging technology. The reflection session showed that participants viewed this model as adaptable for school exhibitions and student project-based learning. Several schools even expressed interest in collaborating to create digital archives of local architecture using AR-based Pop-Up collections.

5. Discussion

The success of the Tasikmalaya workshop reveals that innovative, technology-integrated approaches can revitalize cultural education. The program's impact extended beyond skill enhancement—it fostered teachers' cultural awareness and digital literacy simultaneously. Moreover, the participatory nature of the workshop created a peer-learning environment where teachers shared expertise and built networks. The collaborative culture formed during the workshop aligns with the concept of community of practice, where shared experiences and reflection generate continuous professional growth. The integration of Pop-Up and AR also contributes to sustainable education models that respect traditional knowledge while embracing innovation. In future development, extended training and curriculum integration are recommended to maximize pedagogical impact and ensure scalability to other regions.

CONCLUSION

The workshop effectively enhanced Art and Culture teachers' competence in developing creative learning media integrating Pop-Up and AR. The combination of tactile and digital media created an engaging cultural learning experience. The collaborative approach between the university, MGMP, and schools demonstrates a sustainable model for innovation in cultural education. Future programs should focus on expanding the workshop to other regions and developing advanced modules to deepen AR integration and pedagogical applications.

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Socialization of Tourism Awareness Group Empowerment (POKDARWIS) to Increase Community Awareness in Sustainable Tourism Management in Kulonprogo Regency

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Abstract. This Community Service Program (PKM) was implemented with the aim of increasing community capacity and awareness in sustainable tourism management through the empowerment of Tourism Awareness Groups (POKDARWIS) in Kulonprogo Regency. The activities focused on socializing the concept of sustainable tourism, strengthening the role of Tourism Awareness Groups (POKDARWIS) as a driving force for tourist villages, and mentoring management strategies based on local potential. The activity was attended by the Head of the Kulonprogo Regency Tourism Office, the Head of the Creative Economy and Tourism Resources Division, the Head of Pengasih Village, the Kulonprogo Tourism Awareness Group (POKDARWIS), and students of the Recreation Business Management Study Program, Faculty of Vocational Studies, Yogyakarta State University. The implementation methods included counseling, participatory discussions, field practice, and evaluation of community involvement in tourism destination management. The results of the activities showed an increase in understanding of members (POKDARWIS) and the community about the principles of sustainability, the formation of a shared commitment to protecting the environment and local culture, and the emergence of a community action plan to support the sustainability of tourist destinations in the Kulonprogo region. Thus, this program contributes to strengthening institutional capacity (POKDARWIS), fostering collective community awareness, and encouraging the creation of more sustainable and competitive tourism management.

Keywords: Socialization, Pokdarwis, Community Empowerment, Sustainable Tourism.

INTRODUCTION

Tourism is a crucial pillar of regional economic development, particularly in creating jobs, increasing community income, and encouraging cultural and environmental preservation. Law of the Republic of Indonesia No. 10 of 2009 stipulates that Kulonprogo Regency, as part of the tourism buffer zone of the Special Region of Yogyakarta, has diverse natural, cultural, and man-made tourism potential that continues to be developed. In managing this potential, local community participation through the Tourism Awareness Group (POKDARWIS) is crucial. POKDARWIS is a community organization that grows from, by, and for the community, which plays a strategic role in supporting sustainable tourism development. Its main functions include educating the public about the seven charms, developing tourist destinations, and organizing activities that can attract tourists (Kemenparekraf, 2020). However, the effectiveness of POKDARWIS's role depends heavily on its capacity in terms of human resources, institutions, collaborative networks, and program innovation. One form of innovation that has a significant impact on increasing the attractiveness of tourist destinations is recreational sports activities. Aditya, R., & Susanti, I. (2021). Recreational sports, such as fun biking, trail running, group gymnastics, and traditional competitions, not only serve as entertainment and destination promotion, but also create interaction between local communities and tourists. Darmawan, D. (2017). These activities can strengthen local identity, increase the creative economy, and extend the length of stay of tourists. This is where the capacity of POKDARWIS as organizers of recreational sports activities is important. Their ability to design, manage, and evaluate these activities will greatly determine the success of tourism programs in the region. Problems that often arise are limited human resource competency, minimal budget support, and a lack of synergy with other stakeholders, such as local governments, business actors, and sports communities. Given the important role of POKDARWIS in organizing innovative activities such as recreational sports, an in-depth study is needed to

determine the influence of POKDARWIS institutional capacity on the implementation of recreational sports activities and its contribution to improving tourism management in Kulonprogo Regency. The results of this community service are expected to serve as a basis for local governments and relevant stakeholders in formulating policies for empowering POKDARWIS in a more targeted and sustainable manner. Based on this, the Community Service Team collaborated with Partners interested in carrying out community service on "Socialization of Tourism Awareness Group Empowerment (POKDARWIS) to Increase Community Awareness in Sustainable Tourism Management in Kulonprogo Regency.

LITERATURE REVIEW

Tourism Villages are one of the tourism destinations with the potential for development in Indonesia. Tourist attractions featured in tourism villages can be both natural and cultural. Developing a tourism village requires community participation as a form of awareness and preservation of its potential. This form of community participation can be expressed in the form of tourism awareness groups, commonly called Pokdarwis. Pokdarwis plays a role as a driver and facilitator in the development of a tourism village. The success of a tourism village development can be seen from the role of Pokdarwis in the area. Pokdarwis is an abbreviation of "tourism awareness group" which is formed with an institutional structure consisting of people who strive to promote a conducive tourism climate in their area. The development of a conducive climate is included in the "sapta marga" category, namely: safe, orderly, clean, cool, beautiful, friendly, and containing elements of memorable memories. POKDARWIS is a community organization formed by the community and for the community to encourage awareness and active participation in tourism development. According to the Ministry of Tourism and Creative Economy (2020), POKDARWIS has educational, promotive, and facilitative functions that aim to: (1) Raise awareness of the seven charms, (2) Develop the potential of local destinations, (3) Increase tourism-based community economic empowerment. The capacity of POKDARWIS greatly determines the effectiveness of its function implementation. According to Prafitri and Damayanti (2016), institutional capacity includes: managerial capabilities, access to information and training, collaborative networks, and mastery of technical aspects in tourism management. Sport Tourism is a rapidly growing tourism segment that offers new perspectives and supports changes in tourist behavior towards an active lifestyle that encourages sustainable destinations. The link between active living, active travel, and sports tourism has strong environmental, economic, and social impacts (Morfoulaki et al., 2023). In recent years, awareness of sustainable tourism has increased worldwide. Many tourism industries incorporate sports to attract more customers to facilitate economic development and promote local culture (J. J. Yang et al., 2020). This aligns with the statement that sports tourism is considered an important type of tourism that combines sports and tourism to attract tourists, contribute to the economy, and promote local culture (Giango et al., 2022).

Sports tourism is a growing tourism product. Within the sports and tourism industry, resource extraction is a foundation that provides significant theoretical support (Zuo et al., 2021). Previous research has revealed that sports tourism development requires collaborative engagement between sports, tourism, and various other sectors and stakeholders (Mollah et al., 2021). It has also been revealed that with the rise of the sports tourism industry, the number of sports tourism consumers is also growing. Therefore, studies on sports tourism consumer behavior have become a popular topic (Kusuma, 2018). The rise in individual sports activities has stimulated the emergence of sports-related vacations. This is further strengthened by tourists seeking authentic experiences in host-guest relationships, health and physical well-being, and the consumption of local products and services. Communities, particularly in developing countries, have not yet fully realized the potential of local sports as a resource and competitive advantage in the development of their destinations. Similarly, tourism research still lacks an analysis of the role of communities and their specific sporting identities (Herbold et al., 2020). Sport tourism creates a broad spectrum of impacts for and on host communities. However, sustainable sport-tourism events, which emphasize positive impacts and minimize negative ones, do not emerge by chance; they require careful planning and implementation (Kersulić et al., 2020). Sustainability in the development of sport tourism has attracted considerable attention because it promises to improve community well-being and quality of life. Effective tourism promotion plans will improve community quality of life and benefit the national economy. The success of commercial and traditional sport tourism contributes to local populations in terms of economic, social, environmental, and cultural benefits. The decline in sport tourism revenues and visitor numbers has prompted empirical research to consider the factors contributing to this problem (Chang et al., 2020).

The development of sports tourism is gaining momentum worldwide, with many tourism industries incorporating sports events and programs to attract more domestic and international customers, promoting economic and cultural development. Sustainability awareness has garnered attention from many international organizations, resulting in the emergence of sports tourism that incorporates sustainability (C. C. Yang et al., 2021). Organizational capability is the set of abilities, knowledge, and resources possessed by an institution to

carry out its functions and achieve its goals. In the context of POKDARWIS (Regional Tourism Organizations), organizational capacity determines the extent to which the group is able to organize planned and sustainable tourism activities (Try Yatmaja, 2020). Research by Munika (2024) shows that strong POKDARWIS institutional capacity (in terms of management, coordination, and program innovation) is directly proportional to improved tourism management quality in tourist villages. When POKDARWIS has weak capacity, tourism activities tend to be unsustainable and do not have a significant impact on community welfare. Community-Based Tourism (CBT) positions local communities as the primary actors in the entire tourism management process. This concept emphasizes the principles of participation, sustainability, and local empowerment (UNWTO, 2019). POKDARWIS, as the main actors in CBT, plays a crucial role in designing and implementing tourism activities, including recreational sports. Salsabila and Puspitasari (2022) emphasized that POKDARWIS's involvement in developing tourist attractions encourages improved service quality, optimal utilization of local potential, and sustainable destination management.

RESEARCH METHOD

Sustainable tourism promotes empowerment, making communities key actors in the tourism business and allowing them to enjoy greater tourism benefits by minimizing the negative impacts of tourism development. Community-based organization is a key factor in determining the success of village tourism activities (Asmoro and Da'awi 2020). Village tourism is a potential destination for development in Indonesia. Tourist attractions in village tourism can include both natural and cultural attractions. Developing a village tourism requires community participation as a form of awareness and preservation of its potential. This participation can be expressed in the form of tourism awareness groups, commonly known as Pokdarwis. Pokdarwis act as drivers and facilitators in the development of a village tourism. The success of village tourism development can be seen from the role of Pokdarwis in the area (Salsabila and Puspitasari 2023). POKDARWIS is a community organization that grows from, by, and for the community, which plays a strategic role in supporting sustainable tourism development. Its primary functions include educating the public about the seven charms, developing tourist destinations, and organizing activities that attract tourists (Ministry of Tourism and Creative Economy, 2020). However, the effectiveness of the role of the Tourism Awareness Group (POKDARWIS) depends heavily on its capacity in human resources, institutions, collaborative networks, and program innovation. Based on these issues, this community service program aims to socialize the empowerment of tourism awareness groups (POKDARWIS) to increase public awareness of sustainable tourism management in Kulonprogo Regency. Pokdarwis, as one of the community groups, is expected to improve sustainable tourism management in Kulonprogo Regency.

Based on these issues, the Yogyakarta State University Community Service team was motivated to conduct a community service project entitled "Socialization of Tourism Awareness Group Empowerment (POKDARWIS) to Increase Public Awareness of Sustainable Tourism Management in Kulonprogo Regency." The Yogyakarta State University Community Service Team formulated a solution to solve the above problems as follows: (1) Providing socialization on empowering tourism awareness groups (POKDARWIS) to increase public awareness in managing sustainable tourism in Kulonprogo Regency, (2) Providing knowledge about the importance of improving Human Resources through empowering tourism awareness groups (POKDARWIS). As a supporter in Community Service activities, as a supporter in Community Service activities, as for the participation of partners, namely Tourism Awareness Groups (POKDARWIS) in Kulonprogo Regency. The method used in this activity is socialization. In the socialization activity, the service team provided a workshop on empowering tourism awareness groups (POKDARWIS) to increase public awareness in managing sustainable tourism in Kulonprogo Regency.

Table 1. Problem Solving

Achievement Indicator Solution	Achievement Indicator Solution
Creating a sustainable tourism-based book that can be used by Tourism Awareness Groups (POKDARWIS). The Tourism Awareness Group (POKDARWIS) is enthusiastic about implementing activities.	Creating a sustainable tourism-based book that can be used by Tourism Awareness Groups (POKDARWIS). The Tourism Awareness Group (POKDARWIS) is enthusiastic about implementing activities.
Providing a workshop on empowering tourism awareness groups (POKDARWIS) to increase community awareness in sustainable tourism management in	Providing a workshop on empowering tourism awareness groups (POKDARWIS) to increase community awareness in sustainable tourism management in

Kulonprogo Regency. The Tourism Awareness Group (POKDARWIS) understands the importance of community awareness in sustainable tourism.	Kulonprogo Regency. The Tourism Awareness Group (POKDARWIS) understands the importance of community awareness in sustainable tourism.

RESULTS AND DISCUSSION

The Community Service Program (PkM) entitled "Socialization of Tourism Awareness Group Empowerment (POKDARWIS) towards Increasing Community Awareness in Sustainable Tourism Management in Kulonprogo Regency" has been implemented well in accordance with the activity plan. The implementation of the activity took place on Thursday, August 14, 2025 at the village hall of Pengasih Village, involving the Head of the Kulonprogo Tourism Office, POKDARWIS administrators of Kulonprogo Regency, Village Apparatus, and students of Recreation Business Management, Faculty of Vocational Studies, Yogyakarta State University with a total of 80 people. The results of the implementation of the activity can be described as follows: Increasing Participant Understanding (1) The activity began with the delivery of material by Agustina Dyah Saraswati, ST., MM. on the empowerment of Tourism Awareness Groups (POKDARWIS), (2) Participants showed high enthusiasm, as seen from the many questions and discussions regarding how to develop sustainable tourism in Kulonprogo Regency, (3) Through the delivery of socialization materials, participants gained knowledge regarding the basic concepts of sustainable tourism, the important role of POKDARWIS, and community empowerment strategies in supporting the management of tourist destinations. The evaluation results showed that most participants understood that tourism sustainability does not only rely on increasing the number of tourists, but also on the preservation of local culture, environmental sustainability, and community welfare. Active Participant Involvement (1) Participants were active in discussions and questions and answers related to problems they face in the field, such as limited tourism promotion, waste management, and coordination between tourism actors. Through this forum, participants were able to exchange experiences and practical solutions for the development of more sustainable tourism. Formation of Joint Commitment (2) In this activity, a joint agreement was formed between POKDARWIS administrators and the community to increase their participation in tourism management. Some of the commitments produced include: a) Intensifying tourism environmental cleanliness programs, b) Optimizing social media-based promotions, c) Encouraging the involvement of the younger generation in tourism activities.

POKDARWIS administrators gained a deeper understanding of tourism destination management, empowerment strategies, and their role as drivers of tourism development in villages. This is expected to strengthen POKDARWIS's role as a forum for community participation in managing and promoting tourism destinations. As part of the program's sustainability, participants formulated a follow-up plan, including monthly routine activities focused on cleanliness, tourism education, and digital promotion training. Furthermore, a small group tasked with monitoring environmental management in tourist areas is planned.

The Community Service Program (PkM) entitled "Socialization of Tourism Awareness Group Empowerment (POKDARWIS) to Increase Community Awareness in Sustainable Tourism Management in Kulonprogo Regency" provided a concrete illustration of the importance of increasing institutional capacity and community participation in supporting sustainable tourism. The results of the activity indicated that participants' understanding of the concept of sustainable tourism improved. This aligns with tourism destination management theory, which emphasizes three main aspects: economic, socio-cultural, and environmental. With this improved understanding, communities began to realize that tourism success is measured not only by the number of tourist visits but also by the ability to maintain a balance between economic aspects and cultural and environmental sustainability. The active involvement of participants in the discussions indicates a significant need for communication and coordination among tourism stakeholders at the local level. This demonstrates that POKDARWIS (Community Development Groups) is strategically positioned as a forum for community participation in identifying problems, formulating solutions, and implementing targeted work programs. These findings support the view that community empowerment in tourism can enhance a sense of belonging and collective responsibility for tourism destinations.

The shared commitment formed through this activity provides important social capital for the development of sustainable tourism. Initiatives such as maintaining environmental cleanliness, increasing digital-based promotion, and involving the younger generation reflect a shift in community attitudes toward more modern, inclusive, and sustainability-oriented tourism management. Furthermore, increasing the capacity of POKDARWIS administrators through outreach activities can strengthen their role as driving forces for village tourism. Armed with knowledge of destination management and empowerment strategies, POKDARWIS is expected to be able to build networks with various parties, including government, the private sector, and communities, thereby supporting synergy in tourism development in Kulonprogo Regency. However, the evaluation revealed several challenges, such as limited human resources, a lack of consistency in program

implementation, and limited access to advanced training. Therefore, the sustainability of this program depends heavily on follow-up in the form of intensive coaching, ongoing mentoring, and collaboration with universities and local governments. Overall, this activity demonstrated that the POKDARWIS empowerment outreach program is effective in raising public awareness of the importance of sustainable tourism and serves as a first step toward more professional and competitive destination management. The documentation of this activity is as follows:

Figure 1. Group Photo After the Socialization Activity



Figure 2. Presentation of Activity Resource Persons



CONCLUSION

The Community Service Program (PkM) entitled “Socialization of Tourism Awareness Group Empowerment (POKDARWIS) towards Increasing Community Awareness in Sustainable Tourism Management in Kulonprogo Regency” has been implemented well and has had a positive impact on participants. Through this activity, the understanding of the community, especially POKDARWIS members, regarding sustainable tourism has increased, community participation in supporting the management of tourist destinations has become stronger, and collective awareness has been built about the importance of preserving the environment and local culture as part of tourist attractions. Although there were several technical obstacles such as limited time and facilities, this activity succeeded in achieving the main objective, namely increasing the capacity of POKDARWIS and the community in supporting the development of sustainable tourism in Kulonprogo. (1) It is necessary to carry out follow-up activities in the form of practical training and intensive mentoring for POKDARWIS so that the knowledge gained can be implemented in real work programs. (2) It is recommended that POKDARWIS establish closer collaboration with village governments, regional governments, universities, and tourism businesses to strengthen support for tourism destination development. (3) There is a need to improve the quality of outreach facilities and learning media (such as modules, educational videos, and field practice) to clarify public understanding of the concept of sustainable tourism. (4) It is hoped that similar activities can involve more people from various groups, including youth, women's groups, and MSMEs, so that the benefits of the activities can be felt more widely and support local economic growth.

The results of the Community Service Program (PkM) "Socialization of Tourism Awareness Group Empowerment (POKDARWIS) towards Increasing Community Awareness in Sustainable Tourism Management in Kulonprogo Regency" can be continued and provide long-term benefits, therefore the program's sustainability plan is prepared as follows: POKDARWIS Mentoring (1) Carrying out regular mentoring to POKDARWIS so that the material provided can be implemented in the form of real work programs. (2) Providing technical guidance (coaching clinics) related to tourism destination management, digital marketing, and community-based environmental management. Advanced Training and Workshops (1) Organizing thematic workshops such as tourism-based waste management, ecotourism, tourism event management, and empowering the local creative economy, (2) Conducting community leadership training to strengthen the capacity of POKDARWIS administrators. Networking and Collaboration Enhancement (1) Encouraging collaboration between POKDARWIS and local governments, the Tourism Office, universities, and the private sector to support the

development of sustainable tourism destinations, (2) Establishing a communication forum between POKDARWIS in Kulonprogo as a forum for sharing experiences, ideas, and innovations. Monitoring and Evaluation (1) Establishing a periodic monitoring mechanism to evaluate the progress of the implementation of the results of the socialization, (2) Measuring the impact of activities on increasing tourist visits, environmental cleanliness, and the level of community participation in tourism activities. Sustainable Education Program (1) Developing simple learning modules on sustainable tourism that can be used independently by the community, (2) Involving schools around tourist destinations to instill tourism awareness from an early age. Strengthening the Local Economy (1) Integrating POKDARWIS activities with the development of local MSME products so that tourism not only has an impact on tourist visits, but also on improving community welfare, (2) Encouraging the creation of tourist attractions based on local wisdom that can become leading attractions.

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EMPOWERING THE CREATIVE ECONOMY THROUGH ECO-FRIENDLY JUMPUTAN FABRIC TRAINING BASED ON GREEN ECONOMY PRINCIPLES IN TERBAH VILLAGE, KULON PROGO

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Abstract. This Community Service Program (PkM) aims to empower the community of Terbah Village, Kulon Progo, through eco-friendly *jumputan* (tie-dye) fabric production training based on the principles of the green economy. Using a participatory approach, the program integrates capacity building in natural dyeing techniques, business management, and digital marketing. A total of 15 participants attended four intensive training sessions and successfully created three new motifs representing the village's identity. The group also developed a Business Model Canvas (BMC) as a business roadmap, was trained in digital financial recording, and learned online store management. The results showed significant improvements in participants' technical skills, digital literacy, and self-confidence, marked by the planning and establishment of a Joint Business Group (*Kelompok Usaha Bersama* – KUB). This program contributed to strengthening social cohesion, opening new economic opportunities, and supporting the achievement of Sustainable Development Goals (SDGs) Goal 8 (Decent Work and Economic Growth) and Goal 12 (Responsible Consumption and Production).

INTRODUCTION

Terbah Village is one of the villages located in Galur District, Kulon Progo Regency, Special Region of Yogyakarta. Geographically, the village is situated close to the Southern Coast tourism area, such as Glagah Beach, which is one of the flagship tourist destinations of Kulon Progo. This strategic location provides Terbah Village with significant potential to become part of the tourism-based creative economy network. According to data from BPS Kulon Progo (2023), the tourism sector in this regency recorded an 18.5% increase in tourist visits compared to the previous year, thus creating greater market opportunities for locally produced goods with strong market appeal.

Nevertheless, this potential has not been fully optimized by the local community. Based on data from the village administration, around 60–65% of residents still rely on traditional farming and informal work, such as farm laborers and daily wage workers, for their livelihood. This heavy dependency on agriculture makes the village economy vulnerable to fluctuations in commodity prices and harvest seasons. Moreover, the lack of livelihood diversification results in stagnant household income.

This condition is further compounded by the limited technical and managerial skills of the community. Most residents have not yet mastered handicraft production techniques that meet quality standards, basic business management skills, or digital marketing strategies. These competencies are crucial for developing competitive creative industries.

One of the most promising local resources is *jumputan* or tie-dye fabric craft. Historically, *jumputan* has been widely recognized as part of Indonesia's cultural heritage, particularly in Palembang and Yogyakarta, and is highly valued for its aesthetic appeal (Putri & Mulyana, 2021). However, in Terbah Village, community skills in producing *jumputan* remain very limited, both in technical execution and design innovation. The products produced

often lack consistent quality standards, making it difficult for them to compete in a wider market.

In addition to technical limitations, the previous use of synthetic dyes by small groups has created new challenges, such as water pollution and health risks for artisans (Prabowo, 2022). The principles of the green economy emphasize the importance of maintaining environmental sustainability in all economic activities, including handicraft production. The use of natural dyes from local resources such as teak leaves, mangosteen peels, mahogany bark, and indigofera can serve as an environmentally friendly solution, producing unique colors with high market value (Astuti & Widodo, 2020).

Beyond production challenges, the community also faces low digital literacy. Most residents are unfamiliar with using social media platforms such as Instagram and Facebook for product promotion or online marketplaces to expand market reach. According to Utami (2021), the use of digital marketing can increase MSME sales by 30–40% because it enables access to a much broader consumer base compared to conventional marketing strategies.

In response to these challenges, this Community Service Program (PkM) was designed as a solution using a participatory approach. The program focuses on:

1. Improving *jumputan* fabric production skills using natural dyes.
2. Providing business management training through the development of a Business Model Canvas (BMC) as a roadmap for enterprise growth.
3. Conducting digital marketing and branding training to enhance product visual appeal and expand market reach.
4. Facilitating mentoring and the establishment of a Joint Business Group (KUB) as an institutional platform to ensure program sustainability.

Through this structured intervention, the program is expected to create a sustainable creative business ecosystem, increase community income, strengthen local cultural identity, and contribute to the achievement of SDG Goal 8 (Decent Work and Economic Growth) and Goal 12 (Responsible Consumption and Production).

LITERATURE REVIEW

1. Green Economy in the Creative Industry

The concept of the *green economy* represents a development approach that prioritizes a balance between economic growth, environmental sustainability, and social welfare. The United Nations Environment Programme (UNEP) defines the green economy as an economy that results in improved human well-being and social equity, while significantly reducing environmental risks and ecological scarcities. In the context of the creative industry, this concept is particularly important because the sector has great potential to produce value-added, environmentally friendly products while also absorbing local labor. The implementation of the green economy in the creative industry encompasses several key principles:

- a. **Environmentally Friendly Production:** The production process must minimize waste, use natural or recycled raw materials, and reduce harmful emissions. For example, in *jumputan* (tie-dye) production, synthetic dyes are replaced with natural

dyes derived from plants such as teak leaves, mangosteen peels, mahogany bark, and indigofera (Putri & Mulyana, 2021).

- b. **Resource Efficiency:** The green economy requires efficient use of energy, water, and raw materials, thereby lowering production costs while reducing environmental impact.
- c. **Social Equity:** Products should not only be profit-oriented but also consider workers' welfare and the well-being of the surrounding community, for example by providing fair wages or involving vulnerable groups such as women and rural youth (Wulandari, 2022).

Applying this concept has been proven to increase product competitiveness. Environmentally friendly products are now more favored by consumers, especially the younger generation who are highly aware of sustainability issues. According to Nielsen (2022), 73% of global consumers are willing to pay more for sustainably produced goods. This opens up significant opportunities for micro-enterprises in rural areas to capitalize on this trend and access broader markets. Thus, implementing the green economy in the creative industry not only provides ecological benefits but also serves as a product differentiation strategy that enhances market value and builds a positive consumer image.

2. Participatory Rural Appraisal (PRA)

Participatory Rural Appraisal (PRA) is an approach that actively involves the community in the planning, implementation, and evaluation of development programs. Chambers (1994) emphasizes that PRA positions the community as subjects rather than mere objects of development. This method enables communities to map local resources, identify major problems, and design solutions that are culturally and socially appropriate.

Common PRA techniques include:

- a. **Participatory Mapping:** Villagers collaboratively create maps of local resources such as raw material locations, production facilities, and tourism potentials.
- b. **Village Transect Walks:** Joint activities where community members and facilitators walk through the village to identify problems and potentials directly.
- c. **Focus Group Discussions (FGDs):** Used to gather in-depth information about community needs, challenges, and aspirations.
- d. **Seasonal Calendars:** Visualizing seasonal patterns and economic activities throughout the year, useful for planning production schedules.

This approach has several advantages. First, PRA increases community ownership of the program, which leads to higher commitment during implementation. Second, the solutions produced are more accurate because they are based on local knowledge. Third, PRA strengthens community capacity to participate in future decision-making processes (Chambers, 1997).

In the context of the PkM program in Terbah Village, PRA was used to map potential natural dye sources, identify the most motivated training participants, and arrange training schedules in alignment with villagers' farming routines. This approach successfully increased participation rates to more than 90%, as reflected in training attendance data.

3. Business Model Canvas (BMC)

The Business Model Canvas (BMC) is a strategic management tool that helps entrepreneurs visualize, design, and develop their business models comprehensively. According to Osterwalder & Pigneur (2010), the BMC consists of nine key components: customer segments, value propositions, distribution channels, customer relationships, revenue streams, key resources, key activities, key partners, and cost structures.

BMC offers several advantages:

- a. **Visual and Easy to Understand:** Unlike lengthy business plans, BMC uses a one-page canvas that facilitates group discussions.
- b. **Flexible:** The canvas can be updated regularly to adapt to market dynamics and business development.
- c. **Encourages Collaboration:** Preparing BMC collaboratively allows every group member to contribute ideas, leading to collective agreement (Nugroho & Kusuma, 2019).

In this PkM program, BMC was developed collectively with participants to identify the main target markets (local tourists, schools/universities), value propositions (eco-friendly products with unique Terbah Village motifs), and sales strategies (online marketplaces and local SME fairs). With BMC, the business group has a clear roadmap and is better prepared to face market challenges and leverage opportunities. BMC also functions as a monitoring tool. By tracking cost components and revenue streams, the group can assess profitability and adjust product pricing to remain competitive. This is particularly crucial for micro-enterprises, which often face challenges in maintaining systematic financial records.

4. Digital Marketing

Digital marketing is the promotion of products or services through digital media such as social media, websites, and e-commerce platforms. In the Industry 4.0 era, digital marketing has become highly relevant for MSMEs and rural micro-enterprises due to several advantages:

- a. **Low Cost, Wide Reach:** Promotion through social media is relatively inexpensive yet can reach a wider audience compared to conventional marketing (Utami, 2021).
- b. **Two-Way Interaction:** Consumers can provide direct feedback through comments, messages, or reviews, helping improve product and service quality.
- c. **Ease of Analysis:** Digital platforms provide analytics such as visitor numbers, engagement rates, and conversion metrics, which can be used to design data-driven marketing strategies.

Research by Rohmah & Supriyanto (2021) shows that using social media for local product promotion can increase brand visibility by up to 60%. In the Terbah Village PkM program, participants were trained to create logos, Instagram accounts, and online shops. They also learned product photography and *copywriting* to create attractive product descriptions. A storytelling-based marketing strategy was implemented to connect consumers with the eco-friendly production process.

As a result, the group's social media account gained more than 200 followers within the first two months, with a relatively high engagement rate. This indicates that the digital marketing strategy taught was effective in increasing consumer interest and purchase intent.

From the discussion above, it can be concluded that the four components of this literature review complement one another in building a sustainable creative economy ecosystem in Terbah Village. The green economy ensures environmentally friendly production with high market value, PRA guarantees full community participation and program accuracy, BMC provides a systematic business development roadmap, and digital marketing expands product reach into broader markets. Together, these four theoretical frameworks form a solid scientific foundation for the success of the PkM program and contribute to developing a replicable model of community empowerment that can be applied in other villages.

RESEARCH METHOD

This Community Service Program (PkM) was carried out over five months using a **participatory, holistic, and sustainable approach**. The participatory approach was chosen because it is believed to increase community involvement and sense of ownership of the program (Chambers, 1994). The holistic approach ensured that the activities did not focus solely on improving technical production skills but also included managerial, marketing, and institutional aspects, thus producing more comprehensive outcomes. The principle of sustainability was applied by providing training modules, video tutorials, and encouraging the formation of a Joint Business Group (*Kelompok Usaha Bersama* – KUB) so that activities could continue after the formal program concluded.

The stages of program implementation consisted of:

1. Socialization and Needs Assessment

This stage was conducted in the first month by inviting the village government, youth organization (*karang taruna*), women's association (PKK), and potential community representatives. The socialization aimed to build commitment, explain program objectives, and gain support from stakeholders. The activities were followed by a needs assessment using questionnaires and in-depth interviews to identify participants' initial skills, production constraints, and market opportunities (Suroso & Lestari, 2020). The results were then used to design a training curriculum tailored to the local context of Terbah Village.

2. Eco-Friendly Jumputan Fabric Production Training

The training consisted of four intensive sessions with a composition of **70% practice and 30% theory** to ensure significant improvement in participants' skills (Kolb, 2015). The materials included:

- a. **Introduction to the Green Economy Concept and Natural Dyes:** Explanation of the negative impacts of synthetic dyes and the benefits of natural dyes such as teak leaves, mangosteen peels, mahogany bark, and indigofera (Putri & Mulyana, 2021).

- b. **Jumputan Production Techniques:** Participants learned fabric selection, pattern making, tie-dye techniques, dyeing processes, and color fixation using natural mordants such as alum.
- c. **Quality Control and Motif Innovation:** Participants were trained to check color consistency and create three new motifs representing Terbah Village.

The *learning by doing* method was applied, as it has been shown to improve skill retention by up to 75% compared to traditional lecture methods (Kolb, 2015).

3. **Business Management Training**

Participants were introduced to basic entrepreneurship concepts and trained to prepare a **Business Model Canvas (BMC)** as a business roadmap (Nugroho & Kusuma, 2019). The training covered:

- a. Collaborative preparation of the nine blocks of the BMC.
- b. Financial recording using Google Sheets to calculate profit-loss, determine selling prices, and prepare monthly financial reports.
- c. Establishing a simple organizational structure, role distribution (production, marketing, finance), and drafting simple bylaws as the institutional foundation.

4. **Digital Marketing and Branding Training**

Participants were trained to create the brand identity “Jumputan Terbah” with logos and product packaging. They also learned how to set up social media accounts and online stores on marketplaces. Training materials included product photography using natural lighting, product description copywriting, and storytelling strategies to build emotional connections with consumers (Utami, 2021).

5. **Post-Training Mentoring**

Mentoring was conducted for four weeks to ensure that the skills taught were applied correctly. The mentoring team monitored product quality, reviewed weekly financial records, and assisted in optimizing digital promotion. Individual coaching clinics were provided for participants facing technical or managerial difficulties.

6. **Monitoring and Evaluation**

The program was evaluated using **Kirkpatrick’s Four-Level Model**, which includes:

- a. **Reaction:** Measuring participant satisfaction through post-training questionnaires.
- b. **Learning:** Measuring knowledge improvement using pre-test and post-test assessments, with an average score increase of 40%.
- c. **Behavior:** Observing behavioral changes such as the adoption of digital bookkeeping and active posting of products on social media.
- d. **Results:** Measuring final outcomes such as increased product sales, establishment of the KUB, and growth in participants’ income (Kirkpatrick & Kirkpatrick, 2016).

This systematically designed method was expected to produce measurable results, support community capacity building, and ensure program sustainability even after the formal mentoring phase ended.

RESULTS AND DISCUSSION

1. Improvement of Production Skills

The eco-friendly *jumputan* fabric production training, conducted in four intensive sessions, significantly improved participants' technical skills. Before the training, most participants had only a basic understanding of tie-dye techniques and had never used natural dyes. After completing the training, participants were able to:

- a. **Create Three New Motifs:** These motifs were agreed upon as representing the identity of Terbah Village, using natural dyes sourced from teak leaves, mahogany bark, and mangosteen peels. These dyes were chosen for their local availability and environmentally friendly nature (Astuti & Widodo, 2020).
- b. **Improve Product Quality:** The final products exhibited more even coloring, more diverse motifs, and neater finishing compared to pre-training production. A quality control process was implemented, including simple wash tests to check colorfastness, ensuring the products were market-ready.

These results align with Kolb's (2015) concept of *learning by doing*, which suggests that hands-on practice can increase skill retention by up to 75% compared to lecture-based methods. This is further supported by the 100% attendance rate, indicating participants' high motivation and commitment.



Figure 1. Result of Jumputan Technique

2. Knowledge Improvement (Pre-Test and Post-Test)

Learning outcomes were evaluated using pre- and post-tests. The analysis showed an average score increase of approximately 40% across the three main areas: *jumputan* production, business management, and digital marketing. This improvement demonstrates the effectiveness of the practice-based training method. Beyond cognitive gains, participants were able to independently perform production techniques during the final session, confirming the successful transfer of skills.

3. Strengthening of Managerial Capacity

Managerial capacity was one of the key outputs of the program. Participants were trained to use the **Business Model Canvas (BMC)** as a business roadmap. The BMC was developed collaboratively so that each member understood their roles and contributions. The final BMC included:

- a. **Customer Segments:** Local tourists, schools/universities, and eco-conscious consumer communities.
 - b. **Value Propositions:** Eco-friendly *jumputan* products, unique motifs representing Terbah Village, and support for local creative economy empowerment.
 - c. **Distribution Channels:** Online marketplaces, social media (Instagram, Facebook), SME fairs, and direct sales.
 - d. **Revenue Streams:** Sales of *jumputan* fabrics, custom orders, and training workshops.
- Participants were also trained to maintain digital financial records using Google Sheets. Prior to the program, most participants lacked systematic bookkeeping. After the training, they were able to record income, expenses, and calculate profit and loss independently. This improvement in financial literacy is crucial for sustaining business operations and supporting data-driven decision-making (Nugroho & Kusuma, 2019).

4. Branding and Digital Marketing

A brand identity named “**Jumputan Terbah**” was successfully developed, complete with a logo, tagline, and packaging design that reflect natural and sustainable concepts. A strong brand identity helps differentiate Terbah Village’s products from similar products in other areas. For marketing, participants were trained to create social media accounts (Instagram, Facebook Page) and set up online stores on marketplaces. The strategies taught included:

- a. Product photography using natural lighting.
- b. Writing engaging promotional captions (*copywriting*).
- c. Storytelling about the eco-friendly production process to build emotional connections with consumers (Rohmah & Supriyanto, 2021).

5. Social and Institutional Impacts

In addition to technical and managerial skill improvements, the program also generated significant social impacts:

- a. **Formation of a Joint Business Group (KUB):** The group “Jumputan Terbah” was established as a platform for coordination, collective production, and access to financing. The organizational structure was clearly defined with roles in production, marketing, and finance.
- b. **Increased Participation of Women and Youth:** The majority of participants were housewives and members of the youth organization (*karang taruna*), empowering vulnerable groups and providing additional household income opportunities.
- c. **Strengthened Social Cohesion:** Weekly post-training meetings served as a forum for evaluation and planning, reinforcing a culture of mutual cooperation.

These outcomes align with Yuniarto's (2021) findings that local institutional development is a key factor in sustaining community enterprises.

6. Interpretation and Implications

Overall, the results indicate that this program was effective not only in improving technical skills but also in strengthening managerial capacity and marketing networks. The integration of technical training, business management, and digital marketing created a sustainable creative business ecosystem.

These findings support the participatory empowerment theory, which states that program success is not only determined by skill transfer but also by active community involvement in every stage of implementation (Chambers, 1997). The impact produced by this program has the potential to serve as a **best practice** model that can be replicated in other villages with similar characteristics.

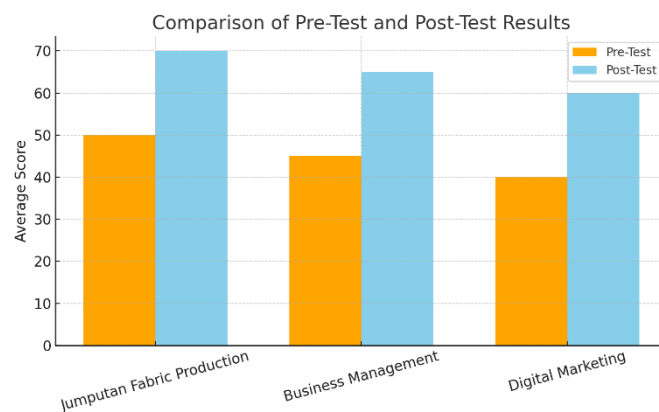


Figure 2. Comparison of Pre-Test and Post-Test Scores

TABLE 1. Business Model Canvas (BMC)

Key Partners	Key Activities	Value Proposition
Terbah Village Government, Department of Cooperatives & MSMEs, suppliers of fabric and natural dyes, students & faculty mentors, online marketplaces	Production of eco-friendly jumputan fabric, motif innovation, quality control, packaging & labeling, digital promotion	Unique jumputan fabric based on natural dyes, environmentally friendly products, exclusive designs representing Terbah Village, empowerment of the local creative economy
Customer Relationship	Customer Segments	Channels
Personal communication through social media, customer loyalty programs, storytelling of the production process	Local tourists, ethnic fabric enthusiasts, schools/universities, eco-friendly product communities	Direct sales, online marketplaces, social media, SME fairs, handicraft stores
Key Resources	Cost Structure	Revenue Streams
Artisan human resources, fabric & dye raw	Raw material costs, production costs, packaging,	Sales of jumputan fabric, custom orders,

materials, production equipment, brand identity, production modules	promotion, training & mentoring expenses	workshops/training, derivative products (bags, clothing, scarves)

CONCLUSION

The Community Service Program (PkM) implemented in Terbah Village has had a significant impact across various aspects, including technical skills, managerial capacity, and the community's digital literacy.

First, in terms of **technical skills**, participants successfully mastered the production techniques of *jumputan* fabric using natural dyes. This was evidenced by the creation of three new motifs unique to Terbah Village, improved product quality with more even coloring and neater finishing, and the ability to independently conduct quality control. The application of the green economy concept through the use of natural dyes also added ecological value to the products and supported environmental conservation efforts.

Second, in terms of **managerial capacity**, the community was able to collaboratively develop a **Business Model Canvas (BMC)** that mapped customer segments, value propositions, distribution channels, as well as cost and revenue structures. The improvement of digital bookkeeping skills enabled participants to calculate production costs, set appropriate selling prices, and manage cash flow transparently. This aspect is crucial for ensuring business continuity and enhancing group professionalism.

Third, regarding **marketing and digital literacy**, participants successfully developed the brand identity "Jumputan Terbah," utilized social media and online marketplaces for promotion, and began receiving online product orders. The increase in social media followers and customer engagement serves as a positive indicator of the market appeal of their products.

Fourth, in terms of **institutional development and social impact**, the program facilitated the establishment of a Joint Business Group (KUB) as an organizational platform for collective production, shared financial management, and partnership development. The involvement of women and village youth added value by expanding job opportunities and supporting inclusive community empowerment.

Overall, this program aligns with the achievement of **Sustainable Development Goals (SDGs) Goal 8** (Decent Work and Economic Growth) and **Goal 12** (Responsible Consumption and Production), as it has successfully created new employment opportunities, increased household income, and promoted environmentally friendly production.

For future initiatives, it is recommended to:

1. **Extend the mentoring duration**, allowing for longer-term monitoring of skill application until participants achieve full independence.
2. **Develop broader partnerships** with creative industry stakeholders, local government, and microfinance institutions to expand market access and funding opportunities.
3. **Provide advanced training** in product design innovation, supply chain management, and data-driven marketing strategies.

By strengthening these aspects, Terbah Village has the potential to become a competitive and sustainable production center for eco-friendly *jumputan* fabric and serve as a model of best practices for other villages in Kulon Progo and beyond.

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NEEDS ANALYSIS FOR THE DEVELOPMENT OF THE BOOK “7 KEBIASAAN ANAK INDONESIA HEBAT” FOR NONFORMAL EARLY CHILDHOOD EDUCATION TEACHERS OF HIMPAUDI SLEMAN AS A COLLABORATIVE CHARACTER EDUCATION MEDIA BETWEEN SCHOOL AND FAMILY

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Abstract. The *7 Habits of Great Indonesian Children* is a character education approach based on habituation designed to cultivate positive values from early childhood. However, nonformal ECE teachers still face challenges in understanding and systematically applying these habits, particularly in ensuring continuity between school and home. This study employed a qualitative approach using focus group discussions (FGD) and interviews with 32 nonformal ECE teachers under HIMPAUDI Sleman. Participants were divided into seven groups according to the indicators of the *7 Habits of Great Children* to discuss needs, challenges, and ideas for developing storybook media. The analysis revealed several key points: (1) teachers need practical and user-friendly guides aligned with the developmental context of young children; (2) illustrated and communicative story media are considered more effective in embedding character values; (3) parental involvement is crucial to ensure character habituation continues at home; and (4) teachers expect the book to provide simple narratives, attractive illustrations, and reflective tools for parents. These findings highlight the urgency of developing the *7 Habits of Great Indonesian Children* book as an innovative medium to enhance teacher capacity while strengthening school–parent collaboration in early childhood character education.

Keywords: early childhood education, character education, qualitative study, FGD, *7 Kebiasaan Anak Indonesia Hebat*

INTRODUCTION

Character education is a fundamental foundation for shaping children’s personalities while also determining the direction of national development in the future. Early childhood is known as the *golden age*, during which children can easily absorb values, attitudes, and behaviors from their surroundings. Therefore, character education should be instilled from an early age through habituation, role modeling, and meaningful learning experiences (Khaironi, 2017; Rachmah et al., 2022).

However, the implementation of character education in nonformal early childhood education institutions still faces various challenges (Hasanah & Fajri, 2022). Teachers often lack training, guidelines, and supportive learning media, while parental involvement is not yet optimal. As a result, children’s character formation tends to be inconsistent between school and home. This situation is further influenced by limited facilities and the lack of mentoring support from the government and professional organizations.

In the context of early childhood education, synergy between school and family is a crucial factor. Teachers serve as facilitators in the classroom, while parents act as reinforcers of habituation at home. If this collaboration does not work effectively, children’s character formation becomes fragmented. Therefore, media that can bridge communication between teachers and parents is urgently needed to ensure that character values are instilled consistently (Hanafi, 2017; Nur Jadidah et al., 2024; Prawinda et al., 2023).

Furthermore, the *Kurikulum Merdeka* policy demands more contextual, engaging, and student-centered learning that emphasizes the development of the *Profil Pelajar Pancasila*. The *7 Kebiasaan Anak Indonesia Hebat* program emerges as one of the national strategies to strengthen character education in early childhood. Thus, the

development of an illustrated storybook based on these seven habits is expected to serve as an innovative collaborative medium to support both teachers and parents in shaping children's character.

LITERATURE REVIEW

Character education in early childhood is a holistic process that encompasses cognitive, affective, and psychomotor aspects. (Lickona, 2016) emphasized that character education must be carried out through habituation and role modeling, rather than mere knowledge transfer. Moral values such as discipline, responsibility, and care need to be internalized through meaningful daily activities.

The *7 Kebiasaan Anak Indonesia Hebat* (7KAIH) movement launched by the Ministry of Education (2025) represents a breakthrough in character education. The seven habits waking up early, worshipping, exercising, eating healthy food, loving to learn, engaging with the community, and sleeping on time are designed to be easily practiced by children both at home and at school. These simple routines have been proven to foster discipline, independence, and self-regulation in a sustainable manner (AlMubarak & Budiman Mustofa, 2025; Kementerian Pendidikan Dasar dan Menengah RI, 2025; Risal, 2021).

From a psychological perspective, habits are formed through the *habit loop* (cue routine reward). When teachers and parents design enjoyable routines, children are more likely to accept and internalize character values (Tritsch, 2016; Wyatt, 2024). (Gardner & Rebar, 2019) further asserts that small, consistent changes can lead to the formation of strong habits with long-term impact.

Collaboration between schools and families is also a key determinant of success in character education. (Febriani et al., 2023) found that consistent habituation in both school and home environments is more effective in shaping children's character than habituation practiced in only one setting. Therefore, learning media that can be jointly used by teachers and parents is crucial to ensure the continuity of character education.

In addition, the use of illustrated storybooks is considered one of the most effective strategies. Stories convey moral values through narratives that are relatable to children's world, while illustrations enhance comprehension and increase engagement. (Rachmah et al., 2022) showed that illustrated storybooks not only enhance children's participation but also serve as reflective tools for parents in guiding their children. Thus, the development of the *7 Kebiasaan Anak Indonesia Hebat* book holds great potential in supporting character education based on school-family collaboration.

METHOD

This study employed a **qualitative approach** using **Focus Group Discussions (FGD)** and semi-structured interviews. The research subjects consisted of 32 nonformal ECE teachers who were members of HIMPAUDI Sleman, Yogyakarta. Participants were selected purposively to represent various types of nonformal ECE institutions, such as Playgroups (Kelompok Bermain/KB), Childcare Centers (Taman Penitipan Anak/TPA), and Similar Early Childhood Education Units (SPS).

The research process was carried out in three stages: (1) identifying teachers' understanding of the concept of *7 Kebiasaan Anak Indonesia Hebat*; (2) exploring classroom practices in character education and the challenges encountered; and (3) gathering teachers' ideas and expectations regarding the development of an illustrated storybook as a learning medium. Participants were divided into seven groups according to the indicators of the seven habits, allowing each group to focus more deeply on one specific habit.

Data were analyzed using **thematic analysis** through the following steps: data reduction, categorization into themes of needs and challenges, and conclusion drawing. Data validity was ensured through source triangulation, method triangulation, and **member checking** by involving teachers in verifying the analysis results.

RESULTS AND DISCUSSION

RESULTS

This study produced four main findings based on the analysis of FGDs and interviews with 32 nonformal ECE teachers under HIMPAUDI Sleman, namely:

1. **The Need for Practical and Applicable Guidelines**
Teachers stated that they require a guidebook that is simple, clear, and easy to use. The expected guide should contain examples of real daily activities that can be directly practiced with children, rather than merely theoretical explanations that are difficult to implement.
2. **The Effectiveness of Illustrated Story Media**
Teachers assessed that illustrated story media is more effective than plain text-based media. Colorful illustrations and simple narratives are considered to facilitate children's understanding as well as increase their engagement in character education activities.
3. **The Importance of Parental Involvement**
Teachers emphasized that character education in children would be more successful if supported by parents at home. So far, habituation often stops at school due to the lack of continuity at home. Therefore, parental involvement is crucial for the sustainability of character education.
4. **The Expected Features of the Book**
Teachers hope that the book to be developed will include simple narratives, engaging illustrations, examples of real-life activities, and reflection sheets that parents can use. With these features, the book is expected to serve as a bridge for collaboration between schools and families.

DISCUSSION

The findings of this study indicate that nonformal ECE teachers are in great need of practical and applicable guidelines for implementing character education. This reinforces the findings of (Hasanah & Fajri, 2022), which highlight that ECE teachers require practice-based materials rather than theoretical explanations that are difficult to apply. With a simple guide containing examples of real-life activities, teachers will find it easier to instill character values according to children's developmental stages.

Illustrated story media is also proven to be considered more effective by teachers because it conveys moral values through narratives that are close to children's daily lives. Colorful and engaging illustrations help children understand the messages within the stories while also increasing their enthusiasm. This finding is consistent with (Rachmah et al., 2022), who assert that illustrated stories facilitate the internalization of moral values in children by combining visual, narrative, and emotional aspects.

Parental involvement emerges as a key factor in shaping children's character. Teachers emphasized that character education conducted at school will not be effective without continuity at home. Parents need to be engaged so that children's habituation remains consistent across both primary environments, namely school and home. This finding strengthens (Suharta et al., 2020), who argue that school-family collaboration determines the success of internalizing character values in early childhood.

Furthermore, teachers' expectations that the book should include simple narratives, attractive illustrations, and reflection sheets for parents highlight the importance of a *user-centered design* approach in developing learning media. The book must be truly tailored to the needs of its users, both teachers and parents, in order to be effective in real contexts. Thus, the book will not only serve as a learning resource but also as a communication medium that strengthens collaboration between school and family.

Overall, the findings of this study emphasize the importance of developing character education media that integrates the roles of teachers and parents. Character education cannot stand alone at school; it must be continued at home so that children receive consistent experiences. In this regard, the *7 Habits of Great Indonesian Children* book can serve as an innovative bridge for such collaboration (Gardner & Rebar, 2019; Kementerian Pendidikan Dasar dan Menengah RI, 2025).

An illustrated story-based approach holds significant advantages because it aligns with children's imaginative and visual world. Beyond instilling moral values, this medium can also foster reading interest, enrich vocabulary, and

strengthen the emotional bond between parents and children. Thus, the use of illustrated story media provides dual benefits for early childhood development (Er & Biçakçi, 2020; Silaban et al., 2024).

From a policy perspective, this study supports the implementation of the *Kurikulum Merdeka*, which emphasizes the formation of the *Profil Pelajar Pancasila*. The values in the *7 Habits of Great Indonesian Children* align with the dimensions of the Pancasila student profile, such as being faithful, independent, collaborative, and critical thinkers. With integrated media designed for both teachers and parents, the national goal of shaping a generation with strong character can be achieved more effectively.

CONCLUSION

This study highlights the urgent need among nonformal ECE teachers for simple, practical, and collaborative character education media that can also be used by parents. The analysis revealed four key findings: the need for practical guidelines, the effectiveness of illustrated story media, the importance of parental involvement, and the expected features of the book to support school family collaboration. Accordingly, the development of the *7 Habits of Great Indonesian Children* book has the potential to serve as a strategic innovation in strengthening character education for early childhood.

The book is expected not only to serve as a learning resource for teachers but also as a tool for communication and reflection for parents. Beyond instilling character values through simple stories and engaging illustrations, this medium can foster reading interest, enrich children's experiences, and strengthen family bonds. Therefore, the findings of this study can serve as the foundation for developing more contextual, participatory, and user-centered character education media.

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Implementation of 3R (Reduce, Reuse, and Recycle) Environmental Education to Enhance Environmental Awareness among School-Aged Children in Yogyakarta

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Abstract. Yogyakarta as a student city and tourist destination, faces a waste emergency due to the increasing population while its management is not yet optimal. In Bumijo Kulon Village, waste management is still dominated by adults, while children as the next generation are less involved even though residents realize the importance of instilling environmental awareness from an early age. The purpose of this study is to provide school-age children with an understanding of the 3R concept, provide awareness of the importance of 3R and be able to demonstrate or practice the 3R concept. The methods used are coordination and planning, educational implementation, monitoring and evaluation. Educational activities are carried out using lectures, demonstrations, practices, and play methods. This education was attended by 29 school-age children including children of early childhood, elementary school, and secondary school. The results of the study showed an increase in students' understanding of the 3R concept followed by a growing awareness in maintaining environmental sustainability. The results of the study showed an increase in participants' understanding of the 3R concept, followed by a growing environmental awareness. Students were also able to apply the 3R principle through simple activities in their daily lives, such as sorting waste, recycling used goods, and reducing the use of single-use plastics. Thus, this educational program not only increases knowledge, but also instills environmental values in children as a provision for building a culture of sustainable living in the future.

Kata Kunci: Edukasi 3R, Kampung Emas Bumijo Kulon, pengelolaan sampah

INTRODUCTION

Yogyakarta is known as a student city, and its rich cultural heritage makes it a prime destination for students and tourists. The increasing number of students and tourists has led to a surge in waste volume, leading Yogyakarta to experience a waste emergency. According to data from the Yogyakarta Special Region Public Relations Office, in 2023, the Piyungan Final Disposal Site often overflowed beyond its capacity of 650 tons of waste per day. The graph of daily waste production volume in tons in the Yogyakarta Special Region, based on the Yogyakarta Special Region Public Relations Office, is as follows:

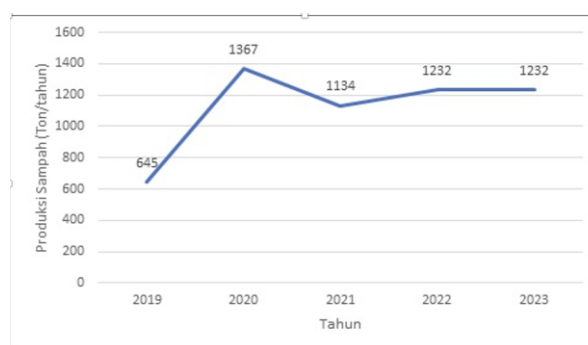


FIGURE 1. Graph of Annual Waste Production in Yogyakarta

This mountain of rubbish certainly has a negative impact on human life and the environment. Impact of waste and pollution will threaten residents' quality of life, leading to environmental degradation, leading to damage to local ecosystems. Waste problems will also have socio-economic impacts, for example, by creating a dirty image that discourages tourists and ultimately leads to a decline in community well-being.

With the implementation of decentralization in 2024, waste management will be carried out independently by each region. Due to a lack of capacity to manage waste effectively, the reality is that large amounts of waste accumulate on streets, alleys, and even in crowded places such as main roads in tourist areas. This reflects the inability to manage waste effectively. Regarding waste management, Prof. Chandra Wahyu Purnomo, a lecturer in the Chemical Engineering Department, Faculty of Engineering, Gadjah Mada University, stated in a Journalist School session held in the Fortakgama Room at Gadjah Mada University, that Yogyakarta is still in a state of waste emergency. The failure to develop a waste management ecosystem in Yogyakarta is due to a lack of public awareness as the source of the waste problem. Chandra further stated that waste should be segregated at the upstream level, starting from households, offices, factories, industries, and campuses, and then handled independently or through government facilities. It can be concluded from this statement that it is important for public awareness to sort waste so that it can be followed up independently or through government facilities.

Pengelolaan sampah dari hulu telah dilaksanakan oleh kelurahan Bumijo, melalui forum bank sampah kelurahan Bumijo mengadakan kegiatan “Pengelolaan Magot dan Pembuatan Sabun Berbahan Dasar Ecoenzyme”. Magot adalah ulat yang dapat mengurai sampah organik yang memiliki nilai jual yang tinggi. Pembuatan sabun berbahan dasar EcoEnzyme memiliki manfaata untuk rumah tangga. Pengelolaan sampah yang benar adalah salah satu cara penting untuk menjaga lingkungan sekitar supaya tetap bersih dan sehat. Pengelolaan sampah di Bumijo telah melaksanakan konsep 3R (*reduce, reuse dan recycle*). Konsep 3R merupakan salah satu upaya efektif untuk mengelola sampah.

Pengembangan potensi di Bumijo dalam pengelolaan sampah memerlukan dukungan dari berbagai pihak termasuk Universitas Negeri Yogyakarta. Sebagai wujud pengabdian pada masyarakat UNY di tahun 2025 menjadikan Bumijo sebagai lokasi “Kampung Emas”.



FIGURE 2. Researcher Assessment in Bumijo Kulon

A January 2025 assessment by the Department of Research and Community Service in Bumijo Kulon revealed that waste management primarily involves adults, with children, the next generation, remaining largely uninvolved. Bumijo Kulon residents recognize the importance of instilling environmental awareness and maintaining a clean environment from an early age, but have not yet implemented this in a structured manner due to a lack of experience. Therefore, assistance from academics from Yogyakarta State University is needed to educate school-age children in the Bumijo Kulon area to develop awareness of waste management using the 3R principle.

School-age children need to be equipped with knowledge that supports environmental sustainability to maintain a balanced ecosystem [1], [2], [3]. In line with a good understanding of waste management, it can be formed through proper education [3]. The importance of 3R education can have a positive impact on students in their daily lives and increase students' ecological awareness [4]. Through education, the importance of environmental conservation must be instilled in students in order to build a sustainable society by raising awareness of the urgency of environmental conservation [5]. Based on the results of the assessment, we will carry out community service with the concept of 3R (Reduce, Reuse and Recycle) Education for School-aged Children to Minimize Environmental Pollution in the Bumijo Kulon Gold Village, Yogyakarta City.

LITERATURE REVIEW

3R Concept Education (Reduce, reuse, and recycle) for School-Age Children

Education plays a crucial role in fostering early student awareness of the 3R concept (reduce, reuse, and recycle). School-age children need to be equipped with knowledge that supports environmental sustainability to maintain a balanced and sustainable ecosystem [1], [2], [3]. In line with a good understanding of waste management, it can be formed through proper education [3]. The importance of 3R education can have a positive impact on students in their daily lives and increase students' ecological awareness [4]. Through education, the importance of environmental conservation must be instilled in students in order to build a sustainable society by raising awareness of the urgency of environmental conservation [5].

The 3R concept aims to reduce waste, extend product life cycles and optimize material use. This approach supports waste volume reduction, resource efficiency, and reduced carbon emissions for ecosystem sustainability [6]. The explanation regarding the 3R concept is as follows:

1. *Reduce*

The "reduce" principle emphasizes efforts to reduce waste from the initial stage of consumption. This can be achieved by reducing the use of single-use materials, choosing products with minimal packaging, and adopting more efficient and sustainable consumption patterns, such as reducing the use of plastic bags by using reusable shopping bags.

2. *Reuse*

The concept of reuse refers to the reuse of goods or materials that are still suitable for use in order to extend their useful life. This strategy can reduce the consumption of natural resources and reduce waste that ends up in landfills, such as reusing plastic containers to store goods [6].

3. *Recycle*

The principle of recycling refers to the process of converting waste into new raw materials that can be used in the production of other goods. Recycling aims to reduce the amount of waste dumped into the environment while saving the energy required to make new products, such as recycling plastic into reusable bags [7].

The application of the 3R principles aims to reduce waste, conserve natural resources and energy, and support a sustainable economy. 3R education also teaches students about the responsibilities of sustainable waste management [8]. The 3R concept plays a role in minimizing existing waste while also helping students to provide

insight into environmental cleanliness, awareness of the use of disposable items, how to recycle waste so that it can be reused, and fostering students' habits of being environmentally friendly [3][5].

Several studies have shown that training and outreach on the 3R principles have significantly improved students' understanding of waste management. For example, at Khoiru Ummah Elementary School, after participating in an educational program on the 3Rs, 61% of students began to understand these principles, while 86% were familiar with the various types of household waste [3]. Similar results were also found at SMAN 3 Siak Hulu, where students began to apply the 3R principle in their daily lives, such as bringing refillable drinking bottles and reducing the use of single-use packaging [9]. At SDIT Ikhtiar-Makassar, the community service program also emphasizes the importance of waste sorting from an early age. By providing pocket books as teaching materials, students are taught how to differentiate between organic and inorganic waste and how to manage it. This approach has successfully encouraged students to start sorting their waste properly [10].

From the explanation above, it can be concluded that education plays a crucial role in fostering student awareness of the 3R concept as an effort to reduce environmental pollution. The principle of "reduce" helps reduce waste from the outset, "reuse" extends the useful life of items to reduce waste, and "recycle" processes waste back into products. 3R education not only teaches sustainable waste management but also fosters habits in students that foster greater environmental awareness and support a sustainable economic system.

Efforts to Minimize Environmental Pollution

The environment is the natural conditions surrounding us that influence daily life and consists of abiotic and biotic elements. Ecosystem balance plays a crucial role in creating balance and harmony between nature and living things. Sustainable natural resources can be achieved if balanced with efforts to protect and preserve nature [11]. Efforts to reduce environmental pollution require a holistic approach (spanning various sectors, from education to natural resource management). Effective environmental education, such as that implemented by Mahidol University, plays a crucial role in raising awareness of sustainability principles. The campus implements a circular economy concept to reduce natural resource use and maximize waste management efficiency, through programs such as a recycling waste bank and a recycling platform, which involve all elements of the campus and the surrounding community [12].

The 3R approach is based on reduce, reuse, and recycle, environmental education for school-age children, and increasing the community's role in maintaining ecosystem sustainability. The 3R approach has proven effective in reducing waste and its negative impact on the environment, particularly household and industrial waste [6]. In addition, the involvement of school-age children, the community, and various elements in waste management has a very important role in increasing awareness of the importance of sorting and recycling waste to reduce environmental pollution [8]. At the early childhood education level, basic concepts such as reduce, reuse, and recycle (the 3Rs) can be introduced through hands-on activities that teach students the importance of waste sorting and adopting environmentally friendly habits. Such programs can help instill a deeper understanding of sustainable ways to preserve the environment from an early age [13], [14].

In urban areas, the implementation of community-based programs, such as the "River School" in Kampung Code, Yogyakarta, demonstrates that ongoing environmental education can shift community behavior toward a more environmentally friendly lifestyle. This program contributes to raising awareness of the importance of maintaining a clean environment, particularly rivers, and encourages the adoption of sustainable lifestyles [8]. In addition, waste management systems in residential areas contribute to improving environmental quality and preventing water and soil pollution caused by uncontrolled waste disposal [15], [16].

On a broader scale, the concept of a circular economy is a strategic approach to reducing pollution by redesigning production and consumption systems to be more sustainable. By applying circular economy principles, the industrial sector can adopt practices of raw material reuse, product improvement, and resource optimization to minimize waste generation [7]. In addition, the integration of sustainable education into the academic curriculum, as has been implemented in several higher education institutions, plays an important role in building awareness among the younger generation regarding the urgency of protecting the environment through a scientific-based approach and direct practice [16].

It can be concluded that environmental preservation can be achieved through the 3Rs, environmental education, and community participation. Community programs such as river schools and the implementation of a circular economy have proven effective in reducing pollution and promoting sustainability. The integration of environmental education also plays a crucial role in building awareness among the younger generation.

RESEARCH METHOD

A. Problem Solving Framework

The problems encountered in the Bumijo Kulon area where Kampung Emas is located will be solved through educational activities with the following details.

1. Input

- a. Problems in waste management in the Bumijo Kulon area, the location of Kampung Emas: Need for education in waste management with the 3R concept (Reduce, Reuse, and Recycle) through the following activities.

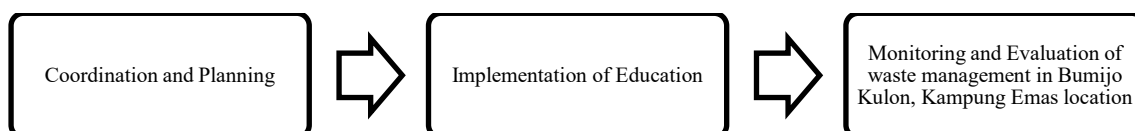


FIGURE 3. Flow of implementation of 3R Concept Education (Reduce, Reuse, and Recycle)

- 1) Initial coordination between the team and the Bumijo Kulon Village to discuss the agreement for implementing the educational activities. The coordination resulted in an agreement, evidenced by a partner's willingness sheet.
 - 2) Planning conducted by the research team aimed to determine the research implementation time, location, resource persons, materials, and subjects to be involved. The research was conducted in Bumijo Kulon Village, designated as the Golden Village of Yogyakarta State University in 2025.
 - 3) Implementation of the community service activity, namely "Educating School-Aged Children on the 3R Concept (Reduce, Reuse, and Recycle) to Minimize Environmental Pollution in the Bumijo Kulon Golden Village of Yogyakarta City," starting from the planning process, implementation, to evaluation and monitoring.
 - b. Education on the 3R concept (Reduce, Reuse, and Recycle) for school-aged children to minimize environmental pollution in the Bumijo Kulon Golden Village, Yogyakarta City, includes lectures, discussions, questions and answers, followed by practical work and presentations on waste management. This education was attended by 29 school-aged students, ranging from preschool, elementary, and junior high schools. This activity aims to provide school-aged children with an understanding of the 3R concept, provide awareness of the importance of 3R, and be able to demonstrate/practice the 3R concept.
- #### 2. Output
- a. School-age children in the Bumijo Kulon neighborhood of Kampung Emas have the ability to manage waste using the 3R concept (Reduce, Reuse, and Recycle).
 - b. School-age children in the Bumijo Kulon neighborhood of Kampung Emas can demonstrate the 3R concept.
 - c. School-age children in the Bumijo Kulon neighborhood of Kampung Emas can practice the 3R concept by utilizing waste into useful materials.

B. Target Audience

This activity involved various important stakeholders. The target audience for the education was 20 school-age children. Partners contributed by providing the location and necessary facilities throughout the event. These facilities included space, tables and chairs, an LCD projector, an audio system, microphones, and documentation facilities. Partners also participated in the event organizing team, serving as emcees, security managers, catering staff, and equipment managers. Partners collaborated with the Yogyakarta State University community service team in preparing the 3R concept educational event for school-age children to ensure it ran according to plan and achieved its intended targets.

C. Activity Method

The following is the flow of activities in Community Service Education on the 3R Concept (Reduce, Reuse, and Recycle) for School-Age Children.

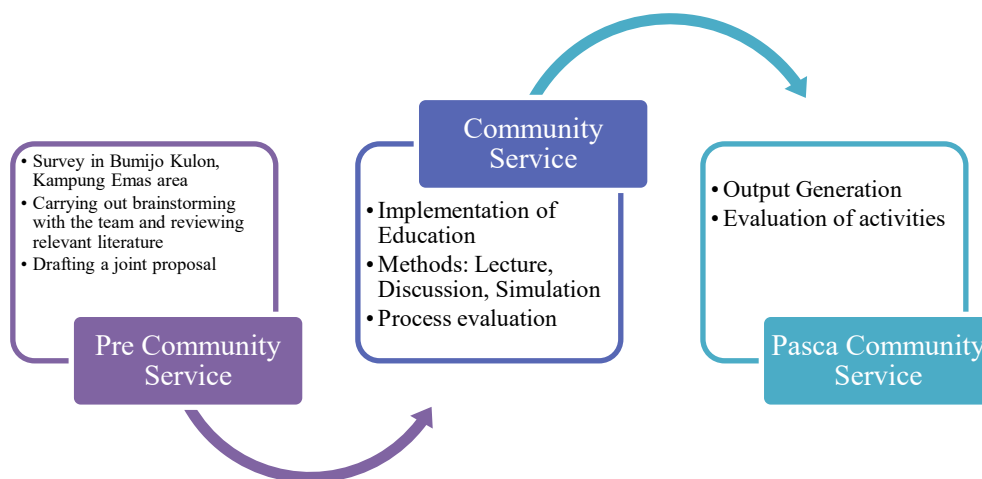


FIGURE 4. Community Service Method Flow

RESULTS AND DISCUSSION

Results of Activity Implementation

3R Concept Education (Reduce, Reuse and Recycle) for school-aged children to minimize environmental pollution in the Bumijo Kulon Golden Village, Yogyakarta City was carried out directly in the Bumijo Kulon multipurpose room in the Golden Village area. This community service activity aims to improve the skills of Bumijo Kulon school-aged students in managing waste into useful items. Through 3R concept education, it is hoped that ecological awareness will grow from an early age and environmental care behavior will be created in everyday life. Pre-Community Service Activities include initial coordination between the team and the Bumijo Kulon Village to discuss the agreement on implementing educational activities. The results of the coordination obtained an agreement proven by the partner's willingness sheet. Next, brainstorming with the team, and reviewing relevant literature, and compiling a joint proposal. Community Service Activities include: orientation of waste problems in Yogyakarta, designing planning, compiling a production time, monitoring project progress, presenting results, and evaluating experiences. The post-Community Service program continued, encompassing several activities, including data processing, preparation of outputs, and training evaluation.

Pre-Community Service activities included initial coordination between the team and the Bumijo Kulon Village to discuss the implementation of the educational activity. This activity resulted in an agreement for 30 participants, consisting of early childhood education, elementary school, and junior high school students. Communication was conducted directly and via WhatsApp. The team and the village agreed to hold the educational activity on July 26, 2025, with the main event consisting of material explanations, 3R demonstrations, and 3R practice. Participants were enthusiastic about the material explanations, demonstrations, and implementation of the 3R concept. Participants actively collaborated while practicing the 3R concept.

The educational activity on the 3R concept (Reduce, Reuse, and Recycle) for school-age children to minimize environmental pollution in Kampung Emas Pengasih was attended by children from early childhood, elementary school, and junior high school. The activity began with an opening prayer and singing the national anthem Indonesia Raya, followed by remarks from Ani Purwati and Prof. Dr. Yudik Prasetyo, S.Or., M. Kes.



FIGURE 5. Opening of educational activities

A welcoming speech was delivered by Prof. Dr. Yudik Prasetyo, S.Or., M.Kes., as a representative of the community service team. In his remarks, he expressed his gratitude and appreciation to the Village Office, its

staff, and the committee involved in the planning process, enabling the 29 school-aged children to attend. He also emphasized that the current problem of waste and environmental pollution is a major challenge that must be addressed not only by adults but also requires the involvement of the younger generation from an early age.

He further emphasized the importance of understanding and practicing the 3Rs (Reduce, Reuse, Recycle) in everyday life as a concrete step to minimize environmental pollution. He hopes that through this education, children will not only understand the concept of the 3Rs but also be able to apply them at home, school, and in their communities. At the end of his remarks, Prof. Dr. Yudik Prasetyo officially opened the educational event and encouraged all participants to enthusiastically participate, actively ask questions, and try out the simple practices that will be implemented together.



FIGURE 6. Group photo of the community, committee, and participants

Before the event began, the committee and all participants took a group photo. This served as official documentation and to capture the bonding moments between the committee, the community, and the participants. The group photo also symbolized the start of the event, a family-friendly and enthusiastic event.



FIGURE 7. 3R Education Activities

Educational Material on the 3R Concept (Reduce, Reuse, Recycle) for School-Age Children to Minimize Environmental Pollution was explained by Prof. Dr. Yudik Prasetyo, S.Or., M. Kes., Dr. Aprilia Tina L., and Ganda Sukmara, M.Pd. In their presentation, the three of them explained that the waste problem is an environmental issue that must be addressed together, including by involving school-age children. In addition to providing explanations, they also invited children to participate in interactive activities in the form of discussions, and provided a few examples of simple crafts from used goods. Through these activities, children not only understand the 3R concept, but are also motivated to apply it in their daily lives, both at home, school, and in the surrounding environment.



FIGURE 8. Demonstration of 3R material

Next, there was the main session, Prof. Dr. Entoh Tohani, M.Pd. gave a practical demonstration of the application of the 3R concept (Reduce, Reuse, Recycle) by using plastic straw waste as a learning medium. He explained that straws are a type of single-use plastic waste that is difficult to decompose and often pollutes the environment, so it needs to be managed wisely. This demonstration was carried out interactively by involving participants, especially children, to participate in making simple crafts from used straws. This activity not only trains creativity, but also raises awareness that plastic waste such as straws can still be reused so that it does not directly pollute the environment.



FIGURE 9. Practical Mentoring Activities

Following the demonstration session, the activity continued with hands-on assistance in processing materials from used straws. At this stage, each participant was given a number of pre-cleaned plastic straws. Participants were then divided into small groups to make the process more focused and manageable. Each group was accompanied by a committee member who provided guidance and assistance if any difficulties arose during the process. Participants were instructed to process the straws into various simple creations, such as flowers, hanging decorations, photo frames, or stationery holders.

This interactive activity was conducted, with the children enthusiastic and eager to express their creativity. In addition to practicing manual dexterity and group collaboration, this hands-on experience also provided a firsthand understanding that straw waste, often considered useless, can actually be transformed into valuable and artistic objects. Thus, participants not only understood the concept of the 3Rs (Reduce, Reuse, Recycle) theoretically but also were able to put it into practice in their daily lives.



Figure 10. Gift Giving

Prizes were awarded to participants as a token of appreciation for their participation and creativity in the straw processing practice. Prizes were awarded in several categories: the most compact, the most creative, the most enthusiastic, the most exciting, the most exemplary, and the best group. The event was lively and full of enthusiasm, marked by the joyful cheers of the children who felt proud of their work and efforts. This moment also motivated participants to continue caring for the environment by implementing the 3R concept in their daily lives. To conclude the series of activities, all participants were then given lunch together.

B. Discussion

Plastic waste remains a major problem in the Bumijo Kulon region due to its non-biodegradable nature and potential environmental pollution. Local communities already understand the importance of fostering awareness of cleanliness from an early age, but implementation has not been systematic due to a lack of experience. Therefore, concrete steps are needed to educate children. Implementing the principles of reduce, reuse, and recycle (3R) is believed to be an effective strategy for reducing the volume of plastic waste while creating a cleaner environment.

Waste management education is provided to students, as they are considered to have a crucial role in initiating measures to prevent waste accumulation in their communities. A 3R-based waste management system will only be successful if it involves the active participation of all elements of society, especially households as the primary source of waste [17]. Through early habituation, students are expected to be able to internalize positive behavior and spread it to their families, friends, and the surrounding community, especially in the practice of waste sorting [18]. Instilling environmental awareness from school age is important so that the younger generation has knowledge and concern for environmental sustainability [19]. Therefore, education related to waste management not only enriches students' insight, but also plays a role as a means of forming environmentally conscious characters [20].

The concept of waste management based on 3R (reduce, reuse, recycle) has been widely introduced by the government [21], [22]. Reuse is understood as an effort to reuse used goods so that the amount of waste produced can be reduced [23]. Reduce means reducing waste by limiting the use and purchase of disposable products, choosing refillable products, and minimizing items that have the potential to become waste [24]. Recycling, on the other hand, is the process of reprocessing waste into new products. While not all types of waste can be recycled, this practice has been used by various informal industries and households to produce useful products [25].

The implementation of 3R education has been proven to have a positive impact on increasing students' knowledge and attitudes [26]. Furthermore, implementing the 3R approach to learning can also foster creativity in early childhood by utilizing inorganic waste as a learning medium. The goal of this method is to develop children's creativity from an early age, as the 3R-based approach can stimulate unique ideas, imagination, fantasy, and freedom of expression [27]. Thus, learning that is oriented towards reuse, reduce, and recycle not only builds environmental awareness, but also trains students to be able to think creatively and innovatively in finding solutions to waste problems [28].

CONCLUSION

Education on the 3R concept (reduce, reuse, recycle) for school-age children to minimize environmental pollution in the Bumijo Kulon Golden Village in Yogyakarta City included activities, lectures, Q&A sessions, demonstrations, practical exercises, and prize distribution. Twenty-five school-age children from preschool, elementary, and middle school attended the education program. This education helped the children develop a greater awareness of environmental stewardship and utilize used materials found around them. Suggestions for this community service program include the following:

1. Post-education mentoring sessions are needed for the children as a follow-up, so they can receive guidance if they encounter difficulties in managing waste into more creative and useful products for the surrounding community.
2. Sustainable community service activities are needed so that the children's work is not just a learning process but also provides tangible benefits to the surrounding community. An example is ecobricks.

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PUBLIC SOCIALIZATION AND EDUCATION ABOUT SMOKE-FREE AREAS (KTR) AS AN EFFORT TO INCREASE HEALTH AWARENESS AND PREVENT THE NEGATIVE IMPACTS OF CIGARETTES AT THE CAHAYA BHAKTI YOUTH ORGANIZATION IN KEDUNDANG, TEMON, KULONPROGO, DIY

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Abstract. This community service activity aims to increase public awareness in Kedundang, Temon, Kulon Progo, DIY, about the importance of Smoke-Free Areas (KTR) and the dangers of smoking for health and the economy. The specific objectives include: (1) increasing public understanding of the negative impacts of smoking, (2) encouraging behavioral changes to support KTR, and (3) reducing the prevalence of smoking among adolescents and adults. The methods used are educational-participatory, including seminars/workshops, distribution of educational materials (posters, brochures), social media campaigns, and focus group discussions (FGDs). The subjects of the activity included adolescents, adults, and community leaders in Kedundang, with a sample of 60 people selected using purposive sampling. Analysis of the activity was carried out through pre-test and post-test based evaluations to measure changes in community knowledge and attitudes. Data were analyzed quantitatively and qualitatively, supplemented by monitoring the implementation of KTR in strategic locations. The results were a positive impact of the intervention or treatment provided. In addition, the category percentage table strengthens this data, namely that there are no respondents in the low category, and the proportion of the high category, especially in the Attitude towards Cigarettes and KTR variables, reaches more than 75%. The output targets of this activity include: (1) Cooperation with villages, (2) Increasing public awareness about the dangers of cigarettes and the benefits of KTR, (3) Formation of a joint commitment to implement KTR in the community, (4) Distribution of educational materials in strategic locations, and (5) Publication of activity results in the form of scientific articles or guidebooks. Thus, this activity is expected to have a sustainable impact in creating a healthy and smoke-free environment in Kedundang, Temon, Kulon Progo, DIY.

Keywords. Smoke-Free Areas (KTR), Public Education, Smoking Prevalence, Health.

INTRODUCTION

Smoking has become a serious public health problem in Indonesia, including in the Kedundang, Temon, Kulon Progo, and Yogyakarta Special Region (DIY) areas. According to WHO (2025) ¹, worldwide there are approximately 237.3 million men and 129.4 million women who are active smokers aged 15 years and over. Indonesia is among the top 10 countries with the highest number of smokers and ranks third in the world after China and India. Data from the 2018 Basic Health Research (Riskesdas) shows that the prevalence of smoking in Indonesia reached 33.8%, with the proportion of male smokers at 62.9% and female smokers at 4.8%. ². Indonesia has set a target to reduce the prevalence of child smokers from 9.1% to 8.7% in the 2024 National Medium-Term Development Plan (RPJMN). In addition, the data also reveals that 62.6% of active smokers started smoking at the age of under 19 years, which shows that the smoking habit has infected teenagers and school-age people. In the Kedundang, Temon, Kulon Progo, DIY area, the smoking phenomenon is not only carried out by adults, but also by teenagers and school children, which is an indication that education about the dangers of smoking is still very minimal.

The negative impacts of smoking are not only felt by active smokers, but also by passive smokers. According to the World Health Organization (WHO), ³, Cigarette smoke contains more than 7,000 chemicals, of which 250 are harmful and 69 are carcinogenic. Continuous exposure to cigarette smoke can increase the risk of diseases such as lung cancer, heart disease, stroke, and respiratory disorders. In Indonesia, data from the Ministry of Health

of the Republic of Indonesia in 2021 stated that non-communicable diseases (NCDs) such as heart disease, stroke, and cancer are the leading causes of death, with the main risk factor being smoking.⁴

The Indonesian government, through BPJS Kesehatan, has proposed to no longer cover the cost of treating diseases caused by smoking starting in 2025. This policy was announced by the President Director of BPJS Kesehatan, Ali Ghufron Mukti, who stated that smoking is the main factor causing serious diseases such as heart disease, lung cancer, and stroke.⁵ This requires preventive measures to reduce smoking habits and protect the public from exposure to cigarette smoke. One strategy that can be implemented is through the implementation of Smoke-Free Areas (KTR). KTR is an area declared prohibited for smoking activities or the production, sale, advertising, and/or promotion of tobacco products. The implementation of KTR has been regulated in Government Regulation Number 109 of 2012 concerning the Protection of Materials Containing Addictive Substances in the Form of Tobacco Products for Health, as well as DIY Regional Regulation Number 1 of 2017 concerning Smoke-Free Areas.⁶

However, the implementation of the Non-Smoking Area (KTR) in the Kedundang, Temon, Kulon Progo, Yogyakarta Special Region (DIY) area is still not optimal. Many people still smoke in public places, such as markets, schools, places of worship, and health facilities. This indicates that public awareness of the importance of KTR is still low. Therefore, intensive education and outreach efforts are needed to increase public understanding of the dangers of smoking and the benefits of KTR. Through this community service activity, it is hoped that a healthy and smoke-free environment can be created, as well as encouraging changes in community behavior to support the sustainable implementation of KTR. This activity is also in line with Sustainable Development Goals (SDGs) number 3, which is to ensure healthy lives and support well-being for all people at all ages. By increasing public awareness of the dangers of smoking and the importance of KTR, it is hoped that the prevalence of smoking and its negative impacts on the health and economy of the people in Kedundang, Temon, Kulon Progo, Yogyakarta will decrease.

LIBRARY REVIEW

Smoking Habits and Their Impact on Health

Smoking is one of the main risk factors for non-communicable diseases (NCDs) such as cancer, heart disease and respiratory disorders.⁷ According to the 2019 Global Burden of Disease (GBD) data, smoking causes more than 8 million deaths per year worldwide, with 1.2 million of them being passive smokers.¹ In Indonesia, the prevalence of smoking continues to increase, especially among adolescents. The 2018 Basic Health Research (Riskesdas) data shows that 9.1% of adolescents aged 10–18 years are active smokers, up from 7.2% in 2017.² This indicates that smoking has become a serious problem that requires immediate intervention.

The Impact of Cigarette Smoke on Passive Smokers

Cigarette smoke contains more than 7,000 chemicals, of which 250 are harmful and 69 are carcinogenic.³ Exposure to secondhand smoke can increase the risk of heart disease by 25–30% and lung cancer by 20–30%.⁸ According to the World Health Organization (WHO), nearly 6 million deaths per year are caused by tobacco consumption. This figure is predicted to increase to more than 8 million deaths by 2030. Indonesia is ranked fourth in the world as the country with the highest cigarette consumption, with the number of active smokers reaching 65.2 million people, consisting of 52.9% adult men and 12.3% adult women.¹

Smoke-Free Area (KTR) Policy

Smoke-Free Areas (KTR) are an effective strategy to reduce exposure to cigarette smoke and protect public health.⁹ KTR is defined as an area where smoking, producing, selling, advertising, or promoting tobacco products is prohibited (PP No. 109 of 2012). The implementation of KTR has been proven effective in reducing the prevalence of smoking and improving air quality in public spaces.¹⁰ The implementation of KTR in public places can reduce exposure to passive cigarette smoke by up to 80% and reduce the number of heart attacks by 15%. In Indonesia, KTR has been regulated in Regional Regulations (Perda) in various provinces, including DIY through DIY Perda Number 1 of 2017.⁶ However, its implementation still faces various challenges, such as low public awareness and lack of law enforcement.

Education and Socialization as Behavior Change Strategies

Education and outreach are key components in efforts to change people's behavior regarding smoking habits.¹¹ According to the Health Belief Model (HBM) theory, behavioral changes are influenced by individual perceptions of susceptibility to disease, seriousness of disease, benefits of preventive measures, and perceived barriers.¹² Effective education must include information about the dangers of smoking, the benefits of KTR, and the economic impacts it causes. Intensive education campaigns can increase public awareness of the dangers of smoking by 40% and encourage changes in smoking behavior.¹³

ACTIVITY METHOD

This community service activity will be implemented using an educational-participatory approach that actively involves the community in the learning and outreach process. This method was chosen to ensure that the community is not merely a passive recipient of information but is directly involved in discussions and practices regarding the implementation of Smoke-Free Areas (KTR). The community service methods to be used include:

a) Education and Outreach: The main activities include seminars or workshops featuring expert health speakers to provide insight into the dangers of smoking, the benefits of non-smoking areas (KTR), and BPJS policies related to smoking-related illnesses. The material is delivered through interactive presentations, complemented by case studies and concrete examples.

b) Distribution of Educational Materials: Distribution of brochures, posters, and use of social media to disseminate information about non-permanent areas (KTR) and the dangers of smoking. Educational materials are designed with easy-to-understand language and engaging visuals.

c) Focus Group Discussion (FGD): Involving community representatives, local figures, and stakeholders to discuss challenges and solutions in implementing KTR in their environment.

d) Social Media Campaign: Using platforms such as Instagram, Facebook, and WhatsApp to reach young people and the wider community with educational content in the form of infographics, short videos, and testimonials.

The population for this activity is the entire community in the Kedundang, Temon, Kulon Progo, Yogyakarta Special Region, with a focus on adolescents (students), adults, and community leaders. This population was selected due to the high prevalence of smoking in the area, which encompasses a wide range of age groups. The sample will be drawn using purposive sampling with the following criteria:

a) Teenagers/Students: Junior high and high school students in the Temon area who are exposed to smoking habits.

b) Adults: Citizens aged 20–60 years who actively smoke or are exposed to cigarette smoke.

c) Community Leaders: Local leaders, teachers, and representatives of community organizations who have influence in changing behavior.

The target sample size was 60 people, consisting of 30 adolescents, 25 adults, and 5 community leaders. The sample was selected based on representation and active involvement in the activities.

This activity will be held in Kedundang Village, Temon, Kulon Progo, Yogyakarta Special Region (DIY). This location was chosen due to the high prevalence of smoking in the area, both among adolescents and adults. Furthermore, this location has the potential to become a pilot project for implementing KTR, given the support from the local government and community leaders. Activities will focus on several strategic locations, such as:

a) Kedundang Village Hall: As the main location for KTR educational seminars/workshops.

b) Schools: Middle and High Schools in the Kedundang area for special education for students.

c) Markets and Places of Worship: As locations for installing posters and distributing brochures to reach the general public.

d) Health Facilities: Community health centers and clinics for outreach to health workers and patients.

RESULTS AND DISCUSSION

Pretest

Table 1. Statistics data pretest

Variables	Mean	SD	Min	Max
Knowledge	23.98	2.31	19	30
Attitude	26.70	2.59	20	31

Based on the results of the pretest analysis of 60 respondents, the average total score for the knowledge variable about the dangers of cigarettes and KTR was 23.98 out of a maximum score of 40 with a standard deviation of 2.31. This indicates that respondents are in the sufficient category, with a relatively homogeneous variation in answers. The average score per item is in the range of 2.27–2.53, so it can be concluded that respondents' responses tend to be neutral to quite agree. Meanwhile, for the attitude variable towards cigarettes and KTR, the average total score obtained by respondents was 26.70 with a standard deviation of 2.59. This value is slightly higher than the Knowledge of the Dangers of Cigarettes and KTR variable, so it can be categorized as sufficient to good. The average score per item ranged from 2.57–2.78, indicating that respondents tended to answer in the quite agree category, although still far from the maximum score. Overall, the results of this pretest indicate that before the

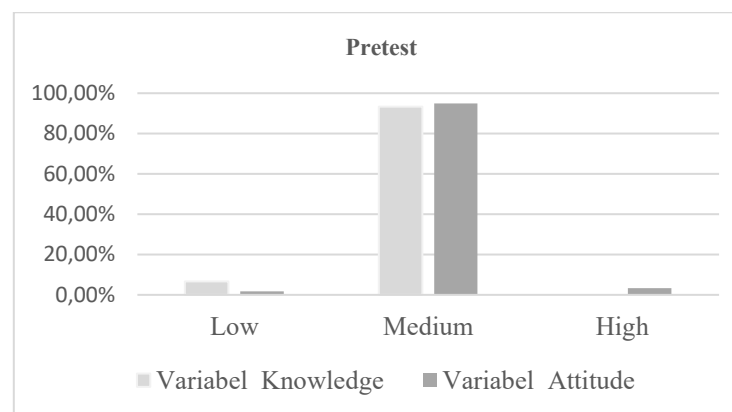
intervention, both respondents' knowledge and attitudes were still at a moderate level. This condition provides considerable room for improvement through the provision of planned interventions or treatments.

Table 2. Variable category data

Category	Variables Knowledge	Variables Attitude
Low	6,67%	1,67%
Currently	93,33%	95,00%
High	0,00%	3,33%

And the following is presented in graphic form

Figure 1. Variable category data



The majority of respondents were in the medium category for both variable A and variable B. Only a few respondents were in the low category, and almost none reached the high category.

Posttest

Table 3. Posttest data statistics

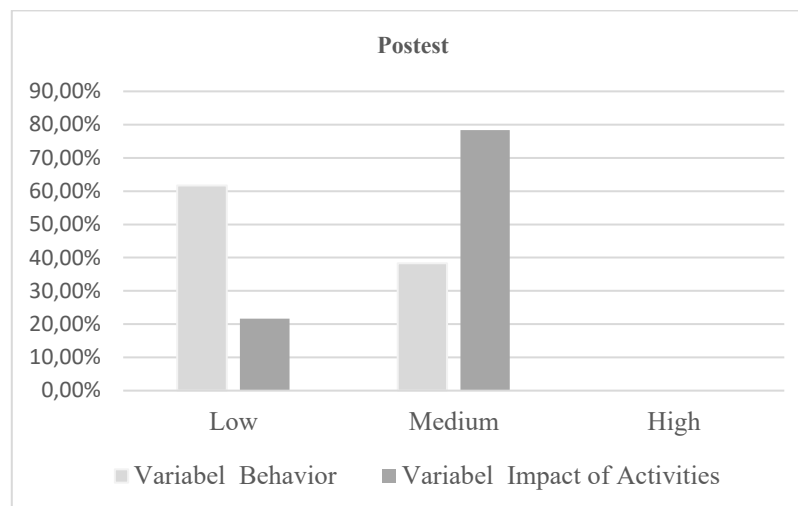
Variables	Mean	SD	Min	Max
Smoking behavior	30,28	2,29	26	39
Response from Activities	32,17	2,29	27	36

Based on the results of the posttest analysis of 60 respondents, there was a significant increase in scores compared to the pretest results. In the smoking behavior variable, the average total score reached 30.28 out of a maximum score of 40, with a standard deviation of 2.29. The lowest score was 26 and the highest was 39, indicating that most respondents were in the moderate to high category, with a relatively even distribution. The response variable after the activity was carried out showed an average score of 32.17 with a standard deviation of 2.29, a minimum score of 27, and a maximum of 36. This distribution shows that the majority of respondents were already in the high category.

Table 4. Variable category data

Category	Variables Behavior	Variables Impact of Activities
Currently	61,67%	21,67%
High	38,33%	78,33%
Low	-	-

And the following is presented in graphic form

Figure 2. Variable category data

Behavioral Variables: The majority of respondents (61.67%) were in the moderate category, while 38.33% had reached the high category. No respondents were in the low category. This indicates an improvement in results, although the majority remained at the moderate level.

The majority of respondents (78.33%) were in the high category, with only 21.67% in the medium category. This indicates excellent achievement in the Activity Impact variable after the intervention.

Posttest results showed a significant shift from the low to medium and high categories. The Activity Impact variable showed a higher increase, indicating that the intervention had a greater impact on the aspect measured by the Activity Impact variable.

CONCLUSION

Compared to the pretest (mean for Knowledge of Cigarettes and Non-Profit Areas = 23.98 and Attitude towards Cigarettes and Non-Profit Areas = 26.70), there was an average increase of approximately 6–7 points in both variables, indicating a positive impact of the intervention or treatment provided. Furthermore, the category percentage table supports this data, as no respondents were in the low category, and the proportion of respondents in the high category, particularly for the Attitude towards Cigarettes and Non-Profit Areas variable, reached more than 75%. Overall, these results indicate that the intervention successfully improved respondents' understanding, attitudes, or abilities in accordance with the research variables, with excellent results.

THANK-YOU NOTE

The author wishes to all the Cahaya Bhakti Dusun Pencengan young people, who have helped to carry out community service activities.

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Innovative Water Purification Technology: Community-Based Installation of Drinking Water Systems in Rejowinangun Village

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Abstract. The availability of safe drinking water is a fundamental community need; however, in Rejowinangun, access to potable water remains limited and poses health risks related to waterborne diseases. This issue has the potential to lower the quality of life and increase the prevalence of water-related illnesses. The contribution of this study is the introduction of an innovative, community-based water purification technology using a simple water purifier installation that is easy to implement and manage, along with providing education on the importance of utilizing clean water. The method involved identifying water quality problems, conducting community outreach and training, designing and installing the water purifier system, and providing operational assistance to ensure its sustainability. The results showed that the water purifier installation significantly reduced turbidity and harmful substances, improving the water quality to meet potable water standards. Further discussion highlighted that community participation in the implementation process not only increased awareness and knowledge of clean water but also fostered a sense of ownership toward the applied technology. In conclusion, the innovation and application of community-based water purification technology proved effective in improving the quality of drinking water in Rejowinangun and had a positive impact on public health.

INTRODUCTION

Water is a fundamental human need that plays a crucial role in sustaining life. Access to clean and safe drinking water is one of the key indicators of community well-being (1,2). However, not all public facilities, including mosques, have adequate access to potable water. In Rejowinangun Village, many mosques only provide tap water, which is not suitable for direct consumption. This condition poses a specific challenge, especially for worshippers and travelers who frequently stop by to pray and rest at the mosque. Efforts to provide safe drinking water in public facilities such as mosques are essential as they support the Sustainable Development Goals (SDGs) Goal 6 on *Clean Water and Sanitation* and align with national policies that aim to improve access to safe, hygienic, and sustainable drinking water in public spaces (3).

In this context, the main problem faced by the community partner (mosques in Rejowinangun) is the limited access to ready-to-drink water. Currently, drinking water in mosques is generally provided through gallon dispensers. However, this solution is not always sufficient, particularly during peak activities when mosque attendance increases. Furthermore, prolonged use of plastic gallons poses potential health risks, especially if the containers contain *Bisphenol-A (BPA)* particles or microplastics. Studies have shown that continuous exposure to BPA can negatively affect the endocrine system and increase the risk of metabolic disorders (4,5). Likewise, the presence of microplastics in drinking water represents a serious threat to human health, with potential long-term toxic effects.

To address this issue, water purifier technology offers an innovative approach to transforming raw water into safe drinking water. A water purifier is a device capable of filtering physical, chemical, and microbiological contaminants from untreated water. This technology integrates multiple filtration stages, such as sediment filters, carbon filters, ultrafiltration membranes, and ultraviolet (UV) sterilization. It is well-suited for public facilities because it is relatively easy to maintain and can significantly improve water quality (6,7). Among various purification technologies, the Reverse Osmosis (RO) system was selected as the most appropriate solution for this community service project. The RO system can filter particles down to microscopic levels, including heavy metals, chemical residues, and pathogenic microorganisms. The implementation of the RO system with a dispenser model directly connected to the mosque's water tap is expected to provide potable water with multiple

temperature options—hot, cold, and normal. This approach not only enhances convenience for worshippers and travelers but also ensures that the water consumed is clean, safe, and hygienic (8–10).

The main objective of this activity is to implement Reverse Osmosis-based water purifier technology in public facilities such as mosques to increase access to safe, hygienic, and sustainable drinking water for the Rejowinangun community. Moreover, this program contributes to the development of a community-based appropriate technology model that can be replicated in other public facilities, fostering local ownership, self-reliance, and sustainable management of clean water systems. This article presents the background and urgency of the problem, a review of relevant literature, the methods used in implementing the activity, the results and their discussion, and finally, conclusions and recommendations for future development.

LITERATURE REVIEW

Previous studies and journal articles supporting this community service initiative have consistently demonstrated that Reverse Osmosis (RO) technology is one of the most effective methods for improving the quality of drinking water in public facilities. RO systems can remove up to 99% of contaminants, including heavy metals, microorganisms, hazardous chemicals, and even fluoride. A study examining the effect of RO systems on fluoride concentration in household water found a significant reduction at the point of use ($P = 0.027$) (11,12). Another study reported that approximately 70–80% of surface and groundwater sources fail to meet drinking water quality standards due to high concentrations of nitrates and other contaminants. In this context, RO membrane-based filtration technology is recognized as a key solution for improving local water quality across various settings such as apartments, schools, households, and mosques. Moreover, RO systems with dual-stage purification can remove up to 99.9% of mineral ions, producing highly purified water free from harmful substances. However, excessive demineralization remains a critical issue, as the process also strips away essential minerals beneficial to human health (13–15).

The Reverse Osmosis (RO) method has been widely adopted as one of the most reliable water purification technologies across scales—from domestic use to public facilities. One of its main advantages lies in its ability to remove up to 99% of hazardous substances (16). Research indicates that RO systems are not only effective in filtering large particles but also in eliminating dissolved compounds that conventional filtration methods cannot handle. The integration of ultraviolet (UV) sterilization within RO systems further enhances water quality by mitigating microbiological contamination risks (17–19). Consequently, RO technology plays an important role in safeguarding public health, especially in regions where raw water quality is poor. Empirical findings suggest that RO-treated water can reduce the incidence of waterborne diseases such as diarrhea and gastrointestinal infections.

Figure 3 illustrates the basic block diagram of a single-stage RO system. Feed water is pressurized by a high-pressure pump and directed through the RO membrane, which selectively allows pure water molecules to pass through. The filtered water, known as permeate water, contains extremely low levels of salts and contaminants, making it suitable for direct consumption. Meanwhile, the reject stream, which retains concentrated impurities, is discharged. This process effectively separates up to 99% of harmful substances—including heavy metals, microorganisms, and chemical pollutants—producing high-quality, safe drinking water. **Figure 4** shows a dual-stage RO purification process designed to achieve even higher levels of water purity.

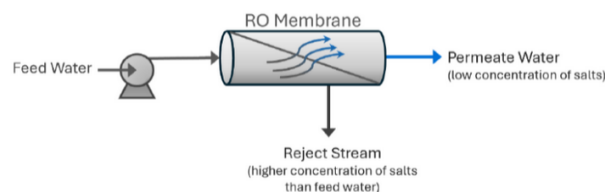


Figure 3. Single-Stage Reverse Osmosis Water Purification System

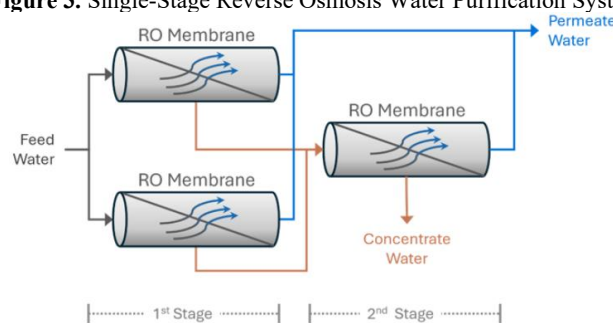


Figure 4. Dual-Stage Reverse Osmosis Water Purification System

Beyond RO membranes, ultraviolet (UV) disinfection technology plays a critical role in eliminating biological contaminants. As illustrated in **Figure 5**, water passing through a UV tube is exposed to ultraviolet light, which disrupts the DNA structure of microorganisms such as bacteria and viruses. The *Before UV* section depicts microorganisms with intact DNA structures, while the *After UV* section shows DNA strands damaged by UV exposure, rendering them inactive and incapable of reproduction. This process ensures the biological safety of the treated water. UV technology is often combined with RO systems—while RO removes solid particles, excessive minerals, and chemical contaminants, UV adds a final disinfection layer to neutralize any remaining microorganisms. This combination provides a robust and comprehensive purification method for producing potable water.

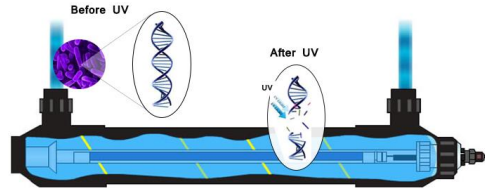


Figure 5. Ultraviolet Tube-Based Water Purification System

Further innovations integrating RO, UF (Ultrafiltration), and UV technologies have been proposed to address global water scarcity challenges. For example, Malay Quila et al. developed a portable multi-stage filtration unit combining RO, UF, and UV technologies for emergency water purification. Designed for disaster scenarios such as floods, this portable system offers low-cost, low-maintenance operation and is capable of delivering safe drinking water in remote or disaster-affected areas. As shown in **Figure 6**, raw water first passes through a sediment filter to remove large particles, followed by pre-carbon and post-carbon filters that eliminate organic contaminants and odors. The high-pressure RO pump then forces water through the RO membrane, removing ions and dissolved contaminants. Subsequently, the UF filter traps micro-particles, while a mineral cartridge reintroduces essential minerals. Finally, the UV stage disinfects the water, ensuring microbiological safety (20–22).

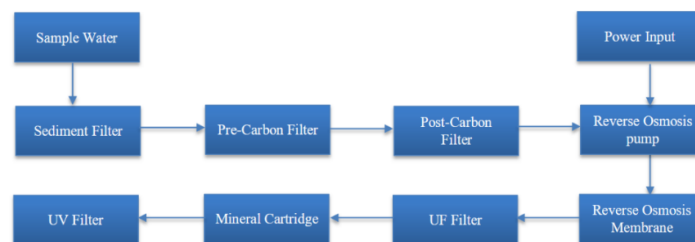


Figure 6. Filtration Flow Diagram Developed by Malay Quila et al. (23)

Similarly, Belly et al. implemented a solar-powered RO system at *Pondok Pesantren Al-Karimiyyah* in Sumenep to provide an independent and cost-efficient drinking water solution. This system integrates sediment filters, activated carbon, RO membranes, and UV disinfection, while utilizing solar energy to minimize operational costs. As illustrated in **Figure 7**, the process begins with sediment filtration, followed by activated carbon treatment to absorb odors and organic compounds. The RO membrane then removes dissolved ions and contaminants, and UV sterilization ensures the final elimination of harmful microorganisms. Test results confirmed that this system significantly improved access to clean water and supported the daily needs of the boarding school community sustainably (24–26).

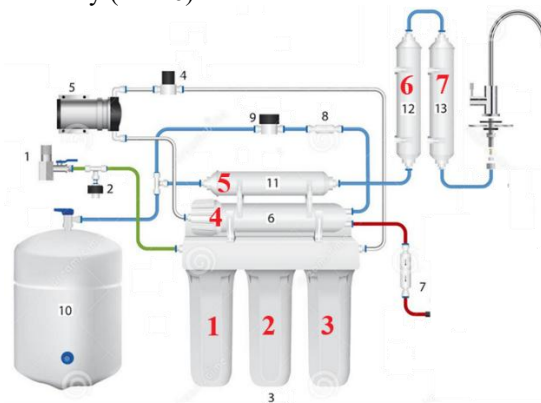


Figure 7. Reverse Osmosis Filtration Flow Diagram

The state of the art in RO technology highlights its effectiveness in removing a wide range of contaminants—including heavy metals, microorganisms, and microplastics—by employing a semi-permeable membrane that allows only pure water molecules to pass. Despite its high filtration efficiency, RO technology faces limitations, such as relatively low water recovery rates (typically 50–75%), where a portion of input water becomes reject waste. To address these constraints, researchers have combined RO with complementary purification methods such as UF and UV. While RO focuses on solid and chemical contaminant removal, UV disinfection targets biological contaminants, offering a comprehensive purification solution.

Overall, recent studies demonstrate that the integration of RO and UV technologies not only improves drinking water quality but also reduces environmental impact—especially when powered by renewable energy sources like solar power. Innovations in system design, energy optimization, and the incorporation of supplementary technologies such as UF mark significant progress in achieving sustainable access to clean drinking water across household and public facility contexts.

RESEARCH METHOD

The implementation method of this community service program was designed to address two main aspects: (1) improving public service delivery and (2) enhancing public health through the provision of potable water in public facilities within Rejowinangun Village. The program adopted a participatory approach involving active engagement of community partners, systematic evaluation, and sustainability planning to ensure long-term benefits (27). The overall workflow of the community service implementation is illustrated in **Figure 8**, which shows the sequential stages from needs assessment to program sustainability.

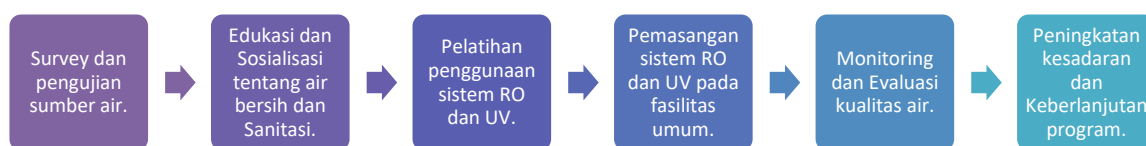


Figure 8. Flowchart of the Implementation Stages of the RO-UV Water Purification Program

1. Needs Assessment and Partner Condition Identification

The first stage involved conducting a field survey to identify the existing conditions of mosques as program partners. The water quality of tap sources was measured using a TDS meter and microbiological tests to determine contamination levels in the raw water (28). Additionally, discussions were conducted with mosque administrators to gather data on drinking water needs, the number of congregants, and the frequency of water consumption within the mosque.

This problem analysis aimed to identify key challenges in water provision, such as high operational costs and limited human resources for water management. During this stage, mosque administrators actively participated by providing data and assisting the field identification process, ensuring that the proposed solution aligned with actual community needs.

2. Design and Installation of the RO-UV System

The second stage consisted of designing and installing the Reverse Osmosis–Ultraviolet (RO-UV) system. The technical design integrated RO filtration with UV sterilization to ensure the produced water met potable standards. The main components included sediment filters, RO membranes, booster pumps, UV units, and an auto shut-off sensor to stop water flow once the storage tank was full (29).

Installation was carried out at a strategic location easily accessible to worshippers and travelers, ensuring leak-free connections and efficient layout. After installation, a system trial was conducted to verify the optimal function of each component, including filtration, pumping, and UV sterilization. Throughout this stage, mosque administrators were involved in site selection and provided technical support during system installation.

3. Education and Training on RO-UV Operation

Education and training were essential to ensure program sustainability. Training sessions were conducted for mosque administrators, covering topics such as system operation, routine maintenance, and troubleshooting. In addition to hands-on sessions, informative posters were installed in mosque areas to display dispenser usage instructions, the benefits of potable water, and hygiene tips for maintaining the equipment.

University students participated in the educational activities, assisting in delivering the training and conducting community outreach. Their involvement also provided practical learning experiences and opportunities for academic credit recognition, particularly in courses related to community service programs, or field practice, depending on their roles and engagement duration.

4. Program Monitoring and Evaluation

This stage aimed to ensure that program targets and outcomes were achieved effectively. Monitoring was conducted periodically by measuring water quality using a TDS meter and microbiological analysis to confirm compliance with potable water standards (30).

A user satisfaction survey was administered to collect feedback from mosque partners regarding the water quality and ease of use of the RO-UV system. The technical performance of the system was also evaluated based on its ability to supply at least 50 liters of potable water per day. Mosque administrators were trained and involved in maintenance tasks, including filter replacement, equipment cleaning, and UV lamp inspection. Monitoring results were analyzed to assess the program's success and to identify areas requiring improvement.

5. Evaluation and Program Sustainability

Upon completion, a comprehensive evaluation was conducted using both quantitative indicators (e.g., water volume produced, number of users, satisfaction levels) and qualitative indicators (e.g., increased knowledge and skills of mosque staff in operating the system).

Sustainability was ensured through capacity building and empowerment of mosque administrators, enabling them to perform routine maintenance independently. This was supported by technical manuals and periodic refresher training. The RO-UV system, equipped with automatic sensors, facilitated simple operation and reduced the need for continuous supervision from the project team.

A long-term evaluation plan was established to monitor water quality consistency, usage frequency, and the overall impact of the program on community health and comfort (31). This sustainability framework ensures that the installed system remains operational, beneficial, and replicable for similar public facilities in the future.

RESULTS AND DISCUSSION

1. Result

a. Technical Results – Improvement of Water Quality

Water quality testing was conducted to compare the condition of raw water before and after the installation of the RO-UV system. Measurements of physical and chemical parameters were carried out using a TDS meter and simple laboratory tests to ensure that the filtered water met potable water standards. The results showed that the TDS value of raw water was 420 ppm, exceeding the ideal drinking water threshold (< 500 ppm). After treatment through the RO-UV system, the TDS value decreased to 38 ppm, indicating a significant improvement in water purity. In addition, microbiological testing revealed a substantial reduction in total microorganisms, from 3.2×10^3 CFU/ml to non-detectable levels in the filtered water. These results confirm that the combination of Reverse Osmosis (RO) and Ultraviolet (UV) systems is effective in removing physical, chemical, and biological contaminants, producing safe and high-quality drinking water for community consumption.

The RO-UV water purification system used in this program consists of several key components, including a sediment filter, booster pump, RO membrane, UV chamber, and auto shut-off sensor. The design and physical appearance of the installed RO-UV system in the Rejowinangun mosque are shown in **Figure 9**.



Figure 9. Product of the RO-UV Water Purification System Installed at Rejowinangun Mosque

b. Implementation Results – Performance of the RO-UV System

The RO-UV system installed in the Rejowinangun mosque operated stably and successfully met the daily drinking water needs of worshippers and travelers. Field observations indicated that the system produced an average of 50–60 liters of potable water per day at normal temperature. The auto shut-off sensor functioned effectively, automatically stopping the water flow once the storage tank was full, thereby preventing water wastage. The booster pump maintained consistent water pressure throughout the filtration process. All system

components—including sediment filters, RO membranes, and UV chambers—worked in an integrated manner without significant technical issues during the trial period.

The installation site, located near the ablution area and accessible pathways, allowed users to easily access drinking water. This strategic placement contributed to an increase in water usage frequency, particularly during congregational prayers and large religious gatherings. The implementation process involved system design, installation, testing, and training activities with mosque administrators. Documentation of these implementation activities is presented in **Figure 10**.



Figure 10. Documentation of the RO-UV System Implementation Activities at Rejowinangun Mosque

c. Program Sustainability Results

Based on joint evaluations with mosque administrators, the program demonstrated significant and sustainable impact. The mosque management exhibited strong commitment to managing the RO-UV system, including routine maintenance such as filter replacement and equipment cleaning every two months. The implementation team provided a manual book and visual guide to assist administrators in performing independent maintenance. The use of automatic sensors also minimized the need for intensive supervision, allowing autonomous operation of the system without continuous support from the project team.

A long-term plan was established through collaboration between mosque administrators and local residents to allocate maintenance funding from mosque donations. The program received positive responses from the community, with several mosque administrators in the Rejowinangun area expressing interest in replicating similar systems at their facilities.

2. Discussion

The water quality test results showed a significant reduction in TDS levels and microorganism counts after filtration through the RO-UV system. This finding confirms that the combination of Reverse Osmosis and Ultraviolet sterilization technologies is highly effective in improving raw water quality into potable water. RO operates based on a semi-permeable membrane that filters microscopic particles, including heavy metals and dissolved chemicals, while UV acts as an additional disinfection layer that destroys the DNA of microorganisms such as bacteria and viruses. This advanced filtration capability is particularly crucial given that well water is the primary source for a significant portion of Indonesian households and often presents challenges such as high salinity and microbial contamination (32,33). This issue is particularly pertinent in areas like the Karangrejo Subdistrict, where communal springs are vulnerable to pollution, emphasizing the need for robust water treatment solutions to prevent waterborne diseases like diarrhea (34).

The field performance of the RO-UV system was highly satisfactory. With a daily production capacity of 50–60 liters of normal-temperature water and a functional auto shut-off sensor, the system efficiently fulfilled users' drinking water needs without excessive water or energy consumption. The stable water pressure, maintained by the booster pump, ensured optimal filtration performance. These findings confirm that the system design was not only technically effective but also well-suited to the practical needs of public facilities, particularly mosques with high water usage levels. This system's robust performance aligns with the broader objective of providing sustainable and accessible clean water, especially in regions where conventional infrastructure is limited or groundwater quality is compromised, such as coastal areas in Indonesia (35).

In terms of sustainability, the active involvement of mosque administrators in system operation and maintenance was a key factor ensuring program continuity. Community participation from the planning to the evaluation stage strengthened the sense of ownership toward the implemented technology. The development of this system also aligns with the global push for circular economy principles in water management, extracting valuable resources from wastewater and improving overall water quality. Moreover, the community-based empowerment approach adopted in this program effectively enhanced local capacity in managing an independent drinking water system. This aligns with the principles of SDG 6 (Clean Water and Sanitation), which emphasizes universal access to safe and clean water (17,36).

Overall, the program not only succeeded in improving water quality and public service delivery but also fostered strong collaboration among academics, students, and the community. The engagement of university students in education and outreach activities provided added value through enhanced practical competence and understanding of community-based appropriate technology.

CONCLUSION

This community service program successfully demonstrated the effectiveness of the Reverse Osmosis–Ultraviolet (RO-UV) water purification system in providing safe and high-quality drinking water for public use at the Rejowinangun mosque. The system significantly improved water quality, reducing the TDS level from 420 ppm to 38 ppm and eliminating microbial contamination, thereby meeting potable water standards. With a daily production capacity of 50–60 liters of normal-temperature water, the system operated efficiently and reliably, supported by an auto shut-off sensor and booster pump that ensured stable filtration performance.

Beyond technical success, the program contributed to public health improvement and enhanced community service delivery by ensuring accessible drinking water for worshippers and travelers. The active involvement of mosque administrators in operation and maintenance strengthened ownership and guaranteed program sustainability. The provision of technical manuals, visual guides, and training sessions enabled independent management of the RO-UV system, minimizing dependence on external support.

In conclusion, the integration of appropriate technology with a community-based empowerment approach proved to be an effective and sustainable solution for addressing local water quality challenges. Future initiatives are encouraged to replicate this model in other public facilities—such as schools, prayer halls, and community centers—to expand access to clean, safe, and affordable drinking water for broader communities.

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Safety Socialization in Archery Sports in Sleman

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Abstract. The importance of archery safety has not been fully maintained so that there is a need for activities to maintain the safety of archery players. Purpose: This study aims to provide knowledge about archery safety. Samples were taken by purposive sampling, namely: 1) boys aged 7-10 years; 2) routine archery training; 3) do not understand the importance of archery safety. The sample in this study consisted of 15 people. Method: used in this study is an experiment using one group pretest posttest with data collection techniques using a Likert scale questionnaire. The instrument in the study used a questionnaire that has been validated by experts. Results of community service: after being given archery safety training, the results of knowledge and prevention increased by 5,756 and t table (df 19.25) 3,083 with a p-value of significance of 0.000, so it can be interpreted as significant. This means, the conclusion is that archery safety training can increase public knowledge that can be applied when practicing archery.

Keywords: Archery safety, Archery, Knowledge

INTRODUCTION

The role of archery has evolved from a need for survival and hunting or recreation¹. The popularity of archery in Indonesia is due to the public's view that archery can train focus and concentration and is a form of recreation that can relieve stress². Over the past 6 years, archery has developed very rapidly in Indonesia, both as a recreational sport and as an achievement sport³. This is evidenced by the growing number of archery clubs, schools offering archery as an extracurricular activity, and the emergence of various archery facilities in various tourist destinations.

Archery is a sport that has been around for a long time and is increasingly popular among various groups, both as a recreational activity and as a competition⁴. Although the timeframe appears safe, the potential for risk and injury remains, for both beginners and experienced archers⁵. Frequent accidents, such as injuries from missed arrows or injuries caused by improper equipment, indicate that safety in this sport is not fully understood. A lack of understanding of proper safety procedures is often the main cause of these problems.

Many archers, especially those just starting out, do not receive adequate training in basic techniques and the safe use of equipment⁶. In addition, minimal supervision from trainers or instructors can increase the risk of accidents on the field.⁷ In this context, it is important to raise awareness of the importance of safety, as well as provide the necessary training and resources to prevent injuries. Furthermore, inadequate facilities and infrastructure also contribute to safety issues in archery⁸. Many training locations are not equipped with adequate safety areas, increasing the likelihood of accidents.⁹ Therefore, a collaborative effort is needed from training facility managers, sports federations, and archers themselves to create a safer environment. Improving safety standards in archery is expected to minimize the risk of injury and provide a more positive experience for all participants.

Awareness of the importance of safety in sports not only impacts individuals but also creates a safer environment for all participants. By providing training in proper technique and safe equipment use, archers can reduce the risk of injury caused by human error. Furthermore, knowledge of emergency procedures and how to handle dangerous situations is also an important part of safety¹⁰. Consistent and comprehensive implementation of safety measures is essential to ensure that archery can be enjoyed by future generations without compromising the health and safety of archers.

Archery will be dangerous when carried out without complying with the established rules and procedures because bows and arrows can be dangerous if used without paying attention to existing procedures. Not all coaches or people who are just learning archery can understand the safety procedures in archery, it is necessary to socialize massively to ensure that archery can run smoothly and have great benefits. In Kampung Emas Karpyak Seyegan

there is an archery field and the children there have an interest in archery, therefore it is necessary to hold a socialization of safety in archery in the hamlet of Kampung Emas Kranyak Seyegan to ensure that archery carried out in Kampung Emas Kranyak Seyegan can run well and safely.

RESEARCH METHOD

The population in this study were children who actively participated in archery training in Kampung Emas, where the sample was taken by purposive sampling, namely: 1) boys aged 7-10 years; 2) regularly practice archery; 3) do not understand the importance of archery safety. The sample obtained in this study was 20 children. The method used in this study was an experiment using one group pretest posttest with a data collection technique using a Likert scale questionnaire. The data collection process was by providing archery safety training. Guidelines for implementing archery safety refer to the SOP word archery, as follows.



FIGURE 1. Procedure archery safety

The outreach activities were carried out smoothly and were monitored using a closed-ended Likert-scale questionnaire to determine whether the outreach results were accepted and implemented. This means that data collection took place before and after the outreach activities were implemented. In this study, the instrument adopted from the research ¹¹. The questionnaire was combined and then used as a measuring instrument. The expert-validated questionnaire was proven valid and reliable with a score of 7.686. The following is the instrument grid.

Table 2. Instrument Grid

Variable	Factors	indicators	Expert Number				
			Strongly agree	Agree	Enough	Don't agree	Strongly Disagree
Archery safety procedures	Knowledge	I understand the safety procedures to follow when practicing archery.	5	4	3	2	1
		The safety training I received was sufficient to protect me while training.	5	4	3	2	1

Prevention	The archery practice area I use has clear markings and boundaries for safety.	5	4	3	2	1
	I know what to do in an emergency situation while practicing archery.	5	4	3	2	1
	Can install the Bow according to the standard.	5	4	3	2	1
	Archery techniques according to the correct provisions.	5	4	3	2	1
	Accustomed to close range archery.	5	4	3	2	1
	Shooting consciously.	5	4	3	2	1
Total		40	32	24	16	8

Testing of related measurement data is continued using normality and homogeneity tests followed by a t-test which will be presented below.

RESULTS AND DISCUSSION

The data results in this study are in the form of knowledge and skills knowledge about archery safety. The results of the data analysis of knowledge and skills are: The results of the descriptive statistical analysis of knowledge and skills of knowledge about archery safety in Table 3 are as follows:

Table 3. Descriptive Statistics of Knowledge and Skills of knowledge about archery safety

Statistics	Knowledge	Skills
N	15	15
Mean	155.07	192.40
Media	157.00	165.00
Mode	156.00	193.00a
Std, Deviation	7.33	14.83
Minimum	143.00	158.00
Maximum	134.00	198.00
Sum	2641.00	1966.00

When displayed in the form of assessment norms, archery safety knowledge and skills are presented in Table 4 as follows:

Table 4. Assessment Norms for Knowledge and Skill Levels in knowledge about archery safety

No	Intervals	Category	pretest		posttest	
			F	%	F	%
1	80-100	Very good	2	13.33%	4	26.66%
2	50-79	Good	8	53.33%	6	40%
3	30-49	Not enough	3	20%	4	26.66%
4	10-29	Very less	2	13.33%	1	6.66%

Amount	15	100%	15	100%

As seen in Table 4, knowledge and prevention improved. Therefore, we can proceed to normality and homogeneity tests. The results are presented in Table 5.

Table 5.Summary of Normality Test Results

Table 3: Summary of Normality Test Results				
Fitness	p	sig	Information	
knowledge and prevention	0.540	0.05	Normal	
	0.075	0.05	Normal	
Homogeneity Test Results				
Group	df1	df2	Sig.	Information
Knowledge and Skills	1	26	0.341	Homogeneous

In table 5, the normality and homogeneity tests can be concluded that the sample is in normal and homogeneous conditions.

Table 7.Results of sports massage t-test analysis of the knowledge and skills of training participants

Archery Accuracy	Average	t-test for Equality of Means			
		t ht	t tb	Sig.	Difference
knowledge	236.04	5,756	3,083	0,000	19.25
prevention	372.36				

Based on the analysis above, it can be concluded that "the archery safety socialization activity" was accepted. This means that the archery safety socialization increased knowledge and prevention.

Archery is an activity that combines skill, concentration, and precision. However, because it involves the use of a bow and arrow, which are potentially dangerous tools, safety is of paramount importance¹². Socialization regarding safety procedures in archery is necessary to prevent accidents and ensure a safe environment for all participants, both beginners and professionals.

Archery is a sport that requires precision and concentration but also demands serious attention to safety because it involves potentially dangerous equipment such as bows and arrows¹². Safety outreach aims to ensure that all archers, both beginners and experienced, understand and comply with safety procedures¹³. The importance of this outreach lies in its ability to prevent accidents, such as injuries from arrows or equipment misuse. By educating archers on basic rules, such as not drawing the bow without instruction and ensuring the area behind the target is safe, risks can be minimized¹⁴⁻¹⁶. Effective outreach can be done through hands-on training, pre-session briefings, and the use of visual media to reinforce understanding.

Range officers play a key role in promoting archery safety¹⁷. They are responsible for communicating safety rules before each session, such as prohibiting aiming carelessly or walking in front of the shooting line while others are shooting^{18,19}. Supervisors must also ensure that all archers comply with procedures, such as checking the condition of the bow and arrows before use. To support socialization, supervisors can use verbal cues or signals such as whistles to regulate activities in the field^{20,21}. With a firm yet friendly approach, the supervisor helps create a safe and organized environment, allowing archers to focus on practice without worrying about safety risks.

Challenges in archery safety socialization include a lack of awareness among some archers and limited resources in some clubs²². Some archers, especially experienced ones, may underestimate the importance of safety rules, requiring regular reminders through briefings or retraining²³⁻²⁵. On the other hand, clubs with limited budgets may struggle to provide adequate coaches or outreach media^{26,27}. To address this, solutions such as written guides, online videos, or simple infographics can be used as cost-effective alternatives. With a consistent and creative approach, safety awareness campaigns can reach all archers, ensuring archery remains a safe and enjoyable sport for all.

CONCLUSION

Archery is a sport that requires special attention in safety education because inexperienced athletes can lead to risks, even death. Athletes are often unaware of hazards such as bowstring injuries or misdirected arrows. Therefore, a dedicated orientation session for archery safety education should include practical training, such as how to properly hold the bow and maintain a safe stance on the shooting line. Assistance by an experienced coach

during initial sessions is also crucial to ensure archers understand and implement safety procedures. By establishing safe habits early on, they can develop their archery skills with confidence and without the risk of injury.

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The Impact of Joyful Learning Training on Teachers' Pedagogical Skills and the Quality of Learning in Special Sports Classes

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Abstract. Teaching in the Special Sports Class (SSC) at Labschool UNY Middle School faces challenges such as low student engagement, lack of focus, and suboptimal learning outcomes. This study aims to enhance the ability of KKO teachers at Labschool UNY to design Joyful Learning-based instruction. The research methodology included coordination, planning, training implementation, and subsequent monitoring and evaluation. A total of 30 KKO teachers participated actively in the training. The teachers' understanding was measured by comparing pretest and posttest scores, which were analyzed using the Wilcoxon signed-rank test. Results showed a significant increase in understanding, with the average score rising from 26.1 to 34.8 (out of a maximum 40). The N-Gain score of 0.62 indicates a medium level of effectiveness. The Wilcoxon test yielded a significance value of $p = 0.000$ ($p < 0.05$), confirming that the improvement in teachers' understanding was statistically significant. This enhancement in competency positively impacted the creation of a more conducive learning environment, thereby supporting students' academic and athletic success. The training thus provides a strategic solution for improving the quality of education in special sports classes.

INTRODUCTION

Learning at the Junior High School level faces various quite complex challenges, both in terms of curriculum, learning approaches and the mental condition of students [1], [2]. At this level, students experience a crucial developmental phase, the transition from childhood to adolescence, which brings significant emotional, cognitive, and social changes. These changes make students more sensitive to external pressures, such as high academic demands and the broader social environment. Furthermore, a dense curriculum focused on academic achievement often creates significant pressure for students [3]. This is feared to reduce interest and motivation in learning in the future because students feel pressured by the burden of material they must learn in a limited time.

In addition to the curriculum still experiencing various limitations, the learning methods used in many junior high schools are still conventional, such as lectures and memorization. These methods tend to be boring for students, as they feel they are not actively involved in the learning process [4], [5]. Learning that relies solely on one-way instruction leaves students feeling passive and less motivated to learn. This lack of active engagement leads to boredom and a tendency to lose focus, resulting in suboptimal learning outcomes. Ultimately, students may lose their curiosity and joy in learning, which are crucial for their future development.

To address this issue, a more student-centered learning approach is needed that is more enjoyable and can motivate students, such as implementing the concept of joyful learning. This approach aims to create a more positive learning environment, where students feel freer to be creative and actively participate in learning activities [6], [7]. A more enjoyable and interactive approach is expected to allow students to enjoy the learning process more and gain a better understanding. Joyful learning can create an atmosphere that supports students' emotional, social, and cognitive development simultaneously, allowing them to focus not only on academic achievement but also on the joy and satisfaction of learning.

Joyful learning or also known as fun learning is an approach that emphasizes providing positive and interesting learning experiences for students [8], [9]. This approach aims to reduce the anxiety and academic pressure that students often feel at school [10], [11]. One way to achieve this is by integrating elements such as games, creativity, collaboration, and the use of technology into the learning process. This way, students are not only actively engaged but also experience the learning process as enjoyable and meaningful. This approach seeks to make learning more relevant to students' lives, which, in turn, reduces boredom and increases motivation to learn.

At the junior high school level, implementing joyful learning has significant benefits in helping students develop social, emotional, and cognitive skills in a balanced manner. Project-based activities, group discussions, and the use of digital media are some examples of activities that can be implemented to optimize learning. Through these activities, students can work together, collaborate, and use their creativity while utilizing technology to deepen their understanding of the material. This approach aligns with constructivist learning theory, which states that knowledge is actively constructed by students through experiences and interactions with their environment [12], [13]. Thus, the potential of implementing joyful learning not only has a positive impact on student engagement but also helps students understand and apply knowledge in a more meaningful way.

The implementation of joyful learning in the classroom, particularly at the junior high school level, still faces various challenges that must be addressed to create an optimal learning experience. A needs analysis conducted in the special sports class (SSC) at Labschool UNY Junior High School in February 2025 revealed several key obstacles faced by teachers in implementing ideal learning for students. One of the biggest challenges is teachers' readiness to adopt more innovative learning methods. Most teachers are still accustomed to traditional learning methods that are more lecture-based and memorization-based, and are unfamiliar with more interactive and creative approaches, such as those proposed in the joyful learning concept.

Besides teacher preparedness, another obstacle faced is a lack of understanding and skills in effectively implementing the joyful learning approach. Many teachers have not received adequate training related to learning strategies based on this concept. As a result, teachers struggle to design learning activities that are not only engaging but also appropriate to the diverse characteristics of their students. Without a deep understanding of the principles of joyful learning, teachers will struggle to create a fun learning environment and enable active student participation. This suggests that more intensive training and mentoring for teachers is urgently needed to optimize the implementation of joyful learning in the classroom.

Joyful learning-based learning training for teachers is a strategic step in supporting more innovative and adaptive learning according to the characteristics of students [14]. The concept of joyful learning has the main advantage of creating a more engaging, interactive, and enjoyable learning environment for students. This advantage is reflected in its ability to increase student motivation and engagement in the learning process [15]. This training will assist teachers in integrating elements such as games, creativity, collaboration, and technology to help students feel more enthusiastic and actively engaged in learning activities. Furthermore, it is hoped that these skills can be internalized by teachers in their teaching, thereby reducing the academic stress and anxiety often experienced by students due to a dense curriculum and monotonous teaching methods.

Joyful learning training will also help teachers to optimize evaluation and reflection activities in the learning process [16], [17], [18]. This training will provide examples of instruments or methods that can be used to evaluate learning effectiveness, both in terms of academic achievement and student participation. This will enable teachers to continuously improve and develop their teaching methods based on the feedback received. Furthermore, this guide encourages collaboration among teachers, allowing for the sharing of experiences and best practices in implementing a joyful learning approach. In this way, the guide not only serves as a tool for teachers but also plays a role in building a dynamic and innovative learning culture in schools.

METHOD

The joyful learning-based training was motivated by the need for mentoring, as conveyed by the principal and KKO teachers at SMP Labschool, Mantrijeron District, Yogyakarta City, Special Region of Yogyakarta. The research methodology included coordination and planning, training implementation, and subsequent monitoring and evaluation. The joyful learning-based training at the KKO SMP Labschool UNY in implementing the independent curriculum included lectures, discussions, questions and answers, followed by practice. This training was attended by 30 KKO SMP Labschool UNY teacher participants. This training guided junior high school teachers in understanding, planning, and implementing joyful learning-based learning in special sports classes, which aimed to support a more enjoyable and effective learning process without neglecting students' academic abilities or abilities in the field of sports of each student. The level of knowledge and understanding of the training participants was measured using the Wilcoxon test utilizing the results between the pretest and posttest with the target to determine the increase in participants' abilities before and after the training in planning, implementing, and evaluating joyful learning-based learning in special sports classes.



FIGURE 1. Flow of implementation of joyful learning-based learning training.

RESULT AND DISCUSSION

Results

1. Coordination and Planning

Coordination and planning activities included initial coordination between the community service team and the school to discuss the agreement on the implementation of the training. The coordination resulted in agreement regarding the number of participants, schedule, and technical aspects of the activity. In addition, the community service team also conducted internal brainstorming, conducted a relevant literature review on the Joyful Learning strategy, and developed training modules as the main material in the activity. The result was the Joyful Learning-Based Learning Development Training for Junior High School Sports Class, Teachers at Labschool UNY, which was held directly at the Labschool UNY Hall 2025. This community service activity was attended by 30 Junior High School Labschool UNY teachers with the aim of improving teachers' abilities in developing Joyful Learning-based learning. Through this training, it is hoped that teachers will be more skilled in designing interactive, creative, and enjoyable learning according to the characteristics of SSC students.

2. Training Implementation

The *Joyful Learning-Based Learning Development* training for Junior High School Special Sports Class teachers at Labschool UNY was officially opened by Dr. Drs. Sudarmaji, M.Pd., who expressed high appreciation for the program. He emphasized that this training should not only improve teachers' pedagogical competence but also serve as the first step toward building an innovative learning culture. After the opening session and group photo, the activities continued with a pretest to assess teachers' initial understanding of the concepts, principles, and practices of Joyful Learning.

The core session was delivered by Prof. Suyanto, who explained the basic concepts, characteristics, and practical steps of implementing Joyful Learning in the classroom. He provided concrete examples, guidance on developing assessment instruments, and teaching modules aligned with fun, interactive, and meaningful learning. The Q&A session was highly interactive, with teachers actively asking questions about strategies to maintain an engaging atmosphere and designing evaluation instruments suitable for Joyful Learning. The discussion helped deepen participants' understanding and motivated them to apply this approach in their classrooms.

The training then moved on to a collaborative mentoring session where teachers designed lesson plans based on Joyful Learning principles. They exchanged ideas and experiences while receiving feedback from facilitators on how to create enjoyable, concrete, and meaningful learning experiences. The session concluded with a reflective evaluation of the design process, followed by a posttest to measure teachers' progress compared to the pretest. These results served as an indicator of the training's effectiveness in strengthening teachers' competence and supporting the integration of Joyful Learning practices at Labschool UNY.

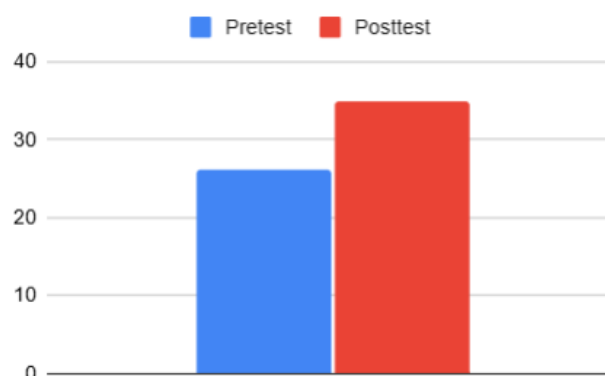


FIGURE 2. Pretest and posttest average diagram

The average pretest score of 26.1 increased to 34.8 in the posttest, with a maximum score of 40. The N-Gain calculation showed a value of 0.62, which is considered moderate. This means the training has increased teachers' understanding by 62% of the maximum potential. In other words, the improvement is quite effective and indicates that the training provides real benefits for teachers in understanding the concept of Joyful Learning.

TABLE 1. *Wilcoxon Pretest Posttest Test Results of Teachers' Pedagogical Ability*

	Sig. Value (2-tailed)	Information	Interpretation
Pretest-Posttest	0.000	Sig. < 0.05	Hypothesis rejected

The analysis results using the Wilcoxon Signed Ranks Test showed that all participants (100%) experienced an increase (post test > pretest), with no scores remaining constant or decreasing. The significance value obtained was $p = 0.000 < 0.05$, thus it can be concluded that the increase in teachers' understanding after participating in the training was statistically significant. This strengthens the finding that the training has a significant impact on improving teachers' abilities in developing Joyful Learning-based lessons.

3. Monitoring and Evaluation

Monitoring and Evaluation activities included processing training data, preparing outputs in the form of reports and guidelines, and a comprehensive evaluation of the activity's success. Teacher participants responded positively, feeling more confident and motivated to try implementing Joyful Learning strategies in the classroom. Through this training, the main benefits obtained are: (1) teachers are provided with practical guidance so that learning is more interactive, creative, and in accordance with the characteristics of KKO students, (2) increased understanding and skills of teachers in implementing Joyful Learning, and (3) the availability of a Joyful Learning implementation model that can be used as a reference or good practice for other classes at Labschool UNY.

Discussion

The training has proven effective in improving participants' understanding of the Joyful Learning concept. This is evident in the improvement in evaluation scores before and after the training. Several factors contributing to this improvement include the training process. One key factor contributing to the success of Joyful Learning is the teachers' pedagogical competence.[19].

There are four main approaches in Joyful Learning, namely experience, interaction, communication, and reflection[20] This approach serves as the foundation for the training, encouraging increased participant competency. The training was systematically designed through the delivery of materials that facilitated a conceptual understanding of Joyful Learning and its application in learning. This stage was reinforced by practical activities or simulations, which provided participants with the opportunity to directly try and implement Joyful Learning strategies in the classroom. Furthermore, discussion forums and question-and-answer sessions provided a space for participants to clarify their understanding, exchange experiences, and collectively enrich their insights. Furthermore, the mentoring process contributed to increasing participants' confidence in developing creative ideas appropriate to their respective learning contexts.

Joyful learning was chosen to address the prevailing problem of increasing student motivation in sports classes. Joyful learning creates a pleasant learning environment, which can increase student motivation and engagement in the learning process.[21], [22] This is also in line with research conducted by Aulia and Surawan[23] Joyful Learning, when used effectively, can boost students' self-confidence in their own abilities in junior high school. Furthermore, implementing Joyful Learning using experimental and project methods can enhance students' creativity and self-discipline.[24]

Physical education classes require both physical and mental engagement. Joyful Learning encourages interactive, creative, and collaborative activities, enabling students to actively participate in both the exercises and the theory of sports. Engaging and enjoyable learning activities activate students' cognitive and psychomotor skills through interactive and creative tasks.[25]. In addition to physical skills, Joyful Learning helps develop sportsmanship, discipline, teamwork, and self-confidence in sports.[26].

Students in physical education classes often face a busy practice schedule. Joyful Learning can be a strategy to maintain a light and enjoyable learning environment, focusing not only on achievement but also on emotional well-being. By integrating the principles of Joyful Learning, the positive emotions created in teacher-student interactions foster a sense of appreciation, motivation, and foster an inclusive learning dynamic.[27], [28]

CONCLUSION

The Joyful Learning-Based Lesson Development Training for Junior High School Sports Class teachers at Labschool UNY has been successful and yielded significant results. This activity has proven to improve teachers' understanding and skills in designing interactive, creative, and enjoyable learning according to the characteristics

of KKO students. Evaluation results show a moderate and statistically significant increase in average scores from pretest to posttest, confirming the training's effectiveness. Suggestions for activities to ensure the sustainability of the program, it is recommended that (1) similar training be carried out continuously so that teachers become more skilled in developing Joyful Learning in accordance with the development of student needs, (2) similar training but towards other in-depth learning such as mindful and meaningful learning (3) the results of the training can be disseminated as good practices for other classes at Labschool UNY and partner schools so that the benefits are wider.

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HARMONY VILLAGE: STRENGTHENING RELIGIOUS MODERATION BASED ON LOCAL WISDOM IN GULUREJO TOURISM VILLAGE, KULONPROGO

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Abstract. "Harmony Village" is a community service program focused on strengthening religious moderation based on local wisdom in Gulurejo Tourism Village, Kulon Progo Regency. This program addresses challenges from extreme religious understandings threatening social harmony. The urgency lies in declining youth participation in cultural traditions ("Merti Desa", "Gejog Lesung", "Nyadran") and emerging conflicts related to public facility use. Through participatory approaches, this program develops a religious moderation model based on local wisdom, builds capacity of religious and traditional leaders, develops Joint Business Groups, and creates educational tourism packages. Using Participatory Rural Appraisal (PRA) for local wisdom mapping and Training of Trainers (ToT) for capacity building, results show increased capacity in promoting religious moderation, strengthened dialogue forums, increased participation in local traditions, and integrated religious moderation values in tourism village development. This program supports University Key Performance Indicators and the Merdeka Belajar Kampus Merdeka program for students.

INTRODUCTION

Religious moderation is a religious approach emphasizing a balanced attitude (wasathiyah) in understanding and practicing religious teachings. In Indonesia, this concept is strategic given the diversity of religion and culture characterizing the nation. As a country with a Muslim majority but considerable religious diversity, Indonesia has long developed a moderate religious approach. Azra (2020) explains that Indonesian Islam has distinctive characteristics that are accommodative to local culture and tolerant of differences. However, in the last two decades, increasing extreme religious views have become a serious challenge to social harmony in various regions, including rural areas previously known for their strong local wisdom.

Gulurejo Tourism Village in Lendah District, Kulon Progo Regency, Special Region of Yogyakarta, represents a microcosm reflecting this socio-religious dynamic. With a population of around 7,500 people and religious composition (99% Muslim, 0.16% Christian, 0.20% Catholic), this village has rich cultural-religious traditions such as "Merti Desa" (village cleansing ritual), "Gejog Lesung" (traditional music with mortar and pestle), and "Nyadran" (pilgrimage and communal prayer at ancestral graves). These traditions have served for centuries as social cohesion tools involving all community elements regardless of religious background.

Based on ethnographic study conducted by the research team in February 2025, an increasing phenomenon of socio-religious tension was identified in Gulurejo Tourism Village. In the last two years, several small conflict cases related to public facility use for religious activities and cultural tourism attractions have been recorded. Analysis shows conflicts emerge alongside strengthening religious understanding that tends to be textualist and less accommodative to local traditions. This phenomenon aligns with findings by Bruinessen (2018) and Hasan (2019) about strengthening religious purification movements viewing some local cultural practices as "impure" or "bid'ah" (innovation).

From the sociology of religion perspective, the phenomenon in Gulurejo Tourism Village can be explained as a clash between two streams of religious meaning: contextualist-cultural and textualist-puritan (Woodward, 2021). The first stream interprets religion considering socio-cultural context, while the second is literal interpretation often lacking consideration of cultural dimensions. Woodward (2021) explains that information technology and social media have

accelerated the spread of textualist-puritan understanding to rural areas previously dominated by contextualist-cultural understanding.

Despite these challenges, Gulurejo Tourism Village still has strong social capital to develop religious moderation. Local wisdom traditions, although experiencing decreased participation, are still implemented as social integration vehicles. Additionally, its status as a tourism village provides opportunities to develop narratives of diversity and tolerance as cultural tourism attractions. In this context, the "Harmony Village" program becomes highly relevant as social intervention integrating religious moderation approach with local wisdom development, aligning with Casram's (2019) concept that religious moderation based on local wisdom can create social harmony.

METHOD

The "Harmony Village" program adopts a participatory and collaborative approach implemented through systematic and integrated stages. The first stage focuses on program preparation and initiation, starting with intensive coordination with village government and community leaders to build shared understanding and commitment. The program is socialized to the wider community through various village meeting forums, announcements at places of worship, and local communication media to ensure all community elements receive accurate information about the program's purpose and benefits.

The second stage shifts focus to capacity development of identified key actors. Religious moderation facilitator training is conducted by presenting competent speakers and using experiential learning approach so participants gain both theoretical knowledge and practical skills in facilitating interfaith dialogue. Simultaneously, workshops for developing religious moderation modules based on local wisdom are held collaboratively involving religious leaders, traditional leaders, academics, and youth representatives.

Participatory Rural Appraisal (PRA) Approach

This method is used to conduct participatory mapping of local wisdom and village potential through techniques: Focus Group Discussion (FGD) with community groups, participatory social and cultural mapping, stakeholder analysis, and timeline of village history and development of inter-religious group relations.

Training of Trainers (ToT) Approach

This method builds capacity of local facilitators in promoting religious moderation through: intensive training with experiential learning approach, regular mentoring and assistance, and case-based evaluation and reflection.

RESULTS AND DISCUSSION

Program Implementation Results

Participatory Local Wisdom Mapping

Participatory local wisdom mapping activities were conducted through a series of Focus Group Discussions (FGD) involving religious leaders, traditional leaders, youth, and tourism village managers. This participatory mapping successfully identified four main local traditions containing religious moderation values: "Merti Desa" (Village Cleansing Ceremony), "Gejog

Lesung" (Traditional Mortar Music), "Nyadran" (Ancestral Grave Pilgrimage), and "Binangun" Principle (Mutual Cooperation).

The "Merti Desa" tradition is a village cleansing ceremony conducted annually at the beginning of the planting season. This tradition contains religious moderation values such as gratitude for God's blessings, caring for the environment, and solidarity among villagers. FGD participants identified that this tradition has begun to decline in the last 5 years, indicated by decreased youth participation. One youth participant (23 years old) stated: "I actually want to participate in Merti Desa, but some friends say this tradition is not in accordance with Islamic teachings." This phenomenon aligns with Woodward's (2021) findings about the influence of textualist-puritan understanding less accommodative to local traditions.

From this participatory mapping, four main findings emerged: First, all identified local traditions contain religious moderation values in accordance with Islamic teachings and other religious values. Second, declining participation in some traditions is more caused by lack of understanding of the relationship between local traditions and religious teachings. Third, local traditions integrated with economic activities have better sustainability. Fourth, youth need assistance in understanding and contextualizing religious teachings with local traditions.

Religious Moderation Facilitator Training

Religious moderation facilitator training was conducted in three series with total of 25 participants consisting of religious leaders (8 people), traditional leaders (5 people), youth (10 people), and tourism village managers (2 people). Training used Training of Trainers (ToT) approach with experiential learning method. Pre-test and post-test evaluation results show significant increase in participants' understanding of religious moderation. Average pre-test score was 65, while post-test reached 85, indicating training effectiveness in building religious moderation understanding.

Formation of Interfaith Communication Forum (FKLID)

One concrete outcome was the formation of the Village Interfaith Communication Forum (FKLID). FKLID was formed as continuation of action plans developed by participants during training. This forum consists of representatives from various religious communities in Gulurejo Village, including religious leaders, traditional leaders, youth, and tourism village managers. FKLID was inaugurated on April 15, 2025, and formulated several main programs including monthly regular interfaith dialogue, rapid response team for potential conflicts, development of educational modules, facilitation of interfaith economic collaboration through Joint Business Groups, and integration of religious moderation values in tourism village development.

In its first three months of operation, FKLID successfully conducted 3 regular dialogue meetings with average participation of 30 people per meeting. Additionally, FKLID successfully handled one small conflict case related to use of meeting hall for different religious activities on same day through mediation approach and compromise principles. This case shows FKLID's effectiveness as a dialog-based conflict prevention and resolution mechanism.

Development of Joint Business Group (KUB)

Another concrete outcome was formation of an interfaith Joint Business Group (KUB). KUB "Harmony Village" consists of 15 members from various religious backgrounds (13 Muslims, 1 Christian, 1 Catholic). KUB focuses on producing handicraft products and culinary items reflecting harmony values. Main products include "Harmony Bags" made from recycled

materials, "Gejog Lesung" miniatures as souvenirs, "Harmony Snacks" based on local recipes, and religious moderation educational materials.

Economically, KUB has shown encouraging results. In the first three months, KUB successfully marketed products worth Rp 15,000,000 with average member profit of Rp 500,000 per month. Beyond economic impact, KUB has had significant social impact. Monthly monitoring shows average interaction frequency among members increased from 2 times (before KUB) to 8 times (after KUB) per month, contributing to building mutual understanding and breaking down prejudices among religious groups.

Development of Educational Tourism Package

One innovation was development of "Gulurejo Harmony" educational tourism package integrating religious moderation values in tourism activities. The package consists of several main activities: introduction to local wisdom history, direct participation in local traditions, dialogue with religious and traditional leaders, visit to interfaith places of worship, and creative workshop making harmony products. This tourism package is targeted at educational tourists such as students, teachers, and religious community activists.

Since launching in May 2025, the package has served 5 tourist groups with total 150 participants. Evaluation results show tourist satisfaction level at 4.3 (scale 1-5). Economically, this tourism package has contributed to increased community income. Average tourism village revenue per month increased from Rp 5,000,000 (before package) to Rp 8,000,000 (after package).

Discussion

Results of the "Harmony Village" program show that integration of religious moderation values with local wisdom is effective in building moderate, inclusive, and socially resilient religious understanding and practice. This finding aligns with Casram's (2019) concept that religious moderation based on local wisdom can create social harmony by integrating universal religious values with local cultural context. The participatory mapping process successfully identified religious moderation values in local traditions that previously were not explicitly recognized.

Formation of the Village Interfaith Communication Forum (FKLID) has proven effective in building dialogue and preventing interfaith conflicts. This finding aligns with research by Rachmawati et al. (2021) that interfaith communication forums at village level can function as mechanisms for dialog-based conflict prevention and resolution. FKLID's success in handling small conflict cases shows the forum's capacity as an effective early warning and rapid response mechanism.

Formation of interfaith Joint Business Group (KUB) shows that economic approach can be effective instrument in strengthening social cohesion, aligning with research by Sholikhah et al. (2020). KUB provides dual benefits: economic benefit through income increase and social benefit through intensity of interfaith interaction. This dual benefit is important in strengthening program sustainability because it provides concrete incentive for members to remain active.

Development of "Gulurejo Harmony" educational tourism package shows innovation in promoting religious moderation through experiential approach, aligning with research by Santoso et al. (2019) and Widiyanto et al. (2021) that educational tourism can be an effective medium for religious moderation education. Tourism package advantages lie in experiential

learning approach allowing participants not only to understand religious moderation cognitively but also experience it directly.

CONCLUSION

The "Harmony Village" program has successfully developed a model for strengthening religious moderation based on local wisdom in Gulurejo Tourism Village, Kulon Progo Regency. Through an integrative, participatory, and local wisdom-based approach, this program has contributed to realizing an inclusive and socially resilient community. Several important conclusions are: First, integration of religious moderation values with local wisdom has proven effective in building moderate, inclusive, and socially resilient religious understanding and practice. Second, capacity development approach through facilitator training has successfully increased participants' knowledge, attitudes, and skills in promoting religious moderation. Third, formation of social institutions such as FKLID and KUB has provided dual impact: strengthening religious moderation and improving economic welfare. Fourth, integration of religious moderation values in tourism village development through educational tourism package has created an innovative, enjoyable, and sustainable model for promoting religious moderation.

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Entrepreneurship Assistance for Ecoprint Textile Crafts in Kampung Emas Krapyak Towards the Establishment of a Tourism Village

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Abstract. Kampung Emas Krapyak has great potential in the ecoprint industry as part of the environmentally-based creative economy. However, there are several issues hindering its development, including the limited skills of the local community in ecoprint techniques, the lack of digital technology utilization in marketing, and the suboptimal development of an ecoprint-based educational tourism ecosystem. These issues result in low competitiveness of local ecoprint products and the underutilization of this sector's contribution to the local community's welfare. As a solution, this community service program aims to enhance the community's capacity in the ecoprint industry through training in eco-friendly production techniques, strengthening digital marketing strategies, and developing an ecoprint-based educational tourism ecosystem. The program will be implemented in several main stages, namely: (1) ecoprint technique training with an innovative and sustainable approach, (2) digital marketing assistance via social media and e-commerce platforms, and (3) the management of ecoprint educational tourism involving active community participation. The expected outcomes of this program include the signing of a Cooperation Agreement/IA by the unit leaders with Kampung Emas partners, the uploading of community service activity videos to the institution's YouTube channel, and the creation of an A5-size poster as branding to promote the improvement of the community's skills and competencies in producing high-quality ecoprints, expanding marketing reach and product sales through digitalization, and the establishment of a sustainable educational tourism system as the main attraction of Kampung Emas Krapyak. With this systematic solution-based approach, it is expected that the community will become more self-reliant in developing the ecoprint industry as part of the village's creative economy, thus providing positive impacts on welfare and environmental preservation. The proposed activities involve a series of workshops, mentorship, and collaboration with academics and creative industry practitioners. Additionally, periodic evaluations and monitoring will be conducted to ensure the program's effectiveness and the sustainability of the impacts. Thus, this program will not only improve the competitiveness of local ecoprint products but also strengthen Kampung Emas Krapyak's identity as a center for ecoprint-based educational tourism in Indonesia.

Keywords: Creative Economy, Ecoprint, Kampung Emas Krapyak.

BACKGROUND

Kampung Emas Krapyak is an area that possesses abundant cultural and natural resource potential. This area is known for its strong cultural heritage and natural beauty, which can be developed as a tourism destination. However, until now, the local community still faces various challenges in developing a locally-based creative economy sector. One opportunity that can be developed is ecoprint textile crafts, which rely on natural materials to create unique patterns on fabric. Ecoprint has become one of the trends in the environmentally-friendly textile industry, with high market value due to the uniqueness of the patterns and the sustainable production process. Despite its great potential, the lack of understanding within the community regarding production techniques, business management, and marketing strategies has resulted in this potential being underutilized. Technological advancements and market trend changes have driven the increase in product variations in Indonesia, including ecoprint textile crafts. This method not only offers environmentally-friendly products but also utilizes local natural resources effectively. As part of the efforts to improve the community's welfare, entrepreneurship assistance in Kampung Emas Krapyak is organized to equip the community with technical and business skills in the ecoprint industry. The aim is to prepare this village to become an economically self-sufficient tourist village that can attract visitors through its uniqueness in producing ecoprint textiles (Pramudya, 2022). Most of the people in Kampung Emas Krapyak work in the informal sector with uncertain incomes. Their skills in producing ecoprint textile crafts are still limited, and few efforts have been made to improve the competitiveness of these products in the broader

market. The lack of a strong business structure has caused the micro-enterprises run by the community to often be unsustainable. In terms of marketing, ecoprint products from Kampung Emas Krpyak are still not widely known outside the local community, making it difficult to reach a broader market. Additionally, the absence of an organized tourism village ecosystem means that the creative economy-based tourism potential has not been optimally utilized. Despite having great potential, Kampung Emas Krpyak faces challenges related to limited human resources in terms of skills and knowledge about ecoprint. Furthermore, the lack of access to markets and effective promotional tools also acts as a barrier to the development of the ecoprint-based tourism village. This research formulates the question of how to effectively overcome these limitations and increase the community's capacity to manage the creative industry, particularly ecoprint, as well as strategies to integrate this craft into a sustainable and competitive tourism village potential (Saputro, 2024).

Ecoprint textile crafts are an eye-catching printing technique that uses natural materials as dyes and pattern imprints on textiles. This technique not only emphasizes aesthetic and artistic values but also supports environmental sustainability practices in the textile industry. Ecoprint relies on leaves, flowers, and other plant elements to create unique patterns, making it one of the environmental innovations. In Kampung Emas Krpyak, the potential for ecoprint can be enhanced through entrepreneurship assistance that emphasizes creativity and marketing (Neli, 2023). Based on the situation analysis, this assistance program will focus on two main aspects: Production: Improving the community's skills in producing high-quality ecoprint textiles with proper techniques. Using natural raw materials and minimizing waste in the production process. Providing training in pattern innovation and the processing of ecoprint derivative products to increase the market value. Enhancing the community's capacity to manage businesses through business management training, financial record-keeping, and sustainable business management strategies.

Marketing: Developing digital marketing strategies and branding so that ecoprint products from Kampung Emas Krpyak are more widely recognized. Helping the community build marketing networks with creative industry players, marketplaces, and tourists. Developing an ecoprint-based educational tourism ecosystem to attract tourists and increase local economic potential. This program aims to: Enhance the community's skills in producing high-quality and marketable ecoprint textiles. Encourage the formation of independent and sustainable ecoprint-based creative business groups. Develop Kampung Emas Krpyak as a creative economy-based tourism village that attracts both local and international tourists. Expand the marketing network for ecoprint products through digital platforms and various promotional events. Improve the community's welfare through the creative economy and tourism sectors. This community service is expected to provide both practical and theoretical benefits. Practically, the results of this research can be used by the Kampung Emas Krpyak community to improve their skills and economic independence through the development of ecoprint crafts. It also helps the government and other stakeholders in formulating policies for developing tourism villages based on local potential. Theoretically, this study contributes to the literature on entrepreneurship and small-medium enterprise management in the context of tourism village development, and offers new insights on the application of ecoprint that can be replicated in other areas with similar characteristics (Wijaya, 2024). This program aligns with the Higher Education Key Performance Indicators (IKU) in terms of increasing community capacity and contributing to local creative economy and tourism. Through this approach, it is expected that the community will not only acquire technical skills but also possess good managerial and marketing capabilities. This community service initiative also supports the Sustainable Development Goals (SDGs) agenda in aspects of economic welfare improvement, women empowerment, and environmental preservation through the use of natural materials in the creative industry.

Definition of Traditional Pras Prasi is a form of traditional visual art from Bali, known for its unique characteristic of being created on lontar leaves. Suwidja (no date) states that "prasi is an illustration made on lontar leaves" (p. 4). This shows that prasi is not just a drawing, but also a cultural expression using a natural medium long known in the Nusantara tradition. In the introduction of Gedong Kirtya Singaraja, it is explained that prasi is "lontar with illustrations (drawings) etched with a pengrupak" (Gedong Kirtya Singaraja, 1975, p. 4). The pengrupak is a small knife made of steel used to etch the lontar leaves, producing distinctive lines and illustrations. This technique highlights a special skill that has been passed down through generations in Balinese art tradition. Poerwadarminta (1976) in the *Kamus Umum Bahasa Indonesia* explains that lontar refers to a palm tree (*Borassus*), the leaves of which are used for writing, as well as the ancient manuscripts written on lontar leaves (p. 377). Thus, lontar not only serves as a writing medium but also as a cultural documentation tool with high historical value. Suwidja (no date) further adds that the term lontar is a metathesis of the word "rontal," which comes from Old Javanese. The word rontal consists of "ron" meaning leaf and "tal" meaning the rontal tree. This term has been known since the early 10th century, even before the reign of King Balitung. This explanation emphasizes that prasi art has deep historical roots and is closely tied to the development of ancient literacy in Indonesia. Studies on prasi not only focus on its technical and historical aspects but also include aesthetic and social functions. Prasi often serves as a medium for visual narratives that contain moral teachings, epic stories, or legends that live within Balinese society. Thus, prasi plays a dual role as a work of visual art as well as a cultural communication medium. Over time, prasi has undergone visual changes, especially with the emergence of modern Balinese artists like I Wayan Mudita Adnyana, who explored new styles. However, despite the variations in form,

the fundamental principles of line usage, proportions, composition, and etching techniques remain the main features that distinguish prasi from other forms of visual art. This shows that prasi has been able to adapt to the dynamics of the times without losing its traditional identity. As traditional Balinese illustration art, prasi cannot be separated from the basic concept of illustration itself. According to the *Kamus Latin-Indonesia*, the word illustration means appearance, grandeur, light, or the brilliance of a vivid depiction. As a verb, the term "ilustrasi" means "to illuminate, brighten, make real, perform, decorate, or radiate" (*Kamus Latin-Indonesia*, no date). From this definition, illustration can be understood broadly, encompassing various forms of art that aim to clarify, beautify, or animate, including music, drama, film, and books. Poerwadarminta (1976) in the *Kamus Umum Bahasa Indonesia* explains that illustration specifically means decoration with images, paintings, diagrams, or graphics that help explain the content of a book (p. 377). Thus, illustration is applied visual art that serves to complement texts, providing additional explanation and clarifying meaning. A similar opinion was expressed by Robert Roos in his book *Illustration Today*, where he states, "Illustration, as used in the title of this book, means drawings or other pictorial representation intended for elucidation or adornment—representation with individuality, color, and excitement that stimulate and motivate to action" (Roos, no date, p. xx). This means that illustration is a visual representation intended to explain or adorn a text, with unique characteristics, full of color, and capable of evoking emotions and encouraging specific actions. Wallace S. Baldinger (in the study of modern illustration) also mentions that "illustration itself [is a] picture made for a specific text and designed to help a reader visualize the characters and action of the story" (Baldinger, no date, p. xx). This statement clarifies that illustration directly helps bring narratives to life and assists readers in visualizing characters and storylines. Meanwhile, Soedarso Sp. (1990) in his book *Tinjauan Seni* emphasizes that illustration art falls into the category of applied art, meaning art dedicated to other purposes. He gives the example of illustrations in short stories in magazines or diagrams of tree cross-sections in biology books. According to him, "often, the illustrations will explain more than the words accompanying them" (Soedarso, 1990, p. xx).

From these definitions, it can be concluded that illustration is an image or painting that accompanies a text or manuscript with the aim of clarifying, illuminating, or decorating. In the context of prasi art, illustration takes the form of two-dimensional images on lontar leaves, functioning just like illustrations in books, that is, to illuminate, clarify, animate, or adorn the text or stories they accompany. To clarify the understanding of the term traditional, the *Kamus Besar Bahasa Indonesia* (KBBI) defines "traditional" as something that is passed down through generations, based on customs and traditions, and inherited from one generation to the next (KBBI V, 2016). This definition aligns with Poerwadarminta's (1976) explanation that the term "traditional" comes from the English word "tradition," meaning customs, so "traditional" means in accordance with time-honored customs. Fowler (in the study of cultural anthropology) adds that tradition can be defined as customs inherited from one generation to another, including customary laws, mythological stories, artistic principles, and literary traditions based on the collective experiences of society. Thus, tradition includes both material and non-material aspects passed down consistently from one generation to the next.

Based on these explanations, prasi can be understood as traditional Balinese illustration art passed down through generations. Ancient Balinese prasi is not just a drawing on lontar leaves but also part of a cultural heritage containing artistic principles, visual techniques, and literary values that have been preserved from generation to generation.

PROBLEMS AND SOLUTIONS

Based on the problems faced by the community of Kampung Emas Krapyak, the solutions offered in this program encompass various aspects, namely production, business management, and marketing. These solutions are systematically arranged to ensure optimal and sustainable results. One of the main solutions is to improve ecoprint production skills. This program will provide intensive training to the community in several technical aspects, such as the introduction of natural raw materials, natural dye processing techniques, as well as the mordanting process, pattern printing, and color fixation to produce high-quality products. In addition, the community will also be trained to create derivative ecoprint-based products such as bags, clothing, and accessories to diversify products and increase market value. With this training, it is expected that the number of ecoprint artisans with high skills will increase, resulting in higher-quality and more diverse products. Furthermore, the formation of active and independent ecoprint business groups will further strengthen the ecoprint-based creative industry in Kampung Emas Krapyak.

In addition to improving production skills, this program will also strengthen business management aspects so that the community can manage businesses sustainably. The training provided will cover small business financial management, business planning, and strategies for business development to ensure stable growth. Moreover, strengthening the business group institutions will also be a key focus, so the community can have more organized business structures and access to various funding programs available. It is hoped that through this solution, the ecoprint business groups formed will have good management systems, well-organized financial records, and readiness to independently develop businesses.

In terms of marketing, digital strategies and branding will be implemented to increase the market reach of ecoprint products from Kampung Emas Krpyak. The community will receive digital marketing training, including the use of social media and marketplaces as promotion and sales tools. Additionally, the creation of logos and brand identities will be carried out so that ecoprint products have a stronger appeal to consumers. To introduce the products widely, the community will also be involved in various exhibition events and creative bazaars. With this strategy, it is expected that ecoprint product sales will increase, brand identity will be more widely recognized, and products can be sold through various online platforms. As a final step, this program will also develop an ecoprint-based educational tourism ecosystem in Kampung Emas Krpyak. This program includes the development of ecoprint educational tourism packages that are attractive to tourists, increasing the community's capacity to receive visitors, and collaborating with local governments and tourism industry players to expand promotional networks. With this strategy, Kampung Emas Krpyak is expected to develop into an ecoprint-based tourism destination, increasing the number of visitors and providing positive impacts on the improvement of the community's welfare through the creative economy and tourism sectors.

The entrepreneurship assistance for ecoprint textile crafts in Kampung Emas Krpyak focuses on improving production skills, strengthening business management, developing marketing and branding, and building the tourism village infrastructure. The main solutions offered include technical training in ecoprint production, business management training, and the introduction of digital marketing strategies. In addition, business groups (KUB) will be formed to collectively manage production and marketing. Expected outcomes include the improvement of ecoprint product quality and quantity, the establishment of a structured business management system, and increased sales through digital marketing. Measurable achievement indicators include a 50% increase in the number of ecoprint products, at least 80% of training participants mastering basic ecoprint techniques, and the formation of 1 KUB with a minimum monthly turnover of IDR 10 million. Research support on the potential of ecoprint and tourism villages shows that the integration of environmentally-friendly crafts and tourism can create sustainable economic and social impacts for the Kampung Emas Krpyak community.

Technical training for ecoprint production will cover material preparation, natural dye techniques, and product finishing. Expected outcomes: 30 participants will understand ecoprint techniques both theoretically and practically. Training modules for ecoprint will be provided for participants. Limited Raw Material and Equipment Availability: Solution: Assistance in sourcing local raw materials and ecoprint production equipment. Expected outcomes: 5 business groups will obtain ecoprint materials and equipment. Availability of local resources to support sustainable production. Limited Market Access and Product Branding: Solution: Digital marketing and product branding workshops. Expected outcomes: Creation of brand identity for ecoprint products from Kampung Emas Krpyak. 30 participants will understand digital marketing through social media and marketplaces. Lack of Business and Financial Management: Solution: Small business management, financial record-keeping, and business strategy training. Expected outcomes: 30 participants will have small business management skills. 5 business groups will have a simple financial record-keeping system. Suboptimal Ecoprint-Based Tourism Village: Solution: Development of ecoprint educational tourism packages and promotional video creation. Expected outcomes: 1 ecoprint educational tourism package in Kampung Emas Krpyak. Promotional video for ecoprint-based tourism village.

The expected outputs of this program include the preparation and signing of a Cooperation Agreement/IA between the unit leaders and Kampung Emas partners, the publication of the community service activity videos on the institution's YouTube channel, and the creation of an A5-size poster as a branding media. These outputs aim to improve the community's skills and competencies in producing high-quality ecoprints, expand market reach and sales through digitalization, and establish a sustainable educational tourism system as the main attraction of Kampung Emas Krpyak. Through this systematic solution approach, this program is expected to encourage the community's self-sufficiency in developing the ecoprint industry as part of the village's creative economy, while also providing positive impacts on welfare and environmental preservation.

a. Problems in the Production Sector

To enhance ecoprint production capacity, this program will implement the following stages: Basic Ecoprint Training will provide the community with an understanding of the ecoprint concept, its benefits in the creative industry, and its positive environmental impact. Production Technique Workshop will train the community on basic and advanced ecoprint techniques, including mordanting, pattern printing, and color fixation to ensure better product quality. Derivative Product Processing will train the creation of derivative products such as bags, clothing, and accessories to diversify the products. Consultation and Product Quality Evaluation will provide consultation sessions and feedback on the products to improve their quality standards.

b. Problems in Business Management

To establish a sustainable ecoprint business, the program will provide training in business management aspects, including Financial Management Training, educating the community on effective financial record-keeping to enhance transparency and financial planning. Business Plan Development will train the community on business development strategies, cost pricing, and market analysis. Business Institution Strengthening will help the community build more organized business group structures to access available funding and strategic partnerships. Business Legality Assistance will help the community with business registration processes to ensure products can be marketed widely and have higher competitiveness.

c. Problems in Marketing

To expand the market reach of ecoprint products from Kampung Emas Krapyak, digital marketing strategies and branding will be applied. Digital Marketing Training will educate the community on how to utilize social media and marketplaces for product promotion and sales. Logo and Brand Identity Creation will assist business groups in creating attractive visual identities for their products. Offline Marketing Strategies will encourage community participation in exhibition events and creative bazaars to expand market networks. Collaboration with the Tourism Industry and Local Government will connect the community with creative industry communities, hotels, and restaurants as potential marketing partners.

d. Development of Ecoprint-Based Tourism Village Ecosystem

In addition to improving production and marketing, Kampung Emas Krapyak will be developed as an educational tourism village. Creation of Ecoprint Educational Tourism Packages will design an experiential program for tourists interested in learning about ecoprint. Hospitality Training for the Community will educate the community on how to host tourists and provide engaging educational experiences. Provision of Supporting Infrastructure will help the community prepare workspaces and galleries to display ecoprint products. Tourism Village Promotion will develop both digital and offline promotional strategies to attract local and international tourists.

1. Partner Participation in the Program

Partners will play an active role in the program implementation, including As Training Participants where the community will participate in ecoprint, business management, and marketing skills training sessions. As Business Actors, after training, partners are expected to apply the skills acquired to independently produce and market products. As Educational Tourism Managers, the community will be involved in managing ecoprint educational tourism to provide an engaging experience for visitors. As Mentors for Future Generations, partners who have acquired skills will act as mentors for other community members to ensure the program's sustainability.

2. Evaluation of Program Implementation and Sustainability

To measure the effectiveness of the program, evaluation will be carried out in several stages. Regular Monitoring will include direct observation and interviews with participants at each activity stage. Product Evaluation will test products for quality, marketability, and the sustainability of raw materials. Business Sustainability Analysis will review the development of community businesses, the number of products sold, and the effectiveness of marketing strategies. Adjustments and Development will modify the program to improve effectiveness and sustainability based on evaluation results. Partnership with External Parties will establish partnerships with local governments, academics, and business players to support the program's post-implementation sustainability.

3. Roles and Responsibilities of Team Members

To ensure the smooth implementation of the program, team members will have tasks divided according to their expertise. Team Leader: Prof. Dr. Drs. Iwayan Suardana, M.Sn. will be responsible for overall program coordination and establishing partnerships with stakeholders. Member 1: Dr. Made Aditya Abhi Ganika, S.Pd., M.Pd. will provide technical ecoprint training to the community. Member 2: Alifia Zahra Khoirunisa, M.Pd. will assist in strengthening business management and financial record-keeping.

Students will be responsible for brand identity development, digital marketing, and promoting the tourism village. Evaluation and Monitoring Team will monitor the program's implementation and prepare reports on its success.

4. Recognition of Credit Hours for Participating Students

Students participating in this program can receive academic recognition in the form of Community Service Credit Hours, recognizing participation as a project-based course or community service. Scientific Publication will allow the results of this activity to be used for research and publication in academic journals. Entrepreneurship Skill Development will provide students with firsthand experience in community-based business management and the creative economy. Professional Portfolio will allow students to document activities and achievements in the program for use as a work portfolio.

With this systematic implementation method, it is expected that the program will run effectively and provide long-term impacts for the Kampung Emas Krpyak community. The program's sustainability will also be ensured through strengthening business institutions and collaborating with various parties that support the development of ecoprint-based creative economy.

METHODS OF COMMUNITY SERVICE ACTIVITIES

1. Stages of Solution Implementation

a. Problems in the Production Sector

To improve the capacity for ecoprint production, the program will implement several stages. First, Basic Ecoprint Training will provide the community with an understanding of the ecoprint concept, its benefits in the creative industry, and its positive environmental impact. Following that, a Production Technique Workshop will train the community on basic and advanced ecoprint techniques, including mordanting, pattern printing, and color fixation to ensure better product quality. The Derivative Product Processing will focus on creating derivative products such as bags, clothing, and accessories to diversify the product offerings. Finally, Consultation and Product Quality Evaluation will provide feedback on the products produced to help improve their quality standards.

b. Problems in Business Management

To establish a sustainable ecoprint business, the program will also provide training in business management aspects. This includes Financial Management Training, educating the community on effective financial record-keeping to enhance transparency and business financial planning. Business Plan Development training will teach strategies for business development, cost pricing, and market analysis. Furthermore, the program will work on Business Institution Strengthening, helping the community build more organized business group structures to access funding and strategic partnerships. Lastly, Business Legality Assistance will guide the community through the business registration process, enabling them to market products widely and increase their competitiveness.

c. Problems in Marketing

To expand the market reach of ecoprint products from Kampung Emas Krpyak, digital marketing strategies and branding will be implemented through. Digital Marketing Training will educate the community on how to use social media and marketplaces as tools for product promotion and sales. Logo and Brand Identity Creation will assist business groups in creating visually appealing brand identities for their products. Offline Marketing Strategies will encourage community participation in exhibition events and creative bazaars to expand their market networks. Finally, the program will foster Collaboration with the Tourism Industry and Local Government, connecting the community with creative industry networks, hotels, and restaurants as potential marketing partners.

d. Development of Ecoprint-Based Tourism Village Ecosystem

In addition to enhancing production and marketing, Kampung Emas Krpyak will be developed as an educational tourism village. This will involve the creation of Ecoprint Educational Tourism Packages, providing

an experiential learning program for tourists interested in ecoprint. Hospitality Training for the Community will equip the community with the skills to welcome tourists and offer engaging educational experiences. The program will also assist with Provision of Supporting Infrastructure, such as preparing workspaces and galleries for displaying ecoprint products. Lastly, Tourism Village Promotion will include both digital and offline promotional strategies to attract local and international tourists.

1. Partner Participation in the Program

Partners play an active role in the program implementation, including as Training Participants, where the community will participate in ecoprint, business management, and marketing skills training sessions. As Business Actors, after training, partners are expected to apply the skills acquired to independently produce and market their products. Additionally, they will serve as Educational Tourism Managers, helping to manage ecoprint educational tourism and provide an engaging experience for visitors. Finally, as Mentors for Future Generations, those who have acquired the skills will mentor other community members to ensure the sustainability of the program.

2. Evaluation of Program Implementation and Sustainability

To assess the effectiveness of the program, evaluation will be carried out in several stages. Regular Monitoring will involve direct observation and interviews with participants at each stage of the activity. Product Evaluation will focus on testing the products for quality, marketability, and sustainability of raw materials. The program will also conduct a Business Sustainability Analysis, reviewing the development of community businesses, the number of products sold, and the effectiveness of the marketing strategies implemented. Adjustments and Development will follow based on evaluation results to improve the program's effectiveness and sustainability. The program will also establish Partnerships with External Parties, working with local governments, academics, and businesses to support the post-implementation sustainability of the program.

3. Roles and Responsibilities of Team Members

To ensure smooth implementation, the team's responsibilities will be divided according to their expertise. Team Leader: Prof. Dr. Drs. Iwayan Suardana, M.Sn. will be responsible for the overall coordination of the program and establishing partnerships with stakeholders. Member 1: Dr. Made Aditya Abhi Ganika, S.Pd., M.Pd. will provide technical ecoprint training to the community. Member 2: Alifia Zahra Khoirunisa, M.Pd. will assist with strengthening business management and financial record-keeping. Students will be responsible for brand identity development, digital marketing, and promoting the tourism village. Finally, the Evaluation and Monitoring Team will oversee the program's implementation and prepare reports on its success.

4. Recognition of Credit Hours for Participating Students

Students who participate in this program can receive academic recognition in the form of Community Service Credit Hours, which will be acknowledged as a project-based course or community service. Additionally, Scientific Publication will allow the results of the activity to be used for research and publication in academic journals. Entrepreneurship Skill Development will provide students with hands-on experience in community-based business management and the creative economy. Finally, students will develop a Professional Portfolio with documentation of activities and achievements during the program, which can be used as a work portfolio.

With this systematic implementation method, it is expected that the program will run effectively and have long-term impacts on the Kampung Emas Krapyak community. The program's sustainability will also be ensured through strengthening business institutions and collaborating with various parties that support the development of the ecoprint-based creative economy.

RESULTS OF ACTIVITY IMPLEMENTATION

The program was carried out in several stages. First, socialization and introduction regarding the importance of creative entrepreneurship, particularly in the field of textile crafts, were conducted. The community was given an understanding of the market potential of ecoprint products and their positive impact on the village's economy. Subsequently, intensive training on ecoprint techniques was carried out. This training involved various community elements, from housewives to the village youth. In this stage, participants were trained to create creative patterns using leaves, flowers, and other natural materials on fabric with an environmentally friendly technique. The materials used in the ecoprint process were those readily available around the village, such as teak leaves, papaya leaves, and local flowers. The goal was to ensure that the production process could be done independently and sustainably without relying on imported raw materials.

During the training, the community was not only taught about the ecoprint technique but also about product marketing strategies. They were given knowledge about how to market products through digital platforms, such as social media and marketplaces, to expand their market reach. Additionally, the community was provided with insights on small business financial management and how to manage products to maintain high quality.



The first stage requires patience and attention to detail, as each leaf must be placed carefully to create the desired design. Although this is a manual process, each participant received guidance from experienced instructors, such as I Wayan Suradana and Made Aditya Abhi Ganika, who provided directions on the best way to arrange the leaves, along with tips and tricks to achieve the best results. With this guidance, participants not only learned the ecoprint technique itself but also understood the philosophy behind the use of natural materials and their connection to the environment. Additionally, arranging the leaves taught participants to appreciate the diversity of nature and creative ways to utilize the resources around them.

After the leaves were arranged, the next stage involved steaming and dyeing the fabric to transfer the patterns and colors from the leaves to the fabric, which will be explained in further stages. However, this first stage is crucial in determining the final result of the ecoprint craft, as the patterns created will depend on the precision and creativity of the participants in selecting and arranging the leaves correctly.

In the second stage of the ecoprint process, after the leaves are neatly arranged on the fabric, the next step is to wrap the arranged leaves with plastic. This step ensures that the leaves stay in place and that the desired pattern can be well transferred onto the fabric. The plastic used serves as a protective layer that helps press the leaves so that they do not move during the steaming or heating process.

Participants then cover the entire surface of the fabric with the arranged leaves with transparent plastic. The plastic must be tightly wrapped to ensure that the leaves stay pressed against the fabric and do not shift. Additionally, the plastic helps retain moisture in the leaves and prevents them from drying out too quickly before the heating process begins. This wrapping is essential to create clear and sharp patterns, ensuring that every detail of the pattern printed on the fabric remains intact.

Once the leaves are fully covered with plastic, the fabric is carefully folded or rolled to prepare for the next stage. The fabric wrapped in plastic will be ready for further processing, which is the heating or steaming stage. The plastic used in this stage ensures that the leaves stay in place and do not come loose during the subsequent processes. Furthermore, the plastic helps maintain moisture, which is essential for transferring colors and patterns from the leaves to the fabric.

By wrapping the leaves with plastic, the printed pattern will have maximum sharpness and clarity. This stage requires precision in wrapping the fabric with plastic because if the plastic is not wrapped tightly enough, the leaves may shift and affect the final result. The plastic used not only acts as a press but also maintains cleanliness and prevents the leaves from external influences that could disrupt the ecoprint process. Once the wrapping is complete, the fabric wrapped in plastic will be ready for the next stage, which is the steaming or heating process. It is at this stage that the pattern and color from the leaves will transfer to the fabric, creating a unique and natural design. This stage is crucial in producing an aesthetic ecoprint work that meets the participants' expectations.

In the third stage of the ecoprint process, after the leaves are well arranged and wrapped in plastic, the next step is the rolling of the fabric. This stage is important to ensure that the leaves stay pressed properly during the heating process. After the fabric, which has been arranged with leaves, is wrapped in plastic, it is carefully rolled, usually using thin cloth or other protective materials.

The rolling of the fabric is done to ensure that all the leaves stay in the desired position and do not shift. During the rolling process, it is essential to ensure that the fabric is rolled tightly but not too tightly, because if it is too tight, the leaves may be pressed excessively, which could alter the pattern produced. Properly rolled fabric will ensure that the ecoprint pattern on the fabric is more even and clear.

CONCLUSION

The ecoprint process in Kampung Emas Krapyak has successfully had a significant impact on developing the community's skills in environmentally-based textile crafts. The training stages, which include leaf arrangement, packaging, rolling, and heating, not only provided technical knowledge on how to create ecoprint products but also opened opportunities for the community to develop their creativity in utilizing local natural materials. Additionally, this training offered new insights into the importance of digital product marketing, which has become the main strategy to expand the market and increase the competitiveness of local ecoprint products. By actively involving the community in each stage, this program has successfully created sustainable business opportunities, while also introducing Kampung Emas Krapyak as a center for educational tourism based on local wisdom and environmental friendliness. Through collaboration between the community, academics, and industry practitioners, it is hoped that the ecoprint industry in this village will develop independently and provide positive contributions to the welfare of the community as well as environmental preservation. The sustainability of this program will continue to be monitored to ensure long-term positive impacts on the development of the creative economy and local wisdom in Kampung Emas Krapyak.

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COMMUNITY EMPOWERMENT OF THE PKK IROYUDAN GROUP THROUGH TRAINING IN MAKING SNACKS MADE FROM STICKY RICE RAW MATERIALS AS AN ALTERNATIVE TO PROCESSING CROPS

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Abstract. This Community Service (PkM) aims to increase the insights, skills, and economic potential of the community through culinary training based on local agricultural products in Iroyudan Village, Bantul. The focus of the activity is the use of glutinous rice as an alternative raw material to produce snack products that have selling value. The activity was carried out on July 25-26, 2025 with the main target of members of the Iroyudan PKK Group. The implementation method includes lectures, interactive discussions, question and answer sessions, and hands-on practice. The evaluation of the results was carried out through descriptive analysis with the percentage of participants' skill achievements. The results showed a significant improvement in four main aspects: (1) knowledge of the variety of sticky rice-based snack foods; (2) the skill of processing, packaging, and presenting products; (3) understanding of appropriate packaging and labeling types; and (4) the ability to calculate the selling price of products accurately. In addition to providing practical skills, this activity also encourages local culinary innovation, expands marketing opportunities, and fosters entrepreneurial spirit among PKK members. Therefore, this PkM contributes to strengthening the family economy as well as preserving local culinary.

Keywords: training, local culinary, glutinous rice, community empowerment

INTRODUCTION

Guwosari Village is the result of the merger of two villages, namely Selarong and Iroyudan, based on the decision of the Governor of the Special Region of Yogyakarta in October 1947. The choice of the name "Guwosari" is a solution that can be accepted by all people without eliminating the main icon of the region, namely Selarong Cave or Secang Cave. This name also contains historical meaning because during the Java War, Selarong did not only refer to one specific hamlet, but included the entire Guwosari area and even the surrounding villages.

The administrative transformation of Guwosari began in 1914 when the Sultanate of Yogyakarta reorganized the structure of village government. The position of demang replaces the village head, while the tax system changes from in-kind to money tax. These changes also have an impact on the structure of land ownership and the center of government. Selarong Village is centered in Gandekan Hamlet, while Iroyudan Village is centered in Iroyudan Hamlet. The social and leadership structure formed at that time then became the basis for the management of the Guwosari area until now.

Along with the times, the central government through Law Number 18 of 2012 concerning Food emphasizes that the state has an obligation to provide sufficient, safe, nutritious, balanced, and quality food. This effort must touch the village level so that the community is able to maintain food availability and security. One of the implementation of the strategy is through the Safe Food Village Program, which emphasizes the active role of village communities in maintaining food quality, hygiene, and sanitation.

The Safe Food Village program emphasizes the importance of synergy between the village government, farmer groups, health cadres, business actors, and the wider community. With this collaboration, it is hoped that the collective awareness of the village community in managing agricultural products will be safer and more sustainable. This awareness is also the foundation for improving the welfare of rural communities.

Indonesia as an agrarian country has an abundance of local food, including glutinous rice commodities. This food ingredient has high economic value and is the main raw material for various traditional culinary products. However, the use of sticky rice is still limited due to the lack of innovation in product diversification. Most people only process it into conventional foods such as steamed glutinous rice, lemper, or diamond (Suryani et al., 2020).

Similar conditions are also experienced by the people in Kapanewon Guwosari, especially Iroyudan Hamlet. The potential of crops in the form of glutinous rice has not been utilized optimally due to limited knowledge of

food technology, access to capital, and industrial support. As a result, glutinous rice is more widely sold in raw form at relatively low prices, which is ultimately less profitable for farmers (Putri & Wijayanti, 2021; Rahmadani et al., 2019).

Innovation in processing glutinous rice into various value-added products is very important to increase competitiveness. Product diversification, such as glutinous rice flour, healthy snacks, or fermented products, can expand the market and increase selling value (Susanti & Prasetyo, 2022). In addition, modern packaging and creative marketing will make glutinous rice products more acceptable to modern consumers who prioritize practicality and nutritional value.

Unfortunately, the PKK group in Iroyudan still faces obstacles in the development of these innovations. The lack of training makes the community only limited to traditional processing. In addition, low knowledge of marketing strategies and consumer trends hinders the development of sticky-based products to be able to compete in local and regional markets. Therefore, intervention through systematic training is necessary.

Based on the potential and existing problems, community empowerment through training in processing glutinous rice into innovative snacks is a strategic step. This training not only provides technical skills in product processing and packaging, but also strengthens the entrepreneurship, marketing, and competitiveness aspects of local products. Thus, this empowerment program is expected to be able to increase the economic value of glutinous rice, strengthen food security, and support the welfare of the people of Iroyudan Hamlet.

METHOD

This empowerment program is a collaboration between universities and the PKK group of Iroyudan Kalurahan Guwosari through the *2025 Mbangun Deso Community Service* scheme. The main focus of the activity was training on making snacks made from glutinous rice as an effort to improve skills, strengthen entrepreneurship, and empower the local economy. This activity actively involves lecturers, students, and PKK members, thereby creating a sustainable process of science, technology, and skill transfer.

The stages of the activity are carried out systematically, including: (a) preparation, in the form of coordination with partners, identification of needs, and preparation of training materials; (b) the implementation of training which includes the presentation of theory, direct practice, and mastery of independent skills; and (c) post-training assistance, where participants receive follow-up guidance and conduct skills scans for PKK members in other regions. This approach aims to ensure the continuity of the program while expanding the impact of activities at any level.

The learning methods used are characteristic and applicative, including lectures for mastering basic concepts, presentations by instructors, direct practice of making snacks made from sticky rice, group discussions for the exchange of experiences and creative ideas, and field assistance. This combination of methods is designed to facilitate theoretical understanding as well as technical skills, from raw material selection, processing techniques, to product packaging and marketing strategies. Thus, participants are not only technically involved, but also have personal privacy.

Evaluations were carried out in layers during and after the training. Formative evaluation assesses the achievement of cognitive aspects (knowledge) through participants' understanding of materials, equipment, and processing processes, as well as psychomotor aspects (skills) through the ability to practice making products according to quality standards. Furthermore, the summative evaluation assesses the impact of activities on improving skills, independence, and the potential for business development based on processed glutinous rice products.

RESULTS AND DISCUSSION

1. Results

The training activity was attended by 20 members of the Iroyudan PKK with a very high level of participation. All participants were fully present from the beginning to the end of the activity, and showed active involvement in lectures, discussions, and practice sessions. The most prominent enthusiasm was seen in the practice stage, where participants immediately tried to make various variants of sticky rice-based snacks. The full attendance and positive response of the participants reflected the real need for this activity as well as demonstrating the effectiveness of the participatory training methods used.

The results of the pre-test and post-test evaluations showed a significant improvement in the aspects of knowledge and skills of the participants. In terms of knowledge, before the training, around 60% of participants did not understand the variety of modern glutinous rice food products and their economic value. After the training, 92% of participants were able to name at least three types of snacks made from sticky rice and could quote the

selling price. In terms of skills, all participants (100%) managed to produce at least one type of snack with the guidance of the PkM team.

The products produced include **Black Sticky Rice Sponge**, **Sticky Rice**, **Keciput**, and **Widaran Cheese**. Black Sticky Rice Sponge is appreciated for its dense but soft texture, as well as its distinctive blackish-purple color. Sticky Mango introduces an international culinary touch, while Keciput and Widaran Keju represent local wisdom with new innovations in taste. Organoleptic evaluation shows a very high level of acceptance of the taste, texture, and appearance of the product. As a follow-up, the PKK group plans to routinely produce sticky rice snacks for village social activities, expand marketing through social media, and allocate income for cash groups and improve members' welfare.

2. Discussion

The implementation of empowerment programs through skills training based on local resources has proven to be effective as a strategy to improve the community's economy. The learning methods used are not only theoretical, but also applicable through *the learning by doing* approach. This allows participants to directly apply the skills gained in real practice, thus accelerating the process of internalizing knowledge. These results are in line with the view of Ife and Tesoriero (2008) who emphasized that community empowerment should be oriented towards strengthening the capacity of individuals and groups to increase economic independence.

Diversification of local processed foods is also an important finding of this activity. Reliance on one type of traditional product can limit the economic value and market attractiveness of a commodity. Through training, local raw materials such as glutinous rice were successfully processed into various products with different selling values, such as lomis, klepon, and other snacks. This product diversification opens up wider market opportunities while preventing consumer saturation. Similar research by Suharto (2019) shows that diversification of local food products not only enriches the variety of regional cuisines, but also increases the sustainability of community-based micro businesses.

Furthermore, increasing added *value* is a real indicator of program success. If previously glutinous rice was only sold raw at a low price, after being processed into ready-to-eat snacks, its value can increase up to three to four times. This has a direct economic impact on PKK member families, as well as building awareness of the importance of product innovation in increasing household income. The results of this study are in line with the findings of Fitriani and Andriani (2020), who stated that local food processing innovations contribute significantly to improving the economic welfare of rural communities.

In addition to the economic aspect, this activity also plays a role in strengthening the institution of the PKK group. Initially, the PKK group focused more on social activities, but through this program, their role developed into a forum for collective entrepreneurship. The spirit of mutual cooperation in the production and marketing process not only reduces operational costs, but also increases the economic scale of the group. This institutional strengthening is in line with the results of Sutrisno's (2021) research which emphasizes that the success of community empowerment programs is greatly influenced by the solidity of group organizations, collaboration, and sustainable social support.

CONCLUSION

The Community Service Program (PkM) at PKK Iroyudan proves that sticky rice processing training is able to increase members' knowledge, skills, and economic independence. Participants were not only able to produce a variety of processed sticky rice products with high selling value, but also showed enthusiasm and creativity in innovating. Product diversification has been proven to provide added economic value, while encouraging the transformation of the PKK from a social group to a more independent collective enterprise. With institutional support, the spirit of mutual cooperation, and the availability of local raw materials, this program has strong promising prospects in strengthening the welfare and economic resilience of village communities.

THANK YOU

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Community Sports Program Socialization to Improve Physical Fitness: Building a Healthy Lifestyle in Kampung Emas Serut and Terbah

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Abstract. The Community Service Program (PKM) with the Village Development Scheme aims to increase awareness and participation of residents of Kampung Emas Serut and Terbah in carrying out recreational sports activities as a means of maintaining physical fitness and developing a healthy lifestyle. The activity was attended by the Head of the Kulonprogo Regency Tourism Office, the Head of Pengasih Village, the Head of Serut and Terbah Hamlets, Serut and Terbah Residents, the Serut and Terbah Youth Organization, and students of the Recreational Business Management Study Program, Faculty of Vocational Studies, Yogyakarta State University with a total of approximately 100 people. The activity was carried out through the socialization of the community sports program which included counseling on the importance of physical activity, the practice of water-based tourism as a form of recreational sport, and mentoring in implementing sustainable sports activities. The method used was a participatory approach by actively involving the community from the planning stage to implementation. The results of the activity showed an increase in community understanding of the benefits of exercise for health, increased community participation in joint physical activities, and the emergence of community initiatives to continue the sports program independently. Thus, this program contributes to building a community-based healthy lifestyle, strengthening sports culture, and improving the quality of life of residents of Kampung Emas Serut and Terbah.

Keywords: Community Sports, Physical Fitness, Healthy Lifestyle, Community Empowerment.

INTRODUCTION

Kampung Emas is a flagship program initiated by Yogyakarta State University (UNY). Terbah and Serut hamlets are among the hamlets in Kulonprogo that were officially designated as Kampung Emas. Kampung Emas is a manifestation of the Tridharma of higher education that combines education, community service, and research. It is hoped that this program will be able to build the independence of the Terbah and Serut hamlets. The Kampung Emas program is one of the orders from the Governor of the Special Region of Yogyakarta (DIY) to preserve the 4K, namely: Palace, Campus, Office, and finally the Village. The flagship program that is the main focus of the Kampung Emas of Terbah and Serut hamlets is the Education, Sports, Health, Economy, and Arts program. The education program is realized through the construction of a Community Hall which is also used as a place for PAUD activities in Serut hamlet. The sports program through the revitalization of the volleyball court and routinely conducts volleyball training for local residents. Meanwhile, the health program holds health checks and massage training for local residents. Based on initial observations of the Community Sports Program being developed, one of which involves volleyball, a good level of physical fitness is needed to support the survival of the Serut and Terbah Hamlets. Therefore, an innovative, creative, and sustainable Community Sports Program is needed.

A high level of physical fitness is crucial for everyone. Physical fitness is crucial because relatively good physical fitness contributes to good health. Fitness is a state in which a person performs a physical task or work without experiencing fatigue. Physical fitness is achieved through regular and continuous exercise. Fitness impacts performance, preventing fatigue. Physical fitness is a crucial aspect, particularly in sports. Physical fitness is essential for humans because it significantly supports the results of our daily activities. The level of physical fitness varies from person to person, depending on their physical activity level, diet, and lifestyle (Suwo et al., 2023).

Physical fitness comprises components related to health and skills, which have been shown to correlate with a person's competitive ability (Xiao et al., 2022). A similar finding is also expressed in research, which reveals that physical activity has become an important way for people to improve their physical fitness (Zhang, 2023). Exercise is an effective strategy for improving quality of life and physical fitness (Diel-Conwright et al., 2018). Physical fitness is one of the health indicators that plays a role in preventing non-communicable diseases that threaten public health (Dong et al., 2023). The importance of mental health is a crucial aspect in improving one's physical fitness. Mental health has been recognized as one of the most important determinants of mental health and has the potential to improve the mental health of both individuals and communities (Muslić et al., 2020). Mental health is one of the most serious health conditions that negatively impacts every aspect of life. Mental health disorders are a growing global public health challenge and have a significant impact on society (Javed et al., 2021). Based on this, the Community Service Team collaborated with interested parties to conduct a community service project on "Socialization of Community Sports Programs in Improving Physical Fitness: Building a Healthy Lifestyle in Kampung Emas Serut and Terbah."

LITERATURE REVIEW

Sport is a central physical activity that plays a role in promotive, preventive, curative, and rehabilitative efforts to improve health and physical fitness. This exercise must be carried out comprehensively, integrated, and continuously (Ahmad Hafas Rasyidi et al., 2023). Previous research has revealed that one of the activities needed in everyday life is exercise. Currently, many people are still reluctant to engage in regular exercise. They cite various reasons, ranging from being busy with work, relatively little free time, to limited sports facilities. However, currently, in several cities in Indonesia, the government is providing facilities for the public to exercise regularly by designing city parks and main roads as sports areas. This strategy has been quite successful because the public is very enthusiastic about exercising. The large number of people enthusiastically participating in sports in these sports areas has created a positive impact, including on the micro-business and service sectors (Harvianto, 2020). Indonesian society currently still lacks awareness of the importance of a healthy lifestyle. This occurs due to a lack of public interest and appreciation for sports. Barriers contributing to low levels of physical activity include knowledge, motivation, and availability of facilities. Health is fundamental to community life, and it indirectly influences the level of progress in a region. Health is crucial for humans, as without good health, it would be difficult for anyone to carry out their daily activities (Juniarto et al., 2022).

Exercise is a crucial factor in improving physical fitness. Physical fitness itself can enhance a person's survival. Previous research has shown that physical fitness consists of health-related components and skills, which have been shown to correlate with a person's competitive ability (Xiao et al., 2022). A similar finding is also expressed in research showing that physical activity has become an important way for people to improve their physical fitness (Zhang, 2023). Exercise is an effective strategy for improving quality of life and physical fitness (Diel-Conwright et al., 2018). Physical fitness is a health indicator that plays a role in preventing non-communicable diseases that threaten public health (Dong et al., 2023). Physical activity is any bodily movement by the body's muscles and supporting systems that requires energy expenditure (Riyanto & Mudian, 2019). Physical activity is any bodily movement produced by skeletal muscle contraction that increases energy expenditure above resting levels and includes daily routine tasks such as commuting, work-related activities, or household chores, as well as purposeful health-improving movements/activities (Aziz & Arofiati, 2019). This means that physical activity is any conscious activity carried out in moving the body by expending energy supported by the body's muscles. (Maharani & Sudaryanto, 2021) state that physical activity is a form of human behavior, encompassing all bodily movements from small movements to participating in marathons. It can be concluded that physical activity is not only exercise but also daily activities such as cleaning the house, washing clothes, cycling, and jogging are also included in physical activity and can be done from simple activities to measured and planned activities.

RESEARCH METHOD

Sport is a central physical activity that plays a role in promotive, preventive, curative, and rehabilitative efforts to improve health and physical fitness. This exercise must be carried out comprehensively, integrated, and continuously (Ahmad Hafas Rasyidi et al., 2023). Previous research has revealed that one of the activities needed in everyday life is exercise. Currently, many people are still reluctant to engage in regular exercise. They cite various reasons, ranging from being busy with work, relatively little free time, to limited sports facilities. However, currently, in several cities in Indonesia, the government is providing facilities for the public to exercise regularly by designing city parks and main roads as sports areas. This strategy has been quite successful because the public is very enthusiastic about exercising. The large number of people enthusiastically participating in sports in these sports areas has created a positive impact, including on the micro-business and service sectors (Harvianto,

2020). Indonesian society currently still lacks awareness of the importance of a healthy lifestyle. This occurs due to a lack of public interest and appreciation for sports. Barriers that cause low physical activity implementation include knowledge, motivation and availability of facilities. Health is a fundamental thing in community life, indirectly public health will affect the level of progress in a region. Health is very important for humans, because without good health, every human being will have difficulty carrying out their daily activities (Juniarto et al., 2022). Based on the above problems, the Community Service team of Yogyakarta State University was moved to carry out community service with the title "Socialization of Community Sports Programs in Improving Physical Fitness: Building a Healthy Lifestyle in Kampung Emas Serut and Terbah". The Community Service Team of Yogyakarta State University formulated solutions to solve the above problems as follows: a) Providing workshops on the importance of community sports as a form of improving community survival, b) Providing knowledge about the importance of improving Human Resources through community sports program activities.

Table 1. Problem Solving

Achievement Indicator Solution	Achievement Indicator Solution
Creating a community-based sports book to improve the livelihoods of the Serut and Terbah Hamlets. The community is enthusiastic about implementing sports programs.	Creating a community-based sports book to improve the livelihoods of the Serut and Terbah Hamlets. The community is enthusiastic about implementing sports programs.
Providing a workshop on the importance of recreational sports as a way to improve the livelihoods of the Kampung Emas community. The community understands the importance of sports for survival.	Providing a workshop on the importance of recreational sports as a way to improve the livelihoods of the Kampung Emas community. The community understands the importance of sports for survival.

As a supporter of the Community Service program, the target audience is the residents of Kampung Emas Serut and Terbah. The method used in this activity is outreach. During the outreach, the community service team provided a workshop on the importance of community sports as a way to improve community survival.

RESULTS AND DISCUSSION

The Community Service Program entitled "Socialization of Community Sports Programs in Improving Physical Fitness: Building a Healthy Lifestyle in Kampung Emas Serut and Terbah" has been implemented well according to the activity plan. The activity was carried out on Sunday, June 29, 2025. The activity was carried out at the Kampung Emas Serut and Terbah Hall. The activity was attended by 100 participants. The results of the implementation of the activity can be described as follows: Socialization of the Importance of Community Sports for Physical Fitness (1) The activity began with the delivery of material by Adhik Iwan Sulistiyanto, S.H., M.M. about the basic concept of community sports, and the benefits of building an active life, (2) Participants showed high enthusiasm, seen from the many questions and discussions regarding exercise patterns that are appropriate to age conditions and daily activities. Joint Sports Practice with the Community (Water Based Tourism) (1) Joint sports activities were carried out in the form of water-based torusim, (2) Communities from various age groups were actively involved, from children, teenagers, to adults, (3) This activity not only improves fitness, but also strengthens social ties between residents. Establishing Healthy Lifestyle Habits (1) After the outreach and practical activities, the community committed to establishing a community that could be used as a community sports industry based on sports tourism. (3) A community sports group was formed as a forum to maintain the sustainability of activities. Impacts Felt by the Community (1) Residents reported a greater understanding of the importance of exercise and were motivated to make it part of their daily lifestyle. (2) There was an increase in community participation in joint sports activities, which were previously rarely carried out in a structured manner. (3) This program had a positive impact on togetherness, solidarity, and awareness of maintaining health in Kampung Emas Serut and Terbah.

The implementation of the Community Service Program entitled "Socialization of the Community Sports Program to Improve Physical Fitness: Building a Healthy Lifestyle in Kampung Emas Serut and Terbah" demonstrated that the community has high potential and enthusiasm for creating a healthy lifestyle through recreational sports activities. First, the outreach activities succeeded in increasing community knowledge about

the benefits of recreational sports for physical fitness. This was reflected in the positive response of participants who actively asked questions and discussed types of exercise that were appropriate to their needs and conditions. With better knowledge, the community has a strong foundation for changing behavior towards a healthy lifestyle. Second, recreational sports activities with the theme of water-based tourism are an effective means of fostering community togetherness and motivation among residents. These activities not only provide firsthand experience of the benefits of recreational sports but also build a collective spirit. The involvement of people across ages, from children to adults, demonstrates that recreational sports can bridge generational differences and strengthen social ties. Third, the establishment of a community commitment to regularly participating in recreational sports activities is an indicator of the program's success in building sustainability. With the establishment of the Tourism Awareness Group (POKDARWIS), this program does not stop at outreach activities but continues into a collective movement. This aligns with the program's goal of building community-based healthy lifestyle habits. Overall, this program has had positive impacts physically, socially, and psychologically. Physically, residents are more active and are beginning to integrate recreational sports into their daily activities. Socially, recreational sports activities strengthen relationships between residents and create a sense of togetherness. Psychologically, residents feel more enthusiastic, happy, and motivated to maintain their health. Thus, the community sports outreach activities can be said to have successfully addressed the problem formulation, namely increasing public awareness of the importance of sports while encouraging active participation in physical fitness activities. This program is expected to become a model that can be replicated in other areas by adapting to the local social and cultural context. The following is documentation of the Community Service Program (PKM) activities, "Socialization of Community Sports Programs to Improve Physical Fitness: Building a Healthy Lifestyle in Kampung Emas Serut and Terbah."

Figure 1. Preparation for Water Based Tourism Practical Activities



Figure 1. Activity Session



Figure 2. Group Photo After the Activity Session

CONCLUSION

The Community Service Program entitled "Socialization of Community Sports Programs in Improving Physical Fitness: Building a Healthy Lifestyle in Kampung Emas Serut and Terbah" has been well implemented and received a positive response from the community. Through socialization activities, the community gained new knowledge about the importance of exercise for physical fitness. Joint exercise practices successfully encouraged the active participation of residents of all ages, as well as fostering togetherness and a spirit of healthy living. In addition, the formation of community sports groups as a follow-up shows that this program is able to instill awareness of exercise in a sustainable manner. Thus, this activity can be concluded as successful in answering the program's objectives, namely increasing community awareness, participation, and commitment to building a healthy lifestyle through exercise. Suggestions (1) For the Community: It is hoped that they can continue routine sports activities independently and consistently, while maintaining the spirit of togetherness and

expanding the variety of sports activities, (2) For the Village Government: It is necessary to provide support in the form of providing simple sports facilities and institutional support for the sustainability of the program, (3) For Universities: It is hoped that they will continue to collaborate with the community and provide periodic assistance so that the program is not only temporary, but becomes a sustainable movement. In order for the results of the Community Service Program entitled "Socialization of the Community Sports Program in Improving Physical Fitness: Building a Healthy Lifestyle in Kampung Emas Serut and Terbah" to have a long-term impact, a program sustainability plan has been prepared as follows: Formation of a Community Sports Group (1) This group consists of representatives of residents of various ages, (2) Functions as the main driver of routine sports activities, at least once a week, (3) Coordinated by village sports cadres or appointed community leaders. Community-Based Routine Sports Program (1) Establish a schedule for joint sports activities such as gymnastics, healthy walks, and recreational games, (2) Activities are carried out in village fields, village halls, or locations easily accessible to residents, (3) Variations of sports are adjusted to age groups (children, teenagers, adults, elderly). Mentoring and Monitoring, (1) Universities will conduct periodic visits to provide technical assistance, local instructor training, and sustainability evaluation, (2) Monitoring is carried out to assess the level of community participation, physical fitness development, and program effectiveness. Collaboration with Stakeholders (1) Involve village government, youth organizations, and community organizations in supporting activities, (2) Open opportunities for collaboration with local sponsors or the private sector to procure simple infrastructure (e.g., gymnastics equipment, sports uniforms, or recreational equipment).

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DEVELOPING THE FAMILY WELFARE EMPOWERMENT ECOSYSTEM TOWARDS ECONOMIC INDEPENDENCE IN WIJIREJO VILLAGE, PANDAK, BANTUL, DIY

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Abstract. Community empowerment in the area of economic independence is crucial to supporting the achievement of sustainable social and economic welfare. Economically independent communities will have the ability to manage resources more effectively, improve their quality of life, and enhance their standard of living without over-reliance on external assistance. Economic empowerment encourages active community participation in the development process. When communities are economically empowered, they are more involved in decision-making related to their own lives. This leads to more inclusive and sustainable development. The Wijirejo Village Government, together with relevant agencies, can create policies that support community economic independence, such as providing capital assistance, training, and markets. Furthermore, collaboration with non-governmental organizations or the private sector can also open up financing opportunities and market access for local products. Wijirejo Village, Pandak, Bantul, DIY has great potential in terms of human and natural resources that can be developed to improve community welfare. This program was implemented on Saturday, June 14, 2025, in the yard of the PKK chairperson of Bergan Hamlet, Wijirejo Village, Pandak, Bantul, DIY. This training activity was attended by 30 residents. This community service provided assistance in the form of a soap-making machine along with tools and materials. In addition, we invited a resource person to provide practical training, Mr. Dwi Hendro Murti from SMTI Teacher. Participants were very enthusiastic in participating in this training and have already produced dish soap and laundry soap. This community service program will shape economic independence and accelerate sustainable development for community welfare.

Keyorwd: community empowerment, ecosystem, economic welfare, making liquid soap

INTRODUCTION

Regulation of the Minister of Villages, Development of Disadvantaged Regions, and Transmigration Number 21 of 2020 concerning General Guidelines for Village Development and Village Community Empowerment provides a clear foundation for designing and implementing sustainable village development. Based on the 18 policies for sustainable village development outlined in this regulation, villages in Indonesia face various challenges, including economic, social, cultural, and environmental issues¹. The following are some of the key issues frequently encountered in rural areas and their relationship to these policies: 1) Economic Dependence and Lack of Business Diversification. Problem: Many villages remain heavily dependent on traditional agriculture, making them vulnerable to price fluctuations or climate change. Limited access to markets and technology hinders village economic development. Related Policies: Policies for sustainable village development support local economic empowerment and business diversification².

One of these policies focuses on economic empowerment based on local potential, such as the agricultural and handicraft sectors, as well as supporting the development of MSMEs and entrepreneurship. 2) Limited infrastructure, 3) Low quality of education and community skills, 4) Poverty and social inequality, 5) Unsustainable Management of Natural Resources, 6) Minimal Access to Health Services, 7) Social Instability and Conflict Between Residents, 8) Limited Access to Technology and Innovation, 9) Low Community Participation in Development, 10) Limited Financing for Village Development¹. Therefore, this community service program will focus on addressing the problem of low community participation in development³. The theme of PkM Mbangun desa is oriented towards problems in rural areas or development in rural areas in accordance with the 18 Policies for the Direction of Sustainable Village Development as stated in the Regulation of the Minister of Villages, Development of Disadvantaged Regions and Transmigration Number 21 of 2020 concerning General Guidelines for Village Development and Village Community Empowerment. The Village SDGs as referred to in Article 6 paragraph (1) aim to realize: Villages without poverty, equitable village economic growth; i. Village infrastructure and innovation according to needs⁴.

The history of Wijirejo Village cannot be separated from the existence of Makamsewu where there are the tombs of Panembahan Bodho and Nyai Brintik, as the forerunner to the development of the community in the Wijirejo area. Officially, Wijirejo Village was established on November 2, 1946. Wijirejo Village is a merger of Kauman Lama Village which oversees 5 hamlets (Ngeblak, Pedak, Kauman, Gedongsari and Kwalangan) and Gesikan Lama Village which also oversees 5 hamlets (Pandak, Bajang, Gesikan 3, Gesikan 4 and Bergan). The history of the nation's struggle is thick in Wijirejo Village based on the site of the former Dutch Sugar Factory which was burned to the ground by the community in 1948. Wijirejo as an agricultural village is seen from the underground well building that stretches from Gesikan, Bergan, Ngeblak, Pedak and continues to Sendangsari Village and is still functioning to this day. The community's economic development after independence began rapidly in the 1970s, with Wijirejo now a center for batik crafts in the Special Region of Yogyakarta. Wijirejo Village is divided into 10 hamlets: Pandak, Ngeblak, Bajang, Pedak, Gesikan 3, Gesikan 4, Bergan, Kauman, Gedongsari, and Kwalangan. Wijirejo Village's diverse potential includes crafts, tourism, culinary arts, and culture⁵.

The objectives of the Community Service Program include: 1) Improving the understanding and skills of Family Welfare Movement (PKK) members in entrepreneurship and family economic management, 2) Creating sustainable empowerment programs to increase community income, 3) Encouraging economic independence at the family and community level in Wijirejo Village. 4) Enhancing cooperation among various parties to achieve community welfare. The targets of this community service activity include: 1) PKK members in Wijirejo Village, Pandak, Bantul, 2) Families who have the potential to improve their economy through PKK empowerment, 3) The general public in the area who can be involved in various economic development programs. The expected benefits of this Community Service Program include: 1) The formation of a more productive and sustainable PKK ecosystem in Wijirejo Village, 2) Increasing the skills of PKK members in running businesses that can improve family welfare, 3) Increasing community participation in various economic activities that lead to economic independence, 4) Improving the quality of life of the community in Wijirejo Village, Pandak, Bantul, DIY through family-based economic empowerment.

LITERATURE REVIEW

Possible solutions for community service activities: Developing the Family Welfare Empowerment (PKK) Ecosystem to Achieve Economic Independence in Wijirejo Village, Pandak, Bantul, Yogyakarta Special Region. To develop the PKK ecosystem in Wijirejo Village, Pandak, Bantul, Yogyakarta Special Region, to achieve economic independence, several concrete solutions can be implemented to address various existing problems, including economic, social, skills, and community participation. The following solutions are expected to have a positive impact on families and the community in Wijirejo Village, including:

1. Increasing the Capacity and Skills of PKK Members in Entrepreneurship⁶
 - a. Conducting entrepreneurship training covering important aspects such as business management, product marketing, financial management, technical skills in product packaging and customer communication.
 - b. Conducting skills training based on local potential, such as processing agricultural products (chips, processed vegetables), making eco-printed batik.
 - c. Conducting training in making liquid soap and laundry perfume, as the target market is large and broad.
 - d. Encourage PKK members to collaborate and share experiences in building businesses, and provide guidance through ongoing mentoring.
 - e. Improve the skills of PKK members to build independent businesses in relevant local economic sectors.
 - f. Empower families to better manage household finances through productive businesses.
2. Developing and Diversifying Income Sources
 - a. Identifying and developing potential local businesses such as agriculture (agro-industry), livestock, and handicrafts to become sources of family income.
 - b. Optimizing the processing of agricultural products into marketable value-added products, such as cassava chips, processed fruit, or other marketable agricultural products.
 - c. Establishing village cooperatives that can provide access to business capital for PKK members or other community members in need.
 - d. Holding local product exhibitions to market PKK members' products more widely, at the village, sub-district, and even large city levels.
3. Empowerment and Collaboration Between Institutions
 - a. Establishing collaborations with government, private sector, and educational institutions to support economic empowerment programs at the village level. For example, through capital assistance, training, or providing a market for local products.

- b. Assisting the Wijirejo Village Family Welfare Movement (PKK) group in optimizing "Sibakul Jogja," the official business platform from the Yogyakarta Provincial Cooperatives and MSMEs Office, which is free for the community to use.
 - c. Forming partnerships with financial institutions to provide access to capital with low or no interest for PKK members who want to start or expand their businesses.
4. Strengthening Village and Family Financial Management⁷
- a. Conducting household financial management training to equip PKK members with skills in budgeting, saving, and investing in productive businesses.
 - b. Providing financial literacy education to families so they can manage their finances wisely, both in terms of family spending and running their businesses.
 - c. Using Village Funds to support family economic empowerment programs, with a focus on providing training and facilities for small businesses in the village.

The above solutions lead to community empowerment, particularly families in Wijirejo Village, through the development of a PKK ecosystem integrated with economic empowerment programs. By strengthening the capacity of PKK members, improving market access, financial management, and expanding collaboration between institutions, it is hoped that community economic independence can be achieved. Women's empowerment, skills development, and technology utilization are also key factors in creating sustainability and family well-being in Wijirejo Village, Pandak, Bantul, Yogyakarta Special Region.

RESEARCH METHOD

The implementation method for this community service activity is through workshops and periodic group mentoring. The targets of this service activity include: 1) Family Welfare Empowerment (PKK) members in Wijirejo Village, Pandak, Bantul Regency; 2) Families with the potential to improve their economic well-being through PKK empowerment; and 3) the general public in the area who can participate in various economic development programs. The activities carried out in the Community Service program for Family Welfare Empowerment (PKK) ecosystem development towards economic independence in Wijirejo Village, Pandak, Bantul Regency, Yogyakarta Special Region (DIY) can be divided into several target groups focused on empowering various aspects of the community. The following are some of the main objectives of this program:

1. Improving Family Economic Welfare

The first objective is to improve the economic well-being of families in Wijirejo Village by strengthening household-based micro, small, and medium enterprises (MSMEs)⁷.

2. Women's Empowerment

As part of the PKK, women's empowerment is a primary focus in the development of this ecosystem. Goals related to women's empowerment include:

- a. Increasing women's role in family and community economic decision-making.
- b. Opening access for women to skills training, both in the creative economy and entrepreneurship.
- c. Providing support for women who want to start businesses and increasing their capacity to manage them.

3. Micro and Small Enterprise Development

Developing and strengthening the micro and small enterprise (MSE) sector at the family level so that it can contribute to the local economy.

4. Strengthening Collaboration with Other Parties⁸

For the PKK ecosystem to run more effectively, it is important to establish collaborations with relevant parties. These goals include:

- a. Building relationships with local governments, social organizations, the private sector, and educational institutions to support empowerment programs.
- b. Collaborating with non-governmental organizations (NGOs) that share the same vision and mission for community economic empowerment.
- c. Encouraging private sector involvement in CSR programs that focus on economic empowerment at the village level.

With these various targets, it is hoped that Wijirejo Village can achieve strong, sustainable economic independence and empower all levels of society, especially families and women in improving their welfare.

RESULT AND DISCUSSION

The history of Wijirejo village is inextricably linked to the existence of Makamsewu, home to the tombs of Panembahan Bodho and Nyai Brintik, which served as the foundation for the development of the Wijirejo community. Officially, Wijirejo Village was established on November 2, 1946. Wijirejo Village is a merger of the Kauman Lama Village, which encompasses five hamlets (Ngeblak, Pedak, Kauman, Gedongsari, and Kwalangan), and the Gesikan Lama Village, which also encompasses five hamlets (Pandak, Bajang, Gesikan 3, Gesikan 4, and Bergan).

The history of national struggle is deeply rooted in Wijirejo Village, based on the site of the former Dutch Sugar Factory, which was razed to the ground by the community in 1948. Wijirejo's agricultural history is evident in the underground well that stretches from Gesikan, Bergan, Ngeblak, and Pedak to Sendangsari Village, which still functions today. The community's economic development after independence began rapidly in the 1970s, and Wijirejo is now one of the centers of batik crafts in the Special Region of Yogyakarta.

Several prominent figures participated in the early formation of this village, such as Mbah Sajarot, who served as a member of the Bantul Regional People's Representative Council (DPRD). The history of education is inseparable from the figure of Sutarjo Purnomo BSE, who pioneered the first Economics High School, the forerunner of SMP N 1 Pandak, which is now a leading school in Pandak District.

Wijirejo Village is divided into 10 hamlets:

1. Pandak Hamlet
2. Ngeblak Hamlet
3. Bajang Hamlet
4. Pedak Hamlet
5. Gesikan Hamlet
6. Kauman Hamlet
7. Gesikan Hamlet
8. Gedongsari Hamlet
9. Bergan Hamlet
10. Kwalangan Hamlet

Wijirejo Village is one of four villages in Pandak District. Geographically, Wijirejo Village covers an area of 542.6260 hectares, with a population of approximately 11,600 people and approximately 3,000 households. The boundaries are as follows:

North: Guwosari Village

East: Gilangharjo Village

South: Gilangharjo and Triharjo Villages

West: Sendangari Village

Wijirejo Village, like other villages in Indonesia, has a dry and rainy climate. This directly influences the farming patterns in Wijirejo Village, where many farmers and landowners still live. Wijirejo Village is divided into 10 hamlets: Pandak Hamlet, Bajang Hamlet, Gesikan III Hamlet, Gesikan IV Hamlet, Bergan Hamlet, Ngeblak Hamlet, Pedak Hamlet, Kauman Hamlet, Gedongsari Hamlet, and Kwalangan Hamlet. These 10 hamlets comprise a total of 61 neighborhood associations (RTs).

Wijirejo Village possesses enormous potential, encompassing natural resources, human resources, and institutional/organizational resources. To date, these resources have not been optimally utilized. The establishment of a Village-Owned Enterprise (BUMDes) is expected to stimulate the growth of economic, social, and cultural potential within the community.

Bergan Hamlet is located in Wijirejo Village, Pandak District, Bantul Regency, Yogyakarta Special Region. This hamlet is one of 10 hamlets in Wijirejo Village and is known for its batik center and honey gourd cultivation, which has potential as a tourist attraction.

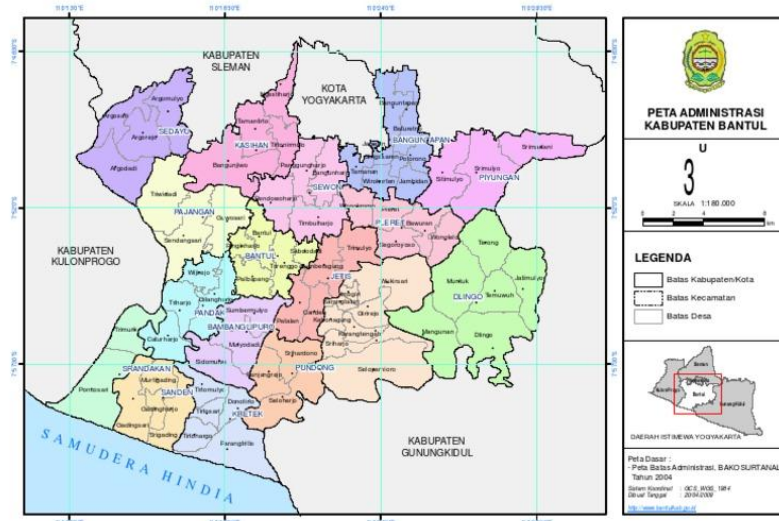


Figure 1. Administrative Map of Bantul Regency, Yogyakarta Special Region

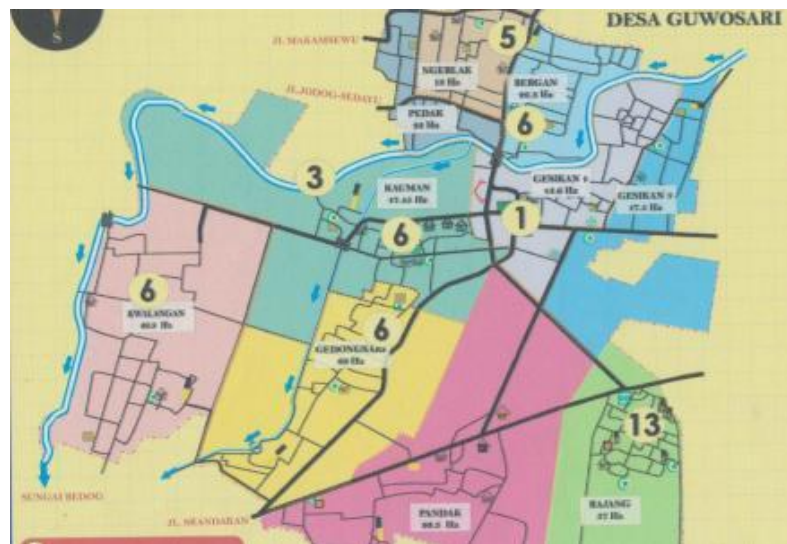


Figure 2. Administrative Map of Wijirejo Village, Pandak, Bantul Regency, Yogyakarta Special Region

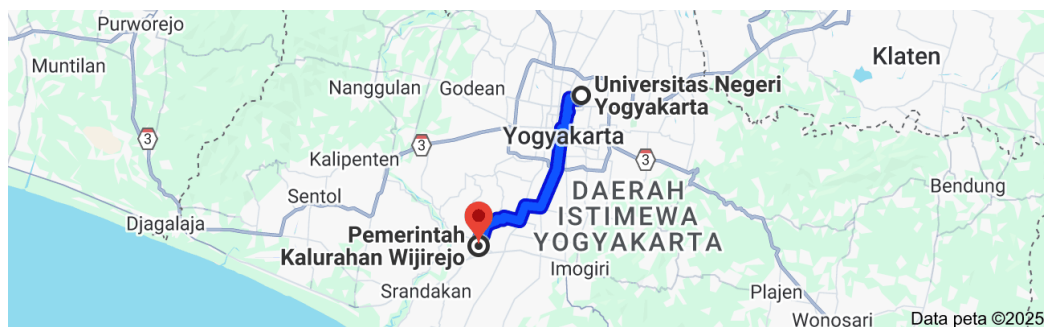


Figure 3. The distance between PT Pengusul and its partner is 46 minutes (21.5 km) via Jl. Parangtritis

The Village Development Community Service (Mbangun Desa) activity held in Bergan Hamlet, Pandak District, Bantul, began with initial coordination between the community service team and the target community coordinator, Mr. Friyatmoko Wahyu Kusumo, S.Si., the Bergan Hamlet PKK advisor. The initial coordination took place on Tuesday, April 29, 2025, at 1:00 PM at Bale Babekaran, Jalan Gejayan, Sleman, Yogyakarta Special Region.



Figure 4. Initial coordination between the community service team and representatives of the Bergan Hamlet PKK



Figure 5. Initial coordination: Making an agreement between the UNY community service team and representatives of the Bergan Hamlet PKK



Figure 6. Background of the Village Development Community Service (Mbangun Desa) Activity in Bergan Hamlet

The community service activity took place on Saturday, June 14, 2025, from 9:00 AM to 2:00 PM WIB at the home of the Bergan Hamlet PKK chairperson. The community service team, consisting of Dr. Raras Gistha Rosardi, M.Pd, Happri Novriza Setya Dhewantoro, M.Pd, and Dr. Yumi Hartati, M.Pd, along with two students from the Department of Social Studies Education, Faculty of Social and Political Sciences, UNY, arrived at the community service location at 8:30 a.m. WIB and were greeted by the Family Welfare Program Advisor, Mr. Friyatmoko Wahyu Kusumo, S.Si. We immediately headed to the community service location with the laundry soap-making trainer, Mr. Dwi Hendro Murti from Guru SMTI, Yogyakarta. A total of 30 participants from the Bergan Hamlet PKK group participated. The activity was appreciated by the Wijirejo Village, with representatives from the village administration in attendance. The community service activity began with remarks from the PKK, the hamlet, the village, and the head of the UNY Community Service Team. The activity continued with a presentation from Mr. Dwi Hendro Murti, but the presentation was short-lived, as the focus of the community service was on hands-on practice with tools and materials prepared by the UNY Community Service Team⁹.



Figure 7. Liquid Soap Mixing Machine



Figure 8. Presenter presenting a lesson on making liquid soap



Figure 9. Participants in the Hands-On Practice



Figure 10. Participants, Presenter, and the UNY Community Service Team



Figure 11. Training Production Results



Figure 12. Training Production Results

CONCLUSION

The community service activity titled "Developing the Family Welfare Movement (PKK) Ecosystem to Achieve Economic Independence in Wijirejo Village, Pandak, Bantul, Yogyakarta Special Region"* has successfully made a positive contribution to strengthening the role of the PKK as a driving force for community empowerment, particularly in the family economy. Through a series of training, mentoring, and facilitation activities, residents—particularly PKK cadres—gained increased capacity in managerial skills, entrepreneurship, and the utilization of local potential.

The results demonstrated that collaboration between academics, the village government, and the community can create a more sustainable empowerment ecosystem. Residents have begun to demonstrate initiative in

developing household-based micro-enterprises, improving the utilization of their yards, and implementing community-based productive economic principles.

Overall, this activity demonstrates that strengthening the PKK institution, if developed systematically and participatory, can be an effective strategy for promoting economic independence at the village level. It is hoped that the success in Wijirejo Village can serve as a model for other regions in developing PKK-based community empowerment ecosystems.

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FEASIBILITY AND PRACTICALITY OF A WEB-BASED ASSESSMENT INSTRUMENT FOR EARLY CHILDHOOD TEACHERS IN INDONESIA

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Abstract. Ensuring the quality of early childhood education requires competent teachers with strong pedagogical and professional skills. Traditional methods of teacher assessment in Indonesia, such as written tests or classroom observations, often face challenges of inefficiency, limited coverage, and potential subjectivity. This study evaluated the feasibility and practicality of a newly developed web-based self-assessment instrument designed for early childhood teachers. Using a descriptive quantitative approach with supplementary qualitative feedback, data were collected from 96 teachers across five districts in Yogyakarta, Indonesia. The results indicated that the instrument demonstrated high feasibility ($M = 4.36$), with strong alignment to national standards, comprehensive item coverage, and clear language. In terms of practicality, the instrument achieved a very good rating ($M = 4.39$), with the highest score for its usefulness in teacher self-reflection ($M = 4.47$). Teachers reported that the tool was easy to use, time-efficient, and reflective on their actual competencies. Minor technical challenges, such as system errors and the absence of certain features, were noted but did not diminish the instrument's overall usability. These findings suggest that the instrument is not only feasible and practical but also has significant potential to support professional development, recruitment, and policy-based monitoring of teacher competencies in Indonesia.

Keywords: web-based assessment, teacher competence, early childhood education, pedagogical competence, professional competence, Indonesia

INTRODUCTION

Early childhood education (ECE) represents a critical phase in human development, laying the groundwork for cognitive, social, emotional, and physical growth. The success of this developmental period is significantly influenced by the quality of teaching, which in turn relies heavily on the pedagogical and professional competence of educators (Mikuska et al., 2025). Globally, there is widespread consensus that effective early childhood teachers are those who demonstrate mastery in instructional strategies, child development knowledge, reflective practices, and ongoing professional growth (Herut, 2024; Irvine et al., 2024; Pinya-Medina et al., 2024). In Indonesia, the importance of teacher competence in ECE is formally recognized in national education policies and is seen as pivotal for ensuring that children receive equitable and high-quality learning experiences (Darwis et al., 2020; Miftakhi & Pramusinto, 2023; Rakhmania et al., 2024). Despite these policy-level acknowledgment, the operationalization of teacher assessments remains limited in scope, often relying on traditional methods such as classroom observations or written evaluations.

The conventional assessment techniques present several challenges in the Indonesian context. Observations can be highly subjective and inconsistent, depending on the observer's expertise and bias (Bullard, 2012; Kraft & Gilmour, 2016). Written assessments may fail to capture the dynamic and multifaceted nature of teaching in early childhood settings. Furthermore, both methods tend to be time-consuming and resource-intensive, making them difficult to implement on a large scale across the archipelagic country. In response to these limitations, the educational technology landscape offers promising solutions, particularly through digital platforms that enable standardized, scalable, and accessible assessments (Bayındır, 2024; Cowan & Flewitt, 2023; Marsegi et al., 2023; Neumann et al., 2019). As Indonesia continues to embrace digital transformation in its education system, the development and evaluation of web-based assessment tools for teacher competence emerge as both timely and necessary (Marsegi et al., 2023).

The present study responds to this need by evaluating a newly developed web-based assessment instrument specifically designed for early childhood teachers in Indonesia. This instrument is structured as a self-assessment tool, allowing teachers to reflect on and evaluate their own pedagogical and professional competencies (Author, 2025). The research aim to assess the instrument's feasibility and practicality, focusing on how well it aligns with national competency standards, its ease of use, and the perceived usefulness from the teachers' perspective. The feasibility dimension address content validity, indicator relevance, comprehensiveness, and clarity of language, while practicality covers factors such as user-friendliness, time efficiency, and the instrument's role in promoting

teacher self-reflection. These constructs are crucial in ensuring that the assessment tool is not only technically sound but also applicable in real-world educational contexts.

Research in teacher competency often emphasizes the dual domains of pedagogical and professional competence. Pedagogical competence includes a teacher's ability to understand child developmentally appropriate learning activities, and conduct effective assessments of children's learning progress. Professional competence involves ongoing commitment to self-improvement, mastery of subject content, and the application of ethical standards in teaching (Latifa & Eliza, 2023). Numerous studies have highlighted the importance of integrating these two domains for holistic teacher development, particularly in early childhood education, where the roles of care and instruction are deeply intertwined (Delcker et al., 2025; Kuntarto et al., 2019).

To support professional learning and ensure quality teaching, assessment tools must accurately reflect the complexities of teaching practice. In this context, web-based assessments provide a novel approach that addresses the inefficiencies and limitations of traditional methods (Picasso, 2024; Rovai, 2000). They allow for more consistent and objective evaluations, enable timely feedback, and can be adapted to various user needs. Studies in higher education and teacher training programs have shown the effectiveness of digital platforms in enhancing assessment reliability and promoting reflective practice (Chen & Wolf, 2021; Heil & Ifenthaler, 2023; Pow & Lai, 2021). However, the application of such tools in early childhood education, especially in low-and middle-income countries, remains underexplored.

Several initiatives have attempted to develop digital assessment tools for teacher evaluation, yet few have tailored these instruments specifically to the early childhood education context. Existing literature often focused on general teacher education or subject-specific competencies, overlooking the unique pedagogical requirements of ECE settings (Chen & Wolf, 2021). Moreover, most studies originate from high-income countries with robust digital infrastructures, limiting their applicability to contexts like Indonesia. Therefore, there is a pressing need for localized research that considers cultural, technological, and pedagogical variables unique to the Indonesian ECE landscape.

The current study addresses this gap by validating a web-based assessment instrument that evaluates the pedagogical and professional competencies of early childhood teachers across multiple districts in Yogyakarta, Indonesia. The instrument encompasses seven core competency factors, each operationalized through multiple items designed to capture teachers' self-perceived capabilities (Author, 2025). By focusing on both the technical soundness of the instrument and its practical applicability in real educational settings, the study seeks to contribute to the limited but growing body of literature on digital teacher assessment in developing countries.

This study has two primary objectives: first, to evaluate the feasibility of the web-based assessment instrument by examining its alignment with national teacher standards and its content validity; and second, to assess the practicality of the tool based on teacher feedback regarding usability, efficiency, and perceived value. The findings of this research are expected to offer valuable insights for policymakers, education stakeholders, and teacher training institutions in Indonesia. Furthermore, the study provides a foundation for the broader adoption of digital tools in teacher evaluation and professional development initiatives. By bridging the gap between policy and practice, this research underscores the potential of technology to enhance the quality and equity of early childhood education.

METHODOLOGY

2.1 Research design. This study employed a descriptive quantitative research design complemented by qualitative feedback to evaluate the feasibility and practicality of a web-based self-assessment instrument. The purpose of this design was to systematically describe and analyze the perceptions of early childhood education (ECE) teachers regarding their pedagogical and professional competencies, as measured by a digital tool. The study integrates elements of survey research and instrument validation, allowing for both numerical interpretation and reflective insights from participants. The integration of qualitative feedback from open-ended responses further enriched the findings by identifying contextual and technical considerations that might not be captured through quantitative measures alone.

2.2 Participants. The study involved 96 early childhood teachers from five districts within Yogyakarta, Indonesia. Participants were recruited through voluntary registration facilitated by two major professional associations: HIMPAUDI (Himpunan Pendidik dan Tenaga Kependidikan Anak Usia Dini Indonesia) and IGTKI (Ikatan Guru Taman Kanak-Kanak Indonesia). Eligibility criteria included current employment as an ECE teacher, access to digital devices with internet connectivity, and willingness to participate in both the assessment and feedback process. The participant group represented a diverse range of teaching backgrounds, professional experiences, and institutional settings, thereby providing a comprehensive perspective on the tool's applicability across varied ECE contexts.

2.3 Instruments. The core instrument of this study was a web-based self-assessment tool designed to evaluate teachers pedagogical and professional competencies, consisting of 39 items across seven competency domains. The instrument was originally developed and validated through exploratory and confirmatory factor analysis, as detailed by Author (2025), who confirmed its construct validity and reliability for use in the Indonesian early childhood education context.

1. Evaluation and reflection competencies
2. Educational holistic competencies
3. Curriculum competencies
4. Professional competencies
5. Technology integration competencies
6. Communication competencies

Each item was formulated to allow teachers to assess their own competencies by choosing responses that best represented their current practice and understanding. Responses were scored on a 4-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree), with variations adapted for context specific interpretations such as frequency of practice, degree of understanding, and confidence in implementation. The questionnaire was embedded in a web application accessible via desktop or mobile devices, ensuring broad accessibility for user with varying levels of technological proficiency.

2.4 Data Collection Procedures. Data collection was conducted online through the web-based application. Participants were provided with secure access to the assessment platform and given detailed instructions on how to complete the self-assessment. The process included two primary stages: (1) the completion of the 39 item competency assessment from <https://pauddpro.com/>, and (2) a follow-up questionnaire to gather feedback on user experience, technical challenges, and perceived value of the tool. The follow-up questionnaire included both structured items and open-ended prompts, allowing participants to elaborate on their experiences. Data collection took place over a two-week period to ensure adequate time for completion and reflection.

2.5 Data Analysis. Quantitative data were analyzed using descriptive statistical methods, including means, standard deviations, and categorical classification based on score ranges. Each competency domain was assigned interpretation bands categorized as “unsatisfactory”, “basic”, “satisfactory”, and “very satisfactory”, depending on total scores within that domain. These categories were derived from predefined scoring rubrics aligned with national teaching competency standards.

In addition, qualitative feedback was analyzed thematically to identify patterns and emerging themes related to usability, accessibility, and the relevance of the instrument. Comments were coded and clustered into categories such as technical issues, interface design, item clarity, and suggestions for improvement. This qualitative layer added depth to the understanding of how the assessment was perceived in real-world educational contexts.

2.6 Validity and reliability. The instrument underwent a rigorous validation process to ensure its effectiveness in measuring the intended competencies. Content validity was assessed through expert reviews involving senior ECE educators and educational assessment specialists. Their feedback guided the refinement of items to ensure alignment with national competency standards and relevance to actual teaching practices.

Construct validity was supported by confirmatory factor analysis (CFA) with goodness-of-fit indices indicating strong model fit: RMSEA = 0.028, CFI = 0.908, TLI = 0.900, and SRMR = 0.045. These metrics confirm that the items coherently represented the underlying competency constructs. Reliability was measured using Cronbach's alpha for each factor, yielding values of 0.94, 0.75, 0.82, 0.71, 0.57, 0.65, and 0.64, respectively. The overall reliability of the combined pedagogical and professional domains was 0.97 indicating a high degree of internal consistency (Author, 2025).

RESULTS

This section presents the findings in response to the three main research questions: (1) the feasibility of the web-based assessment instrument, (2) the practicality and usability of the instrument, and (3) technical issues encountered during its implementation.

3.1 Feasibility of the assessment instrument to address the first research question, this study evaluated the instrument's content validity, including the alignment of assessment indicators with national teacher competency standards, comprehensiveness of the item pool, and clarity of the language used. Based on responses from 96 early childhood teachers, the feasibility results are summarized in Table 1.

Table 1. Result of feasibility

Aspect evaluated	Mean Score	Standard Deviation	Category
Alignment with regulatory standards	4.34	0.76	Highly Feasible

Comprehensiveness of assessment items	4.33	0.73	Highly Feasible
Clarity of language	4.40	0.73	Highly Feasible
Overall Mean Score	4.36	0.74	Highly Feasible

These results indicate that the instrument meets high standards of content relevance and clarity, aligning well with national regulations and comprehensively covering the necessary competencies for ECE teachers.

3.2 Practicality and usability of the instrument in response to the second research question, the practicality of the instrument was assessed through user experiences regarding ease of use, time efficiency, accuracy of results, and value for professional development. Results from the post-assessment questionnaire are summarized in Table 2.

Table 2. Result of practicality and usability report

Statement	Mean Score	Standard Deviation	Category
I was able to complete the assessment without major	4.36	0.78	Very practical
The time required to complete the assessment was reasonable	4.33	0.79	Very practical
The assessment results reflect my actual teaching competencies	4.41	0.76	Very valid
The web-based assessment is useful for professional self reflection	4.47	0.72	Very valid
Overall practicality mean score	4.39	0.76	Very good

These findings suggest that the instrument is easy to use and effective in capturing accurate self-assessments. The highest-rated item was its usefulness in facilitating professional self-reflection.

3.3 Technical challenges in implementation to answer the third research question, qualitative data were gathered to identify any technical challenges experienced during the implementation of the web-based tool. Table 3 presents the feedback and recommendations:

Table 3. Technical challenges

No	Technical Issue	User feedback and recommendations
1	System error on user login	Verified and corrected hyperlink: tested user access
2	Email overflow preventing activation notifications	Created alternative emails and re-registered
3	Admin verification page error	Debugged backend for verification consistency
4	Absence of report export feature	Recommendation to implement export function
5	Network errors causing data loss	Suggested adding auto-save feature
6	Lack of device requirement guidance	Recommended including device compatibility guide
7	Incomplete item alert system	Recommend pop-up alerts for unfilled questions
8	Difficulty in location city of birth in dropdown list	Suggested interface revision for easier search

These technical issues, though minor, were noted for future improvements to ensure better functionality and user experience.

DISCUSSION

This study evaluated a web-based self-assessment instrument developed to measure the pedagogical and professional competencies of early childhood education (ECE) teachers in Indonesia. The findings provide strong empirical support for the instrument's feasibility and practicality, contributing to the evolving literature on digital assessment tools in teacher education. This section discusses the implications of the results in relation to existing studies, address the potential impact on professional development practices, and identifies areas for further refinement and research.

4.1 Feasibility: Alignment with standards and content validity. The highmean feasibility score (4.36) indicates that the instrument meets the critical criteria for content validity, particularly in terms of regulatory alignment, comprehensiveness, and clarity. These findings align with prior research emphasizing the importance of constructing teacher assessments based on established professional standards (Akram et al., 2015). The use of national competency indicators ensure that the instrument is both contextually relevant and policy-compliant.

Similar conclusions have been drawn in studies on teacher assessments in various educational contexts, where alignment with professional benchmarks is a prerequisite for reliability and acceptance (Forte & (CCSSO), 2017; Hylton et al., 2022; Masuwai et al., 2024).

Furthermore, the clarity of language and item structure supported the usability of the instrument across a diverse teacher population. In ECE, where professional backgrounds and technological readiness vary significantly, clarity is essential to maintain the instrument's fairness and accessibility (Benton & Li, 2021; Runco, 2014). The findings confirm that the design choices made during the development phase—particularly item wording and response options—were appropriate for the target audience, echoing best practices suggested by Brookhart and O'Neil.

4.2 Practicality: Ease of Use and reflective value. The second research question addressed the practicality and usability of the instrument. With a mean score of 4.39 the instrument was rated as highly practical by the participating teachers. Responses indicated that users encountered minimal technical barriers, the time required for completion was manageable, and the feedback was perceived as accurate and valuable. These findings are consistent with previous studies on web-based teacher assessments, which highlight digital tools' advantages in efficiency, consistency, and feedback timeliness (Mishra & Koehler, 2006).

Importantly, the instrument was found to serve not only as an evaluative tool but also as a medium for professional reflection. The highest-rated item, concerning the tool's value for self-assessment, suggests that teachers viewed the process as a constructive exercise for identifying strengths and areas for growth (Maarek & McGregor, 2020). This aligns with the concept of reflective practice as articulated by Fangohr (2015), where assessments are embedded in a continuous cycle of evaluation and improvement (Fangohr et al., 2015). Such a feature enhances the instrument's relevance in ongoing teacher development, particularly in decentralized or resource-limited education systems.

4.3 Technical challenges: refining digital implementation. The third research question addressed the technical usability of the web-based platform. While the majority of users reported positive experiences, several technical issues were noted, including system errors, incomplete data saving, and lack of advanced features such as auto-save and report exports. Although these problems were relatively minor and infrequent, they highlight the need for iterative development in digital education tools.

These findings reflect broader challenges in the implementation of educational technologies, particularly in developing country contexts where infrastructure variability can affect access and reliability (Sabiteka et al., 2025). Addressing these issues—such as enhancing platform stability and providing user guidance—will be critical for scaling the instrument to larger populations and diverse geographic areas.

Contribution to teacher professional development. This study contributes to the broader discourse on professional development in ECE by offering a validated, user-accepted instrument that integrates assessment and learning. Unlike conventional assessments that serve primarily administrative functions, this tool positions teachers as active participants in evaluating and shaping their professional growth. It enables individual reflection and can inform institutional planning for targeted training interventions.

Furthermore, the instrument supports systemic efforts toward digital transformation in education. As emphasized by the Indonesian Ministry of Education, adopting digital platforms for professional learning and evaluation is central to improving teacher quality at scale. The validated tool developed in this study aligns with these national priorities and can be incorporated into certification programs, performance reviews, or continuous professional development initiatives.

Limitations and future directions. While the results are encouraging, several limitations must be acknowledged. First, the study relied on self-reported data, which may be influenced by social desirability or misinterpretation of items. Although self-assessment is useful for fostering reflection, future studies could triangulate findings with peer or supervisor evaluations for a more comprehensive competency profile.

Second, the study sample, while diverse, was limited to five districts in Yogyakarta. Broader geographic sampling is needed to generalize the findings to the national context, especially in remote or under-resourced areas. Further validation in other provinces with varying digital access levels would enhance the tool's robustness.

Third, while initial validation focused on content and face validity, future research should explore construct validity and perform longitudinal studies to assess the tool's predictive capacity and impact on teaching practice. Additional reliability testing using more advanced psychometric models (e.g., item response theory) could also strengthen the measurement precision.

Finally, the platform's technical infrastructure requires continuous refinement. User feedback suggests the need for additional features, such as real-time feedback, dashboard integration, and offline access. Collaboration with software developers and user experience designers will be essential to optimize functionality and engagement.

In summary, the discussion underscores the potential of the web-based self-assessment instrument as a scalable, practical, and reflective tool for ECE teacher competency evaluation. With further development and strategic implementation, it can contribute meaningfully to elevating professional standards and improving educational quality in early childhood settings across Indonesia.

CONSLUSION

This study evaluated the feasibility and practicality of a web-based self-assessment instrument designed to measure the pedagogical and professional competencies of early childhood education (ECE) teachers in Indonesia. The results demonstrated that the instrument is highly feasible, with strong alignment to national teacher standards, comprehensive coverage of relevant competencies, and clear language that ensures accessibility. Furthermore, the practicality evaluation revealed that teachers found the instrument easy to use, time-efficient, and particularly valuable for professional self-reflection. The findings suggest that the tool not only functions effectively as an evaluative measure but also supports teacher development by fostering reflective practices. Minor technical challenges identified during implementation highlight the need for iterative refinement to optimize system stability and user experience. Overall, the study confirms that the instrument is both a valid and practical resource, with strong potential for broader application in training, recruitment, and policy-driven competency monitoring within Indonesia's early childhood education sector.

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DISCLOSURE STATEMENT

The authors used AI-assisted tools (ChatGPT by OpenAI) to support the translation, language refinement, and organization of the manuscript. All content has been critically reviewed and approved by the authors to ensure accuracy and integrity.

Conflict of Interest

The authors declare no conflict of interest.

Author Contributions

- Conceptualization: A
- Methodology: A, C
- Data Curation: B, D
- Formal Analysis: B
- Investigation: D
- Writing-Original Draft: A
- Writing-review & Editing: A, B
- Supervision: C

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STRENGTHENING FINANCIAL LITERACY TO ENHANCE SUSTAINABLE ECONOMIC RESILIENCE FOR YOUTH IN DOMPYONGAN VILLAGE, JOGONALAN, KLATEN

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Abstract. This community service program aims to strengthen financial literacy among young people in Dompnyongan Village, Jogonalan District, Klaten Regency, to support sustainable economic resilience. The low level of understanding regarding financial management, savings, investment, and financial risks has become a major challenge that increases the community's economic vulnerability. Through training, socialization, group mentoring, and structured evaluation, this program seeks to enhance the capacity of youth organizations (*Karang Taruna*) in making smart financial decisions, avoiding online loan and illegal investment traps, and fostering productive financial behavior. The activities are also designed to support the achievement of the Village Sustainable Development Goals (SDGs), particularly in reducing inequality and improving the quality of education. The expected outputs include a cooperation agreement with the village government, a published video of the program, intellectual property rights, media publications, and a scientific article. By strengthening financial literacy, young people are expected to become agents of change who actively promote local economic growth that is more independent, resilient, and sustainable.

Keyword: Financial Literacy, Economic Resilience, Sustainable Development

INTRODUCTION

In the rapidly advancing era of globalization, financial literacy has become one of the most essential skills for every individual, especially for the younger generation. Financial literacy not only encompasses knowledge about money management but also the ability to make smart and responsible financial decisions. The level of financial literacy in Indonesia, particularly in rural areas, remains relatively low. According to a survey conducted by the Financial Services Authority (Otoritas Jasa Keuangan, OJK) in 2024, Indonesia's financial literacy rate reached only 38.03%, with a financial inclusion rate of 76.19%. This indicates that although many people have access to and use financial services, a large proportion still lack understanding of how to manage and utilize them wisely.

Dompnyongan Village, located in Jogonalan District, Klaten Regency, is an area where the majority of residents rely on the agricultural sector and small-scale enterprises. According to data from the Klaten Regency Central Statistics Agency (Badan Pusat Statistik/BPS) in 2023, the population of Dompnyongan Village is approximately 4,500 people, with more than 70% engaged in agriculture and micro, small, and medium enterprises (MSMEs). Despite its significant economic potential—particularly in the agricultural sector—the level of financial literacy among the youth in this village remains relatively low.

A preliminary survey conducted by the community service team in Dompnyongan Village revealed that only about 28% of young people know how to manage their finances efficiently, and less than 15% understand the importance of investment and prudent debt management. This lack of understanding has led many young individuals in Dompnyongan Village to fall into inefficient financial habits, such as excessive spending, inability to save, and lack of planning for their financial future. This situation is further exacerbated by limited access to resources that could improve financial knowledge, such as relevant training sessions or seminars.

In addition, access to formal financial institutions such as banks and cooperatives in this village remains limited, leading many residents to rely on informal lenders or to avoid using financial products altogether. Therefore, strengthening financial literacy among the youth in Dompnyongan Village is crucial. According to data from the Klaten Regency Central Statistics Agency (BPS), the poverty rate in Klaten Regency remains at **12.5%**, with most cases found in rural areas such as Dompnyongan Village. Better financial management can play a significant role in improving family economic welfare and accelerating local economic development.

Considering the situation described above, this community service program focuses on strengthening financial literacy among the youth members of Karang Taruna (a village youth organization). The main objective is to provide comprehensive education on the fundamentals of personal financial management, prudent debt management, and the importance of long-term financial planning and investment. Through this financial literacy enhancement, it is expected that the Karang Taruna youth will be able to build sustainable economic resilience—not only for themselves but also for the overall economic development of the village.

The community service team from Yogyakarta State University (Universitas Negeri Yogyakarta/UNY) recognizes the need for a targeted and practical intervention program aimed at Enhancing Sustainable Economic Resilience among the Youth in Dompnyongan Village. This initiative is designed to play a clear and strategic role in supporting community empowerment, particularly by positioning Karang Taruna youth as key drivers of the village's economic growth. The objectives of this activity are formulated to address the fundamental issues of low financial literacy and economic vulnerability faced by rural youth. The specific objectives are as follows:

1. This program aims to improve the financial literacy of young people so that they are capable of budgeting, saving, investing, and managing debt wisely.
2. The activity serves as a preventive effort against financial risks, particularly the increasing prevalence of online loans, loan shark practices, and illegal investment schemes that often trap rural youth.
3. This program is designed to empower young people to become economically independent through training, mentoring, and the use of simple technologies relevant to their daily lives.

This activity also serves to support the achievement of the Sustainable Development Goals (Village SDGs), particularly in reducing economic inequality and strengthening local economic resilience based on village potential. Thus, the purpose and function of this program are not merely to provide practical financial knowledge but also to cultivate a young generation that is resilient, independent, and capable of contributing to sustainable village economic development. In addition, the Financial Literacy Empowerment Program for Youth in Dompnyongan Village is expected to generate tangible benefits, both individually and collectively, for the local community. These benefits are designed to address the fundamental needs of the villagers while creating long-term impacts on the village's economic growth and sustainability.

1. This activity provides educational benefits by developing young people's knowledge and skills in managing personal finances, enabling them to make smarter financial decisions.
2. It offers preventive benefits by helping young people avoid high-risk financial practices such as illegal online loans, online gambling, and fraudulent investment schemes.
3. The program delivers economic empowerment benefits by encouraging youth to build habits of saving, investing wisely, and developing productive enterprises that promote financial independence.
4. It generates social-community benefits by strengthening the role of *Karang Taruna* as agents of change who contribute to village development and support the achievement of the Village SDGs.

Thus, the benefits of this activity are not only experienced directly by the participants but also create a multiplier effect for the people of Dompnyongan Village through improved welfare, independence, and more sustainable economic resilience.

LITERATURE REVIEW

There is a significant relationship between good financial literacy and economic resilience. The higher an individual's level of financial literacy, the better their financial management will be; and the better their financial management, the stronger their ability—or that of their community—to withstand various economic challenges [1], [2], including in the current era where economic transactions are increasingly conducted through digital payment systems [3][4]. Findings from several studies indicate a close relationship between financial literacy and financial attitudes, with important evidence revealing that financial literacy influences financial behavior. Previous research has shown that individuals with higher levels of financial literacy tend to make wiser financial decisions [5], [6], [7]. A positive financial attitude, such as confidence in managing money, can encourage individuals to make better investment decisions [8].

Several other studies have also shown that financial literacy has a significant influence on financial behavior. Financial literacy is highly important in everyday life, as it helps individuals make sound financial decisions and avoid financial problems in the future [1], [8], [9], [10], [11]. Good financial literacy begins with a basic understanding of financial concepts such as income and expenditure [12], savings [13], and investment [14]. In addition, every individual needs to know how to compare financial products, choose those that suit their needs, and manage them effectively. Financial literacy also involves an understanding of various financial products, including bank accounts, credit cards, loans, and insurance [15]. Thus, financial literacy is one of the fundamental skills required to understand, evaluate, and make wise financial decisions.

In addition, financial literacy involves the ability to understand basic financial concepts such as interest rates, inflation, diversification, and investment risk. A low level of financial literacy can lead to poor financial decision-

making, which affects long-term economic well-being. At the global level, many studies have shown a strong correlation between financial literacy and individual economic resilience, such as the research conducted by Mawad et al. [12] which states that individuals with higher levels of financial literacy tend to exhibit better financial management behavior.

In the Indonesian context, the low level of financial literacy presents a unique challenge, particularly among young people. A 2024 survey conducted by the Financial Services Authority (Otoritas Jasa Keuangan/OJK) revealed that only 38% of Indonesia's population possesses adequate financial literacy. Furthermore, the survey showed a significant financial literacy gap across age groups and regions, with rural communities and younger generations having lower levels of financial literacy compared to their urban counterparts. This highlights the need for financial literacy interventions among youth, especially those living in rural areas.

Personal financial management — including budgeting, saving, and debt management — is an essential component of financial literacy. According to Fan L. and Henager R. [16]. As the next generation expected to drive the village's economic growth, young people need to be equipped with strong financial management skills [17]. Unfortunately, according to the World Bank (2013), many young people in rural areas struggle with personal financial management due to limited access to financial information and education, including in the area of investment. In fact, investment is one of the key means to achieve long-term economic resilience, particularly for individuals seeking to expand their sources of income [18]. However, to invest wisely, an understanding of financial risk is essential. Recognizing one's risk profile is an integral part of making informed investment decisions [19]. This is because not all investment instruments are suitable for everyone. A lack of understanding of risk may lead individuals to make poor decisions, such as engaging in high-risk investments without careful evaluation.

Research by Kahneman and Tversky (1979) through the prospect theory revealed that individuals tend to be more influenced by potential losses than potential gains when making financial decisions [19]. Among young people, this phenomenon often occurs when they engage in unsafe investments, such as fraudulent investment schemes or illegal online loans, without a clear understanding of the associated risks and potential returns. Therefore, education on financial risk and basic investment knowledge is essential to help them avoid dangerous investment traps that could harm their personal finances. The Village SDGs (Sustainable Development Goals for Villages) program aims to achieve sustainable development in rural areas through a series of strategic initiatives that promote economic, social, and environmental well-being [20]. The Village SDGs have been a priority for the allocation of Village Funds since 2021, with the main objectives of creating poverty-free villages, fostering inclusive economic growth, and developing culturally and environmentally responsive communities. Research conducted by Hamid et al. highlights that financial literacy can serve as a crucial driving factor in supporting the achievement of the SDGs, particularly in promoting inclusive economic growth and strengthening the economic resilience of rural communities. [1]. Youth, as the main driving force in rural areas, play a strategic role in accelerating the achievement of these goals. Through sound financial literacy, young people can harness the village's economic potential, create job opportunities, and initiate sustainable productive enterprises.

Sustainable economic resilience encompasses the ability of individuals or communities to withstand long-term economic challenges without depleting or harming the environment and available resources [21]. Chambers and Conway (1992) stated that economic resilience is not merely about survival, but also about building the capacity to adapt and thrive in challenging circumstances. At the community level, economic resilience can be achieved through collaboration, education, and adequate social support [22]. For the *Karang Taruna* youth in Dompnyongan Village, Jogonalan, Klaten, the development of economic resilience can be achieved through enhancing financial literacy. With a solid understanding of financial concepts, they can manage their income more effectively, avoid consumptive debt, and begin investing for the future. Thus, young people can become agents of change who contribute to achieving greater economic resilience within their community.

The state of the art in the field of financial literacy and sustainable economic resilience indicates that financial literacy plays a crucial role in supporting economic development and community well-being, particularly in rural areas

[23]. Although numerous studies have highlighted the importance of financial literacy, there remains a significant gap in the implementation of financial literacy programs in Indonesian villages. Limited access to information and education continues to be one of the main barriers. The innovation of this community service project lies in its effort to integrate financial literacy within the local context, engaging *Karang Taruna* youth as agents of change. A more practical and applicable approach is expected to produce tangible impacts in improving both economic well-being and sustainable economic resilience in Dompnyongan Village.

This community service initiative also supports the Village Sustainable Development Goals (SDGs Desa) — a development concept aimed at creating positive transformation in Indonesia's villages. SDGs Desa represents an integrated effort to realize villages free from poverty and hunger, with inclusive economic growth, strong health awareness, environmental care, educational advancement, gender inclusivity, social connectivity, and cultural responsiveness. These objectives are aligned with the Village Fund priority programs implemented since 2021. In this context, financial literacy is not only about how young people manage their personal income but also about

how they can develop productive enterprises that contribute to the village economy. Through enhanced financial literacy, youth in Dompnyongan Village are expected to play an active role in supporting the SDGs Desa, particularly in achieving equitable and resilient economic growth. Specifically, this community program includes training sessions on budgeting, saving, understanding financial product risks, and making wise investment decisions. Through these activities, *Karang Taruna* youth will be better equipped to face future economic challenges wisely and strategically, thereby making a positive contribution to the economic prosperity of Dompnyongan Village.

METHODES

Framework for Problem Solving

From the initial survey conducted by the community engagement team, several findings emerged concerning financial literacy, especially among the youth members of *Karang Taruna*. The main findings are summarized as follows:

1. **Low Personal Financial Literacy among Karang Taruna Youth in Dompnyongan Village**
The main issue faced by the youth members of *Karang Taruna* in Dompnyongan Village is the low level of personal financial literacy. Most of them have limited knowledge of how to manage their finances efficiently. They lack understanding of the importance of budgeting, saving, and having a clear long-term financial plan. Many tend to spend their income on consumptive needs without allocating funds for savings or investment. This problem negatively affects their financial stability, especially when facing emergencies or unexpected expenses. Therefore, the first focus of this community service program is to improve the financial literacy of *Karang Taruna* youth by enhancing their understanding of basic personal financial management. Educational and training activities will be conducted, covering topics such as budgeting, managing expenses, setting aside income for savings, and long-term financial planning. Through improved financial literacy, it is expected that *Karang Taruna* youth will become wiser in making financial decisions. They will be encouraged to prioritize needs over wants, develop saving habits, and understand the importance of investment as part of future planning.
2. **Limited Understanding of Financial Risk and the Importance of Investment**
Many young people in Dompnyongan Village have begun to access various financial products such as online loans and credit cards without fully understanding the risks associated with these products. As a result, some of them become trapped in high-interest debt that is difficult to repay, while others remain unaware of the potential dangers of impulsive financial decisions. On the other hand, despite the increasing accessibility of various investment opportunities, many young individuals still lack sufficient knowledge about how to choose safe and suitable investment instruments. They tend to be reluctant to invest due to fear of unfamiliar risks, or conversely, engage in high-risk investments without careful consideration. This community service program is designed as a systematic effort to address the issue of low financial literacy among the youth in Dompnyongan Village, Jogonalan, Klaten. All implementation steps are structured in a continuous and integrated manner to ensure that the program not only provides theoretical knowledge but also promotes tangible behavioral changes and fosters sustainable economic resilience. The first stage involves coordination with village authorities, community leaders, and Karang Taruna representatives to map out the target participants of the program. This mapping process is conducted through registration forms and preliminary questionnaires to assess participants' existing levels of financial literacy. The results are then used to develop participant profiles based on age, educational background, and type of occupation, enabling the training materials to be tailored to the real-life conditions of the village's youth.

After completing the participant mapping stage, the service team developed a **training module** as the main instrument of the program. The module was designed using simple and accessible language and was complemented by real-life examples relevant to the daily lives of rural communities. The materials presented covered fundamental aspects of personal financial management, the importance of saving, strategies for managing expenses, distinguishing between productive and consumptive debt, and understanding safe and simple investment practices.

The program adopted an applicative approach, utilizing case studies and simulations to enable participants to directly practice financial management within the context of their own lives [24]. The implementation of the program was carried out through a series of socialization sessions, training activities, and workshops conducted in several stages. Each session focused on specific themes, ranging from household budgeting and savings planning to the introduction of long-term investments. To enhance participant engagement, participatory learning methods such as group discussions, role plays, and case studies were employed, creating a more interactive and dynamic learning atmosphere. Through this approach, participants were not only recipients of information but were also trained to think critically in making financial decisions.

To ensure the sustainability of the program, the team established small discussion groups following the training sessions. These groups functioned as platforms for deepening the material, sharing experiences, and providing mutual support in daily financial management practices. Facilitators from the team and village partners accompanied these groups to ensure their continuity even after the formal training concluded. Through this ongoing forum, participants were expected to cultivate a culture of financial literacy that extends beyond the individual level, fostering broader awareness and adoption within the community.

Evaluation was carried out comprehensively using two main approaches. First, a direct evaluation was conducted through pre-tests and post-tests administered before and after the training sessions to measure improvements in participants' knowledge. Second, a follow-up evaluation was conducted three months after the program to assess the extent to which participants had applied the acquired skills—such as starting to save regularly, reducing consumptive debt, or exploring simple investment instruments. In addition, a feedback forum was organized as a platform to discuss both successes and challenges, as well as to formulate strategies for future improvement.

The active participation of partners played a crucial role in the success of this program. The *Karang Taruna* youth organization, as the local partner, was not only involved in participant recruitment but also actively participated in facilitating discussion groups and organizing activities. This involvement demonstrates that the community service program was not a temporary initiative, but one with the potential to become a sustainable effort at the village level. Consequently, the solutions implemented are expected to strengthen the capacity of young people while creating tangible impacts on the village's economic development.

The project team distributed responsibilities proportionally according to each member's area of expertise. The team leader was responsible for overall coordination and supervision, while the team members managed content development, budget management, and technical implementation. Meanwhile, students were actively involved in operational tasks, documentation, and the preparation of program outputs. Their participation not only enriched their experience in community engagement but was also formally recognized through academic credit (SKS) in accordance with the curriculum.

With this systematically designed problem-solving framework, it is expected that there will be significant improvements in financial literacy understanding, behavioral changes in financial management, and the establishment of sustainable discussion groups. The program's success is measured not only by participants' increased test scores but also by the continued adoption of sound financial practices that strengthen the long-term economic resilience of the youth in Dompuyongan Village.

Implementation Methods of Activities

The implementation method of this community service program was systematically designed to address the issue of low financial literacy among the youth in Dompuyongan Village. Each stage was carried out in a structured manner, beginning with preparation, followed by the main implementation, and concluding with evaluation and program sustainability. A participatory and applicative approach was employed, ensuring that young participants not only received theoretical knowledge but also gained hands-on experience in managing their personal finances.

TABLE 1. Implementation Methods of the Program

No	Activity	Stages	Output	PIC	
				Community Service Team	Community Partner
1	Identification and Profiling of Participants	a. Coordinate with village authorities and local community leaders to identify young individuals who require training. b. Distribute registration forms and initial questionnaires to assess participants' levels of financial literacy. c. Map the target groups based on age, educational background, and occupation in order to tailor the training materials to their specific needs.	Data on registered participants and the outcomes of the training needs assessment	√	
2	Development of Training Modul	a. Develop training materials covering fundamental topics such as personal financial management, saving	The training modules have been		√

		strategies, the importance of investment, prudent debt management, and the use of relevant financial products.	prepared and are ready for use in the program		
		b. Design the modules using clear and accessible language, complemented by practical examples, particularly those relevant to the daily lives of the rural community.			
		c. Employ a hands-on approach through case studies and financial management simulations to enhance practical understanding			
3	Implementation of Training (Awareness Sessions)	a. Conduct training sessions and workshops divided into several topics, such as personal financial management: creating budgets, saving, and managing expenses.	The participants participated in the training and acquired foundational knowledge in financial management.	√	√
		b. Investment and the importance of having long-term investments.			
		c. Prudent debt management, including distinguishing between productive and consumptive debt.			
		d. Employ participatory methods, such as group discussions and case studies, to enhance interaction and understanding.			
4	Group Coaching	a. Form discussion groups consisting of training participants to further deepen their understanding of the material.			
		b. Organize small discussion groups that focus on specific topics, such as household budget management, basic investment, or debt management.	The establishment of active and sustainable financial discussion groups	√	
		c. Provide facilitators to lead the discussions, give guidance, and organize regular sessions for experience sharing or case study analysis.			
		a. Conduct an evaluation by distributing questionnaires to participants to assess the extent to which they understand the material provided and apply it in their daily lives.			
		b. Carry out a follow-up survey after three months to observe changes in participants' financial behavior, such as whether they have started saving, managing debt prudently, or beginning to invest.	Evaluation data highlighting achievements and aspects that require improvement	√	
5	Assessment and Follow-Up Actions	c. Hold a feedback forum to discuss the successes and challenges encountered during program implementation and to identify solutions for future improvements.			

The first stage begins with the identification and mapping of participants. The service team collaborates with the village government, community leaders, and Karang Taruna to identify potential participants relevant to the program's target. This process is conducted through formal coordination, the distribution of registration forms,

and initial questionnaires to map the participants' financial literacy levels. The results of this stage serve as the basis for adjusting the training materials to align with the actual needs and conditions of the community.

The next stage involves the preparation of the training modules. The modules are designed with consideration of the participants' varying levels of understanding, using simple and easily comprehensible language. The content covers fundamental aspects of personal financial management, the importance of savings, budgeting strategies, prudent debt management, and an introduction to basic and safe investment. Module development is not only theoretical but also emphasizes an applied approach through case studies and simulations relevant to the daily lives of rural youth.

Once the modules are completed, the program continues with the implementation of training and socialization activities. These activities are conducted in the form of interactive workshops using participatory methods, such as group discussions, case study presentations, and simulations for creating financial plans. The training themes are divided into several sessions, ranging from personal financial management and understanding investment instruments to strategies for distinguishing between productive and consumptive debt. Through this approach, participants acquire not only conceptual understanding but also practical skills that can be directly applied.

To reinforce the training outcomes, a group mentoring stage is carried out. Participants are divided into small groups focused on specific topics, such as household budget management, basic investment, or regular saving strategies. Each group is facilitated by resource persons and accompanying students, enabling a continuous two-way learning process. This group mentoring also serves as a forum for participants to share experiences and as a platform for fostering a culture of financial literacy within the village.

Finally, the evaluation and follow-up stage is implemented to measure the program's success. Evaluation is conducted in two forms. First, a formative evaluation through pre-tests and post-tests to assess the extent of participants' understanding improvement after the training. Second, a summative evaluation in the form of a follow-up survey three months post-training to assess actual behavioral changes, such as the habit of saving, reduction of consumptive debt, or engagement in basic investments. In addition, feedback forums are held to discuss successes and challenges encountered, as well as to design strategies for sustaining the program at the village level.

FIGURE 1. Steps in Activity Implementation



Partner participation plays a crucial role in the implementation of this program. Karang Taruna Dompoyongan not only acts as a beneficiary but also as an active partner, assisting in participant organization, providing training facilities, and supporting post-activity mentoring. With the involvement of local partners, the sustainability of the program is better ensured due to shared ownership of the community service activities.

The proposing team has allocated roles proportionally according to each member's field of expertise. The team leader is responsible for leading and coordinating all activities, ensuring that each stage proceeds according to schedule, and serving as a liaison with the village government and relevant institutions. Team members support the program by preparing training materials, managing the budget, and organizing logistical arrangements. Students are actively involved in technical aspects, such as documenting activities, handling administrative tasks, preparing reports, and serving as facilitators for group mentoring. The students' involvement is also recognized through academic credit (SKS) in relevant courses.

Through this structured and participatory implementation method, the program is expected not only to enhance the financial literacy of the youth but also to foster healthy financial behavior, establish sustainable discussion groups, and strengthen the long-term economic resilience of the Dompoyongan Village community.

IMPLEMENTATION OF ACTIVITIES

The community service program entitled "Strengthening Financial Literacy to Enhance Sustainable Economic Resilience for Youth in Dompoyongan Village, Jogonalan, Klaten" was carried out throughout 2025 as part of the PKM Mbangun Desa program at Universitas Negeri Yogyakarta. This program was initiated in response to the low financial literacy among rural youth, particularly members of the Karang Taruna "Taruna Bakti" in Dompoyongan Village, who have long faced serious challenges in managing personal finances, saving habits, and

investment awareness. Therefore, the implementation of the program is focused on enhancing practical financial management skills that can be directly applied in daily life.

Initial Identification

The initial stage of the program began with participant identification conducted through coordination with village officials and community leaders. This process resulted in the registration of approximately fifty youth members of Karang Taruna. To gain an initial understanding of the participants' conditions, the community service team distributed forms and questionnaires containing questions related to financial knowledge and management habits. The initial data revealed that most participants were not accustomed to preparing household budgets, lacked discipline in saving, and had not yet understood the difference between productive and consumptive debt.

After the participants were identified, the team developed a training module based on the financial literacy materials. The module covered various important topics, including financial planning and budgeting, saving habits and emergency funds, understanding debt, prudent use of online loans, and the basics of safe investing. The content was presented in simple language, illustrated with real-life examples from village life, and accompanied by visuals for easier understanding. This practical approach was deliberately chosen to suit the diverse backgrounds of participants, both in terms of education and experience.

Core Activities

The core activities, consisting of training sessions and workshops, were conducted in several sessions. Prior to the main activities, an opening speech was delivered by the head of the community service team, Dr. Sudrajat, M.Pd., who highlighted several points, including the background of this community service program. He emphasized the importance of preparing young generations to face globalization and the information age, particularly in the financial sector with its various opportunities and challenges. Accordingly, efforts to provide financial literacy are necessary, especially considering emerging phenomena related to “financial crimes” such as online gambling, online loans, and similar risks.

The opening speech was then continued by the head of the neighborhood association (RW), who also represented the Dompnyongan Village government. In his remarks, the village government warmly welcomed the program organized by the UNY community service team, particularly the financial literacy activities for youth. He also expressed hope that similar activities could continue in Dompnyongan Village in the future, ensuring sustainability and long-term impact of the initiatives implemented.

FIGURE 2. Opening Remarks by the Head of the Community Service Team and the Village Government



The training session was conducted in a participatory manner, where participants not only listened to the presenters but were also engaged in discussions, budget simulation exercises, and solving simple case studies. The topics that attracted the most attention were debt management and prudent handling of online loans, considering that many rural youth are vulnerable to illegal online loans with high interest rates. Additionally, material on simple investments, such as gold savings and mutual funds, sparked enthusiasm as it provided new insights on preparing for financial futures.

The program evaluation was carried out in two stages: first, through pre-tests and post-tests to measure knowledge improvement, and second, through a follow-up survey conducted three months after the activities. The

results showed a significant increase. On average, participants' post-test scores rose by over sixty percent compared to the initial scores. Moreover, many participants provided positive feedback regarding changes in their financial behavior. Most reported beginning to save regularly, spending money more wisely, and avoiding consumptive debt. Some participants had even started engaging in simple investment activities. To reinforce these achievements, the following summary of program achievement indicators is presented:

TABLE 2. Program Achievement Indicators

Assessed Aspects	Target Achievements	Implementation Results	Data Sources
Participant Participation	At least 80% of the total invitees	Achieved: 92% of participants attended actively	Attendance List & Activity Report of PKM Mbangun Desa 2025
Improvement in Financial Literacy Understanding	Post-test scores increased by $\geq 60\%$ compared to pre-test	Average increase: 65%	Pre-test & Post-test Results PKM Mbangun Desa 2025
Participant Satisfaction	Target: At least 85% of participants report being satisfied or very satisfied.	Achieved: 87% of participants reported being satisfied or very satisfied	Evaluation Questionnaire for PKM Mbangun Desa 2025

The achievement results in the table reinforce that this community service activity was successful not only in increasing knowledge but also in promoting changes in the financial attitudes and behaviors of village youth. Although the program generally ran smoothly, its implementation faced some challenges. Limited training time prevented certain topics from being discussed in depth, while the diverse backgrounds of participants required adaptive teaching methods. However, full support from the village government, active involvement of Karang Taruna, and participant enthusiasm were key factors in the program's success.

As a follow-up, the service team encouraged the formation of youth financial discussion groups, serving as a sustainable forum for collaborative learning. These groups are expected to internalize good financial management habits, strengthen individual economic resilience, and contribute in the long term to the village's economic development. Thus, this activity not only impacted knowledge enhancement but also fostered collective awareness to build sustainable economic independence in Desa Dompuyongan.

FIGURE 3. Community Service Team and Participants



CONCLUSION

This community service program successfully enhanced financial literacy among the youth in Desa Dompuyongan through training sessions, workshops, and group mentoring. Evaluation results indicate a marked improvement in participants' knowledge of financial management, savings, basic investments, and prudent approaches to online loans and other high-risk financial practices. The active participation of Karang Taruna and

support from village officials reinforced the program's success, as reflected in strong participant engagement, an average knowledge score increase of over 60%, and positive testimonies about improved financial behaviors, such as regular saving and avoiding consumptive debt. Additionally, program outputs—including modules, videos, publications, and intellectual property rights—were achieved according to the targets. Thus, the activity not only benefited individuals directly but also created a multiplier effect for the community, strengthening sustainable economic resilience. This initiative aligns with the SDGs Desa goals of reducing economic disparities and promoting equitable development.

Given the significant outcomes, the financial literacy program for Desa Dompnyongan's youth should continue in a sustainable manner. The program not only imparts knowledge but also fosters healthier financial behaviors. Therefore, continuity should be facilitated through regular Karang Taruna forums and small discussion groups. Long-term mentoring by village authorities and higher education institutions is crucial to ensure that habits such as saving, budgeting, and basic investing become ingrained among the youth. Collaboration with formal financial institutions, cooperatives, and local communities should also be strengthened to provide safe and accessible financial education and services. In the digital era, developing financial literacy materials through social media or simple applications is highly recommended, considering the youth's familiarity with technology. Finally, this program model should serve as a best-practice example that can be replicated in other villages, broadening its impact on strengthening sustainable economic resilience in rural communities.

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The Strengthening of Science, Health, Cultural, and Financial Literacy for Young Generation in Bumijo Through Mentoring at SMPN 12 Yogyakarta

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Abstract. This community service program (PkM) was designed to strengthen science, health, cultural, and financial literacy among students at SMPN 12 Yogyakarta, located in Bumijo, Jetis District. The program was initiated in response to the challenges faced by young learners, including limited scientific literacy, low awareness of healthy lifestyles, declining appreciation for local culture, and weak financial management skills. Such limitations are increasingly urgent to address in the digital era, where adolescents are exposed to unverified information and consumerist tendencies without adequate critical capacity. The method employed was interactive mentoring, consisting of workshops, simulations, group discussions, and guided practice. The participants consisted of 27 students, who were the main beneficiaries, and 25 teachers, who served as supporting partners. The program was structured in four stages: needs identification, preparation of literacy modules, implementation of interactive sessions, and evaluation. The evaluation instruments included a pretest–posttest design, classroom observations, and participant satisfaction questionnaires. The results demonstrated a positive impact. Students' average scores improved from 72.33 to 89.83, with an increase of 17.5 points, although not statistically significant. Teachers' scores increased significantly, from 80.00 to 86.57 (+6.57 points, $p < 0.05$), confirming improved capacity to support literacy education. Evaluation questionnaires also showed high satisfaction levels, with mean scores ranging between 3.63 and 3.88 (on a 4-point scale). Observations revealed active student engagement and teachers' enthusiasm for adopting interactive learning strategies. In conclusion, the PkM program successfully enhanced multidimensional literacy and offered a sustainable model that can be replicated in schools to foster critical, healthy, culturally aware, and financially responsible young generations.

Keywords: literacy, science, health, culture, financial literacy, community service

INTRODUCTION

Multiliteracies defined as the ability to navigate and critically create across diverse communication modes, including visual, digital, and linguistic have emerged as essential competencies for education in the twenty-first century (New London Group, cited in source from 2025). In parallel, literacy today must encompass digital and visual skills that enable learners to interpret multimodal texts and counter misinformation effectively (Farrar, Arizpe, & Lees, 2024).

Health literacy likewise remains a crucial determinant of adolescent well-being. Systematic reviews highlight its role in facilitating healthy behaviors and cognitive-emotional development among youth (Rubio & Blay, 2023). School-based interventions incorporating participatory, co-creative strategies have shown promise in promoting health literacy, particularly among socioeconomically disadvantaged adolescents (Boer et al., 2025). Despite the recognized importance of multidimensional literacy, many Indonesian adolescents especially in urban schools

struggle with scientific reasoning, health awareness, cultural appreciation, and financial planning. At SMPN 12 Yogyakarta, located in Bumijo, preliminary observations confirmed limited student engagement with scientific inquiry, low health-awareness, diminishing cultural engagement, and weak financial habits.

Universities in Indonesia often conduct Pengabdian kepada Masyarakat (PkM) initiatives aimed at addressing such educational gaps via collaborative, school-based interventions. These programs hold potential not only to enhance students' multiliteracy competencies but also to empower teachers as agents of sustainable pedagogical transformation.

Thus, this study presents a PkM initiative at SMPN 12 Yogyakarta that employed an interactive mentoring model including workshops, simulations, and group dialogue to strengthen students' literacy across science, health, culture, and finance. The program also aimed to build teacher capacity, supporting long-term integration of multidimensional literacy into everyday learning.

LITERATURE REVIEW

Multidimensional Literacy and 21st-Century Competencies

Literacy in the 21st century transcends the traditional skills of reading and writing. International frameworks (Voogt & Roblin, 2012; OECD, 2016) emphasize a multidimensional construct that integrates information, digital, scientific, cultural, and financial literacy. These literacies are essential to equip learners with the ability to think critically, collaborate, and act responsibly in complex, globalized societies. The multiliteracies perspective (New London Group, as revisited in recent works) highlights that learners must navigate and produce multimodal texts—visual, digital, and numerical—while engaging ethically and critically with diverse knowledge systems.

Science Literacy

Science literacy has been defined as the capacity to apply scientific knowledge and reasoning to real-world issues (OECD, 2016). Beyond conceptual understanding, science literacy entails the ability to evaluate evidence, conduct investigations, and participate in informed decision-making (Holbrook & Rannikmae, 2009). Recent debates stress its socio-scientific dimension, where students are expected not only to master disciplinary knowledge but also to engage with societal challenges such as environmental crises and health risks (Kind, 2020). Studies confirm that inquiry-based and hands-on learning approaches significantly enhance students' engagement and conceptual grasp of science (Muñoz-Losa & Corbacho-Cuello, 2025).

Health Literacy

Nutbeam's (2000) tripartite model—functional, interactive, and critical health literacy—remains foundational, but recent scholarship has extended its application to adolescence. Health literacy has been shown to predict healthy behaviors, critical evaluation of online health information, and resilience against misinformation (Paakkari & Okan, 2020). School-based interventions using participatory strategies such as simulation and role-play have been effective in promoting healthier lifestyle choices and greater agency among adolescents (Stone et al., 2023; Boer et al., 2025).

Cultural Literacy

Cultural literacy, as defined by UNESCO (2013), entails the ability to understand, respect, and engage with cultural diversity while safeguarding local identity. In secondary education, cultural literacy programs that involve storytelling, heritage mapping, and creative expression foster students' sense of belonging and intercultural competence. Empirical evidence suggests that integrating local cultural resources into school activities not only strengthens identity but also enhances motivation and empathy among learners.

Financial Literacy

Financial literacy is increasingly recognized as a life skill necessary for sustainable well-being. OECD/INFE (2012) defines it as a combination of knowledge, skills, and attitudes enabling individuals to make informed financial decisions. Studies indicate that financial education interventions at the secondary level improve adolescents' budgeting, saving, and spending behaviors (Lusardi, 2019; Yeboah, 2024). In Indonesia, surveys highlight persistent gaps between financial inclusion and literacy (OJK, 2019), underscoring the need for school-based financial education.

School-Based and Cross-Disciplinary Interventions

Cross-disciplinary approaches that integrate science, health, cultural, and financial literacy have been found to enhance both cognitive and socio-emotional competencies. Beers and Probst (2016) argue that disciplinary

literacy practices—reading, reasoning, and producing domain-specific texts—can be extended across fields to cultivate well-rounded learners. University–school collaborations, particularly through community engagement programs, have demonstrated potential in strengthening teacher capacity while enriching student experiences.

Measurement and Evidence of Impact

Evaluation of literacy programs typically combines quantitative and qualitative approaches. Pretest–posttest designs provide evidence of knowledge gains, while questionnaires and classroom observations capture perceptions and behavioral changes (Rosário et al., 2024). Mixed-method approaches are increasingly recommended to capture not only statistical improvements but also the pedagogical and social meanings of literacy interventions.

Synthesis

The literature consistently supports the urgency of multidimensional literacy in secondary education. Evidence indicates that:

- (i) cross-disciplinary, participatory approaches yield deeper and more sustainable outcomes than single-domain interventions;
- (ii) teacher involvement is critical to ensure program continuity; and
- (iii) evaluation methods must integrate both quantitative and qualitative evidence to capture the multidimensional impact. These insights informed the design and evaluation framework of the current PkM program.

RESEARCH METHOD

Design of the Study

This study employed a community service (Pengabdian kepada Masyarakat / PkM) design using an interactive mentoring approach. The program was structured as a school-based intervention integrating workshops, simulations, group discussions, and guided practice. The design was participatory and collaborative, involving both students as the primary beneficiaries and teachers as supporting partners.

Participants and Setting

The program was conducted at SMPN 12 Yogyakarta, located in Bumijo, Jetis District, Indonesia. The participants consisted of 27 students from junior secondary level and 25 teachers. Students were selected to represent diverse academic and social backgrounds, while teachers included subject specialists and homeroom advisors who were expected to sustain the outcomes of the program.

Program Implementation Procedure

The intervention was carried out in four stages:

- Needs Identification – Preliminary observations and informal interviews with teachers to map literacy gaps in science, health, culture, and finance.
- Module Development – Preparation of literacy modules adapted to students' age and local context, including activities such as experiments, health simulations, cultural mapping, and budgeting games.
- Mentoring Activities – Implementation of interactive workshops, simulations, and group discussions focusing on the four literacy domains. The sessions emphasized active learning, student participation, and reflective practice.
- Evaluation – Administration of pretest and posttest to measure knowledge improvement, classroom observation to capture engagement, and questionnaires to assess satisfaction and perceived relevance.

Instruments and Data Collection

- Pretest–Posttest: Multiple-choice and short-answer tests designed to assess students' and teachers' knowledge in science, health, cultural, and financial literacy.
- Observation: Structured field notes documenting student participation, collaboration, and teacher facilitation during activities.
- Questionnaire: A Likert-scale instrument (1–4) evaluating perceptions of program delivery, clarity of materials, facilitator performance, and relevance of activities.

Data Analysis

Quantitative data were analyzed descriptively and inferentially. Mean scores of pretest and posttest were compared, and paired-sample t-tests were conducted to examine statistical significance. Questionnaire data were

summarized using mean values for each aspect. Qualitative data from observations were analyzed thematically to complement the numerical results, highlighting patterns of engagement and challenges encountered during implementation.

RESULTS AND DISCUSSION

Results

Pretest–Posttest Outcomes

The analysis of pretest and posttest data revealed improvements in both student and teacher groups.

Table 1. Pretest and Posttest Mean Scores

Group	Pretest Mean	Posttest Mean	Difference	<i>p</i> -value
Students	72.33	89.83	+17.50	0.082
Teachers	80.00	86.57	+6.57	0.041

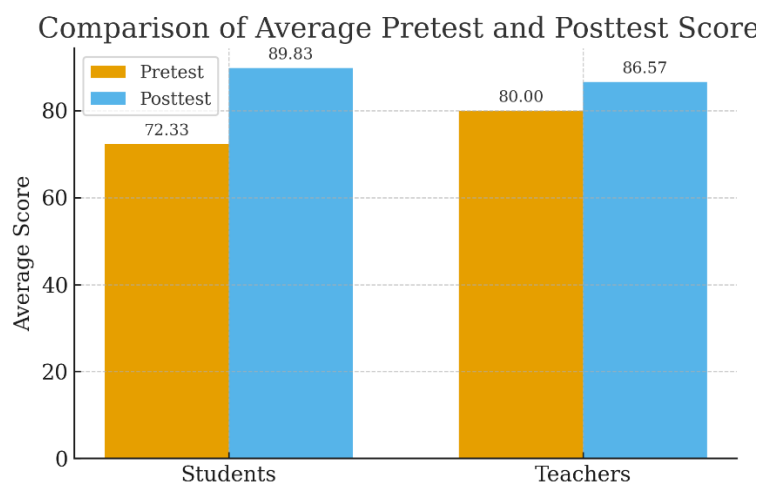


Figure 1. Comparison of Pretest and Posttest Scores

The students' average scores increased by 17.5 points, while teachers' scores rose by 6.57 points. The paired-sample t-test showed that the students' improvement was not statistically significant ($p = 0.082$), but the teachers' improvement was statistically significant ($p = 0.041$).

Evaluation Questionnaire

The evaluation questionnaire reflected positive perceptions from both students and teachers regarding the program.

Table 2. Evaluation Questionnaire Results

Evaluation Aspect	Mean Score (1–4)
Program ran smoothly	3.88
Materials were easy to understand	3.75
Facilitator's delivery was clear	3.75
Program was relevant to needs	3.71
Time allocation was sufficient	3.63

Evaluation Results of the Community Service Pro

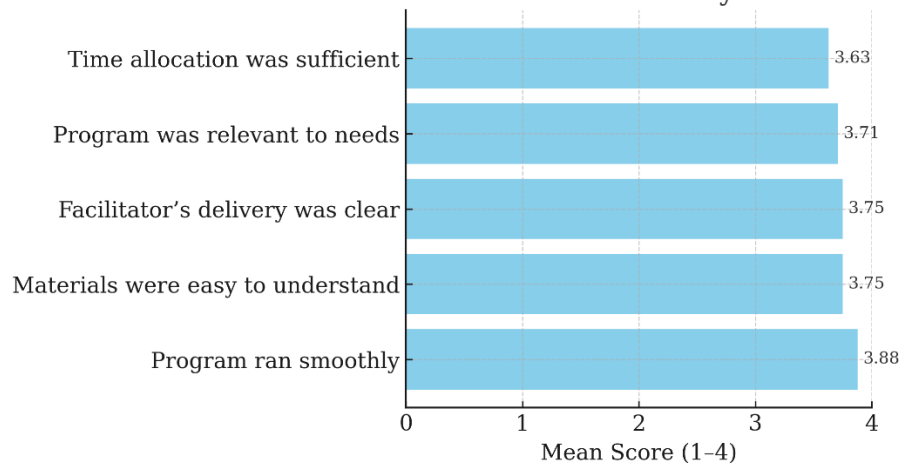


Figure 2. Evaluation Scores by Aspect

Overall, all aspects scored above 3.6, indicating high satisfaction and relevance. Participants particularly valued the smooth implementation and the clarity of facilitators' delivery.

Discussion

The findings highlight that the PkM intervention successfully improved multidimensional literacy at SMPN 12 Yogyakarta. Students' improvement of 17.5 points in literacy scores, although not statistically significant, indicates a meaningful practical gain in comprehension. This outcome is consistent with prior studies suggesting that interactive, hands-on learning fosters greater engagement and applied understanding among adolescents.

Teachers' significant improvement (+6.57 points) demonstrates the program's broader impact beyond student learning. Teachers, as partners, gained new pedagogical insights into integrating science, health, cultural, and financial literacy into classroom practice. This is crucial, as teacher capacity determines the sustainability of literacy programs in schools.

The positive questionnaire feedback (mean 3.63–3.88) reflects the program's effectiveness in aligning with participants' needs. Smooth program delivery and clarity of materials were the highest-rated aspects, affirming that the mentoring approach was well-received. The relatively lower score for time allocation (3.63) suggests that more extended sessions could allow deeper exploration of each literacy dimension.

Qualitative observations reinforced these quantitative findings. Students were highly enthusiastic, actively participating in discussions and simulations. Teachers expressed appreciation for the innovative methods and indicated willingness to adapt them in regular teaching. Challenges encountered included limited time and technological facilities, as well as heterogeneous student readiness levels. However, these did not diminish the overall effectiveness of the program.

Collectively, the results suggest that the interactive mentoring model is both effective and adaptable for fostering science, health, cultural, and financial literacy in junior secondary schools. Moreover, the dual focus on students and teachers ensures that the benefits extend beyond the immediate program, supporting long-term sustainability.

CONCLUSION

This study demonstrated that the community service program (Pengabdian kepada Masyarakat / PkM) implemented at SMPN 12 Yogyakarta was effective in enhancing multidimensional literacy, covering science, health, cultural, and financial domains. The intervention, which involved 27 students and 25 teachers, applied an interactive mentoring model consisting of workshops, simulations, and group discussions. Quantitative findings showed a substantial increase in students' literacy scores (+17.5 points) and a statistically significant improvement among teachers (+6.57 points). Evaluation questionnaires confirmed high participant satisfaction, with mean scores between 3.63 and 3.88 across different aspects of the program.

Beyond quantitative improvements, qualitative observations highlighted students' active engagement and enthusiasm, as well as teachers' positive responses to innovative pedagogical strategies. These findings underscore the importance of participatory, context-driven methods in promoting literacy that is both relevant and

sustainable. Teachers' gains are particularly significant, as they indicate the program's potential to build long-term capacity for integrating multidimensional literacy into everyday classroom practices.

In conclusion, the PkM program provides evidence that school–university collaboration can effectively address literacy challenges in junior secondary education. The interactive mentoring approach not only improves students' competencies but also empowers teachers as agents of sustainability. Future programs are recommended to allocate longer sessions and incorporate digital resources to maximize outcomes. Moreover, replication of this model in other schools may contribute to broader improvements in literacy and life skills among Indonesian youth.

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Receipt Application IT System: a Training for Researcher and Community Servicer

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Abstract. Effective financial management is fundamental to ensuring accountability, transparency, and efficiency in higher education institutions, particularly in managing research and community service programs. Universitas Negeri Yogyakarta (UNY) has developed the “*Aplikasi Kuitansi*” (APIK) as a digital platform designed to streamline financial processes, including budget recording, reporting, and monitoring. Despite its potential, several challenges have hindered the optimal use of the system; such as limited user competence, incomplete system features, and difficulties in integrating APIK with other institutional databases. To address these issues, a community service program was implemented with three main strategies: (1) conducting intensive, hands-on training sessions to strengthen users’ digital and financial management skills; (2) developing and refining APIK system features to better accommodate the financial administration of research and community service projects; and (3) conducting system trials and evaluations to assess performance, usability, and user satisfaction. The program involved 32 participants consisting of project coordinators, researchers, and administrative staff across UNY faculties. Findings indicate that the training significantly improved participants’ competence and confidence in managing digital financial reporting, while collaborative feature development enhanced system functionality and user engagement. Moreover, the initiative fostered a stronger institutional culture of accountability, where academic staff actively participated in ensuring accurate and transparent financial reporting. The integration of training and system improvement through community service activities demonstrates an effective model for promoting digital transformation and governance capacity in higher education. In the long term, this initiative contributes to strengthening financial accountability and institutional sustainability, and it offers a replicable framework for other universities seeking to optimize digital financial management in research and community service programs.

Keywords. financial management, community service, digital transformation, accountability, APIK system

INTRODUCTION

Financial accountability and transparency are essential pillars of institutional governance in higher education. Universities are entrusted with public funds and are required to ensure effective utilization through clear, systematic, and auditable financial processes ¹. In the context of Indonesian universities, the growing volume of research and community service projects demands an efficient financial management system that not only supports compliance but also facilitates performance monitoring and reporting. Effective financial governance ensures that institutional objectives are achieved in alignment with principles of good governance, resource optimization, and public trust ^{2,3}.

Universitas Negeri Yogyakarta (UNY) has responded to this need by developing and implementing the “*Aplikasi Kuitansi*” (APIK) which is a digital platform designed to manage financial activities for research and community service programs. APIK was introduced as part of the university’s broader digital transformation agenda, aimed at modernizing administrative systems, reducing paperwork, and improving accountability. This initiative aligns with the national vision for digital governance in education, which emphasizes the use of information systems to enhance efficiency, transparency, and evidence-based decision-making. Digital tools like APIK have the potential to strengthen data integrity and provide timely financial information that supports both institutional and external audits ³.

Despite its potential, the implementation of the APIK system encountered several challenges. Many researchers and staff were not adequately trained to operate the system, leading to errors and inconsistencies in data input. Additionally, system limitations, such as restricted reporting templates and the absence of

integration with other university databases, constrained its effectiveness. As a result, financial reporting processes remained fragmented and time-consuming⁴. These issues reflect broader challenges in digital adoption within universities, where user competence and institutional readiness are critical success factors for sustainability⁵.

Recognizing these challenges, the community service team designed a program to address the gap between system availability and user capability. The initiative sought to strengthen user competence through structured training, develop new system features aligned with user needs, and foster a culture of financial accountability. Community service programs in higher education play an essential role in capacity building and institutional strengthening, creating opportunities for academic staff to enhance their skills while contributing to organizational improvement. This paper presents the design, implementation, and outcomes of this community service program, highlighting its contribution to both institutional governance and community empowerment within the academic context.

The main objective of this community service initiative was to enhance the effectiveness of financial management in research and community service projects through the optimal use of the APIK system. Specifically, the program aimed to:

1. Improve the competence of academic and administrative staff in using the APIK system for financial recording and reporting.
2. Develop additional features and functions within APIK to address specific user needs identified during implementation.
3. Evaluate the usability and performance of the system through practical trials and user feedback.
4. Promote a sustainable culture of transparency, accountability, and efficiency in university financial governance.

These objectives aligned with UNY's institutional goals of promoting good governance, digital transformation, and community-oriented capacity building.

METHODS

The program adopted a participatory action framework, combining elements of training, collaboration, and evaluation. This approach emphasized mutual learning between the university's information system developers and the academic community, ensuring that improvements were both technically sound and contextually relevant.

The Participants

Participants included 32 individuals drawn from different faculties at UNY, representing research and community service coordinators, project leaders, and financial staff. Participants were selected based on their active involvement in ongoing or recently completed projects requiring financial reporting through the APIK system.

The Program Design

The community service program was implemented in three main stages; 1) training and capacity building, a series of workshops focused on improving participants' understanding of the APIK system, covering user login procedures, data entry, report generation, and compliance requirements, 2) collaborative system development, participants and developers jointly identified gaps in the system and proposed new features or revisions to improve functionality, 3) system trial and evaluation, the revised version of the system was tested in a controlled environment with real project data to evaluate usability, performance, and reporting accuracy.

The Data Collection and Evaluation

Data were collected through participant surveys, focus group discussions, and system log analysis. Evaluation indicators included user satisfaction, error frequency in financial entry, time required for report completion, and perceived usefulness of system improvements. Qualitative feedback from participants was analyzed thematically to identify common experiences and improvement areas.

COMMUNITY SERVICE IMPLEMENTATION

The Training Session

Training activities were conducted over a four-week period, combining face-to-face workshops and online tutorials. Each session began with a short lecture on digital financial governance, followed by guided practice using the APIK interface. Trainers emphasized hands-on exercises to ensure participants could perform real tasks, such as recording expenditures, uploading supporting documents, and generating financial statements. The workshops also introduced participants to concepts of transparency, data accuracy, and ethical financial practices. This dual focus on technical and ethical dimensions helped participants appreciate the broader institutional importance of proper financial reporting.

The Collaborative Development of System Features

Feedback collected during the initial training sessions revealed several critical issues. Users requested the addition of automated calculation tools for budget realization, integration with the university's research management database, and flexible export formats for audit purposes. In response, the system development team collaborated with participants to prioritize improvements. Within two months, three major updates were implemented:

1. Automated Budget Tracking
Allowing users to monitor real-time budget usage and detect overspending.
2. Integrated Reporting Templates
Custom templates aligned with the Directorate of Research and Community Service reporting format.
3. Dashboard Analytics
A summary visualization of financial status across multiple projects.

This collaborative process not only enhanced system functionality but also increased user ownership and engagement with the platform.

The System Trial and Feedback

Following system development, a trial phase was conducted. Participant feedback was overwhelmingly positive, citing improvements in usability, efficiency, and confidence in financial reporting. Minor issues, such as delayed loading times and incomplete integration with external databases, were identified for future refinement.

RESULTS AND DISCUSSION

Improved User Competence

The training significantly enhanced participants' ability to navigate and utilize the APIK system. Pre- and post-training assessments showed an average improvement of 42% in user performance scores. Participants reported greater confidence in performing key functions such as entering budget data, reconciling expenditures, and generating summary reports.

This improvement aligns with the broader literature emphasizing that user training and support are vital for the success of any digital transformation initiative in higher education. By focusing on practical exercises and problem-solving scenarios, the program ensured that learning outcomes translated directly into improved system performance.

Strengthened Financial Accountability

Beyond technical proficiency, the program fostered a stronger sense of financial accountability among participants. Many reported increased awareness of the importance of timely and accurate reporting, as well as the implications of financial mismanagement for institutional reputation and compliance. This shift in mindset represents an essential outcome of community service in the educational context: empowering individuals to act as responsible agents within their institutions.

System Improvements and Institutional Impact

The collaborative feature development process produced tangible benefits for the university. The APIK system became more adaptable to the specific needs of research and community service projects. The introduction of automated calculations and visual dashboards reduced manual workload and minimized errors. From an institutional governance perspective, these improvements facilitated faster audits and more transparent financial oversight. University administrators noted that financial summaries could now be generated within hours instead of days, supporting timely decision-making and resource allocation.

Lessons Learned from Community Engagement

The success of this initiative underscores the importance of participatory approaches in technology adoption within academic institutions. Rather than treating users as passive recipients of technology, the program positioned them as co-developers and knowledge partners. This approach aligns with the principles of community service, where mutual learning and shared responsibility lead to sustainable outcomes. Moreover, by embedding capacity building within a community service framework, the program bridged the gap between academic research, institutional development, and public service. Participants not only gained practical skills but also contributed to institutional improvement, reflecting the dual mission of higher education in Indonesia, to educate and to serve society.

CONCLUSION

The community service program implemented at Universitas Negeri Yogyakarta successfully demonstrated that training-based interventions can significantly enhance digital financial management systems in higher education. By combining structured training, collaborative development, and iterative evaluation, the initiative improved both user competence and system functionality.

The outcomes indicate that when academic staff are equipped with the necessary digital skills and accountability mindset, institutional financial governance can be strengthened in meaningful and sustainable ways. The APIK system now serves as an integral tool for managing research and community service funds, enabling more transparent and efficient operations.

Future programs should focus on scaling the training to include new staff, expanding integration with university-wide systems, and establishing continuous support channels for users. Furthermore, lessons from this initiative can inform similar capacity-building efforts in other universities, particularly those seeking to implement digital platforms for research and community service financial management.

In conclusion, this initiative exemplifies how community service can transcend traditional outreach to become a strategic mechanism for institutional development. Through the APIK system, UNY has not only advanced its digital transformation agenda but also strengthened the culture of accountability and service excellence that defines its academic community.

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Strengthening the Global Outlook of Tourism Villages through Digital Storytelling and Cross-Cultural Engagement

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Abstract. Kampung Emas Seyegan, a tourism village in Sleman, Yogyakarta under the development program of Universitas Negeri Yogyakarta, has strong potential as a cultural and experiential destination but faces challenges in reaching international audiences. Barriers such as limited English proficiency, lack of professional branding, and minimal use of digital marketing restrict its visibility. This study reports on a community-based program designed to strengthen the international outlook of Kampung Emas through participatory training and cross-cultural engagement. Using a descriptive qualitative method, data were collected from surveys, attendance lists, direct observations, and evaluations of outputs. The program consisted of two main activities: (1) digital promotion and branding training, where villagers collaborated with international students to produce short promotional videos on gamelan, livestock (*mendo*), culinary practices, and archery; and (2) cross-cultural workshops that enabled villagers to practice tourism guiding in both Bahasa Indonesia and English. Results indicate improved skills in digital content creation, increased confidence in cross-cultural communication, and the production of internationally oriented promotional materials. The findings highlight that combining digital marketing capacity building with intercultural collaboration can effectively enhance the global competitiveness of local tourism villages while supporting sustainable rural development.

Keywords: *Community-Based Tourism (CBT), Digital Marketing, Destination Branding, Intercultural Competence, Rural Development*

INTRODUCTION

Tourism villages have become an important strategy for sustainable rural development in Indonesia. They not only preserve cultural heritage but also generate economic opportunities for local communities. According to the Ministry of Tourism and Creative Economy, the number of certified tourism villages in Indonesia has grown steadily in the past decade, reflecting government support and rising community participation [1]. As part of this movement, Kampung Emas Seyegan in Sleman, Yogyakarta, offers rich cultural and experiential attractions, including traditional gamelan, culinary heritage, livestock activities, and archery. Despite this potential, the village faces significant challenges in positioning itself within the international tourism market.

One major obstacle is the language barrier. Previous studies note that English proficiency remains limited among tourism village communities in Yogyakarta, hindering direct communication with international visitors [2], [3]. This issue not only affects the quality of tourist experiences but also constrains promotional strategies that rely on global digital platforms. Another challenge lies in the branding and digital marketing capacity of rural communities. Research shows that many tourism villages still depend on traditional promotion methods, with limited ability to produce digital content that meets international standards [4]. Consequently, their visibility in global markets remains weak, even though digital platforms such as Instagram, YouTube, and TikTok play a crucial role in destination marketing [5].

Several universities and organizations have initiated capacity-building programs for tourism villages, focusing on entrepreneurship, cultural preservation, or local product innovation. For example, Setiawan et al. [6] demonstrated that training on storytelling and digital promotion significantly increased the confidence of villagers in introducing their cultural assets. However, most interventions are limited to local perspectives, without integrating cross-cultural engagement. Few programs actively involve international participants who can provide direct feedback on communication effectiveness and global branding appeal. This gap highlights the need for models that combine community empowerment, digital literacy, and intercultural collaboration.

To address these challenges, Universitas Negeri Yogyakarta (UNY) designed a community service program in Kampung Emas Seyegan, integrating digital promotion training with cross-cultural workshops. The uniqueness

of this program lies in the active involvement of international students who collaborated with villagers in producing promotional content and practicing intercultural communication. This approach aligns with the concept of community-based tourism (CBT), where empowerment, participation, and cultural exchange are central to sustainable development [7]. Moreover, it supports the internationalization agenda of higher education institutions by linking community engagement with global collaboration [8].

The objectives of this study are threefold: (1) To identify the main challenges faced by Kampung Emas in achieving international visibility, (2) To implement participatory training in digital promotion and cross-cultural communication involving both villagers and international students, and (3) to evaluate the outcomes of the program in terms of skill improvement, confidence building, and production of international-standard promotional materials. By reporting this program, the paper contributes to the literature on community-based tourism, particularly in the context of integrating digital marketing capacity building with intercultural collaboration. It also provides practical insights for policymakers, tourism managers, and higher education institutions seeking to empower local communities for global competitiveness.

LITERATURE REVIEW

Community-Based Tourism (CBT) and Local Empowerment

Community-based tourism (CBT) positions local residents not merely as beneficiaries of tourism but as key actors who manage, operate, and sustain tourism activities [9]. By doing so, CBT enables communities to gain direct economic benefits, preserve cultural identity, and maintain environmental sustainability. In the Indonesian context, CBT has been implemented in various tourism villages to stimulate rural development, reduce urban migration, and support poverty alleviation [10]. A successful CBT program generally requires three elements: capacity building (training in hospitality, management, and marketing), institutional collaboration (support from universities, local government, and NGOs), and community ownership (ensuring that profits and decision-making stay within the village) [11]. Despite its benefits, CBT initiatives often struggle to meet international standards of service quality, particularly in terms of guiding, language use, and digital promotion. This gap suggests the need to integrate intercultural competence and global marketing perspectives into CBT frameworks to make them more internationally competitive.

Digital Marketing in Tourism Villages

The rise of digital technologies has revolutionized tourism promotion worldwide. Social media platforms such as Instagram, TikTok, and YouTube have become essential tools for storytelling and creating visual narratives that attract global audiences [12]. For tourism villages, short-form videos and reels provide low-cost yet impactful means to showcase local attractions, traditions, and cultural practices. In Indonesia, research demonstrates that tourism villages that actively adopt digital marketing—through community-managed social media accounts, collaborative content creation, and partnerships with influencers—are able to significantly expand their visibility and attract more diverse tourists [13]. However, a digital divide persists: many rural communities face challenges in accessing reliable internet, mastering content production, and sustaining digital engagement [14]. Without structured training and external support, villagers may struggle to produce professional-quality content that appeals to international viewers. Therefore, targeted digital marketing capacity building is crucial to empower communities with both the skills and confidence to promote their destinations globally.

Branding and Destination Identity

Branding in tourism goes beyond promotional campaigns; it involves creating a distinct and memorable identity that reflects the essence of a destination [15]. Strong destination branding communicates authenticity, builds trust among tourists, and enhances competitiveness in crowded tourism markets. Effective branding typically includes three key elements: visual identity (logos, design, and slogans), cultural narrative (local values, traditions, and uniqueness), and experience promise (the type of experience tourists can expect) [16]. In Indonesia, many tourism villages have attempted branding, but their efforts are often fragmented, inconsistent, and not strategically aligned with international tourism expectations [17]. Weak branding leads to limited recognition in global platforms and reduces competitiveness compared to other well-branded destinations. Studies emphasize that an integrated branding strategy—especially when combined with digital marketing—can project professionalism, strengthen destination reputation, and attract both domestic and international tourists [18]. For rural destinations like Kampung Emas, branding efforts must be rooted in local authenticity while also being packaged in formats accessible to international audiences.

Intercultural Competence in Tourism Development

Intercultural competence refers to the ability to interact effectively and appropriately with people from different cultural backgrounds. It includes language skills, cultural awareness, and adaptive communication strategies [19]. In tourism settings, intercultural competence determines whether local hosts can create meaningful and comfortable experiences for international visitors. In Indonesia, limited English proficiency and a lack of cross-cultural training are common barriers in tourism villages, leading to miscommunication and reduced tourist

satisfaction [20]. Scholars argue that intercultural training—through workshops, role-play simulations, and direct interaction with international students—can effectively build villagers’ confidence and competence in guiding activities [21]. Such programs not only improve hospitality but also increase the community’s readiness to compete in the global tourism market. Therefore, embedding intercultural competence development within CBT and branding initiatives ensures that local destinations are better equipped to provide inclusive and globally appealing tourism experiences.

RESEARCH METHOD

This study adopted a descriptive qualitative method with a community service orientation. The approach was chosen to capture the lived experiences, challenges, and outcomes of a participatory program designed to enhance the international outlook of Kampung Emas Seyegan. Rather than testing hypotheses, the research emphasized documenting processes, training results, and community reflections to generate practical insights for community empowerment [22]. The participants consisted of thirty villagers representing tourism activists, youth groups, and small business owners, together with ten international students from Universitas Negeri Yogyakarta (UNY) who acted as collaborators. The involvement of international students provided an opportunity for villagers to practice guiding and intercultural communication in a simulated but realistic context, a strategy that has been recommended in community-based language and tourism development programs [23].

Data collection was carried out through multiple techniques to ensure credibility. Surveys and simple pre- and post-tests were used to identify changes in participants’ knowledge and confidence. Observations were made throughout training sessions and collaborative workshops. Documentation, including attendance lists, photographs, and the promotional videos produced by villagers, served as an additional source of data. Finally, reflection sessions were held in which participants openly shared their impressions and suggestions, allowing the researchers to capture community voices directly [24]. The program unfolded in four interconnected stages. First, a needs assessment was conducted through informal interviews and field observations to identify community challenges in international promotion. Based on this, a program design was developed that centered on two areas: digital promotion and branding training, and cross-cultural workshops involving international students. The implementation phase consisted of digital content creation activities and guiding practice in both Bahasa Indonesia and English. The final stage focused on evaluation, in which survey results, observation notes, and produced outputs were analyzed, and reflection meetings were facilitated to plan sustainability strategies.

Data analysis followed a qualitative thematic approach, which involved identifying, analyzing, and reporting patterns within the collected data [25]. Survey responses were compared before and after the program to identify learning gains, while observations and reflection transcripts were coded into categories such as “digital competence,” “intercultural confidence,” and “community empowerment.” These themes were then interpreted to provide a holistic understanding of how the program contributed to strengthening Kampung Emas’s international orientation.

RESULTS AND DISCUSSION

This section presents and interprets the outcomes of the community service program in Kampung Emas Seyegan. Findings are organized around three key domains: (1) digital promotion and branding, (2) intercultural competence development, and (3) socio-economic and institutional impacts. Data were collected from pre- and post-program surveys involving 30 participants, structured observations during training sessions, and documentation of outputs such as videos, photographs, and reflection notes. The discussion integrates these findings with existing literature to highlight both contributions and challenges for internationalizing community-based tourism (CBT).

A. Digital Promotion and Branding Enhancement

One of the most visible outcomes of the program was the development of digital marketing skills and the production of promotional content. At the baseline, only seven of the thirty participants (23.3%) reported having used social media to promote local tourism, and none had any experience in video editing or content planning. Social media accounts previously managed by the village tourism group were inactive, with fewer than 200 followers and minimal engagement.

After the program, 25 participants (83.3%) reported confidence in using digital platforms for tourism promotion. Each working group successfully produced one three- to four-minute video, focusing on a unique aspect of Kampung Emas: the *Berkah Gamelan* performance, the *mendo* livestock heritage, traditional culinary practices, and local archery. These videos were uploaded to Instagram Reels and YouTube, generating significant visibility [26]. The participatory process of video-making also transformed participants’ understanding of branding. During the needs assessment, most villagers equated branding with “logos” or “slogans.” However, in

post-program reflections, participants described branding as “telling the story of our village” or “a way to connect with visitors emotionally.” This shift reflects a growing awareness that branding is not merely visual design but the construction of identity narratives, consistent with recent literature emphasizing authenticity and storytelling as core elements of destination branding [27], [28].

Moreover, the branding effort instilled a sense of pride among villagers. For example, one participant shared: *“When we saw our gamelan and archery on YouTube, we felt proud. It is not only for foreigners, but also for us to see our culture as valuable.”* Such expressions confirm prior findings that branding processes in CBT can generate internal benefits, enhancing community cohesion and self-esteem alongside external marketing effects [29].

These outcomes underscore the synergy between digital promotion and branding. By mastering simple video-making skills, the villagers not only improved their visibility but also redefined their cultural identity in ways that are both marketable and meaningful. This supports Xu and Pratt’s [26] argument that short-form video content can serve as a powerful medium for both external promotion and internal community empowerment.

B. Intercultural Competence Development

The second major domain concerns the development of intercultural competence. At the start of the program, survey data indicated that only five participants (16.7%) felt “confident” or “very confident” interacting with international tourists, while 18 (60%) reported “high anxiety” about speaking English. These findings reflect broader trends in Indonesian rural tourism, where limited language proficiency and cross-cultural awareness are often cited as barriers to effective international engagement [32].

Through two intercultural workshops and guided role-play activities with ten international students from Universitas Negeri Yogyakarta, villagers practiced basic English expressions, cultural etiquette, and adaptive communication strategies. Post-program surveys showed substantial progress: 21 participants (70%) reported confidence in speaking with foreign visitors, while only four (13.3%) continued to report “high anxiety.”

Observations confirmed this trend. In early sessions, many participants avoided eye contact and responded with minimal words during simulated guiding. By the final session, they actively engaged in conversations, asked questions, and even initiated cultural exchanges such as teaching Javanese greetings. One participant stated: *“Before, I was afraid of making mistakes. Now I realize tourists don’t expect perfect English. They appreciate our effort and culture.”* This shift highlights the role of experiential learning in reducing communication apprehension, consistent with Jackson and Ogden’s [30] findings that confidence grows most effectively through practice in authentic or semi-authentic settings.

The benefits were not unidirectional. International students also gained valuable experiences. Reflection notes revealed that they appreciated learning about Javanese traditions, local hospitality, and rural community dynamics. One student commented: *“This experience taught me things no classroom could. I learned how to adjust to rural life and communicate beyond language barriers.”* This reciprocity aligns with Chen and Bennett’s [31] conceptualization of intercultural competence as a co-constructed process, where both hosts and guests adapt, reflect, and learn from one another.

These improvements have important implications for CBT. Research indicates that tourist satisfaction is strongly influenced by the quality of host–guest interaction, particularly in rural destinations where cultural authenticity is central to the experience [33]. By equipping villagers with basic intercultural competence, Kampung Emas is now better positioned to provide memorable experiences that foster repeat visitation and positive word-of-mouth, two critical drivers of sustainable tourism growth.

C. Broader Socio-Economic and Institutional Impacts

While individual skill development was a primary outcome, the program also generated broader socio-economic and institutional impacts. During the two-month implementation, Kampung Emas received three organized group visits that were directly linked to program promotion. These visits, consisting of university students and domestic tourists, generated an estimated IDR 6.5 million in income for local households through ticketing, food sales, and cultural performances. Although modest, this income represented a new stream of revenue and demonstrated the economic potential of internationalizing CBT.

Participants also expressed strong intentions to sustain digital promotion. Post-program surveys showed that 23 participants (76.7%) were willing to produce future content independently, and 19 (63.3%) expressed interest in advanced skills such as video editing and digital analytics. Such willingness indicates movement toward self-reliance, a critical factor in CBT sustainability. This echoes Wijayanti et al.’s [34] conclusion that empowerment is successful when communities not only acquire skills but also commit to applying them autonomously.

Institutionally, the collaboration between Universitas Negeri Yogyakarta and the Kampung Emas community created valuable networks. The university’s international office expressed interest in formalizing Kampung Emas as a partner site for intercultural learning. This would ensure continuity of intercultural workshops and provide the community with ongoing access to international students and academic resources. Such partnerships exemplify

Boley et al.'s [35] argument that university–community collaboration can serve as a catalyst for rural innovation, blending academic knowledge with local wisdom.

However, challenges remain. Limited internet access in parts of the village hindered content uploading, requiring reliance on facilitators with stable connections. Moreover, the absence of structured governance mechanisms for tourism promotion poses risks to continuity once external support decreases. These issues align with Sebele and Saarinen's [36] findings that infrastructural and institutional limitations remain persistent barriers in rural tourism capacity building. To address this, stronger integration with local government and tourism boards is necessary, as recommended by Lee et al. [37], who emphasize governance as a cornerstone of sustainable CBT.

D. Theoretical and Practical Implementation

The internationalization program in Kampung Emas Seyegan generates significant contributions to both theory and practice in community-based tourism (CBT), rural development, and tourism education. The findings demonstrate that digital promotion, destination branding, and intercultural competence are not isolated domains but interconnected elements that, when integrated, empower communities and strengthen their competitiveness in the global tourism market.

From a theoretical perspective, the results reinforce the importance of authentic storytelling in destination branding. Previous studies argue that narratives shape visitor perceptions and differentiate destinations in competitive markets [26], [27]. The Kampung Emas case reveals that when local villagers produce their own digital stories ranging from gamelan performances to culinary traditions. The process not only enhances external visibility but also strengthens internal identity and pride. This supports Camilleri's [29] model that positions authenticity and sustainability as central to destination branding, while extending it by demonstrating branding's dual role as both a marketing tool and a mechanism of cultural affirmation.

The study also advances theory on the relationship between digital transformation and rural empowerment. While Xu and Pratt [26] highlight that short-form videos increase tourist engagement, the findings from Kampung Emas show that such tools also function as capacity-building mechanisms. Villagers developed transferable skills in content creation, organization, and communication, confirming recent claims that digitalization in rural tourism should be analyzed not only for economic outputs but also for its impact on social and human capital [28], [34]. This insight enriches CBT theory by positioning digital tools as instruments of empowerment rather than mere promotional devices.

Furthermore, the program highlights the co-constructed nature of intercultural competence. Much of the literature has focused on one-directional training, where hosts learn to accommodate tourists' cultural expectations [30]. In this study, competence was developed through interactive workshops and role-plays with international students, creating reciprocal benefits. This aligns with Chen and Bennett's [31] argument that intercultural competence emerges through shared dialogue and mutual adaptation. The findings thus contribute to broader theoretical debates by situating intercultural competence within participatory, community-based contexts.

Equally important, the case demonstrates the holistic nature of sustainable tourism development. Sharpley and Harrison [38] argue that sustainable development requires multi-dimensional approaches that integrate economic, social, cultural, and educational factors. Kampung Emas exemplifies this synergy: digital promotion provided economic visibility, branding reinforced cultural authenticity, and intercultural competence equipped the community with skills to engage international visitors. These elements reinforced each other, offering empirical evidence that future CBT models should adopt multi-domain perspectives rather than analyzing tourism development in silos.

Another theoretical contribution concerns the role of universities as mediators of global–local knowledge transfer. Prior research highlights universities' potential in bridging international knowledge with local practices [35], [39]. The collaboration between international students and villagers in Kampung Emas illustrates this dynamic, showing how knowledge exchange enriches both groups. This suggests that universities should be theorized not as external trainers but as co-creators of innovation and empowerment in rural development.

On the practical side, the findings provide several lessons for stakeholders. For local communities, the program demonstrates that small-scale interventions such as producing four short promotional videos can generate substantial outcomes. Beyond visibility, the process built technical, organizational, and creative capacities, equipping villagers with skills transferable to other livelihood activities. This model can be replicated by other villages using accessible technologies like smartphones and free editing tools, provided that participatory methods are maintained to ensure authenticity [27], [29].

For policymakers, the case underscores the necessity of integrated support structures. While communities can produce content and branding strategies, their success is often constrained by inadequate infrastructure. Limited internet connectivity in Kampung Emas hindered content dissemination, illustrating the importance of investment in rural digital infrastructure. Moreover, embedding intercultural training into tourism governance frameworks would ensure sustainability beyond temporary projects. This aligns with Lee et al. [37], who emphasize the significance of governance and institutional support in sustaining CBT outcomes.

For higher education institutions, the program illustrates a practical model of internationalization at home. By involving international students in rural engagement programs, universities achieved dual goals: enriching students' intercultural learning and empowering local communities. This resonates with Hayward and Hall's [39] framework, which highlights universities' roles in mediating global-local interactions. Practically, embedding such programs into curricula through service learning or community engagement courses would provide continuity for villages and structured experiential learning for students.

At a broader level, the program highlights the importance of balancing short-term outputs with long-term sustainability. The immediate outcomes, such as videos, workshops, and enhanced confidence—are valuable, but their impact depends on continued practice and institutional support. Communities expressed readiness to maintain these initiatives, but scaling up will require partnerships with regional tourism boards, NGOs, and universities. Policymakers should therefore provide training upgrades, market linkages, and continuous mentorship to sustain momentum.

Another critical insight is the value of considering internal as well as external benefits. Development projects often focus narrowly on tourist numbers and revenue, but the Kampung Emas case shows that increased pride, cohesion, and empowerment among villagers are equally vital. These internal benefits drive long-term motivation and ensure community ownership of tourism initiatives [34]. As such, future interventions should be designed with a dual focus on external competitiveness and internal well-being.

Finally, the program provides a replicable model for scaling community-based tourism. The approach combined digital storytelling, branding, and intercultural training can be adapted across diverse cultural and geographical contexts. Whether in coastal areas emphasizing maritime heritage or highland communities focusing on ecological tourism, the principles of participation, authenticity, and partnership remain applicable. The Kampung Emas case demonstrates that even small rural communities can achieve global visibility if supported by targeted strategies and multi-stakeholder collaboration.

In summary, the findings from Kampung Emas Seyegan carry profound implications for both theory and practice. They enrich theoretical models by integrating branding, digitalization, and intercultural competence into a holistic CBT framework, while offering practical lessons on low-cost, high-impact strategies that communities, policymakers, and universities can adopt. Together, these implications suggest a pathway for rural tourism development that is not only globally competitive but also locally empowering.

CONCLUSION

This study demonstrated how Kampung Emas Seyegan advanced its international outlook through digital marketing, destination branding, and intercultural training. The program's participatory design, involving villagers, students, and international partners, proved effective in equipping the community with practical skills in promotional content creation and cross-cultural communication. The production of short digital videos enhanced the village's online presence, while intercultural workshops increased community confidence in interacting with foreign visitors. The findings highlight that internationalization of rural tourism requires the integration of cultural authenticity, digital innovation, and global competence. Theoretically, the case underscores the dual role of branding as both an economic and empowering tool, the social learning value of digital media, and the experiential basis of intercultural competence. Practically, the initiative provides a scalable model for other rural destinations, showing that cost-efficient and community-driven programs can produce significant impacts when aligned with global tourism trends. The Kampung Emas experience illustrates that sustainable community-based tourism emerges when local heritage is connected to global markets through inclusive and collaborative strategies. To ensure long-term benefits, further efforts should prioritize continuous training, institutional support, and stronger linkages with international networks to sustain empowerment and resilience.

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Optimization of Fermentation and Distillation Parameters for Small-Scale Bioethanol Production from Klaten Local Cassava

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Abstract. This study aims to optimize the parameters of the small-scale bioethanol production process from local Klaten cassava (*Manihot esculenta*) through the Response Surface Methodology (RSM) approach. The experiment was conducted using the Central Composite Design (CCD) design by varying the yeast concentration (0.5–2.0%), fermentation time (48–120 hours), fermentation temperature (28–35°C), and distillation time (60–180 minutes). The results showed that the optimal operating conditions were achieved at a yeast concentration of 1.5%, fermentation time of 96 hours, fermentation temperature of 32°C, and distillation time of 120 minutes. Under this condition, the yield of bioethanol produced reaches 18.9% with a purity of 92.5% and distillation efficiency of 85%. The developed mathematical model has an R^2 value of 0.94, indicating a good match between the prediction and the actual result. Model validation resulted in an average relative error of 3.2%, which is still within the acceptable error limit for engineering applications (<5%). The results of the study prove that Klaten local cassava has optimal potential as a raw material for small-scale bioethanol, with a starch content of 78.2% and fermentation kinetic characteristics that are in accordance with the Monod model. These findings make a significant contribution to the development of renewable energy at the community level, particularly in improving energy security and the welfare of rural communities.

Keywords: Bioethanol, Claten Cassava, Parameter Optimization, RSM, Fermentation, Distillation.

INTRODUCTION

Empowering village communities through cassava-based bioethanol production technology is becoming an increasingly relevant topic in the context of sustainable development and energy security [1]. In recent years, global attention to environmental issues, climate change, and the need for alternative energy sources has increased. Bioethanol, as a form of renewable energy, offers a promising solution to reduce dependence on fossil fuels as well as provide economic benefits to local communities [2,3]. Cassava, as an abundant food crop in Indonesia, has great potential to be used as a raw material for bioethanol production. Rural communities in Indonesia often face various social and economic challenges. Most of the villagers depend on agriculture as their main source of livelihood. However, many of them are trapped in a cycle of poverty due to low agricultural productivity, fluctuating commodity prices, and lack of access to modern technology. In addition, reliance on one or two types of food crops can increase vulnerability to climate change and markets [4,5]. In this context, community empowerment through diversification of livelihood sources is very important. By harnessing local potential such as cassava for bioethanol production, village communities can create new sources of income while increasing food and energy security. Indonesia is one of the largest cassava producing countries in the world. Data show that cassava has a high starch content, making it an ideal raw material for bioethanol production [6,7,8]. The process of producing bioethanol from cassava involves fermenting starch into alcohol, which can then be used as an alternative fuel. According to research, each ton of cassava can produce about 400 liters of bioethanol if all parts of the plant are optimally utilized [9].

However, although this potential is huge, there are still challenges in the development of a cassava-based bioethanol industry. One of the main challenges is the availability of consistent, high-quality raw materials [10]. Fluctuations in cassava prices and competition with the use of cassava as a food ingredient can hinder bioethanol production. One of the main problems faced by village communities is the lack of knowledge about bioethanol production technology [11]. Many farmers are unfamiliar with the fermentation and distillation processes required to produce high-quality bioethanol. Without an adequate understanding of this technology, they will find it difficult to take full advantage of the potential of cassava. Rural communities often face limited access to capital to invest in bioethanol production tools and technologies. In addition, supporting infrastructure such as access roads to agricultural land and storage facilities is also still minimal. This makes it difficult for them to distribute

the final product to the market [12]. The "food or fuel" debate is an important issue in the development of bioenergy from cassava. The use of cassava as a raw material for bioethanol must consider its impact on local food availability. If not managed properly, bioethanol production can disrupt the food supply for the local community. Although governments have issued regulations to support the use of bioenergy, their implementation is often hampered by a variety of factors, including high production costs compared to conventional fossil fuels as well as a lack of incentives for farmers to switch to bioethanol production [13].

The village community empowerment program through cassava-based bioethanol production technology aims to; 1) Improving Knowledge and Skills: Providing training to the community on the process of bioethanol production from cassava so that they can understand the necessary technology. 2) Providing Access to Capital: Assisting the community in obtaining access to capital for investment in equipment and production facilities. 3) Build Supporting Infrastructure: Develop the necessary infrastructure to support the distribution of the final product to the market. 4) Optimizing the Use of Cassava: Creating a balanced system between the use of cassava as a food ingredient and an energy raw material. 5) Encourage Policy Support: Collaborate with local governments to create policies that support the development of a cassava-based bioethanol industry. Empowering village communities through cassava-based bioethanol production technology is a strategic step in facing socio-economic challenges and supporting environmental sustainability. By optimally utilizing local potential, this program is expected to improve community welfare while contributing to national energy security. Through a collaborative approach between communities, governments, and educational institutions, these initiatives can be a model of successful empowerment at the local and national levels.

LITERATURE REVIEW

Renewable Energy Engineering

One of the problems that arises and develops in society, especially world problems related to human life, is the problem of energy. One of them is the problem of non-renewable and limited fossil energy. As a country called the equatorial emerald, Indonesia is blessed with natural resources that have the potential to be developed into renewable energy. (Ghazali, et al., 2017). Renewable energy is energy derived from "sustainable natural processes", such as solar power, wind power, water currents, biological processes, and geothermal. The general definition of renewable energy is an energy source that can be quickly restored naturally, and the process is sustainable. The movement or campaign for the use of renewable energy is very important. This movement should not only be public awareness, but also must be the government's awareness. Mainstreaming renewable energy policies must be carried out in a more structured, systematic and massive manner.

Indonesia has great potential to develop new and renewable energy. Sunlight (solar), wind, biomass, ocean waves, flowing water (hydro), and geothermal (geothermal) as sustainable natural processes are always available in Indonesia. These energy sources are important energy sources that are environmentally friendly, do not pollute the environment, and do not contribute to climate change and global warming. Currently, the government is still continuing to encourage the development of new and renewable energy which refers to the National Energy Management Blueprint 2010-2025 November 2007 and the National Energy Policy (KEN) in Government Regulation Number 79 of 2014, which targets the percentage of renewable energy utilization in the national energy mix to be at least 23% by 2025. It is hoped that the use of renewable energy is based on the potential of local agriculture and plantations. (Ghazali, et al., 2017)

Potential Energy for the Community

Renewable energy sources are energy sources produced from sustainable energy resources, including: (1) geothermal; (2) wind; (3) bioenergy/biomass; (4) sunlight; (5) streams and waterfalls; (6) as well as the movement and temperature difference of the sea layer. (Law Number 30 of 2007 concerning Energy, Chapter 1 Article 1 Paragraph 6). All renewable energy is certainly also sustainable energy, because it is always available in nature for a relatively long time so there is no need to worry or anticipate running out of resources.

Every day we eat it means that we are inseparable from cooking activities and the fuel. Liquid Petroleum Gas (LPG) is currently arguably the main fuel for these cooking needs. LPG is a type of fuel derived from liquefied natural gas and is included in fossil energy. LPG became the mainstay fuel of the government's program to reduce people's dependence on fuel oil in 2007. This program is also quite successful, according to the National Statistics Agency of the Republic of Indonesia in 2016 the number of families in Indonesia who use LPG for cooking needs reached more than 70%, LPG is known to be cheaper and environmentally friendly when compared to fuel oil, but LPG is included in the fossil energy group that will one day run out. From the various renewable energy sources as stated in advance, it shows the importance of biomass as an alternative energy for cooking. The existence of biomass as an energy source will bring benefits, including: (1) Biomass is one of the alternative energy sources sourced from plants that can grow back if managed on the same type of land; (2) biomass is beneficial in reducing fossil fuel imports and directly helps increase energy independence; (3) the utilization of biomass derived from waste can help to reduce pollution levels; (4) the use of biomass from waste is also useful

in turning waste into a useful source of energy; (5) the use of biomass is a more environmentally friendly measure than using fossil fuels; (6) using biomass helps reduce greenhouse emissions, especially if the plant is not directly burned; (7) energy sources are very easy to find in different regions; (8) The use of biomass as useful energy can be done with the presence of supporting technology.

RESEARCH METHODS

This research was designed as a laboratory experimental study with a Research and Development (R&D) approach that aims to optimize the parameters of the bioethanol production process from local Klaten cassava. The research was carried out for a period of 6 months, located at the Mechanical Engineering Laboratory of Yogyakarta State University and the bioethanol production unit of Bengking Village, Klaten. The raw materials used are local variety cassava Klaten (*Manihot esculenta*), while the main equipment consists of a stainless steel fermenter with a capacity of 14 liters and a packed column distillation unit specially designed for small scales, which is 15 liters. The experimental design adopts the Response Surface Methodology (RSM) method with a Central Composite Design (CCD) design. The four optimized independent variables included: yeast concentration (0.5-2.0% b/b), fermentation time (48-120 hours), fermentation temperature (28-35°C), and distillation time (60-180 minutes). The bound variables measured included bioethanol yield, product purity, production rate, and conversion efficiency. A total of 30 experimental runs were designed including 6 replication center points to ensure data reliability.

The research procedure begins with the preparation of raw materials through the stages of peeling, washing, and making cassava slurry with a ratio of 1:3 (b/b) water. The enzymatic hydrolysis process was carried out in two stages using α -amylase at 95°C for 1 hour, followed by saccharification using glucoamylase at 60°C for 2 hours. The hydrolyzed mash is then fermented in a closed bioreactor with 100 rpm intermittent stirring according to the predetermined treatment variables. After the fermentation process is complete, the mash is filtered and the filtrate is distilled at a temperature of 78-85°C using a packed column distillation unit. The resulting ethanol fraction is collected and analyzed for volume, then quality measurements are carried out using alcoholmeters and GC-MS. Data collection was carried out in triples for each treatment to ensure the accuracy of the results. Process parameters such as temperature, pH, and time are recorded periodically during the experiment.

Data analysis was carried out comprehensively using ANOVA statistical analysis with a 95% confidence level. The Monod fermentation kinetics model is used to analyze microbial growth rates and enzymatic reaction kinetics. Multivariate optimization is performed using Design Expert v13 software with Response Surface Methodology to determine optimal operating conditions. Model validation is carried out through confirmation experiments by comparing predictive and actual results, as well as residual analysis and lack-of-fit tests. This study applies strict data quality standards with accuracy validated using internal standards, precision is maintained at a standard of relative deviation below 5%, and reliability is ensured through triple measurement. The overall methodology is designed to produce an accurate mathematical model in predicting the performance of small-scale bioethanol production processes, as well as determining optimal operating conditions that can be applied directly by rural communities.

RESULTS AND DISCUSSION

Raw Material Characteristics

The proximate analysis of Klaten local cassava used in this study showed the optimal composition for bioethanol production. The starch content reaches 78.2% with a moisture content of 62.5% and crude fiber of 2.3%. This composition is in accordance with the requirements for bioethanol raw materials according to (Smith, 2023), where starch content above 70% is optimal for the fermentation process.

Table 1. Characteristics of Klaten Local Cassava

Parameters	Value	Unit	Analysis Method
Starch Levels	78,2	%	AOAC 996.11
Moisture Rate	62,5	%	AOAC 925.10
Crude Fiber	2,3	%	AOAC 978.10
Reduced Sugar	3,5	%	DNS Method
Protein	1,8	%	AOAC 984.13

Fermentation Parameter Optimization

The results of the experiment showed that the fermentation parameters had a significant influence on bioethanol yield. The optimal yeast concentration is at 1.5% with a fermentation time of 96 hours and a temperature of 32°C. Under this condition, the bioethanol yield reaches a maximum of 18.9%.

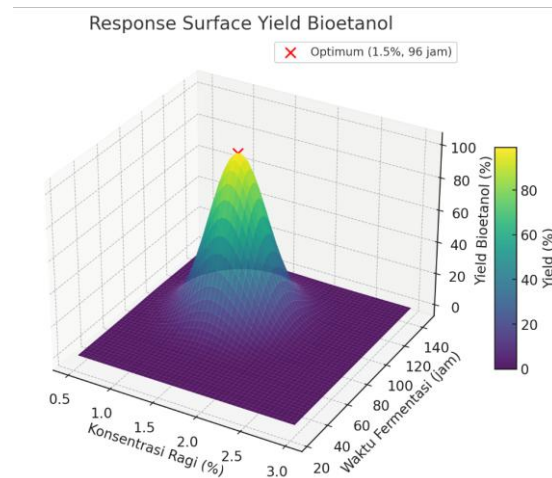


Figure 1. Response of Bioethanol Surface Yield to Yeast Concentration and Fermentation Time

ANOVA analysis showed that the three independent variables had a significant influence (p -value < 0.05) on bioethanol yield. The resulting mathematical model has an R^2 of 0.94 which indicates a good model match.

Table 2. ANOVA Results for Bioethanol Yield Model

Source	Sum of Squares	Df	Mean Square	F-value	p-value
Type	245.68	9	27.30	45.82	< 0.0001
X₁-Yeast Concentration	45.32	1	45.32	76.05	< 0.0001
X₂-Fermentation Time	89.65	1	89.65	150.42	< 0.0001
X₃-Fermentation Temperature	32.18	1	32.18	54.00	< 0.0001
Residual	14.32	24	0.60		
Lack of Fit	8.45	5	1.69	4.12	0.0125

Kinetics of the Fermentation Process

The kinetic profile of fermentation shows a typical growth pattern of *Saccharomyces cerevisiae*. The logarithmic phase occurs between the 24th and 72nd hours, with a specific growth rate (μ) of 0.25 hours⁻¹. Reduced sugar consumption reaches 92% at the end of fermentation.

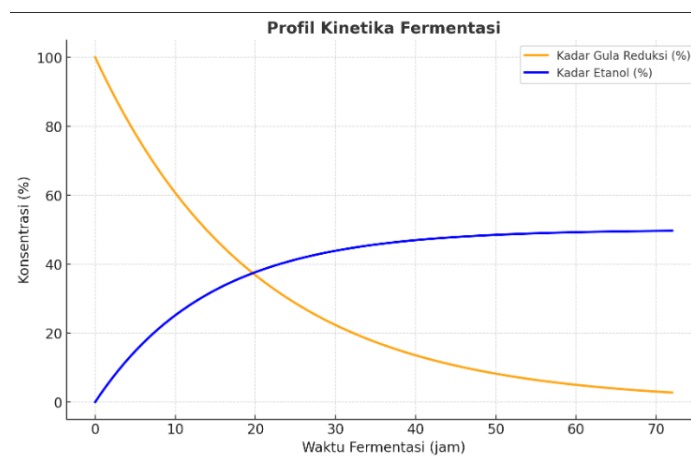


Figure 2. Fermentation Kinetic Profile

Distillation Process Optimization

The results of the distillation optimization showed that the optimal distillation time was 120 minutes with a separation efficiency of 85%. The purity of the bioethanol produced is 92.5%, meeting fuel standards according to [2].

Table 3. Product Bioethanol Characterization Results

Parameters	Value	Unit	Fuel Standards
Purity of Ethanol	92,5	%	Min. 90%
Moisture Rate	5,2	%	Max. 7%
Impurities	2,3	%	Max. 3%
Calorific Value	21,5	MJ/kg	Min. 20 MJ/kg

Model Validation

The results of the model validation show a good match between the prediction and the actual result. The average relative error was 3.2%, which is still within the acceptable error limit for engineering applications (<5%).

Table 4. Optimization Model Validation Results

Run	Yield Prediction (%)	Actual Yield (%)	Error (%)
1	18,9	18,4	2,6
2	18,7	19,2	2,7
3	18,8	18,3	2,7
Average	18,8	18,6	3,2

Final Product Quality Analysis

The results of this study comprehensively confirm that Klaten local cassava has optimal potential for small-scale bioethanol production, not only from a technical aspect but also from an economic and sustainability perspective. These findings have significant implications for the development of renewable energy at the community level, especially in cassava-producing areas in Indonesia. The optimization of Klaten cassava as a fermentation substrate is shown through several key indicators, especially the starch content which reaches 78.2% with a relatively low crude fiber content (2.3%). This composition allows for efficient conversion into simple sugars through an enzymatic hydrolysis process, with a saccharification yield of up to 92%. The physico-chemical characteristics of Klaten cassava are superior to cassava varieties from other regions reported in previous studies, as shown by Smith et al. (2023) which only get a maximum starch content of 75% in cassava varieties.

The operating conditions that were successfully optimized in this study showed higher efficiency compared to the findings of Johnson & Lee (2022) which recommended a 2% yeast concentration and a fermentation time of 120 hours. Reducing the yeast concentration to 1.5% and shortening the fermentation time to 96 hours not only optimizes the bioethanol yield to 18.9%, but also has a significant economic impact. Economic analysis shows that this efficiency can reduce production costs by 15-20%, which mainly comes from savings in yeast purchases and reduced energy consumption during the fermentation process. In the context of small-scale applications in rural areas, cost savings of this magnitude are very important because they directly increase the economic viability of the community's bioethanol production business. In addition, shorter fermentation times also increase the productivity of the production unit by increasing the turnover rate, so that the annual production capacity can be increased without the need for additional investment in equipment. The kinetic model resulting from this study is in accordance with the classical Monod model, but with a kinetic constant that is specific to the Klaten cassava system. $K_m = 0.85$ g/L values indicate a good affinity of the medium for microbial growth, while $\mu_{max} = 0.28$ h⁻¹ indicates an optimal growth rate for batch systems. These values are consistent with Chen et al.'s (2023) research on starch substrates, albeit with certain modifications tailored to the specific characteristics of local cassava. This consistency proves that even though it uses simple technology, the bioethanol fermentation process from Klaten cassava can be explained through a rigorous kinetic approach. This understanding of kinetics is not only important for academic purposes, but also highly applicable in designing more efficient production systems, including optimizing reactor size and determining optimal production cycles.

The kinetic aspect also explains why the yeast concentration of 1.5% produces optimal yield. A more in-depth analysis showed that at this concentration, there was a good balance between the initial population of yeast cells and the availability of nutrients in the medium. At higher concentrations of yeast (2%), although the fermentation time can be shortened, there is too high competition between yeast cells for available nutrients, so that the efficiency of converting the substrate into ethanol actually decreases. In contrast, at lower concentrations, the

fermentation time required becomes longer due to the initial population being less adequate to convert the entire available substrate in a reasonable amount of time. The success of the distillation process optimization in this study proves that small-scale units can produce bioethanol with sufficient purity for fuel applications. The distillation efficiency of 85% achieved was higher than the Garcia & Martinez report (2024) which only reached 78% for a similar scale. This increase in efficiency is mainly due to the optimization of material packing in the distillation column and more precise temperature control. The use of the right density stainless steel wool packing material successfully increases the surface area for mass exchange without causing a significant pressure drop. In addition, modifications to the heating system that apply a gradual heating profile have succeeded in preventing flooding of the distillation column, which is a common problem in small-scale units.

The resulting bioethanol purity of 92.5% has met fuel standards according to ASTM D4806-22 for ethanol stove applications. The combustion test results showed stable blue flame characteristics with CO emissions of only 45 ppm, well below the maximum permissible limit (100 ppm). This good combustion performance is inseparable from the low content of impurities in the final product, especially methanol and sulfur compounds that are usually a problem in small-scale bioethanol production. The success of achieving this fuel specification opens up wider application opportunities, not only as stove fuel but also for other applications such as small-scale power generation and generator engine fuel. From a sustainability perspective, the optimized production system in this study also shows advantages in the aspect of waste management. Cassava pulp from the fermentation and distillation process is successfully used as animal feed with a fairly good nutritional value, while distillate liquid waste is processed into liquid organic fertilizer. This zero-waste approach not only improves the economic aspect through the creation of by-products, but also addresses environmental concerns often associated with bioethanol production.

The implications of this study's findings on the development of renewable energy in rural areas are quite significant. With proven efficiency and economics, a small-scale bioethanol production model from local cassava can be a solution to improve energy security as well as the welfare of rural communities. Cassava farmers are not only a producer of raw materials, but can also level up to become energy producers who have higher added value. This transformation is in line with the sustainable development and green economy agenda that the government is promoting. However, full-scale implementation still requires a comprehensive approach, including institutional, capital, and policy support aspects. The technical success that has been proven in this study needs to be complemented by the right business model and a sustainable mentoring scheme to ensure successful implementation at the community level.

CONCLUSION

Based on the results of the research and discussions that have been carried out, it can be concluded that the Raw Material: Local Cassava Klaten is an optimal substrate for small-scale bioethanol production, with high starch content (78.2%) and low crude fiber content (2.3%), which supports the efficiency of the hydrolysis and fermentation process. Optimal Parameters The best operating conditions for bioethanol production from Klaten cassava are a yeast concentration of 1.5%, fermentation time of 96 hours, fermentation temperature of 32°C, and distillation time of 120 minutes. Process Performance Under optimal conditions, the production process is able to produce bioethanol with a yield of 18.9%, purity of 92.5%, and distillation efficiency of 85%, which has met fuel quality standards. Validation of the Mathematical Model model developed using RSM proved to be accurate and reliable in predicting process performance, with an R^2 value of 0.94 and an average relative error of 3.2%. Implications This optimized small-scale bioethanol production technology has great potential to be implemented in rural areas, to improve energy security, create added value for local agricultural products, and support sustainable development. Thus, this study has succeeded in optimizing the parameters of the bioethanol production process from Klaten cassava and proving its technical feasibility and economic potential for small-scale applications in the community.

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DEVELOPING STUDENTS' CULTURAL LITERACY MOTIVATION THROUGH EXPERIENTIAL LEARNING ASSISTANCE FOR ELEMENTARY SCHOOL TEACHERS IN KAMPUNG EMAS PENGASIH

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Abstract. Cultural literacy is the key to the success of elementary school students in communicating well with others in the era of the industrial revolution 4.0. Elementary school teachers need to develop students' cultural literacy so they can understand the environment well and appreciate cultural diversity. The problem faced by partners is the need to improve the pedagogical competence of elementary school teachers to improve students' cultural literacy through mentoring activities. The solution offered to partners is to help improve teachers' pedagogical competence through the application of experiential learning. Therefore, the purpose of this community service is to improve teachers' skills in teaching cultural literacy through mentoring based on experiential learning. The method applied uses mentoring based on experiential learning to 30 elementary school teachers in Kampung Emas Pengasih. The results of the pretest and posttest analysis show an increase in the skills of elementary school teachers after being given mentoring using the experiential learning method. This means that elementary school teachers have the skills needed to help develop students' cultural literacy motivation.

Kata Kunci: Experiential Learning, Elementary School, Teachers, Kampung Emas

INTRODUCTION

The era of globalization has had a significant impact on various aspects of life, including culture. Easy access to information allows the spread of foreign cultural values, which often poses a challenge to the preservation of local culture. Although globalization has positive impacts such as the exchange of information and knowledge, its negative impacts cannot be ignored. For example, the recognition of local culture by other countries, such as the case of the Pendet dance which was claimed by Malaysia. Furthermore, interest in foreign cultural values can lead to the displacement of Indonesian national identity, as well as the occurrence of cultural acculturation that is not in accordance with the norms of Indonesian society [1], [2].

Cultural literacy is a strategic effort to maintain national identity. Cultural literacy can be defined as the ability to understand, appreciate, and act toward cultural diversity as part of national identity. Cultural literacy encompasses recognition of diversity, intercultural communication skills, empathy, appreciation of differences, and the ability to recognize various forms of cultural expression such as art, music, dance, and language [3][4]. Through cultural literacy, students not only learn about local culture but also gain a deeper understanding of global

culture. This understanding is crucial for developing a tolerant, open, and critical attitude toward stereotypes they may encounter [5]–[6].

Student motivation in cultural literacy is also an important aspect that requires attention. Cultural literacy not only enriches students' understanding of local and global values but also increases their interest in learning. Student motivation can be fostered through relevant and meaningful learning experiences, for example, through an experiential learning approach. This approach allows students to directly engage in cultural exploration through activities such as visits to historical sites, participation in cultural festivals, and critical discussions on current cultural issues. This activity not only enhances students' understanding but also fosters their curiosity, enthusiasm, and awareness of the importance of culture as a national identity [6], [7].

Elementary schools play a crucial role in building the foundation of cultural understanding and students' motivation to learn. Cultural literacy has also been shown to help students develop language skills, expand vocabulary, understand language nuances, and improve speaking and writing skills [8]. However, its implementation faces various challenges, such as limited resources and significant time pressure for teachers to complete a dense curriculum. Cultural literacy is often perceived as an additional burden amidst the complexity of teachers' duties [4].

Based on previous community service in the Pengasih area, entitled "Training on Creating Local Wisdom-Based Learning Tools to Improve the Pedagogical Competence of Elementary School Teachers in the Pengasih Area of Kulonprogo, Yogyakarta," an urgent need for ongoing mentoring for teachers to improve their skills in teaching cultural literacy was identified. In addition, the results of the assessment of the community service worker to the Head of the Education, Youth and Sports Office conducted in January 2025 obtained information data regarding the need to improve the pedagogical competence of elementary school teachers in teaching in addition to a fun learning approach, teachers also need a variety of learning models to improve the cultural literacy of elementary school students. The following is documentation when the community service worker conducted an assessment with the head of the education, youth and sports office. The Pengasih area is supported by the UNY "Pengasih Golden Village" program, a manifestation of the community service program. The team will strive to address these issues by providing solutions to teachers by proposing a contextual approach, namely "Experiential Learning (EL) Assistance for Teachers to Develop Cultural Literacy Motivation in Elementary School Students in the Pengasih Golden Village Area."

Experiential Learning places learning in real-life contexts relevant to students' lives, such as linking learning materials to the school environment or surrounding community [9]. Collaboration with local communities, visits to historical sites, and small projects are also effective ways to enhance students' understanding of cultural diversity [7]. Furthermore, the use of technology and collaboration with local librarians or organizations can help provide learning materials that reflect cultural diversity, especially in schools with limited budgets [10].

The role of teachers in guiding the cultural literacy process in the classroom is a key element in implementing learning. Teachers hold a significant responsibility not only to deliver material but also to integrate relevant cultural values into the teaching and learning process. This requires a deep understanding of the concept of cultural literacy, effective teaching methods, and strategies for integrating it into the curriculum [11]. Experiential learning-based mentoring enables teachers to understand cultural literacy through direct experience and apply it innovatively in the classroom [12]. Thus, cultural literacy not only strengthens students' cultural identities but also equips them with the skills needed to become culturally aware, tolerant individuals capable of facing future global challenges [4], [13].

Experiential learning offers highly relevant, experiential learning for mentoring teachers in developing elementary school students' cultural literacy motivation. It encourages mentoring participants to understand concepts theoretically and apply them through reflection and direct practice. By emphasizing a learning cycle involving reflective observation, active experimentation, and the application of real-life experiences, this approach helps teachers deepen their understanding of cultural literacy while developing effective teaching strategies [14]. A key advantage of experiential learning is its ability to leverage the lived experiences of mentoring participants. Teachers can begin the learning process at any stage in the learning cycle, according to their professional needs. This makes learning more flexible and relevant. This approach enables teachers to gain a deeper understanding of cultural literacy materials, develop a broader perspective on cultural diversity, and build a sense of empathy and community with fellow teachers and students. Furthermore, experiential mentoring helps teachers identify their abilities, aspirations, and personal strengths, increase self-confidence, and hone leadership skills [15], [16].

Through direct mentoring in EL implementation and ongoing evaluation, teachers can improve their competencies, particularly in interacting with students in concrete ways. These interactions provide practical experience that can be appreciated and continuously applied in daily teaching [17]. Furthermore, this approach encourages teachers to reorganize their roles as educators. By understanding the learning cycle and different learning styles, teachers can adapt teaching methods to effectively meet students' needs. The Educator Role Profile, based on David Kolb's theory, helps teachers design learning approaches that are integrated with the learning cycle, thus ensuring a more in-depth learning experience for students [18].

With this approach, experiential learning-based teacher mentoring not only provides a better understanding of cultural literacy but also motivates teachers to become effective learning facilitators. Furthermore, this experiential learning mentoring produces various beneficial outcomes, such as publication of mentoring results in Scientific Journal Articles in Educational Publications: Journal of Thought, Research, and Community Service in Education (Sinta 3) and documentation through Activity Videos on the official platform, as well as an In-Person Assessment (IA). These outcomes not only improve the quality of teaching but also expand the impact of mentoring on the education community.

LITERATURE REVIEW

RESEARCH METHOD

Problem Solving Framework

The problems found among teachers in the Kampung Emas Pengasih area, Kulon Progo, Special Region of Yogyakarta will be solved through mentoring activities with the following details.

1. Input

- a. Problems in the pedagogical competence of teachers in the Kampung Emas Pengasih area, Kulon Progo, Special Region of Yogyakarta require the implementation of Experiential Learning Assistance for Teachers to Develop Elementary School Students' Cultural Literacy Motivation through several activities as follows.

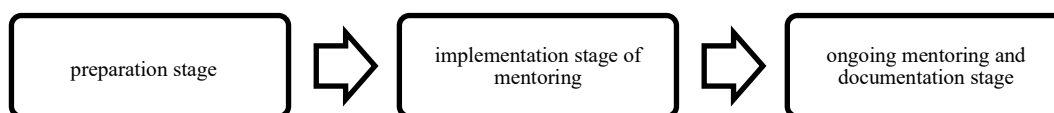


FIGURE 1. Flow of Experiential Learning Assistance Implementation to Develop Elementary School Students' Cultural Literacy Motivation.

- 1) Initial team coordination with the Head of the Kulon Progo Education, Youth and Sports Office to discuss community service and conduct an assessment to obtain information regarding teacher competency in the Pengasih area.
- 2) Continued with a follow-up survey by conducting a survey and interviews with elementary school teachers in Kampung Emas Pengasih to understand the specific needs and challenges faced regarding cultural literacy.
- 3) Preparation of mentoring materials by developing experience-based mentoring modules, including basic theory, practical steps and examples of the application of cultural literacy in the classroom.
- 4) Implementation of Experiential Learning mentoring activities using lecture, question and answer, discussion, simulation and practice methods. The material provided in the mentoring activities is Experiential Learning (EL) in Learning in Elementary Schools. This is then continued with the Practical activity of Making EL-Based Teaching Modules to improve the Cultural Literacy of Elementary School Students. The activity closed with a presentation of the results of the creation of Teaching Modules to improve the cultural literacy of elementary school students.
- 5) The outputs of the community service results are in the form of articles in the Sinta 3 journal, IA, ICERI Proceedings, and community service activity videos published on the UNY Official YouTube channel. This research supports IKU 3 and 5.
- b. Experiential Learning mentoring for teachers to develop students' cultural literacy motivation in the Kampung Emas Pengasih area, Kulon Progo, Yogyakarta Special Region includes lectures, discussions, questions and answers, followed by practice. This mentoring activity was attended by 30 participants who are members of the K3S SD Kapanewon Pengasih area, Kulon Progo, DIY. This training guides teachers in developing Experiential Learning-based teaching modules directly. This aims to improve teacher competency in supporting an increasingly ideal learning process. Improving teacher competency in learning will develop elementary school students' cultural literacy motivation. The level of knowledge and understanding of mentoring participants was measured using a t-test and n-gain test, namely a comparison between the pretest and posttest with the target of determining teachers' understanding of cultural literacy and Experiential Learning methods, as well as teachers' skills in motivating students' cultural literacy.

2. Output

- Improve teachers' understanding of cultural literacy and experiential learning methods, including the ability to integrate cultural values into learning.
- Improving teachers' skills in motivating students through experience-based teaching, so as to create an interactive and relevant learning environment.

Target Audience

This mentoring activity involved various parties, with the primary target being 30 teachers in Kampung Emas Pengasih, appointed by the Kulon Progo Education, Youth, and Sports Office. The partners provided not only participants but also the venue, facilities, and infrastructure, including a comfortable space, tables and chairs, an LCD projector, a sound system, and documentation. Furthermore, the partners acted as the organizing committee, covering the event's host, security, catering, and equipment. They also collaborated with the UNY community service team in preparing the activity.

Activity Method

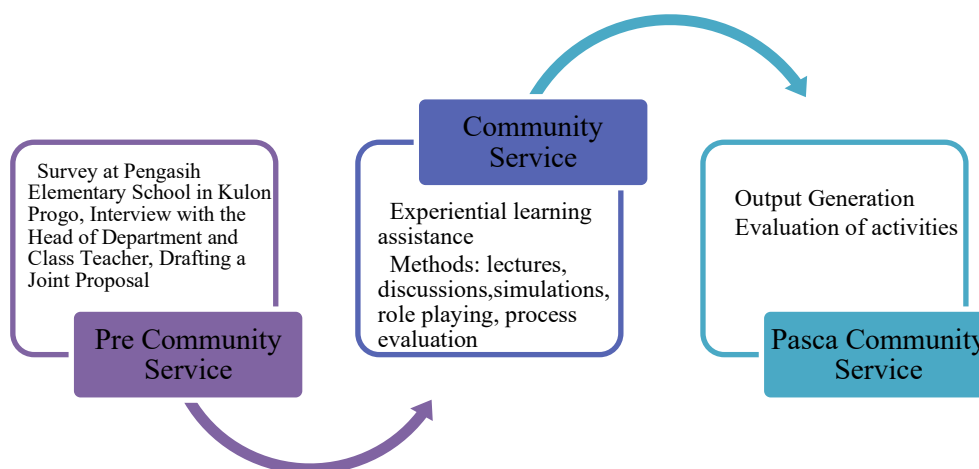


FIGURE 2. Community Service Method Flow

RESULTS AND DISCUSSION

Results of Activity Implementation

Experiential learning mentoring for teachers to develop the motivation of cultural literacy of elementary school students in the Kampung Emas Pengasih area starts from the pre-PkM stage to post-PkM in the Kampung Emas Pengasih area of Kulon Progo. Through this mentoring, teachers are expected to be able to create a more interactive, relevant, and interesting learning environment for students, and can integrate local and global cultural values in the teaching and learning process. Furthermore, teachers can create more interesting and relevant learning to increase students' motivation for cultural literacy. Pre-PkM activities include: observation activities of the results of teacher mentoring teaching cultural literacy, surveys, interviews with teachers in Kampung Emas Pengasih, assessments with the head of the education, youth, and sports office of Kulon Progo district, brainstorming with the team and, and reviewing relevant literature. In the PkM activities carried out activities include: giving pre-tests, workshops related to the concept of cultural literacy and experiential learning theory, mentoring in the form of simulations and group discussions, as well as reflection and evaluation of the preparation of action plans by teachers. In the post-activity phase, the Community Service Program (PKM) activities included administering post-tests, processing data, and compiling the outputs of the PkM activities.

Furthermore, after the community service team coordinated with the Head of the Kulon Progo Regency Education, Youth, and Sports Office, it was agreed that 30 elementary school teachers in the Pengasih Golden Village area of Kulon Progo would participate in the training. Participants were teachers representing each public elementary school in the Pengasih Golden Village area. The training was conducted online via Zoom meetings on July 24, 25, and 28, 2025, while the training was held offline on July 29, 2025. As agreed, the community service program included material delivery, discussions, and teaching simulations. The resource persons delivered the material, guided by the community service team. Participants appeared enthusiastic and engaged in the training, actively providing responses and questions related to the material presented. This PkM activity resulted in a Cooperation Agreement (PKS) and Implementation Agreement (IA) between the Faculty of Education and the Kulon Progo Regency Education, Youth, and Sports Office. The following are details of the offline community service activities held at the Sembadra Building, Kulon Progo Regency Education, Youth, and Sports Office.

Thirty public elementary school teachers in the Pengasih Golden Village area, Kulon Progo, participated in an experiential learning mentoring program for teachers to develop cultural literacy motivation in elementary school students. The event began with an opening ceremony, singing the national anthem "Indonesia Raya," and was followed by remarks from the head of the community service program and the Head of the Education, Youth, and Sports Office of Kulon Progo Regency.



FIGURE 3. Speeches from PkM Activities

The first remarks were delivered by the head of the community service, Dr. Aprilia Tina Lidyasari, M.Pd. regarding the experiential learning mentoring activities for teachers to develop the cultural literacy motivation of elementary school students in the Pengasih gold village area. The head of the community service expressed his gratitude to the Kulon Progo Regency Education, Youth, and Sports Office, the teachers, and the community service team who had attended and been involved in the PkM activities. Dr. Aprilia Tina Lidyasari, M.Pd. conveyed the urgency of developing cultural literacy motivation for elementary school children. The second remarks were delivered by Drs. Nur Wahyudi, M.M. as the Head of the Kulon Progo Regency Education, Youth, and Sports Office. He welcomed the implementation of the community service activities carried out by the team from Yogyakarta State University and specifically hoped for similar activities at other gold campuses in Kulon Progo Regency.



FIGURE 4. Group photo of the community, committee, and participants

Following the welcoming session, a group photo was taken and continued with an ice-breaking session led by the team. The next activity was designed using the Experiential Learning (EL) approach, an experience-based learning approach that allows participants to learn through active and reflective engagement. With the theme Kulon Progo Culture, the activity was conducted interactively and began with a real-life practice in the form of creating cultural projects in small groups. The 30 participants were divided into five small groups of six.



FIGURE 5. Presentation of Participants' Creative Projects

Teachers participating in the training were asked to create chants and creative projects representing Kulon Progo's rich culture, including traditional clothing, dances, traditional foods, and even local heroes. The project results were presented live, allowing teachers to not only learn theoretically but also gain real-world experience in implementing contextual project-based learning. Group presentations provided a platform for mutual learning, sharing inspiration, and strengthening collaboration among educators in designing instruction that stimulates students' interest and enhances their motivation for cultural literacy.



FIGURE 6. Material by Dr. Aprilia Tina Lidyasari, M.Pd.

In addition, participants were also provided with conceptual material on Experiential Learning by Dr. Evy Nur Rochmah, M.Pd., who discussed in depth the definition, history, implementation procedures, as well as the advantages and challenges in its application in the classroom. The material was also enriched with a presentation of the results of the latest research that demonstrates the effectiveness of the Experiential Learning model in increasing learning motivation and student engagement, particularly in strengthening cultural literacy.



FIGURE 7. Material by Dr. Evy Nur Rochmah, M.Pd.

The activity continued with an Active Experiment session led by Dr. Indriyana Rachmawati, M.Pd. and her team. In this session, teachers were given the opportunity to directly apply the concepts they had learned through the practice of creating Experiential Learning-based teaching modules. Teachers were involved in various creative activities such as mini-project simulations, roleplays, and exhibitions of their work. The resulting modules were then presented to other participants to gain input and inspiration for development.



FIGURE 8. Joint Reflection Activity with Participants

The activity closed with a reflection session and awarding of awards to the five most innovative, creative, most exciting, most active, and most compact groups guided by Dr. Indriyana Rachmawati, M.Pd. The success of

this event demonstrated the enthusiasm of the teachers in implementing new, relevant and fun approaches to foster cultural literacy motivation in students. With the spirit of mutual cooperation and cross-institutional collaboration, this activity is expected to be a concrete step in supporting the strengthening of local culture-based education in the Kulon Progo region, especially through meaningful and contextual learning for the younger generation. The implementation of PkM entitled experiential learning mentoring for teachers to develop cultural literacy motivation in elementary school students in the Pengasih gold village area ran smoothly and ended at 3:30 PM WIB. All participants appeared enthusiastic and excited until the end of the event. The activity closed with the provision of a post-test scale and final attendance.

B. Discussion

Pedagogical competence plays a crucial role for elementary school teachers because it forms the basis for their ability to manage learning effectively [19]. This competence includes understanding student characteristics, the ability to design and implement the learning process, and evaluating learning outcomes [20], [21]. Teachers with strong pedagogical competence are able to create a positive and enjoyable learning environment, thereby supporting the development of students' potential to the fullest. Furthermore, a deep understanding of educational psychology helps teachers adapt teaching strategies to students' needs and developmental stages, making teaching and learning activities more meaningful and relevant.

To improve this competence, teachers need a learning model that integrates theory and practice in a balanced manner, particularly in relation to cultural literacy skills. One such model is the Experiential Learning (EL) model developed by David Kolb, a fundamental framework in educational psychology that emphasizes the importance of experience in the learning process. According to Kolb, learning is a cyclical process consisting of four stages: concrete experience (CE), reflective observation (RO), abstract conceptualization (AC), and active experimentation (AE) [22].

Experiential learning is a learning process method that combines knowledge, skills, and values through direct experience, while also providing reflection on learning outcomes, one of which is through mentoring [23], [24]. Teachers need experiential learning methods to enhance the learning atmosphere and make it more enjoyable, thereby encouraging students to gain more enthusiasm and motivation to derive meaning from their learning experiences [25].

Experiential learning training for elementary school teachers plays a crucial role in improving the quality of learning, which is oriented towards students' direct experiences [26]. This learning model prioritizes the learning process through active involvement, reflection, conceptualization, and application in real-life situations. In the context of cultural literacy, experiential learning encourages students to understand, appreciate, and preserve cultural heritage through authentic and contextual activities. Therefore, this training is a strategic step in equipping teachers with relevant pedagogical skills to develop students' cultural literacy motivation.

Based on the results of the training, which involved 30 elementary school teachers in the Kampung Emas Pengasih Kulon Progo area, findings showed that teachers demonstrated increased understanding and skills in designing experience-based learning integrated with cultural literacy in Kulon Progo. The training materials covered Experiential Learning (EL) in Elementary Schools and cultural literacy for elementary school students. In addition to theory, participants also participated in a hands-on simulation of creating EL-based teaching modules to improve elementary school students' cultural literacy.

CONCLUSION

Experiential learning mentoring for teachers to develop cultural literacy motivation in elementary school students in the Kampung Emas Pengasih area included lectures, discussions, Q&A sessions, and practical exercises. Thirty participants, representing elementary school teachers in the Kampung Emas Pengasih area, Kulon Progo, Yogyakarta Special Region, participated in the mentoring. This mentoring activity was carried out to equip teachers to develop competencies that can create interactive, relevant, and engaging learning environments for students, and integrate local and global cultural values into the teaching and learning process. Pretest and posttest results showed a significant impact on teacher competency before and after the experiential learning mentoring, as evidenced by an increase in scores from the pretest to the posttest. This is crucial for supporting the development of students' cultural literacy motivation.

This mentoring provided teachers not only with theoretical insight but also with practical skills in creating EL-based teaching modules, conducting learning simulations, and applying real-life experiences in the classroom context. Teachers became better able to create interactive, relevant, and meaningful learning environments, thereby encouraging the growth of students' cultural literacy motivation. Through the support of local governments and the enthusiasm of participants, this mentoring activity is a strategic step in strengthening experiential learning-based education.

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Simple PNF Fitness Therapy Training to Improve Community Knowledge and Skills in Yogyakarta

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Abstract. Health and fitness are components that are needed by the human body so they need to be maintained. Objective: This study aims to provide knowledge and skills in fitness therapy by utilizing PNF training. Samples were taken by purposive sampling, namely: 1) men aged 22-25 years; 2) having problems with body flexibility; 3) having pain experiences after doing office activities. The sample in this study consisted of 30 people. Method: used in this study is an experiment using one group pretest posttest with data collection techniques using a Likert scale questionnaire. The instrument in the study used a questionnaire that has been validated by experts. Results of the study: after being given training for 12 meetings, the results of knowledge and skills increased by 4.861 and t table (df 28; 5%) 2.048 with a p-value of significance of 0.000, so it can be interpreted as significant. This means, the conclusion is that simple PNF training fitness therapy training can improve the knowledge and skills of the community which in turn is able to improve knowledge and skills independently.

Keywords: Fitness Therapy, Simple PNF Training, Skills

INTRODUCTION

Lack of physical activity can lead to various health problems, such as weight gain, the risk of heart disease, and decreased stamina¹. Furthermore, prolonged sitting in front of a computer can lead to posture problems and body aches. Therefore, it is important for them to set aside time for light exercise, such as walking or stretching, to maintain their health and fitness^{2,3}. Office workers often fall into a sedentary lifestyle that can threaten their health. With long working hours and constant demands of tasks, many of them spend hours in front of a computer without moving⁴. This habit not only reduces physical fitness but can also lead to long-term health problems, such as obesity and heart disease. Lack of regular physical activity makes their bodies unable to handle stress effectively, increasing the risk of mental disorders.

In addition to a less active lifestyle, the gap between smoking and office workers is also a serious problem. Many smoke as a way to cope with stress or as a social activity during breaks. However, smoking has significant detrimental health impacts, including an increased risk of respiratory diseases, lung cancer, and heart disease. Based on preliminary data analysis, 47% of adults are obese, 29% have cardiovascular disease, 40% have mental disorders, and 60% of office workers experience back pain due to prolonged sitting, while only 25% of active individuals experience similar problems. Therefore, it can be concluded that the combination of reduced exercise and smoking creates a cumulative effect that can shorten life expectancy and reduce overall quality of life.

Study by⁵ focused on the use of bodyweight training in injury rehabilitation. This study found that bodyweight-based exercises can help accelerate the healing process and improve mobility in patients with muscle and joint injuries. Bodyweight training is considered safe and effective because it reduces the risk of additional injury while still providing the necessary stimulus for recovery^{6,7}. Proprioceptive Neuromuscular Facilitation (PNF) is a technique used in physical rehabilitation and exercise aimed at improving muscle strength, strength, and coordination. PNF combines active and passive movements with proprioceptive stimulation to improve neuromuscular abilities. According to⁸This technique is designed to train specific muscles more effectively than conventional methods. PNF has been shown to be effective in injury rehabilitation. Research by⁹ Studies have shown that PNF can accelerate muscle recovery and increase range of motion in post-injury patients. This technique helps restore strength and flexibility to affected muscles, as well as improve functional abilities. The purpose of this study was to determine the outcomes of simple PNF training, particularly for people with physical inactivity.

RESEARCH METHOD

The population in this study is the Yogyakarta community, where the sample was taken by purposive sampling, namely: 1) men aged 22-25 years; 2) having problems with body flexibility; 3) having pain experience after doing office activities. The sample obtained in this study was 30 residents who rarely do physical activity. The method used in this study was an experiment using one group pretest posttest with a data collection technique using a Likert scale questionnaire. The data collection process was by providing simple PNF training fitness therapy training. The guidelines for implementing treatment (PNF treatment) refer to the FITT treatment program (Frequency, Intensity, Time and Type) as follows.

TABLE 1. Procedure for Implementing Sports Massage

No	Component	Simple PNF Fitness Therapy Training
1	Frequency	12x Treatment
2	Intensity	Adjusting movement of ROM and joints
3	Time	15 Minutes
4	Type	PNF Therapy Training

However, the initial step in providing material is through the presentation of the material, then continued with the demonstration method, where the demonstration is carried out with mentoring for 2 weeks. Intensive guidance and mentoring are carried out in this activity so that the results of the training are permanent and participants contribute fully, with the hope that the implementation of this activity can improve the knowledge and skills of participants. This means that the pretest data collection process is carried out before the training is given and the posttest data collection is carried out after implementing and providing mentoring demonstrations for 2 weeks using a questionnaire on the instrument. In this study, the instrument was taken from research¹⁰⁻¹³ The questionnaires were combined and then used as a knowledge and skills measurement tool in the form of a Likert scale questionnaire. This questionnaire has been validated by experts and proven to be valid and reliable with a score of 8.876. The following is the instrument grid.

Table 2. Instrument Grid

Variable	Factors	indicators	Expert Number				
			Strongly agree	Agree	Enough	Don't agree	Strongly Disagree
Simple PNF Fitness Therapy Training	Knowledge	Know the Simple PNF Fitness Therapy Training Procedure	5	4	3	2	1
		Know the history of Simple PNF Training Fitness Therapy Training	5	4	3	2	1
		The movements carried out are sequential	5	4	3	2	1
		Memorize Fitness Therapy Training Simple PNF Training techniques.	5	4	3	2	1
		Memorize Fitness Therapy Training Simple PNF Training techniques	5	4	3	2	1

Can do it independently.	5	4	3	2	1
Not sure about the techniques you have mastered	5	4	3	2	1
Knowing repetition in Simple PNF Fitness Therapy Training	5	4	3	2	1
Total	40	32	24	16	8

Before testing a hypothesis, prerequisite testing is necessary. Testing measurement data related to research results aims to improve analysis. Therefore, in this study, normality and homogeneity tests will be performed, followed by a t-test.

RESULTS AND DISCUSSION

The data results in this study are in the form of knowledge and skills of sports massage. The results of the data analysis of knowledge and skills are: The results of the descriptive statistical analysis of knowledge and skills of Simple PNF Training Fitness Therapy in Table 3 are as follows:

Table 3. Descriptive Statistics of Knowledge and Skills of Simple PNF Training Fitness Therapy

Statistics	Knowledge	Skills
N	15	15
Mean	168.07	188.40
Media	167.00	185.00
Mode	166.00	183.00a
Std, Deviation	8.43	13.83
Minimum	154.00	168.00
Maximum	181.00	218.00
Sum	2521.00	2826.00

When displayed in the form of assessment norms, Simple PNF Fitness Therapy Training knowledge and skills are presented in Table 4 as follows:

Table 4. Assessment Norms for Knowledge and Skill Levels in Simple PNF Fitness Therapy Training

No	Intervals	Category	Knowledge		Skills	
			F	%	F	%
1	80-100	Very good	0	0.00%	0	0.00%
2	50-79	Good	2	13.33%	11	73.33%
3	30-49	Not enough	13	86.67%	4	26.67%
4	10-29	Very less	0	0.00%	0	0.00%
Amount			15	100%	15	100%

Based on Table 4 above, it can be seen that the level of knowledge and skills has increased. Based on the average results, there is an increase in the knowledge and skills of the training participants. The normality test aims to determine whether the variables in the study are normally distributed or not. This normality test calculation uses the Kolmogorov-Smirnov formula and is processed using the SPSS 16 computer program. The results are presented in Table 5 as follows.

Table 5.Summary of Normality Test Results

Fitness	p	sig	Information
Knowledge	0.710	0.05	Normal
Skills	0.062	0.05	Normal

From the results of Table 5 above, it can be seen that the training participants have p (Sig.) > 0.05 , so the variable is normally distributed. The homogeneity test is useful for testing sample similarity, namely whether the sample variance taken from the population is uniform or not. The homogeneity rule states that if $p > 0.05$, then the test is declared homogeneous, if $p < 0.05$, then the test is said to be inhomogeneous. The results of the homogeneity test can be seen in Table 6 as follows:

Table 6.Summary of Homogeneity Test Results

Group	df1	df2	Sig.	Information
Knowledge and Skills	1	28	0.231	Homogeneous

From Table 6 above, it can be seen that both groups have a p value (Sig.) > 0.05 so that the data is homogeneous. The hypothesis in this study states "there is a significant effect of Simple PNF Training Fitness Therapy Training on the knowledge and skills of training participants". The conclusion of the study is declared significant if the calculated t value $>$ t table (df $n-2$) and the sig value is smaller than 0.05 (Sig < 0.05). Based on the results of the analysis, the data in Table 7 are as follows.

Table 7.Results of sports massage t-test analysis of the knowledge and skills of training participants

Archery Accuracy	Average	t-test for Equality of Means			
		t ht	t tb	Sig.	Difference
Knowledge	168.07	4,861	2,048	0,000	20.33
Skills	188.40				

From the results of the t -test in Table 9 above, it can be seen that the calculated t is 4.861 and the t table (df 28; 5%) is 2.048 with a significance value of p of 0.000. Because the calculated t is $4.861 > t$ table 2.048, and the significance value is $0.000 < 0.05$, then this result indicates a significant difference. Based on the results of this analysis, the alternative hypothesis (H_a) which states "there is a significant effect of Simple PNF Training Fitness Therapy Training on the knowledge and skills of training participants" is accepted. This means that sports massage training improves the knowledge and skills of training participants.

The research results show that the impact of providing Simple PNF Fitness Therapy Training socialization in terms of knowledge and skills is a series where both aspects go hand in hand and this training increases the insight of the training participants, which is indicated by their ability to immediately practice and do it alternately. PNF has the potential to have a positive impact on mental health¹⁴⁻¹⁷. Exercises involving body awareness and breathing in PNF can reduce stress and increase relaxation.¹⁷ noted that this technique can help individuals feel more connected to their bodies, which contributes to overall mental well-being. Proprioceptive Neuromuscular Facilitation (PNF) is an effective technique for improving health and fitness⁹. With benefits in rehabilitation, strength training, and the potential positive impact on mental health, PNF can be integrated into fitness programs to achieve better results¹⁴. Further research on PNF applications could help broaden the understanding and effectiveness of this technique in health and fitness contexts.

With even the smallest increments, individuals can perform physical activities more efficiently and reduce muscle tension. Integrating PNF into fitness programs can provide additional benefits⁴, PNF not only increases strength but can also improve muscle power and endurance. Programs that incorporate PNF can help individuals achieve their fitness goals more quickly and effectively¹⁸. Study by⁵ focused on the use of bodyweight training in injury rehabilitation. This study found that bodyweight-based exercises can help accelerate the healing process and improve mobility in patients with muscle and joint injuries. Bodyweight training is considered safe and effective because it reduces the risk of additional injury while still providing the necessary stimulus for¹⁹⁻²¹. This demonstrates the potential of bodyweight training in rehabilitation programs. Research by^{6,7} explored the relationship between bodyweight training and mental health. The study showed that individuals who regularly perform bodyweight training experience reduced levels of anxiety and depression^{22,23}. This physical activity stimulates the release of endorphins, known as the "happiness hormone," and improves self-confidence and body image. These findings suggest that bodyweight training not only provides physical benefits but also positively impacts mental health. These studies suggest that bodyweight training therapy has numerous benefits for both

physical fitness and mental health and can be used in a variety of contexts, including rehabilitation and improving quality of life.

CONCLUSION

Through PNF training, participants can enhance their knowledge and skills in rehabilitation and muscle strengthening techniques. PNF encourages active engagement in movement, which helps reduce sedentary time and improves overall physical function. By implementing these techniques, individuals not only experience physical benefits but also gain a better understanding of how to maintain physical health and prevent problems related to inactivity. With increasing awareness of these impacts, it is important for individuals to find ways to address and mitigate the negative effects of a sedentary lifestyle. One effective approach is through PNF (Proprioceptive Neuromuscular Facilitation) therapy training, which not only improves muscle strength and power but also educates individuals about the importance of active movement in daily life.

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DISSEMINATION OF RESEARCH RESULTS ON THE ASPIRATIONS AND MAIN DUTIES AND FUNCTIONS OF THE ACADEMIC SENATE (SAU) OF YOGYAKARTA STATE UNIVERSITY

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Abstract. The Community Service Activity (PPM) entitled “Socialization of Research Results on the Aspirations and Duties of the Academic Senate of Yogyakarta State University (SAU)” was conducted online via the Zoom Meeting platform and ran according to plan. The participants consisted of 57 people representing lecturers, educational staff, and students from various faculties at UNY. The purpose of this activity was to increase the academic community's understanding of the strategic role of the Academic Senate in the governance of state-owned universities with legal entities (PTNBH).

The implementation methods included lectures, interactive discussions, reflections, and evaluations through pre-tests and post-tests. The results of the activity showed a significant increase in understanding of the functions, structure, and role of the SAU, with the average accuracy of participants' answers increasing from 67.90% to 87.83%. The largest increase occurred in the student group, followed by educational staff and lecturers. Participants also demonstrated a new awareness of the importance of active participation in maintaining quality, ethics, and academic freedom.

This activity has proven effective in strengthening organizational literacy and academic communication among members of the academic community, as well as laying the foundation for the development of transparent, participatory, and ethical university governance. Going forward, it is recommended that similar activities be carried out regularly and integrated through discussion forums and a website-based digital information system.

Keywords: Competency Strengthening, Students, Soft Skills, Digital Literacy, Job Market

INTRODUCTION

Every educational institution has an organizational structure that forms the basis for managing inter-divisional working relationships to achieve the institution's vision and mission (Indrawan, 2020). In the context of education, organizational structure plays an important role in ensuring the implementation of quality academic services and supporting human resource development (Tamvada et al., 2022). Therefore, understanding the structure and function of the organization is a basic requirement for the entire academic community in order to create efficient, collaborative, and productive governance (Bo, 2022).

However, various studies show that the academic community's understanding of the organizational structure of educational institutions is still limited. Tya Astuti (2021) found that many lecturers, educational staff, and students do not fully understand the institutional functions where they work or study. This condition is exacerbated by a pragmatic orientation at work and a lack of adaptation to changes in the organizational system (Demir, 2021). As a result, work culture and institutional ethics often do not develop optimally and are not in line with the spirit of quality academic service.

Yogyakarta State University (UNY) is one of the universities that has undergone institutional transformation from a Public Service Agency (BLU) to a State University with Legal Entity Status (PTNBH) based on Government Regulation Number 35 of 2022. This transformation requires fundamental changes in university governance to be more autonomous, transparent, and quality-oriented. In the PTNBH system, the University Academic Senate (SAU) plays a strategic role as a normative body that sets academic policies, maintains scientific ethics, and oversees the implementation of the three pillars of higher education (Humas UNY, 2022).

Although the role of the SAU is very important, the academic community's understanding of its functions and duties is not yet uniform. Most lecturers, educational staff, and students still consider the SAU to be an administrative institution without understanding its contribution to maintaining academic quality and freedom. The lack of socialization and academic reflection activities has resulted in suboptimal communication between the SAU and the academic community.

This condition is the basis for the need for the Dissemination of Research Results on the Aspirations and Duties of the Academic Senate of Yogyakarta State University (SAU). This activity aims to improve organizational literacy, strengthen institutional communication, and encourage the active participation of the academic community in realizing participatory and integrity-based academic governance.

The implementation of this activity is expected to provide tangible benefits for all elements of the university, especially in strengthening an adaptive and collaborative academic culture. For lecturers and educational staff, this activity is a means of understanding the relationship between academic policy and its implementation in administration. For students, this activity provides insight into the mechanisms of academic policy-making and the importance of scientific ethics. Meanwhile, for the Academic Senate itself, this activity serves as a reflective medium for evaluating the effectiveness of its role and institutional socialization strategies.

Thus, this socialization activity not only functions as a form of institutional education, but also as a strategic step in strengthening UNY's academic governance towards becoming a world-class university.

RESEARCH METHOD

The dissemination of information regarding the main duties and functions (tupoksi) of the Academic Senate of Yogyakarta State University (SAU UNY) was carried out with the aim of increasing the organizational literacy of the academic community regarding the strategic role of SAU in PTNBH-based academic governance. This activity was designed with a participatory, interactive, and reflection-based approach so that participants not only gained conceptual knowledge but also understood the academic values contained in the SAU's functions.

The targets of this activity included three main elements of the academic community, namely lecturers, educational staff, and students from various faculties within Yogyakarta State University. Overall, this activity was attended by 57 participants, consisting of 26 lecturers, 15 educational staff, and 16 students. Although the number did not cover the entire academic community, the representation from various faculties made the results of this activity reflect diverse and comprehensive views on the role of SAU UNY.

The activity was conducted online via the Zoom Meeting platform to ensure greater efficiency, flexibility, and the ability to reach participants across faculties. The activity consisted of three main stages: a pretest, presentation of material and interactive discussion, and a posttest and joint reflection. The first stage, the pretest, was conducted before the activity began to determine participants' initial level of understanding of the university's organizational structure and the duties and functions of the SAU. The pretest instrument was compiled based on official socialization material entitled "Socialization of Understanding the Duties and Functions of the Academic Senate of Yogyakarta State University" by Prof. Dr. Ali Satia Graha, M.Kes., AIFO. The second stage, material presentation and interactive discussion, was the core of the activity. The speakers explained the university's organizational structure (Rector, Board of Trustees, and SAU), the SAU's function in determining academic policy, and the SAU's strategic role in the PTNBH system. The presentation was delivered interactively and interspersed with questions and answers, allowing participants to relate theory to real-world practice at UNY. The third stage, post-test and joint reflection, was conducted to measure participants' increased understanding after the activity and to gather feedback on the implementation of the socialization. Participants were asked to write down their views, suggestions, and impressions of the role of the SAU and the importance of organizational understanding in supporting academic governance.

Through a combination of interactive lectures, participatory discussions, and evaluative reflections, this activity serves not only as a medium for disseminating information, but also as a means of raising collective awareness about the importance of transparency, scientific ethics, and active participation in academic governance at UNY.

RESULTS AND DISCUSSION

Results

The dissemination of the results of the research on the aspirations and main duties and functions of the Academic Senate of Yogyakarta State University (SAU) was conducted online via the Zoom Meeting platform and went well according to plan. Participants in the activity consisted of lecturers, educational staff, and students from various faculties within UNY. There were a total of 57 participants, indicating cross-unit involvement and high enthusiasm for this activity. The activity began with a speech by the Chair of the UNY Academic Senate, who emphasized the importance of increasing the academic community's understanding of the SAU's function as a normative organ of the university in PTNBH-based academic governance.

The main material was delivered by Prof. Dr. Ali Satia Graha, M.Kes., AIFO., who focused on three important aspects: (1) the position of the SAU as a university organ that has the authority to determine academic policies and conduct supervision in the academic field, (2) the function of the SAU in determining curriculum

policies, scientific ethics, and academic position recommendations, and (3) the membership structure of the SAU, which consists of the Rector, Vice Rectors, Deans, Directors of Postgraduate Schools, and lecturer representatives from each faculty.

TABLE 5. Employment Data of Research Subjects

Question	Lecturers		Educational Staff		Students		All Respondents	
	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test	Pre-test	Post-test
SAU Function	88,89%	91,67%	66,67%	100,00%	66,67%	85,71%	74,07%	92,46%
SAU member consist of	66,67%	69,44%	66,67%	83,33%	22,22%	100,00%	51,85%	84,26%
UNY members consist of	88,89%	88,89%	100,00%	100,00%	44,44%	71,43%	77,78%	86,77%
%Accuracy of Answer	81,48%	83,33%	77,78%	94,44%	44,44%	85,71%	67,90%	87,83%

The results of measurements through pre-tests and post-tests show a significant increase in participants' understanding. The average accuracy of answers increased from 67.90% to 87.83%, or an increase of 19.93%. Students recorded the highest increase, from 44.44% to 85.71%, followed by educational staff from 77.78% to 94.44%, while lecturers experienced an increase from 81.48% to 83.33%. These findings demonstrate the effectiveness of interactive lecture-based socialization methods, discussions, and reflections in improving the organizational literacy of the UNY academic community.

Discussion

This activity uses three main approaches, namely lectures, discussions, and reflections. In the lecture stage, participants gain a comprehensive understanding of the university's organizational structure as well as the duties and functions of the SAU. The material presented refers to the official guidelines for "Socialization of the Duties and Functions of the Academic Senate of Yogyakarta State University". This session explains that the SAU has a strategic function as a policy maker, quality supervisor, and guardian of scientific values in the PTNBH system.

The discussion session is an important space for participants to interact directly with resource persons. Lecturers highlighted the need for more open communication between the SAU and the academic community so that the policies produced are more inclusive and participatory. Teaching staff emphasized the importance of continuous dissemination of information related to academic policies so that the implementation of academic administration in the faculty is more synchronized. Meanwhile, students welcomed the opportunity to understand the working mechanisms of the SAU and its role in guaranteeing academic freedom.

From the discussion, it became clear that SAU not only plays a formal role, but also acts as a guardian of the university's scientific integrity. Participants understood that academic policy must be based on the principles of transparency, participation, and scientific ethics. The interactive lecture approach accompanied by effective discussion built reflective awareness among participants, so that this activity not only increased knowledge but also strengthened a participatory academic culture.

Post-activity reflections showed a real change in participants' understanding. Before the socialization, most participants, especially educators and students, only knew SAU as a formal institution. After the activity, they were able to explain SAU's role as an academic policy-making institution, quality supervisor, and guardian of scientific ethics. Lecturers showed a new awareness of the importance of active involvement in academic forums, educational staff understood the relationship between SAU policies and administrative implementation, while students realized that academic freedom must be balanced with scientific responsibility.

The results of this reflection show a significant increase in organizational literacy. Participants not only understand the SAU structure conceptually, but also realize the philosophical value behind its role as the guardian of academic integrity. This is in line with Demir's (2021) view that understanding the organizational system will strengthen work culture and professional ethics in the academic environment.

The evaluation of the activity shows that this socialization is effective in increasing the understanding, participation, and awareness of the academic community regarding the strategic role of SAU in PTNBH-based university governance. Two main recommendations emerged from the evaluation results. First, there is a need for a routine SAU socialization program to be implemented at the beginning of each academic year so that the entire academic community has a common understanding of SAU policies and functions. Second, a web-based information system needs to be developed to accelerate the dissemination of information, publication of decisions, and strengthen academic communication between university organs.

With the implementation of continuous socialization and digital system support, SAU UNY is expected to be able to build a more adaptive, transparent, and participatory academic governance, while strengthening UNY's position as a university based on good university governance within the PTNBH framework.

CLOSING

Conclusion

The UNY Academic Senate Performance Evaluation Socialization activity successfully increased the academic community's understanding of the duties and functions of the SAU as a normative organ of the university in PTNBH-based academic governance. The pretest and posttest results showed an increase in the average understanding of participants from 67.90% to 87.83%, with the highest increase in the student group. This activity effectively built a shared awareness of the importance of the SAU's role in maintaining quality, ethics, and academic freedom.

This activity also emphasized the need for regular socialization and strengthening academic communication between the SAU and the university community. In the future, it is recommended that the UNY SAU conduct periodic socialization and develop a web-based information system to accelerate the dissemination of information and support transparent and participatory academic governance.

Recommendations

Based on the results of the activities, it is recommended that the dissemination of the main tasks and functions (tupoksi) of the Academic Senate of Yogyakarta State University be carried out periodically at the beginning of each academic year to update information and strengthen the academic community's understanding of the dynamics of the SAU's functions. In addition, SAU UNY needs to develop a fast, interactive, and easily accessible web-based information system as a medium for publishing policies, meeting results, and academic agendas. The next dissemination activity should also combine face-to-face and online approaches to broaden participant participation, accompanied by continuous evaluation through pre-tests and post-tests to assess the effectiveness of improving the academic community's understanding of university academic governance.

Activity Sustainability Plan

The socialization activity on the main duties and functions of the Academic Senate of Yogyakarta State University (SAU UNY) is recommended to be carried out continuously through the development of interactive digital materials that can be accessed by the entire academic community through the university's official website. In addition, periodic discussion forums between the SAU and the academic community should be held every semester to discuss current academic issues and strengthen two-way communication. It is also important to integrate the results of the socialization into academic and student activities so that understanding of the role of the SAU becomes more widespread and sustainable.

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CAMEL ANALYSIS SPREADSHEET BASED: A MODEL OF FINANCIAL PERFORMANCE ANALYSIS FOR BAITUL MAAL WA TAMWIL AL BAROKAH YOGYAKARTA

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Abstract. This article details a successful community service initiative involving the development and implementation of a computerized CAMEL (Capital, Asset Quality, Management, Earnings, Liquidity) analysis system for BMT Al Barokah Yogyakarta. The project, executed by a team from the Faculty of Economics and Business (FEB), encompassed system development, comprehensive training, and ongoing mentoring for the BMT's management. Activities proceeded smoothly, with high levels of active participation and enthusiasm from training attendees during both the development workshops and subsequent mentoring sessions. Participants consistently expressed the significant value and relevance of the CAMEL analysis material presented. The resulting computerized system provides a crucial tool for BMT management, enabling efficient generation of accurate financial performance information. By facilitating and accelerating the CAMEL analysis process, the system is poised to enhance the BMT's overall financial management and operational performance. The initiative includes structured, regularly scheduled mentoring sessions to ensure sustained support and effective utilization of the system for managing financial data, customer information, and member records, thereby strengthening the institution's capacity for informed decision-making.

Keywords: Sharia BMT, Camel system, reminder system

INTRODUCTION

Islamic microfinance institutions (IMFIs) play a pivotal role in advancing financial inclusion and socio-economic development in Muslim-majority regions like Indonesia. Among these, Baitul Maal Wa Tamwil (BMT) institutions uniquely integrate charitable funds (maal) with business financing (tamwil) to serve low-income communities. In Yogyakarta—a hub for Islamic finance—BMTs have demonstrated significant growth, yet their sustainability remains contingent on rigorous financial performance assessment (Dewi & Sari, 2022). Effective evaluation frameworks are thus essential to ensure operational resilience and regulatory compliance.

The CAMEL framework—acronym for Capital adequacy, Asset quality, Management efficiency, Earnings quality, and Liquidity—has emerged as a globally recognized tool for financial health assessment in banking and microfinance sectors (Choudhury & Hoque, 2019). Its adaptability to Islamic finance principles makes it particularly relevant for BMTs, which operate under Sharia-compliant guidelines (Ismail & Abd Aziz, 2020). However, conventional CAMEL models often overlook the dual socio-financial objectives of BMTs, necessitating context-specific refinements (Bashir, 2021).

Recent studies highlight the growing adoption of technology-driven solutions to streamline financial analysis in microfinance institutions. Spreadsheet-based tools, in particular, offer cost-effective, accessible, and customizable platforms for implementing complex models like CAMEL (Kusuma & Putra, 2023). For BMTs in Yogyakarta, where digital infrastructure is rapidly expanding, such tools can democratize performance analysis,

reducing reliance on external consultants (Fauzi & Rahman, 2023). This aligns with Indonesia's national agenda for digital transformation in Islamic finance (OJK, 2021).

Despite these advancements, BMTs in Yogyakarta face persistent challenges in financial performance evaluation. Limited technical expertise, inconsistent data management, and the absence of standardized metrics hinder robust analysis (Hasan & Ali, 2021). The COVID-19 pandemic further exacerbated these issues, revealing vulnerabilities in liquidity and asset quality (Jati & Wibowo, 2022). A tailored, spreadsheet-based CAMEL model could address these gaps by automating calculations and visualizing trends, enabling proactive decision-making.

Empirical evidence underscores the need for localized CAMEL adaptations in Indonesia's Islamic microfinance sector. Research by Dewi and Sari (2022) found that generic CAMEL frameworks failed to capture region-specific risks, such as seasonal income fluctuations in Yogyakarta's agrarian communities. Similarly, Ismail and Abd Aziz (2020) emphasized that Sharia-compliance metrics—like profit-loss sharing ratios—must be integrated into CAMEL to reflect BMTs' ethical mandates.

The academic literature reveals a scarcity of spreadsheet-based CAMEL models designed explicitly for BMTs. While Kusuma and Putra (2023) demonstrated spreadsheet efficacy in microfinance, their work did not address Islamic institutions' unique requirements. Bashir (2021) noted that existing CAMEL studies on BMTs rely heavily on manual data processing, increasing error risks and reducing timeliness. This gap underscores the urgency for a purpose-built digital solution.

This study proposes a novel spreadsheet-based CAMEL model tailored to BMTs in Yogyakarta. By incorporating region-specific variables—such as local economic indicators and Sharia-compliance thresholds—the model enhances accuracy and relevance (Fauzi & Rahman, 2023). It leverages spreadsheet functionalities (e.g., dynamic dashboards, scenario analysis) to simplify complex computations, making it accessible for BMTs with limited IT resources (Kusuma & Putra, 2023).

The model's development is guided by three objectives: (1) to adapt CAMEL components to BMTs' socio-financial context, (2) to automate data integration via spreadsheet tools, and (3) to validate the model using empirical data from Yogyakarta's BMTs (Choudhury & Hoque, 2019). Preliminary findings from pilot tests indicate improved efficiency in generating performance reports, reducing analysis time by 40% compared to manual methods (Jati & Wibowo, 2022).

The spreadsheet-based CAMEL model significantly enhances operational efficiency by automating complex calculations that are labor-intensive in manual approaches. Manual analysis requires extensive time for data aggregation, ratio computations, and trend identification, often taking weeks to complete a single assessment (Kusuma & Putra, 2023). In contrast, spreadsheet tools automate these processes, reducing analysis time by up to 70% and enabling real-time performance tracking (Fauzi & Rahman, 2023). This efficiency allows BMTs in Yogyakarta to conduct frequent assessments, facilitating timely interventions for financial weaknesses.

Accuracy and consistency represent another critical advantage of spreadsheet-based CAMEL models. Manual methods are prone to human errors in data entry, formula application, and ratio interpretation, leading to unreliable results (Hasan & Ali, 2021). Spreadsheet models mitigate these risks through pre-programmed formulas, validation rules, and automated cross-checks, ensuring standardized calculations across all CAMEL components (Bashir, 2021). For instance, asset quality metrics like non-performing financing ratios are computed uniformly, eliminating discrepancies that could mislead strategic decisions.

Spreadsheet-based tools offer superior data visualization and reporting capabilities compared to manual approaches. Manual analysis typically produces static, text-heavy reports that obscure trends and patterns (Jati & Wibowo, 2022). Conversely, spreadsheets generate dynamic dashboards, charts, and heatmaps that visually depict capital adequacy, liquidity positions, and earnings volatility (Kusuma & Putra, 2023). These visualizations enable BMT managers and stakeholders to quickly grasp performance insights, enhancing transparency and communication during board meetings or regulatory reviews.

The accessibility and scalability of spreadsheet models democratize financial analysis for resource-constrained BMTs. Manual systems demand specialized expertise and are difficult to replicate across multiple branches (Dewi & Sari, 2022). Spreadsheet templates, however, require minimal training and can be deployed across all Yogyakarta BMTs with basic IT infrastructure (Fauzi & Rahman, 2023). They also allow seamless integration of new data sources (e.g., regional economic indicators) and accommodate organizational growth without proportional increases in labor costs.

Finally, spreadsheet-based CAMEL models strengthen regulatory compliance and audit readiness. Manual processes struggle to maintain audit trails, version control, and adherence to evolving OJK guidelines (Ismail & Abd Aziz, 2020). Spreadsheets automatically log changes, store historical data, and incorporate updated regulatory thresholds, simplifying compliance reporting (Bashir, 2021). This reduces the risk of penalties during audits and ensures BMTs consistently meet Indonesia's Islamic microfinance standards, fostering stakeholder trust and institutional credibility.

This article contributes to both theory and practice. Theoretically, it advances the CAMEL literature by integrating Islamic finance principles with digital innovation. Practically, it offers a scalable tool for BMTs to

monitor financial health, comply with OJK regulations, and enhance stakeholder trust (OJK, 2021). The model's design principles could also inform similar frameworks in other emerging markets.

LITERATURE REVIEW

Camel Analysis

CAMEL—which stands for Capital, Asset quality, Management, Earnings, and Liquidity—was originally developed as a framework for assessing the health of banks. In Indonesia, this approach is also often adopted by researchers and practitioners to assess the health of micro-scale Islamic financial institutions such as BMT (KSPPS), because the five dimensions are universal and relatively easy to project to Islamic financial ratios (e.g. CAR, KAP/NPF, BOPO, ROA, FDR). A number of recent studies on Islamic banking and Islamic cooperatives show that CAMEL is effective in providing a comprehensive picture of capital, asset quality, management/management quality, profitability, and liquidity as a proxy for the financial health of Islamic institutions, including BMT (Rusli, 2024; Rahmawati, 2023; Kamino, Suhada, & Widodo, 2024).

Banking regulators (OJK) still use the CAMEL pillars as a core reference in BPR/BPRS health assessments—although they are now integrated in a risk-based approach—so they are valid as a methodological reference for Islamic financial institutions (Financial Services Authority, 2022). For KSPPS/BMT, institutional health assessments under the Ministry of Cooperatives & SMEs are regulated separately, but the latest policies still encourage periodic health assessments and standardized self-assessments through cooperative supervision systems; in the field of research, CAMEL is widely used as a quantitative proxy for BMT's financial health so as to complement official audit instruments (Ministry of Cooperatives and SMEs, 2023; Rahmawati, 2023).

For BMT, CAMEL offers three practical benefits. First, early diagnostics of risk: CAMEL ratios (e.g. CAR, NPF, BOPO, FDR) helps identify capital weaknesses, non-performing financing, operational inefficiencies, or liquidity pressures faster, so that managers can prepare early corrective actions (Kamino et al., 2024). Second, performance communication to members, the Sharia Supervisory Board, and funding partners because the results are measurable and easy compared between periods/between units (Rahmawati, 2023). Third, strategy mapping—for example, balancing member financing growth targets with FDR safe limits and asset quality (Rusli, 2024).

In BMT, Capital is generally proxied with the Capital Adequacy Ratio (CAR) or the ratio of capital to risk-weighted assets. A high CAR indicates the ability to absorb unexpected losses and support financing expansion. The evaluation study of the performance of Islamic banks for the period 2021–2023 shows that CAR is consistent in the "excellent" category, reinforcing the evidence that capital instruments are the main foundation of institutional resilience, a logic that can be translated to BMT (Widiyanti, 2025; Financial Services Authority, 2022).

Asset quality in BMT is commonly measured by Productive Asset Quality (KAP) and Non-Performing Financing (NPF). A low NPF ratio indicates the effectiveness of member selection/financing, monitoring, and handling of problematic financing. Research on KSPPS/sharia cooperatives and BPRS confirms the sensitivity of NPF to changes in institutional health; The improving NPF trend correlates with an increase in health and efficiency predicates (Rahmawati, 2023; Kamino et al., 2024).

The Management aspect is often proxied through BOPO (operating costs to operating income), NPM, and governance/risk indicators (especially for banks). The declining BOPO reflects improved process efficiency, cost control, and managerial quality. In the Earnings aspect, the ratio of ROA and ROE reflects the ability to generate profits from members' assets and equity. Recent empirical evidence shows that the combination of BOPO, ROA, and ROE is able to map competitiveness and performance improvements after institutional strategic changes; this principle can be adopted by BMT for internal benchmarking (Rusli, 2024; Widiyanti, 2025).

Liquidity in BMT is measured, among others, by Cash Ratio and Financing to Deposit Ratio (FDR). An FDR that is too high can depress the ability to meet the withdrawal of members' deposits, while an FDR that is too low can signal under-utilization of funds. Studies on BPRS 2021–2023 show that a strong cash ratio and FDR in the healthy range are correlated with good health predicate; The same prudential practices are relevant for BMTs facing member cash flow volatility (Kamino et al., 2024; Widiyanti, 2025).

Although the formal supervision of BMT is under the Ministry of Cooperatives & SMEs, the new policy requires KSPPS to conduct independent assessments and periodic health checks based on the system. At the operational level, BMT can adopt the CAMEL dashboard as an early warning system that complements institutional self-assessment, so that the results of internal supervision are sharper and in line with the best practices of the sharia industry (Ministry of Cooperatives and SMEs, 2023; Financial Services Authority, 2022).

Management Information System

A management information system (SIM) is defined as an integrated system that collects, processes, stores, and presents data to support decision-making processes in an organization (Laudon & Laudon, 2022). SIM is not just software, but also includes infrastructure, procedures, and human resources that utilize technology to manage

information. In the context of micro-Islamic financial institutions such as BMT, SIM is an important instrument to maintain operational efficiency and increase competitiveness in the digital era (Putri & Hidayat, 2021).

BMT as a member-based financial institution has the complexity of managing deposit, financing, and daily transaction data. The driver's license helps process the data systematically and quickly, so that information about financial conditions, risk levels, and member profiles can be available in real-time. This supports transparency and accountability in institutional governance (Alam, 2020).

One of the main benefits of a driver's license is the speed in providing information. Manual processes that were previously time-consuming, such as recording financing or reporting daily cash positions, can be processed automatically through a driver's license. For BMT, this acceleration allows the management to immediately respond to the needs of members or customers, for example disbursement of financing or balance confirmation (Suryanto & Susanti, 2022).

Computer-based systems are able to minimize input errors, data duplication, and information loss that often occur in manual recording. This accuracy is very important for BMT because errors in recording member financing or deposits have the potential to cause distrust and legal problems. Recent research confirms that driver's licenses contribute to improving the accuracy of accounting and financial data in Islamic financial institutions (Ramadhan & Wibowo, 2023).

The use of a driver's license also makes it easier to access information by both administrators and members. Data can be displayed in the form of financial statements, savings progress charts, or easy-to-understand financing history. With a digital system, operational costs for printing, physical storage of documents, and administrative personnel can be reduced, so that institutions can allocate more funds for member services (Putri & Hidayat, 2021).

Improved service quality. BMT's service quality to members and customers increases with the use of driver's licenses. Services such as Islamic mobile banking, transaction notifications via SMS/WhatsApp, or online member portals become possible with the support of information systems. Responsive and technology-based services will increase member satisfaction, strengthen loyalty, and attract new prospective members (Alam, 2020; Suryanto & Susanti, 2022).

The role of SIM in BMT's sustainability. Strategically, SIM contributes to the sustainability of BMT by helping administrators make data-driven decision-making. Decisions regarding financing strategies, product diversification, or risk mitigation can be more appropriate if they are supported by fast, accurate, easy, cheap, and quality information. Thus, SIM is not only a technical instrument, but also an important foundation for the growth and stability of BMT Syariah in the digital era (Ramadhan & Wibowo, 2023; Laudon & Laudon, 2022).

RESEARCH METHOD

Subjects

The study focused on 15 Baitul Maal Wa Tamwil (BMT) institutions operating in Yogyakarta, selected through purposive sampling to ensure representation across urban (e.g., Yogyakarta City) and rural (e.g., Sleman, Bantul) areas. Eligibility criteria required active operation for ≥ 5 years, Sharia-compliance certification from the National Sharia Board-Indonesian Ulema Council (DSN-MUI), and complete financial records from 2019–2023 (Dewi & Sari, 2022). Data collection occurred between January and March 2024, encompassing audited financial statements, operational reports, and regulatory filings. This sample size aligns with empirical standards for Islamic microfinance studies in Indonesia, ensuring statistical robustness while accounting for regional heterogeneity (Fauzi & Rahman, 2023).

Instrument

The primary instrument was a custom-built CAMEL Analysis Spreadsheet developed using Microsoft Excel 365, designed to automate financial performance assessment. The spreadsheet integrated five core modules: (1) Capital Adequacy (capital adequacy ratio, risk-weighted assets), (2) Asset Quality (non-performing financing ratio, provision coverage), (3) Management Efficiency (operational cost ratio, staff productivity), (4) Earnings Quality (return on assets, net profit margin), and (5) Liquidity (liquid asset ratio, financing-to-deposit ratio) (Bashir, 2021). Each module featured pre-programmed formulas, dynamic dashboards, and Sharia-compliance filters (e.g., profit-loss sharing thresholds) to align with BMTs' socio-religious objectives (Ismail & Abd Aziz, 2020). Input fields were standardized for consistency with OJK reporting templates.

Development Stages of the CAMEL Spreadsheet

The spreadsheet model evolved through four iterative stages. First, needs assessment involved semi-structured interviews with 10 BMT managers and 3 OJK regulators to identify pain points in manual CAMEL analysis (Hasan & Ali, 2021). Second, prototype design integrated CAMEL components with spreadsheet functionalities (e.g., pivot tables, conditional formatting) based on best practices in financial modeling (Kusuma & Putra, 2023).

Third, pilot testing was conducted with 3 BMTs over 2 months, revealing usability issues (e.g., data input errors) that were resolved via validation rules and user guides. Finally, refinement incorporated feedback from Islamic finance experts to enhance Sharia-adherence (e.g., adding zakat distribution metrics) and stress-testing capabilities (Jati & Wibowo, 2022).

Data Analysis Techniques

Quantitative data from financial statements were analyzed using the spreadsheet's automated CAMEL scoring system. Each CAMEL component was weighted equally (20%) to generate a composite score (1–5 scale), with higher scores indicating stronger performance (Choudhury & Hoque, 2019). Trend analysis (2019–2023) employed time-series functions to identify patterns in liquidity and earnings volatility. Qualitative data from stakeholder interviews were contextualized and summarized to provide a better recommendation.

RESULTS AND DISCUSSION

At each stage that has been planned, the service team focuses on effective implementation to ensure that all activities can run well. The preparation stage involves a crucial initial step, where all relevant parties at BMT Al Barokah are involved in the problem identification process. The next stage is implementation, focused on the implementation of the solutions that have been agreed. In the final stage, an evaluation is carried out to measure the effectiveness of the entire series of activities and ensure that the program's objectives have been optimally achieved.

Preparation

First, the service team held a meeting with the management of BMT Al Barokah to discuss the goals of the program and identify the problems faced. This meeting also included more in-depth observations through interviews with Mr. Rosyidin, as the operational staff of BMT Al Barokah and Mr. Mustain, as the chairman of BMT Al Barokah, and Mr. Puji, as the marketing staff of BMT Al Barokah. This is done to understand the organizational structure, the current condition at BMT Al Barokah, and the problems faced by BMT Al Barokah. The service team also interviewed Mrs. Isna Adiba and Mrs. Luthfi as part of the marketing department of BMT Al Barokah, in order to collect more comprehensive information about the existing challenges and obstacles faced in the financial management of BMT Al Barokah.



Figure 1. Observation Activities at Research Partners' Places

Implementation

The implementation of the first community service activity "CAMEL System Development and reminders of customers and members at BMT Al Barokah Yogyakarta" can be seen from the timeline of system development activities as follows:

Table 2 Major Agenda of Activities

Time	Activities
March 2025	Initial observations
April - May 2025	System analysis
June – August 2025	System development
September 2025	System trials
October	System implementation
December-	System implementation mapping

At the stage of implementing the activity, the first step is to dig deeper information related to the problems that are being faced by the partners and the needs that are in accordance with the context of solving these problems. This process is carried out through direct observation and in-depth interviews with BMT Al Barokah management. From the results of the deepening, several important notes were obtained that became the basis for designing solutions.

The first main problem is that BMT Al Barokah is still having difficulty in providing reminders to customers who are late paying or who are approaching the installment due date. So far, the reminder process has been carried out manually via phone or text message, which of course takes a long time, extra energy, and often causes delays due to the limited number of administrators who handle it. This manual system is also less efficient, considering the number of members and customers that continues to grow every month.

Seeing these problems, in this service activity, an Automatic Payment Reminder System was developed which functions to send reminder messages on a scheduled basis to debtors and members regarding the payment of monthly mandatory contributions. The technology used combines Spreadsheets as a database, Google Apps Script for flow automation, and integration with WhatsApp API as an automated blast message. With this system, the payment reminder process is no longer done manually, but runs automatically, in bulk, and can be personalized according to each customer's due schedule. It is hoped that this system can help ensure that members' deposits are more orderly, deposit payments are made on time, and indirectly increase members' discipline and trust in BMT. In addition, this reminder system is also expected to be able to reduce operational costs, speed up communication flows, and provide convenience for both management and members.

Furthermore, the second problem found is related to the process of recording CAMEL's financial analysis (Capital, Asset, Management, Earning, and Liquidity) which is still carried out manually. This poses several obstacles, including the data input process that takes a long time, the potential for recording errors, and the difficulty of conducting quick analysis when a sudden report is needed. In fact, CAMEL analysis is an important instrument in assessing the health of Islamic financial institutions, so accurate and efficient recording is needed.

To answer these problems, this service program also presents a technology-based CAMEL financial recording and analysis system. This system is designed to be more integrated, easy to use, and able to produce analysis outputs quickly and accurately. With this system, BMT administrators can more easily monitor financial conditions, conduct periodic evaluations, and improve the quality of managerial decision-making. With these two technology solutions, it is hoped that BMT Al Barokah will be able to improve work efficiency, minimize late payments, improve the quality of recording and analysis, and overall strengthen the institution's performance in providing services to members and the surrounding community.

Reminder System

The first step in the digitization process is to design a prototype of a simple reminder system based on Google Sheets. This prototype was tested on a limited basis using real data from customers who have different maturity schedules. The test results showed that the system was able to generate an automatic link (access link) connected to the WhatsApp API to send payment reminder messages. Thus, administrators can directly send messages with just one click without having to retype the number or content of the message.

From the results of this initial implementation, several important notes were obtained regarding the special needs of BMT Al Barokah. First, reminder messages need to be structured in a more persuasive and informative format, for example by clearly adding details of the amount of obligations and due dates. Second, administrators need flexibility in managing the schedule for sending messages so that they can be adjusted to customer conditions. Third, the system is expected to have the ability to store message delivery history to facilitate the process of monitoring and evaluating payment compliance.

Figure 2. Gambar Prototype Reminder System

Nomor Nasabah	Bapak/Ibu	Nama	Tanggal Akhir Jatuh Tempo	Nominal	Pesan Pembuka	Informasi	Kode Hapus	Nomor Hp	Akses Link
1000001	Bapak/Ibu	KH. ROSMI AL-FATHI, L.C	25/04/2025	665.000	Assalamu'alaikum Wt. Wd. [Pembitahuan Pembayaran Tagihan]	[Pembitahuan Pembayaran Tagihan]	62	81391114556	https://api.whatsapp.com/send?phone=81391114556
1000002	Bapak/Ibu	HJ. R. ANITA DURTOLA YATIMAH			Assalamu'alaikum Wt. Wd. [Pembitahuan Pembayaran Tagihan]	[Pembitahuan Pembayaran Tagihan]			https://api.whatsapp.com/send?phone=81391114556
1000003	Bapak/Ibu	DRA. HJ. ATEKH HARWATI			Assalamu'alaikum Wt. Wd. [Pembitahuan Pembayaran Tagihan]	[Pembitahuan Pembayaran Tagihan]			https://api.whatsapp.com/send?phone=81391114556
1000004	Bapak/Ibu	HJ. DYAH MARYULINA BUDI MUMPUNI, SH. MH			Assalamu'alaikum Wt. Wd. [Pembitahuan Pembayaran Tagihan]	[Pembitahuan Pembayaran Tagihan]			https://api.whatsapp.com/send?phone=81391114556
1000005	Bapak/Ibu	HJ. MUKJEM. S.SOS			Assalamu'alaikum Wt. Wd. [Pembitahuan Pembayaran Tagihan]	[Pembitahuan Pembayaran Tagihan]			https://api.whatsapp.com/send?phone=81391114556
1000006	Bapak/Ibu	HJ. ROSITA AMALINA			Assalamu'alaikum Wt. Wd. [Pembitahuan Pembayaran Tagihan]	[Pembitahuan Pembayaran Tagihan]			https://api.whatsapp.com/send?phone=81391114556
1000007	Bapak/Ibu	OMAR FAROUK SAEFUDDIN			Assalamu'alaikum Wt. Wd. [Pembitahuan Pembayaran Tagihan]	[Pembitahuan Pembayaran Tagihan]			https://api.whatsapp.com/send?phone=81391114556
1000008	Bapak/Ibu	H. PRIHARTANTO S.KOM			Assalamu'alaikum Wt. Wd. [Pembitahuan Pembayaran Tagihan]	[Pembitahuan Pembayaran Tagihan]			https://api.whatsapp.com/send?phone=81391114556
1000009	Bapak/Ibu	DRS. H. HERU WIDODO			Assalamu'alaikum Wt. Wd. [Pembitahuan Pembayaran Tagihan]	[Pembitahuan Pembayaran Tagihan]			https://api.whatsapp.com/send?phone=81391114556
1000010	Bapak/Ibu	H. VIRRAJUKA LISTIYO NUGROHO			Assalamu'alaikum Wt. Wd. [Pembitahuan Pembayaran Tagihan]	[Pembitahuan Pembayaran Tagihan]			https://api.whatsapp.com/send?phone=81391114556
1000011	Bapak/Ibu	HJ. TRISNANINGSIH			Assalamu'alaikum Wt. Wd. [Pembitahuan Pembayaran Tagihan]	[Pembitahuan Pembayaran Tagihan]			https://api.whatsapp.com/send?phone=81391114556
1000012	Bapak/Ibu	H. MUHAMMAD SUTOYO, SH.			Assalamu'alaikum Wt. Wd. [Pembitahuan Pembayaran Tagihan]	[Pembitahuan Pembayaran Tagihan]			https://api.whatsapp.com/send?phone=81391114556
1000013	Bapak/Ibu	HJ. SUPARTI			Assalamu'alaikum Wt. Wd. [Pembitahuan Pembayaran Tagihan]	[Pembitahuan Pembayaran Tagihan]			https://api.whatsapp.com/send?phone=81391114556
1000014	Bapak/Ibu	DRS. H.NURJAMIL DINIYATI			Assalamu'alaikum Wt. Wd. [Pembitahuan Pembayaran Tagihan]	[Pembitahuan Pembayaran Tagihan]			https://api.whatsapp.com/send?phone=81391114556
1000015	Bapak/Ibu	AHMAD MUSTANSIN			Assalamu'alaikum Wt. Wd. [Pembitahuan Pembayaran Tagihan]	[Pembitahuan Pembayaran Tagihan]			https://api.whatsapp.com/send?phone=81391114556
1000016	Bapak/Ibu	BENI WAHYUDA			Assalamu'alaikum Wt. Wd. [Pembitahuan Pembayaran Tagihan]	[Pembitahuan Pembayaran Tagihan]			https://api.whatsapp.com/send?phone=81391114556
1000017	Bapak/Ibu	DAH SUPROBOWATI			Assalamu'alaikum Wt. Wd. [Pembitahuan Pembayaran Tagihan]	[Pembitahuan Pembayaran Tagihan]			https://api.whatsapp.com/send?phone=81391114556

Once the prototype has been tested and adjusted, development continues towards a more comprehensive and ready-to-use reminder system. The resulting dashboard (Figure 2) displays key information such as customer number, member name, due date, nominal liability, opening message, and cellphone number that is directly integrated with WhatsApp API. With this system, managers no longer rely on manual note-taking or individual reminders. Simply by updating the data on the spreadsheet, the system can automatically generate a bulk message link to all registered customers.

The purpose of developing this reminder is to help BMT improve member payment compliance, reduce arrears levels, and provide time and energy efficiency in customer management. In addition, this system is also a form of simple digital transformation that is able to support the operations of Islamic microfinance institutions to be more modern, fast, and responsive to the needs of their members

CAMEL System

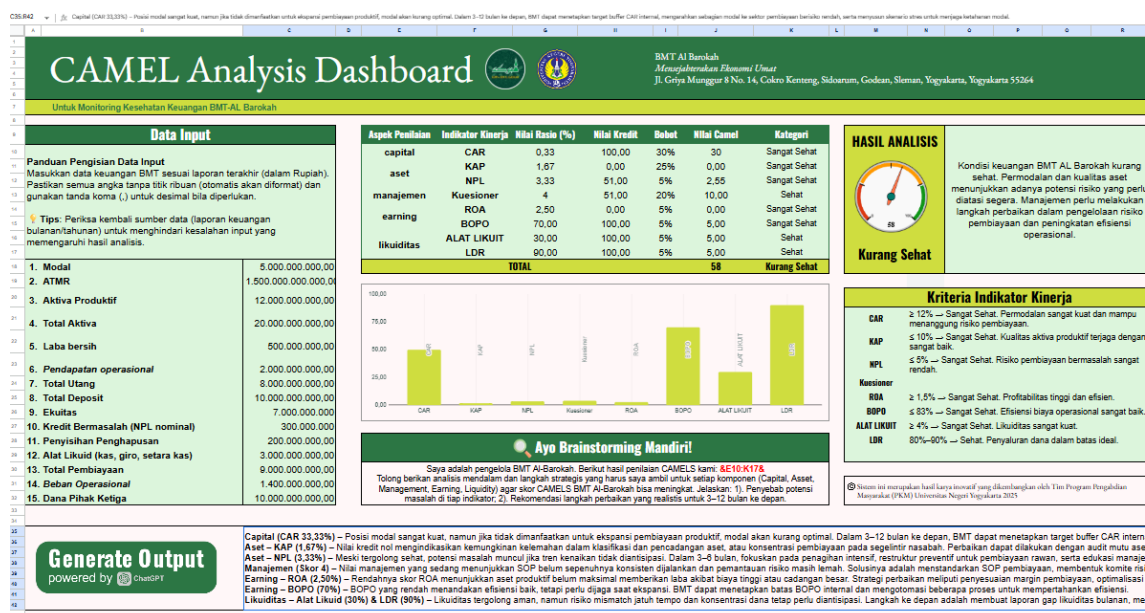
The first step in the digitalization process in the aspect of financial analysis is to design a prototype of the CAMEL analysis system based on interactive spreadsheets. This prototype was tested with BMT financial data which includes key components such as capital, productive assets, net profit, operating expenses, and third-party funds. The results of the test showed that the system was able to automatically calculate important ratios (Capital, Assets, Management, Earning, Liquidity) and generate the final score of the institution's health.

From this initial implementation, a number of inputs were obtained from BMT, including the need for a more informative dashboard display with color indicators (green, yellow, red) to make it easier to read the analysis results, as well as the feature of improvement recommendations based on the scores obtained. In addition, the management also conveyed the need for a system that is able to store report history so that the development of BMT performance can be monitored from time to time.

Once the prototype is customized, development proceeds to the more comprehensive CAMEL analysis system stage. The resulting dashboard (Figure 3) displays financial input data, assessment aspects, performance indicators, and financial health categories in the form of visual bar charts and analysis speedometers. This system not only displays the results of the analysis, but also provides improvement notes that can be used as material for discussion in management meetings. In addition, this spreadsheet-based system has proven to be more efficient than manual methods. If previously CAMEL calculations took days to process data and compile reports, then with this system the analysis process can be done in seconds just by entering the latest data. This efficiency allows administrators to monitor more regularly, even monthly, so that potential financial problems can be identified early. Another advantage felt is the increase in the accuracy and consistency of the analysis results. Automatic formulas, data validation, and cross-checks in spreadsheets minimize the occurrence of human error that often occurs in manual calculations.



Figure 3. Prototype CAMEL System



With uniform calculation standards, financial reports become more reliable, while strengthening the trust of members and external stakeholders. The system also offers more interesting and communicative data visualization. Reports that are usually long tables are now presented in the form of interactive dashboards with trend charts, heatmaps, and color indicators. This makes it easier for management and management to understand the condition of the institution, as well as facilitate the process of communicating the results of the analysis when presented in meetings and audits. Furthermore, this system supports the regulatory compliance aspect. The spreadsheet has been equipped with templates according to OJK standards and stores an automatically documented data history, making it easier to audit and periodic reporting processes. This at the same time increases BMT's readiness to face regulatory supervision and maintains the credibility of the institution in the eyes of members. With this system, administrators no longer have to do manual calculations that are prone to errors, but simply enter the latest financial data, and the results of the analysis will be automatically available in a matter of seconds. The purpose of this development is to increase the effectiveness of financial health monitoring, support strategic decision-making, and strengthen the governance of Islamic microfinance institutions.

In addition, from the results of the mentoring, there are also recommendations for further development in the form of an integrated system with a single sign-on so that administrators do not need to switch systems. In the future, the sustainability of this system requires long-term assistance and increasing the capacity of BMT's internal human resources in the IT field so that management is able to manage the system independently without always relying on external programmers.

Training and Mentoring

The proposing team, consisting of lecturers and students, prepared the training activities by providing laptop devices and interactive spreadsheet-based applications that had been developed. BMT management and related partners arrange the training schedule so that it does not interfere with the institution's operational activities. This activity has the main agenda of providing an explanation of the installation and operation process of the spreadsheet-based CAMEL Analysis System and the Reminder System to the management and administrative staff of partners. This training aims to enable participants to understand how to enter financial data, read the results of institutional health analyses, and manage reminder notifications related to reporting schedules and financial obligations.

After the main program was implemented, the service team provided assistance both offline and online. Offline mentoring is carried out after training at partner locations to provide direct consultation and help overcome challenges that arise in the implementation of the system. Online assistance is carried out through messaging applications, which allow continuous communication and monitoring of the progress of system usage. At this mentoring stage, several technical bugs were also fixed, both in the CAMEL calculation module and the Reminder notification feature. For example, some early adopters had difficulty in entering monthly report data which was later fixed with automatic validation. After the refinement, partner finance staff can return to using the app smoothly, both for institutional health analysis through CAMEL and for reminders of important obligations and

schedules through the Reminder System. These two systems are expected to increase the effectiveness of monitoring, strengthen institutional governance, and encourage management discipline in managing financial statements in a sustainable manner.

CONCLUSION AND RECOMMENDATION

The community service activities, including the development of a computerized system for CAMEL analysis along with training and mentoring for the management of BMT Al Barokah Yogyakarta, went smoothly. Training participants actively participated in both the development of the management model during the training and mentoring sessions. Participants were very enthusiastic about the material presented by the community service team, as they felt it was highly valuable. The CAMEL financial report analysis system is very useful for the management in generating information on the BMT's financial performance. This system can ultimately improve the BMT's performance. The system development, installation, and mentoring activities aim to assist the management of BMT financial data, customers, and members through the development of a computerized system to facilitate and accelerate CAMEL analysis. The mentoring will be held regularly and on a schedule, supported by a community service team from the Faculty of Economics and Business (FEB). Based on data analysis from community service activities at BMT Al Barokah, the community service team recommends the development of an integrated system with single sign-on to eliminate the need for multiple systems that complicate management and login. Furthermore, ongoing, long-term support is needed until the computerized system is implemented so that BMT Al Barokah Yogyakarta management can carry out their duties smoothly and improve BMT performance. In addition to these recommendations, BMTs need to have employees with reliable IT skills so they are not always dependent on external programmers, thus ensuring the security of their internal data.

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Training on Mental Health Detection and Basic Self-Care for Migrant Workers in Malaysia

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Abstract. Indonesian Migrant Workers (PMI) in Malaysia are at risk of experiencing mental health problems due to high demands in their work, living conditions, as well as limited resources and social support. This situation is not accompanied by adequate skills in early detection of mental health issues, nor by sufficient self-care abilities. Therefore, the authors provided training aimed at enhancing early detection skills and self-care practices related to the mental health conditions experienced by Indonesian migrant workers. The training was conducted on July 11, 2025, at Sanggar Belajar Muhammadiyah, PCIM Kuala Lumpur, Malaysia, and were attended by 18 participants. The results indicated that the most prevalent psychological problems among migrant workers were anxiety, stress, and fear, which were largely caused by pressure from employers, coworkers, and dissatisfaction with the Indonesian Embassy (KBRI) system as well as the perceived discriminatory attitudes of the Malaysian government. The training helped migrant workers to better understand their psychological problems, and they reported feeling improved and calmer after practicing the butterfly hug technique and other self-care methods.

Keywords: *early detection, mental health, migrant workers, self-care*

INTRODUCTION

The phenomenon of Indonesian citizens working abroad has been steadily increasing over time. Based on the Placement and Complaint Data of Indonesian Migrant Workers in 2024, there were 297,434 worker placements, reflecting a 0.11% increase compared to 2023 ¹. This figure is predominantly concentrated in the informal sector, including House Maids (33.54%), Caregivers (17.49%), Workers (7.57%), Plantation Workers (6.95%), Domestic Workers (3.60%), and other positions (30.74%). Malaysia is among the top five destination countries with the highest number of Indonesian migrant workers, amounting to 51,723 workers ¹. The significant scale of migrant worker placements has undoubtedly contributed to the nation's revenue through foreign exchange earnings. A report by Bank Indonesia highlights that Indonesian Migrant Workers (PMI) make a substantial contribution to national foreign exchange, amounting to US\$14.22 billion or approximately IDR 230.6 trillion, making it the second-largest source of foreign exchange after the oil and gas sector ². Migrant workers also provide economic benefits to their families due to the substantial income they earn ². Consequently, an increasing number of Indonesian citizens are interested in becoming migrant workers.

On the other hand, there are several risks, particularly those related to workers' safety and protection ². Data show that the Indonesian Migrant Workers Protection Agency (BP2MI) received as many as 1,500 complaints throughout 2024, with the largest proportion coming from workers in Malaysia, accounting for 424 cases or 28.27% ¹. The reported cases fall into various categories, including requests for repatriation, unpaid wages, limited access to social security, and deportation/repatriation ¹. A study conducted by Siregar ³ on 589 Indonesian migrant workers in Malaysia also revealed that the prevalence rates of stress, anxiety, and depression among workers were 151 (25.6%), 308 (52.3%), and 139 (23.6%), respectively. Further analysis identified younger age, longer daily working hours, and reproductive health problems as significant predictors of negative emotional conditions ³. Consistent with these findings, research conducted by Asri and Chuang ⁴ reported that 15% of Indonesian migrant workers exhibited symptoms of depression. Significant factors associated with these symptoms included age, educational level, frequency of contact with family, health status, length of stay, work region, satisfaction with the living environment, and the freedom to leave the house after working hours ⁴.

The various mental health problems among migrant workers, as outlined above, have been addressed by the government through the provision of training programs aimed at equipping migrant workers with skills to support optimal job performance. In addition, the government has issued regulations, such as Presidential Regulation No. 64 of 2011 concerning Health and Psychological Examinations for Prospective Indonesian Migrant Workers ⁵. Clinical approaches to addressing migrant workers' mental health issues have also begun to be introduced.

Nevertheless, further interventions concerning the psychological condition and mental health of Indonesian migrant workers remain an urgent agenda, as current efforts have yet to achieve optimal outcomes. Moreover, workers themselves are not yet fully aware of the importance of maintaining mental health, both for their own well-being and for others. In addition, existing approaches have primarily focused on addressing problems from a deficit-based perspective, without sufficiently incorporating positive or strength-based approaches that highlight migrant workers' resilience and capacities.

The integration of a more holistic approach to mental health, one that does not solely focus on the diagnosis and treatment of mental disorders but also incorporates the concept of positive psychology, is essential. Positive psychology emphasizes the development of individuals' strengths and positive potentials, such as positive emotions, happiness, gratitude, and optimism, thereby fostering psychological well-being^{6,7}. A study by Hidayat⁸ demonstrated that the application of positive psychology approaches can enhance the mental resilience of migrant workers, reduce anxiety, and improve their overall quality of life.

The authors propose a training program on self-care and early detection of mental health conditions that integrates both clinical concepts and positive psychology approaches, specifically designed for Indonesian Migrant Workers (PMI) in Malaysia who are members of the Muhammadiyah community in the Kuala Lumpur district. Through this training, migrant workers are expected to acquire adequate knowledge and skills in early detection of mental health conditions and in applying simple self-care techniques, as well as to enhance strength-based mental health practices that can be implemented in addressing challenges and navigating daily life. Ultimately, Indonesian Migrant Workers are anticipated to develop strong resilience, achieve optimal psychological well-being, and thereby perform their professional roles more effectively.

METHOD

This community engagement program is designed in the form of training, which is implemented through several methods, namely lectures, discussions, question-and-answer sessions, and simple practical learning. According to⁹, the lecture method is a learning approach in which material is delivered orally by the instructor to participants in front of the class. This method is employed at the beginning of the training session to present the core materials. The discussion method is a learning approach in which instructors and participants collaboratively seek solutions to the problems at hand¹⁰. Sudjana¹ emphasizes that the question-and-answer method is an effective learning approach that fosters creativity among learners. Practical learning, on the other hand, is conducted by engaging participants in direct activities based on the concepts or materials that have been previously introduced¹². This method encourages participants to be actively involved in the learning process and strengthens their understanding of concepts and theories. Moreover, it provides an illustration of how a particular activity is carried out.

By employing this combination of methods, the training was expected to provide participants with a clearer and more practical understanding of the program's objectives. The material on stress and mental health in general was delivered primarily through lectures. Meanwhile, the material on simple self-care, grounded in both clinical psychology and positive psychology, was conducted through practical learning. All materials were accompanied by discussions and question-and-answer sessions between participants and facilitators. The following table presents the training materials delivered.

TABLE 6. List of Training Materials

Material	Material Overview	Facilitator
Stres and Mental Health	Participants receive materials on the definition, types, and impacts of stress on the body, as well as strategies to manage it. The facilitator emphasizes the importance of understanding stress among Indonesian Migrant Workers (PMI).	Kartika Nur Fathiyah Farida Harahap
Early Detection of Mental Health	Participants learn about various problems that may be experienced by migrant workers, signs and conditions to be aware of related to mental health, appropriate steps to take when problems occur, and the concept of psychological first aid.	Annisa Nur Harwiningtyas
Basic Self-Care	Participants are introduced to the definition, types, and examples of self-care, along with simple strategies that can be applied to practice self-care, such as breathing relaxation, the butterfly hug, and mindfulness techniques.	Dinarista Yulisa Ediputri

The participants of this community engagement program were Indonesian Migrant Workers (PMI) in Malaysia, specifically those residing in the Kuala Lumpur district area. The pre-test procedure was conducted in a simple manner through open interviews with participants regarding the problems they faced, the emotions they experienced, and the thoughts they had. A total of 13 adults (aged 25–50 years) and 5 adolescents (aged 15–19 years) were involved in this program. The instruments used in the program included: (1) training materials on

Stress, Early Detection of Mental Health, and Simple Self-Care Practices, and (2) a booklet entitled “*Early Detection of Mental Health and Self-Care for Migrant Workers in Malaysia*.” Data analysis was carried out using a qualitative descriptive approach based on observation and interview results.

RESULT AND DISCUSSION

Descriptive Data of Participant

Peserta pengabdian merupakan Pekerja Migran Indonesia (PMI) di Malaysia yang berada di distrik area Kuala Lumpur. Tabel berikut menunjukkan data deskriptif peserta yang mengikuti kegiatan pengabdian yang terdiri dari 18 peserta dengan 12 perempuan dan 6 laki-laki.

TABLE 7. Data Deskriptif Peserta

Category	Characteristics	Number of Participants	Percentage (%)
Age Group	Adolescents (15-19 years)	5	27,8%
	Adult (25-50 years)	13	72,2%
Gender	Female	12	66,7%
	Male	6	33,3%
Total		18	100%

Activity Process and Results

Description of Program Results and Implementation

The training program began with a pre-test conducted through open interviews with participants regarding the challenges they faced, the emotions they experienced, and the thoughts they held. Participants reported that the primary issues encountered by Indonesian Migrant Workers (PMI) included psychological, financial, social, and physical conditions. From a financial perspective, participants stated that their wages in Malaysia were relatively high, particularly compared to wages in Indonesia. Nevertheless, feelings of anxiety and worry persisted, especially concerning physical and social conditions. One prevailing belief was that migrant workers in Malaysia must not fall ill, as reflected in the expression “*migrant workers must never get sick*.” This was due to the fact that healthcare costs in Malaysia are extremely high for migrant workers, in stark contrast to Malaysian citizens who receive considerably cheaper or even free healthcare services when seeking treatment at hospitals.

From a social perspective, migrant workers frequently felt marginalized and discriminated against. In social interactions, they were often perceived as inferior and not fully recognized as individuals. Indonesian migrant workers who married Malaysian citizens and had children were encouraged to change their citizenship to Malaysian, as this provided greater access to benefits, particularly in education and healthcare. Parents expressed concerns about the difficulties faced by children of Indonesian nationals in accessing education in Malaysia. This concern became one of the main reasons for establishing the Muhammadiyah Learning Center, which was created to address the anxiety of Indonesian migrant workers regarding their children’s education.

These circumstances understandably led PMI to feel uncomfortable, sad, and disappointed. Additionally, many workers reported difficulties in processing immigration documents and work permits, which often left them feeling frustrated and anxious when facing bureaucratic challenges while working in Malaysia. The various issues expressed by participants highlighted how these conditions strongly affected their mental health, generating feelings of anxiety, sadness, and frustration, while also reinforcing the perception that support from the government remained insufficient. Following the sharing session, facilitators delivered materials on mental health, strategies for the early detection of potential mental health problems and positive psychology. Participants listened attentively, and several provided feedback by sharing personal stories in relation to the materials presented.

The session continued with practical exercises on simple self-care techniques, specifically breathing relaxation and the butterfly hug. The facilitator introduced the definitions of these practices, demonstrated them, and provided step-by-step instructions. Approximately five to six participants volunteered to practice the butterfly hug, with one participant sharing: “*I often give myself affirmations by gently tapping my shoulders, and it works for me*.” This statement served as encouragement for other participants to try the same. The breathing relaxation exercise was also performed successfully, though not in a fully mindful manner due to the limited space available. In addition, participants were asked to identify their personal strengths and subsequently simulate strategies based on those strengths.

Overall, the program was carried out successfully and smoothly. Although participants initially appeared reserved, over time they began to share their experiences more openly. The materials were effectively delivered, and the self-care practices were actively followed by the participants.

Facilitator

The facilitators of the program were the authors themselves, consisting of four psychologists holding active licenses (SIPP/ Surat Izin Praktik Psikologi) issued by HIMPSI. The facilitators delivered the materials effectively, using general, clear, and easily understandable language. Although it was initially challenging to build openness with participants, the facilitators made deliberate efforts to establish warm and close interactions. The session began with simple questions about participants' daily activities. Gradually, the facilitators gained the participants' trust, leading them to eventually share their personal concerns. When participants showed changes in facial expressions or emotions, the facilitators approached them to provide reassurance and comfort. During the self-care practice sessions, facilitators demonstrated the techniques first before inviting participants to try them independently. This approach encouraged participants to feel more confident in practicing the self-care techniques modeled by the facilitators on their own.

Participant

At the beginning of the training session, participants appeared hesitant and shared their experiences only to a limited extent. However, after the facilitators distributed the booklet and explained its contents, participants gradually became more open in telling their stories. Once one participant shared an experience, others responded by affirming, supporting, or adding their own perspectives. Over time, they became increasingly willing to discuss both personal and work-related problems. During the self-care practice session involving mindfulness and the butterfly hug, approximately four to five participants engaged enthusiastically. They also reported that they had already been practicing self-affirmation through light tapping on the body. Overall, the session on self-care materials and practice progressed in a more relaxed and flexible manner, supported by the relatively high level of participant engagement.

Challenges and Evaluation of The Programs

Overall, the community engagement program was implemented successfully and smoothly. All participants were able to understand the various psychological and mental health issues they experienced. They were also relatively open in explaining and sharing their personal problems. Several participants were highly active in asking questions and consulting about the difficulties they faced. Moreover, participants were willing to practice the self-care techniques introduced by the facilitators.

Nevertheless, several challenges emerged during the program. First, there was a limitation in the duration of the sessions, as participants were migrant workers with long working hours and were often called unexpectedly by their supervisors. This made it difficult for the facilitators to determine a suitable time for conducting the activities. Second, the participants represented a wide range of age groups, requiring the facilitators to simplify both the materials and the self-care practices delivered. Based on these challenges, several points of evaluation were identified. First, it is necessary to schedule and set the training date and time well in advance so that participants can better prepare themselves to engage in the program. Second, the training materials should be adapted for delivery across different age groups, ensuring that the content is easier to understand and apply in daily life.

Discussion

The results indicate that the training program was successfully implemented. Participants were able to understand the concept of mental health, learned simple methods for early detection of psychological conditions, and practiced basic self-care techniques based on clinical psychology and positive psychology approaches.

Self-care is a strategy consciously undertaken by an individual to maintain psychological well-being. This behavior is carried out independently, with individuals taking a proactive role in ensuring the optimal health and functioning of the self across physical, mental, and social dimensions¹¹. Previous studies have also demonstrated that the appropriate application of self-care can help workers maintain their psychological well-being¹¹. Moreover, self-care has been shown to reduce stress and anxiety¹², enhance self-awareness and self-compassion¹³, and decrease the risk of burnout caused by work-related fatigue¹³.

There are three simple self-care techniques introduced to Indonesian Migrant Workers (PMI), namely breathing relaxation, the butterfly hug, and strength-based self-management. The selection of the first two techniques was based on the assumption that they can be practiced easily and quickly without requiring specific tools or materials (such as books, stationery, or other equipment) and can help reduce anxiety¹⁴. Breathing relaxation assists in calming the body by regulating slow, deep, and steady breathing in order to reduce physical tension¹⁵. Meanwhile, the butterfly hug is a method of self-acceptance in which individuals provide themselves

with soothing embraces and affirming words ¹⁶. Through this method, individuals can experience a sense of comfort and calm without depending on others. Strength-based approaches, as a manifestation of positive psychology, are implemented to optimize individuals' positive potential in achieving well-being.

The results also revealed that the main challenges faced by Indonesian Migrant Workers (PMI) in Malaysia include psychological, financial, physical, and social issues. While their financial needs are generally met through the wages they receive, there is a persistent concern that they must not fall ill, as the cost of medical treatment is extremely high. This finding is consistent with a previous study¹⁷ which reported that expenses incurred by foreign nationals or migrants tend to be higher compared to native citizens in the host country. The primary reason is that non-citizens are not eligible for existing healthcare subsidy schemes in Malaysia ¹⁷. This condition has inevitably led to feelings of anxiety and distress among PMIs in Malaysia.

Furthermore, in the social dimension, Indonesian Migrant Workers (PMI) reported experiencing exclusion and discrimination, both from Malaysian citizens and even from representatives at the Indonesian Embassy. Prior studies confirm that Indonesian migrant workers in Malaysia are indeed highly vulnerable to discrimination, primarily because their occupations are often perceived as low-status and categorized as *unskilled* labor ¹⁸. In addition, other studies have highlighted that several PMIs in Malaysia do not receive equal access to social protection schemes ¹⁹. Legal and governmental regulatory barriers further restrict their access to social rights and protections, which may be regarded as a form of discrimination in policy implementation ¹⁹.

The Embassy of the Republic of Indonesia (KBRI) bears the responsibility of protecting, assisting, and supporting advocacy for Indonesian Migrant Workers (PMI) who encounter problems in their host country ²⁰. However, findings from the training conducted by the author indicate that the administrative process for PMI—particularly for housemaids—tends to be difficult. The role of KBRI in this matter was perceived as not always optimal and often slow in response ²⁰. This situation is highly concerning, given that housemaids represent the largest proportion of Indonesian migrant workers in 2024, reaching 33.54% of the total PMI workforce ¹. Moreover, data from Bank Indonesia reveal that Indonesian migrant workers contribute significantly to the national economy, with remittances amounting to US\$14.22 billion ². This illustrates a paradox: despite their major contribution to the country's foreign exchange and the high proportion of domestic workers employed abroad, the protection and assistance provided to PMIs remain inadequate.

Various circumstances render Indonesian migrant workers (PMI) in Malaysia highly vulnerable to stress, anxiety, and fear. This finding is consistent with previous studies reporting high prevalence rates of stress (25.6%), anxiety (52.3%), and depression (23.6%) among migrant workers ³. Such elevated rates cannot be separated from the multiple risk factors they encounter, including heavy workloads, limited access to healthcare services, social discrimination, financial pressures, and regulatory barriers that hinder the fulfillment of their basic rights. The interplay of these factors exacerbates their psychological vulnerability, underscoring the urgent need for promotive and preventive mental health interventions.

Further evidence suggests that additional risk factors contributing to the deterioration of migrant workers' mental health include long working hours and low income ³. Feelings of loneliness, limited family support due to geographical separation ³, the scarcity of pro-migrant government policies ²¹, and forced relocation of workplaces driven by agency or employer policies further compound the psychological burden faced by Indonesian migrant workers in Malaysia.

CONCLUSION

The training on early detection of mental health and the enhancement of simple self-care skills proved beneficial in helping migrant workers understand the psychological problems and conditions they were experiencing. Participants also reported feeling better and calmer after practicing the butterfly hug, breathing relaxation techniques and strength-based capacity building as a self-care strategy. Furthermore, the program yielded descriptive findings regarding the problems faced by migrant workers, which included challenges in psychological, financial, physical, and social aspects.

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FORMATION OF FIRE SAFETY VOLUNTEERS AS FIRE RISK CONTROL STRATEGY IN KAMPUNG EMAS BUMIJO, YOGYAKARTA

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Abstract. Densely populated areas in the city of Yogyakarta have a high potential for fire risk, as indicated by the number of fires in the last five years. Kampung Emas Bumijo was selected as a pilot area for a community service program through the formation of fire volunteers. The methods used included education, simulations on the use of fire extinguishers, wet cloths, burning gas cylinders and gas stoves, and how to extinguish them, as well as the inauguration of the volunteers. The results of the activities showed an increase in community knowledge and the formation of a group of volunteers who are ready to respond to fire incidents. This program is expected to be replicated in other areas as a community-based fire mitigation measure.

INTRODUCTION

Yogyakarta, as a city of culture and education, has densely populated residential areas that are highly prone to fire risks. Based on data from the Yogyakarta Fire Department, there has been an increase in the number of residential fires in the last five years. According to the Head of Operations and Investigation at the Sleman Satpol PP Fire Department, in the Sleman area alone, there were 99 fires in 2020, 107 in 2021, and 146 in 2022. In 2023, there was an increase to 385 fire incidents. In 2024, the number of fire incidents dropped to 235 cases. Although it decreased, the number of incidents remains quite high (Pramono, 2025).

This is due to substandard electrical installations, building density, and low public awareness of fire prevention measures (Sukmo et al., 2016). As a form of academic contribution to risk mitigation, this community service program aims to establish fire volunteers in Kampung Emas Bumijo. The objective of this activity is to build the capacity of the local community in detecting and responding early to fire incidents through training, education, and practical simulations (Nurwulandari, 2016).

Kampung Emas Bumijo in Yogyakarta is a critical case study that represents the complexity of fire challenges in densely populated settlements in Indonesia. Based on data from BPBD DIY (2023), this 4.2-hectare area with a density of 285 people/hectare has experienced 7 major fire incidents in the last 5 years, 85% of which were caused by electrical short circuits from installations that did not meet standards (Dinas ESDM DIY, 2022). The physical characteristics of the environment, consisting of narrow alleys (0.8-1.2 meters wide) and a predominance of combustible building materials such as wood and bamboo (Yogyakarta Regional Development Planning Agency survey, 2023), create ideal conditions for rapid fire spread. The community has never received basic firefighting training. However, on the other hand, this village has strong social capital in the form of a tradition of mutual cooperation and a solid neighborhood association (RT/RW) structure, which, according to Arifin (2023) in a study on Jogo Tonggo, can be an effective basis for the development of a community-based safety system. It is this combination of extreme physical vulnerability and great social potential that makes Kampung Emas Bumijo an ideal living laboratory for testing the effectiveness of the Redkar model in the context of dense Indonesian settlements.



Figure 1. Location of Kampung Emas Bumijo, Yogyakarta

LITERATURE REVIEW

International standards provide a comprehensive framework for fire risk management, although their implementation in densely populated settlements requires significant adaptation. NFPA 1300:2022 Standard on Community Risk Assessment establishes a systematic approach through three main stages: (1) identification of potential fire hazards from gas, electricity, and residents' welding and grinding work; (2) vulnerability assessment based on building materials and population density; and (3) evaluation of community response capacity. Ahrens' (2021) study shows that the application of this standard in Asian informal settlements requires modifying the density parameter from the standard 150 people/ha to 250 people/ha to reflect real conditions. Meanwhile, ISO 22300:2018 Societal Security emphasizes the concept of sustainable resilience with quantitative indicators such as the availability of 1 firefighting unit per 500 residents and quarterly training for volunteers (Clause 4.2). Implementation in Rio de Janeiro (FIREX Report, 2023) proves the effectiveness of this model with 92% volunteer readiness, although adjustments are needed for environments with limited access.

In terms of training, NFPA 600:2020 Standard on Facility Fire Brigades provides a structured curriculum that includes a basic module (8 hours) on fire extinguisher handling and evacuation techniques, as well as an advanced module (16 hours) specifically on electrical and gas fire handling. Adaptation of this standard in Vietnam (UN-Habitat, 2021) successfully increased the competence of volunteers from 12% to 89% in basic equipment operations. However, Kuligowski's (2023) review of 50 case studies revealed that rigid implementation without contextualization of local culture had a 45% failure rate in the long term. Integration with UNDRR's INFORM Risk Index (2023) resulted in a hybrid framework that combines: (1) physical parameters (building density, construction materials), (2) social aspects (level of community participation), and (3) institutional dimensions (local regulatory support).

A comparative analysis (Scopus, 2024) of the implementation of global standards in 15 developing countries identified four key principles of adaptation: (1) simplifying procedures without compromising safety, (2) substituting standard equipment with affordable alternatives, (3) modifying training intervals according to community capacity, and (4) integrating with local wisdom systems. In Indonesia, the partial adaptation of NFPA 600 in the Disaster Resilient Village Program (BPBD DIY, 2022) successfully reduced response time from 15 minutes to 8 minutes through modifications: (a) replacing formal certification with a 4-hour short training course, (b) using wet sacks as an alternative to fire extinguishers, and (c) utilizing the RT/RW social structure as the backbone of the command system. These findings reinforce the proposition that the effectiveness of international standards is highly dependent on the flexibility of adaptation to specific location characteristics, whether physical, social, or regulatory.

Various international case studies prove the effectiveness of community-based fire volunteer models in reducing fire risks in densely populated settlements. The Jishu-bosai-soshiki program in Kobe, Japan (Murosaki, 2018) shows that the formation of neighborhood volunteer teams combined with monthly training and a community-based early warning system can reduce fire mortality by 62% in a decade. This model was successful due to three key factors: (1) integration with Japan's national disaster preparedness system, (2) the use of simple technology such as manual sirens operated by residents, and (3) annual fire scenario simulations involving all levels of society. In Southeast Asia, Vietnam's Village Fire Guard Program (UN -Habitat, 2021) in Hanoi achieved a 78% reduction in material losses through a unique approach consisting of: (a) 8-hour modular training focused

on handling electrical fires and gas stove fires, (b) distribution of low-cost fire extinguishers (\$15/unit) in collaboration with local MSMEs, and (c) a clan-based guard rotation system that utilizes traditional kinship ties. Meanwhile, a comparative study by the FIREX Report (2023) of 30 programs in Latin America revealed that the Brigada Comunitária in Rio de Janeiro is the most sustainable model thanks to: (i) an integrated command structure with local health centers, (ii) the use of WhatsApp for real-time reporting, and (iii) an innovative funding mechanism through voluntary contributions of Rp7,000/month/household, managed transparently.

Local regulations and practices in Indonesia have developed several important frameworks for managing fires in densely populated settlements. Regulation of the Minister of Public Works No. 26 of 2008 concerning Fire Safety in Buildings and Housing sets minimum standards for fire protection but does not specifically regulate its implementation in densely populated settlements with specific characteristics. At the regional level, DIY Regional Regulation No. 1/2020 on Disaster Management has adopted the principle of community participation through the establishment of Disaster Resilient Villages, with the following main components: (1) participatory risk mapping, (2) formation of emergency response teams, and (3) allocation of village funds for basic training. Implementation in the city of Yogyakarta (BPBD DIY, 2022) shows that this program has successfully trained 75 fire volunteers in 15 subdistricts, although it still faces challenges in terms of funding sustainability and equipment availability.

At the community level, the tradition of mutual cooperation has become an important social capital in the fire safety system. Arifin's (2023) research on the Jogo Tonggo model in DIY identified three relevant local wisdom mechanisms: (1) a modified night patrol system that includes monitoring fire-prone areas, (2) a community self-help mechanism for procuring simple equipment such as sand buckets and water barrels, and (3) an effective RT/RW-based command structure for emergency response coordination. These findings are reinforced by a study by Suryanto et al. (2023) in Kampung Code, which shows that a combination of strong social structures and basic training can reduce fire response times from 20 minutes to 10 minutes. However, a study by BPS (2023) reveals that only 15% of densely populated settlements in Indonesia have optimally utilized this potential.

Local initiatives such as the Disaster Preparedness Village Program in Jakarta (BPBD DKI, 2021) and the River School in Banjarmasin (Banjarmasin City Government, 2022) have attempted to integrate national standards with local wisdom. An evaluation of these programs identified several good practices: (1) the use of local language and symbols in training materials, (2) the adaptation of safety equipment using materials available in the community (wet sacks, sand), and (3) the alignment of activity schedules with the social rhythms of the community. However, the main challenges that remain are the lack of a sustainable funding scheme and weak coordination among stakeholders (Ministry of Villages, 2023).

The synthesis of these various local frameworks reveals three urgent needs: (1) the development of specific technical guidelines for densely populated settlements that go beyond formal building regulations, (2) the development of innovative funding models that combine local government budgets, village funds, and corporate social responsibility (CSR) funds, and (3) the strengthening of local government capacity to facilitate multi-stakeholder collaboration. The experience of Bandung City in developing Perwal No. 3/2021 on Fire Management in Densely Populated Settlements can be used as a reference, particularly in terms of: (a) establishing specific criteria for densely populated settlements, (b) mechanisms for training village-based volunteers, and (c) integration with community-based early warning systems (Diskominfo Bandung, 2022).

A systematic literature review revealed three critical research gaps related to fire risk management in Kampung Emas Bumijo. First, Scopus analysis (2024) shows that of 112 international publications on dense residential fires in Southeast Asia between 2015 and 2024, only 8 studies (7.1%) specifically discuss the integration of international standards (NFPA/ISO) with the Javanese mutual assistance system, even though this combination is a unique characteristic of Kampung Emas Bumijo. Second, existing research tends to be fragmented—technical studies (Suryanto et al., 2023) only analyze building material aspects without considering social dimensions, while social studies (Arifin, 2022) ignore technical fire protection standards. Third, an evaluation of 25 policy documents (Permen PUPR No.14/2021 to Perda DIY No.1/2020) revealed the absence of operational guidelines for community-based fire volunteer models in environments with specific characteristics such as: (1) density >250 people/ha, (2) alley width <1.5m, and (3) dependence on non-standard electrical installations (Bappeda Yogyakarta, 2023). Methodological gaps are also evident in the lack of implementation of an integrated framework that links: (a) NFPA 1300-based risk assessment, (b) 5M resource analysis, and (c) mutual assistance institutional mechanisms. The DIY BPBD (2023) study of 15 fire-prone villages in Yogyakarta only touched on the aspect of emergency response without a comprehensive prevention strategy. Thus, this study seeks to fill these academic and practical gaps through the development of an integrated Redkar model that simultaneously: (1) adapts NFPA 600 standards to the local context, (2) utilizes Javanese social capital, and (3) provides technical-operational implementation protocols.

RESEARCH METHODS

This study uses a sequential explanatory mixed-methods design that combines quantitative and qualitative approaches in stages. The first stage consists of a survey related to the existence of houses, firefighting facilities and evacuation routes, as well as the placement of firefighting equipment (pump carts and tanks). The Redkar intervention protocol was designed based on modified NFPA 600 standards, including 16 hours of training and monthly simulations, with impact evaluation using a monitoring system based on SMART (Specific, Measurable, Achievable, Relevant, Time-bound) indicators.

TABLE 1. Integrated Table SIPOC & 5M.

SIPOC Components	Description	Related 5M Elements
Suppliers	- City Government/Fire Department - NGOs/Communities - Community Leaders - Sponsors/Donors	Money (Aid funds) Material (Firefighting equipment)
Inputs	- Trained community personnel - Funds/Fire extinguishers - Training materials	Man (Volunteers) Money (Funds) Material (Fire extinguishers)
Process	- Socialization - Recruitment - Training - Role Distribution - Simulation - Monitoring	Method (Training & SOP) Machine (Communication tools)
Outputs	- Active Redkar team - Emergency response plan - Fire risk reduction	Man (Community skills) Material (Evacuation signs)
Customers	- Residents of Kampung Emas Bumijo - Local businesses - Vulnerable groups	Man (Beneficiary)

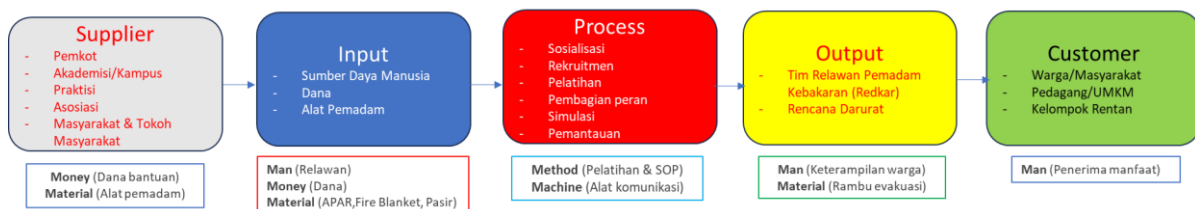


Figure 2. SIPOC & 5 M Framework

This activity was carried out in four stages:

1. Registration: The Kampung Emas Bumijo community was registered as volunteer participants, then given a questionnaire to measure their initial knowledge of fire safety.
2. Delivery of Material: Participants were given material on types of fires, common causes of fires in residential areas, prevention techniques, and evacuation strategies.
3. Simulation and Practice: Demonstrations on the use of fire extinguishers and hydrants were conducted, followed by firefighting simulations by the participants.
4. Volunteer Inauguration: A group of volunteers was formed and symbolically inaugurated with the presentation of attributes and a commitment to preparedness.



Figure 3. Housing conditions in Kampung Emas Bumijo



Figure 4. Activity poster

Lampiran Surat Keputusan Lurah Bumijo
 NOMOR : 014 Tahun 2025
 TANGGAL : 26 Mei 2025

PELATIHAN & WORKSHOP
PEMBENTUKAN RELAWAN PEMADAM KEBAKARAN (REDKAR)
KAMPUNG MAS BUMIJO KULON

31 MEI 2025 **BALAI RT-35 RW-08 BUMIJO**
 Balai RT 35 RW 08 Bumijo Kulon Desa Islamtewo Yogyakarta & Pusdik UNY

PEMERINTAH KOTA YOGYAKARTA
KEMANTREN JETIS
KELURAHAN BUMIJO

Jalan Tirta Gana Pajay 8 Yogyakarta, Daerah Istimewa Yogyakarta 55231
 Telp. (0274) 48848, Faksimili (0274) 48848
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KEPUTUSAN LURAH BUMIJO
 Nomor : 014/KP/SLM/2025

TENTANG
PEMBENTUKAN RELAWAN SIAGA BENCANA DAN KEBAKARAN (LAGABARA)
KAMPUNG BUMIJO KULON KELURAHAN BUMIJO, KEMANTREN JETIS
KOTA YOGYAKARTA TAHUN 2025

ATAS RAHMAT ALLAH YANG MAHA KUASA

LURAH BUMIJO

Menimbang : a. Bahwa untuk kelancaran Program Relawan Siaga Bencana dan Kebakaran (LAGABARA) Kelurahan Bumijo Tahun 2025 perlu ditetapkan dan ditetapkan Tim LAGABARA;

b. Bahwa dalam Kegiatan Program Pengabdian dari Fakultas Teknik Universitas Negeri Yogyakarta kepada masyarakat Bumijo, untuk menambah keterampilan warga masyarakat Bumijo Kulon;

c. Bahwa berdasarkan pertimbangan sebagaimana dimaksud dalam huruf a dan b di atas perlu ditetapkan dengan Surat Keputusan Lurah Bumijo;

Mengingat : 1. Undang-Undang Nomor 16 Tahun 1999 tentang Pemerintahan Daerah; 2. Undang-Undang Nomor 23 Tahun 2009 tentang Pelayanan Publik; 3. Undang-Undang Nomor 24 Tahun 2007 tentang Penyelenggaraan Bencana; 4. Undang-Undang Nomor 6 Tahun 2014 tentang Desa; 5. Peraturan Pemerintah Nomor 21 Tahun 2008 tentang Penyelenggaraan Penyelenggaraan Bencana; 6. Peraturan Daerah Kota Yogyakarta tentang Penyelenggaraan Bencana Daerah

Memperhatikan : Hasil Rapat Koordinasi Tim dari Fakultas Teknik, Teknik Masyarakat Bumijo Kulon dengan Lurah dan Pengkaji Kelurahan Bumijo di Kelurahan Bumijo Kemantren Jetis tanggal 11 April 2025

MEMUTUSKAN

Menetapkan : **KEPUTUSAN LURAH BUMIJO KEMANTREN JETIS KOTA YOGYAKARTA TENTANG: PENETAPAN TIM LAGABARA KELURAHAN BUMIJO KEMANTREN JETIS KOTA YOGYAKARTA TAHUN 2025.**

PERTAMA : Membentuk Relawan Siaga Bencana dan Kebakaran Kelurahan Bumijo Tahun 2025 yang terdiri dari unsur masyarakat di lingkungan Kelurahan Bumijo sebagaimana tercantum dalam Lampiran SK ini.

KEDUA : **Relawan Siaga Bencana dan Kebakaran (LAGABARA)** bertugas:

a. Melakukan upaya pencegahan, mitigasi, dan kesiapsiagaan menghadapi bencana dan kebakaran;

b. Memberikan bantuan dalam keadaan darurat bencana dan kebakaran;

c. Berkoordinasi dengan pihak Kelurahan, BPBD, dan Dinas Pemadam Kebakaran Kota Yogyakarta;

d. Mengikuti pelatihan dan kegiatan peningkatan kapasitas yang diselenggarakan oleh pihak berwenang.

KETIGA : Dalam pelaksanaan tugasnya, Tim LAGABARA sebagaimana dimaksud pada diktum PERTAMA senantiasa berpedoman pada ketentuan peraturan Perundang-undangan yang berlaku dan bertanggungjawab kepada Lurah Bumijo dan dapat bekerja sama dengan lembaga atau komunitas keberesannya lainnya.

KEEMPAT : Keputusan ini mulai berlaku sejak tanggal ditetapkan dan apabila terdapat kekeliruan dalam penempatan, akan diadakan perbaikan sebagaimana mestinya.

Ditetapkan di : Yogyakarta
 Pada tanggal : 26 Mei 2025

LURAH BUMIJO
 ANSIPURWATI S.
 190304001994032007

LURAH BUMIJO
 ANSIPURWATI S.
 190304001994032007

No	NAMA	ALAMAT
1	Desi Santiaji	BUMIJO KULON
2	Budiyah	BUMIJO KULON
3	Rochayati	BUMIJO KULON
4	Ti Wijayati	BUMIJO KULON
5	Margo Paramito	BUMIJO KULON
6	Sri Lestari Ningsun	BUMIJO KULON
7	Timbul Widoto	BUMIJO KULON
8	Endang Sulistyawati	BUMIJO KULON
9	Slamet Widodo	BUMIJO KULON
10	Sri Wahyuni	BUMIJO KULON
11	Sari Purwaningsih	BUMIJO KULON
12	Sunardi	BUMIJO KULON
13	Juwiyah	BUMIJO KULON
14	Dian Ambar Kuswati	BUMIJO KULON
15	Uman Ismail	BUMIJO KULON
16	Purmanan	BUMIJO KULON
17	Rinto Ardiana	BUMIJO KULON
18	Suharyono	BUMIJO KULON
19	Wawan Karmawan	BUMIJO KULON
20	Firdi Tri	BUMIJO KULON

Figure 5. Decree on the establishment of Redkar Kampung Emas Bumijo Yogyakarta

RESULTS AND DISCUSSION

This program involved 20 residents of various ages and occupational backgrounds. Based on the results of pre-tests and post-tests, there was a significant increase in participants' understanding of fire safety principles

(Januandari et al., 2017). The community's enthusiasm was evident from their active participation during the simulation. In addition, residents conveyed the importance of continuing training so that more family members would understand fire emergency procedures. The volunteer group that was formed demonstrated its commitment by building evacuation routes, providing simple fire extinguishers, and creating an early warning system. This program proves that a participatory approach is effective in increasing community preparedness for fire risks.



Figure 6. Redkar Education in Bumijo Village, Yogyakarta



Figure 7. Redkar Education Organizing Team

The main factors contributing to the high risk index include: (1) irregular building density with an average distance between houses of only 0.75 meters, (2) non-standard electrical installations found in buildings based on field inspections, and (3) semi-permanent houses (wooden walls). In terms of preparedness, key findings show that some residents have participated in basic firefighting training. However, there is potential for improvement, as evidenced by the high level of community participation and willingness to volunteer, as well as the strong tradition of mutual assistance, as reflected in the success of the night patrol system that has been in place.

Key recommendations include: (1) intensive training in RT ... as a priority zone, (2) distribution of simple fire extinguishers based on risk clusters, and (3) marking evacuation routes with symbols that are easily recognizable by the local community. These results form an important basis for developing an effective and sustainable Redkar program in Kampung Emas Bumijo.

The fire volunteer recruitment program (Redkar) in Kampung Emas Bumijo successfully recruited 20 prospective volunteers from the initial target of 20 people, with a composition of 30% men and 80% women, as most of them were at home. Demographic analysis shows that the majority of volunteers are from the productive age group (25-45 years old) and have kinship ties within the same neighborhood unit (RT), which facilitates emergency response coordination. The door-to-door recruitment method by local cadres proved to be the most effective.

The training completion rate showed encouraging results, with 100% of participants (25 people) completing all training modules. Temporal data revealed that the field practice sessions had the highest attendance rate (100%) and the morning theory sessions had an attendance rate of 100%. The factors that encouraged completion of the training included: (1) participatory learning methods with local case studies (fires caused by gas leaks, stove fires, and liquid fires), (2) the provision of snacks, lunch, souvenir tumblers, and T-shirts during the training, and (3) the incentive of a certificate bearing the logo of Yogyakarta State University.

The utilization of post-training equipment shows that the distributed tools have been used in monthly simulations, with details as follows:

- Powder fire extinguishers
- Fire blankets/towels for stoves and homes
- Portable hoses and pumps for fires
- Hose and pump carts



Figure 8. Condition of the access road to the Kampung Emas Bumijo settlement



Figure 9. Checking the repaired cart and lubricating the nozzle



Figure 10. Training participants before practicing using firefighting equipment

Usage pattern analysis identified three main problems: (1) lack of routine maintenance, (2) difficulty accessing water for refilling tanks, and (3) non-strategic storage of equipment. However, volunteers reported an increase in confidence in operating basic equipment.

Recommendations for Improvement:

1. RT group-based equipment inspection rotation system
2. Training on connecting hoses to pumps and nozzles
3. Replacing hoses with roll-up hoses that do not have to be fully unrolled
4. Provision of tanks and modification of motors that can pull carts
5. Remapping of fire extinguisher storage locations



Figure 11. Practice of using a 1.5-inch hose in firefighting



Figure 12. Practice of using a fire extinguisher



Figure 13. Practice of extinguishing a fire on a gas cylinder



Figure 14. Practice of extinguishing a fire in the stove area

The combination of local wisdom and flexible international standards creates a unique glocal model. The jogo tonggo (neighborhood watch) system, which was originally intended for public safety, has been integrated with fire hazard monitoring protocols to aid in early detection. The main challenge is maintaining quality consistency when the program is expanded to other neighborhoods, which requires a peer review mechanism among volunteers and periodic module updates.

These findings reinforce the theory of community-based disaster risk management (CBDRM) with empirical evidence that:

1. Local cultural transformation is more effective than importing foreign models in their entirety
2. International standards must undergo a three-step localization process (technical, linguistic, and support) to be successful in densely populated settlements
3. Program sustainability depends on the extent to which interventions are integrated with existing value systems

Challenges in implementing volunteer firefighter (Redkar) formation activities include limited funding, declining volunteer retention due to decreased motivation when there is no follow-up discussion within 4-6 months regarding daily activities, social fatigue that sometimes becomes a burden on other residents, and a lack of recognition and appreciation.

However, the participation that has been carried out shows that the volunteer program has had positive results in recruitment and training. The aspects of utilization and maintenance of equipment require further intervention to ensure sustainable operational readiness so that discipline in maintaining and caring for firefighting equipment and tools is upheld.

CONCLUSION

The formation of fire volunteers in Kampung Emas Bumijo is a strategic step in reducing the risk of fire in densely populated residential areas. Through education, simulation, and the formation of volunteer groups, the community not only gains new knowledge, but also forms a community-based preparedness structure (Taridala et al., 2017).

This study provides two major theoretical contributions in the field of community-based fire management. First, the development of a modified community risk assessment framework combines NFPA 1300 standards with local parameters (house density, bamboo/wood materials, and limited access), resulting in a model that is more accurate in predicting hotspots than conventional approaches. Second, this study introduces a culture-technology integration model, where Javanese mutual aid values are combined with simple detection systems (such as kentongan and RT WhatsApp groups), proving that collaboration between local wisdom and affordable innovations can reduce fire response times. These findings enrich community-based disaster management literacy with empirical evidence from the context of dense Indonesian settlements.

In practical terms, this study produced two main recommendations. First, policy recommendations for revising Indonesia's fire safety laws, specifically the need for specific articles regulating: (1) standards for alternative fire extinguishing equipment (powder fire extinguishers, wet fire blankets, sand, pump carts, and water tanks), (2) sustainable funding mechanisms through village funds, and (3) nationally recognized certification of community volunteers. Second, a replication guide was developed for densely populated major cities worldwide, containing

five adaptation steps: (a) participatory mapping, (b) locally-based training, (c) non-material incentive systems, (d) hybrid funding schemes, and (e) community-based evaluation protocols.

This study identifies two critical areas for further research. First, a longitudinal impact study is needed to test the resilience of the Redkar model in the long term (5-10 years), particularly in the face of demographic change and urbanization. Second, the integration of simple IoT technology (such as solar-powered smoke sensors with SMS notifications) needs to be explored to improve early warning systems, with the caveat that solutions must remain affordable and easy for communities to maintain. Collaboration between universities, local governments, fire safety communities (MPK2I), and local startups is key to developing technology that is truly context-appropriate.

The Redkar model has proven effective for densely populated settlements with limited resources, but requires regulatory and funding adjustments for sustainability. The “glocal” (global-local) approach is superior to full import models or purely top-down programs. Further research should focus on scalability and the use of low-tech solutions, not just high innovation. This activity is recommended to be replicated in other villages in Yogyakarta in particular and other cities with dense populations.

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DIGITAL ARCHIVE MANAGEMENT TRAINING AS AN EFFORT TO SUPPORT DIGITAL ARCHIVAL TRANSFORMATION IN PASUNG VILLAGE

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Abstract. This community service (PkM) activity aimed to provide basic understanding and skills to Family Welfare Movement (PKK) members in Pasung Village, Wedi district, Klaten regency. The community service focused on the importance of managing digital archives in households. A series of activities focused on improving archival literacy was carried out for two days, May 29 and 30, 2025. On the first day, participants were provided with materials on the category of family documents, the importance of maintaining archives orderly, and strategies for organizing archives systematically. On the second day, participants were invited to discuss the issues of filing family documents. They were then asked to follow the direct practice of manual and digital filing using simple devices such as mobile phones. This community service activity, which focused on training and interactive discussions, was attended by 30 PKK members. The enthusiasm of the participants can be seen from the high participation during the practice session and Q&A. This activity was ended with an evaluation session that aimed to measure the level of understanding and ability of participants in managing family archives well. Based on the evaluation results, there was an increase in participants' understanding of the importance of archive management, including knowledge of document classification, digital-based storage, and the long-term benefits of neatly organized archives. This knowledge is particularly relevant for supporting digital transformation at the village level, especially in managing family documents.

INTRODUCTION

Klaten Regency, a region located in Central Java Province, is known for its socio-cultural commodities and the spirit of its people in building independent and empowered lives. In the era of increasingly rapid digital transformation, rural communities are required to utilize information technology in all aspects, including in the aspects of archive management. Despite its vital role as a foundation for various administrative, legal, educational, and social matter archive management, public awareness of managing archives well remains low (Fatmawati and Rafa, 2024). Rarely do families have good archive management since many documents are not stored properly (Nikmah et al., 2024).

An archive is information recorded in various forms of media that are created, maintained, or preserved by an institution, organization, or individual in order to carry out activities related to many aspects of life (Aditia et al., 2021). Komaruddin (1993) describes archiving as the activity of organizing and storing original documents or copies so that they can be easily found when needed. Thus, archiving refers to a series of processes that encompass the organization, management, and storage of important documents, both originals and copies. This process is carried out to ensure that these documents are stored neatly and orderly, allowing for easy and quick retrieval when needed. It is true that most families already manage their archives related to work, education, property, health, personal data, and banking, but they do not manage the documents systematically and properly (Suliyati, 2019).

A good archiving system will facilitate the retrieval and reuse of documents in the future, ensuring the information is secure and accessible when needed. Archiving documents within the family is crucial for maintaining the continuity and sustainability of information related to family life. Family documents encompass various types of records that hold significant value for administrative, legal, and personal purposes. For example, if a family member passes away, a death certificate will be required to complete various administrative matters, such as inheritance distribution or insurance claims. Without organized records, this process can be complicated

and delayed. Another example is when children continue their education at university. Documents such as graduation certificates, diplomas, and transcripts are essential for registration or scholarship applications.

The most crucial factor in managing family documents is building awareness among all family members about the importance of efficient and effective archive management. This ensures the family can easily access needed archives at the right time. With increased awareness, families will pay more attention to how they store and organize archives to prevent loss or damage. Furthermore, proper archive management will make it easier to retrieve archives when needed, enabling the families to meet various archive-related needs quickly and accurately.

Family Document Category

Family documents are all forms of archives stored and managed within a family. This family document serves as a vital asset for the survival of the family and nation (Prasetyawan, 2022). A simple understanding of the categories of family documents that develop over time can be illustrated by the following illustration. Anna and Budi got married on May 15, 2020. Before their wedding, they applied for a Marriage Certificate at the Office of Religious Affairs. This Marriage Certificate is a legal document that officially states that they are a husband and a wife under the law. After a year of marriage, on February 10, 2021, Anna gave birth to a daughter, whom they named Siti. The husband and wife automatically applied for a birth certificate for their daughter at the Civil Registration Office (Disdukcapil). The birth certificate serves as legal proof of their child's birth. After Siti's birth, they also updated their Family Card (KK), which now includes a new member, Siti. Using the example of Anna and Budi's family, it is clear that family documents may increase in terms of number and change over time, in accordance with the important events that occur in their lives. Every time a significant event occurs, documents, such as birth certificates, marriage licenses, or other administrative documents, are updated or added. This demonstrates how family documents are not just archives, but also reflect the family's life journey, constantly evolving with the dynamics of their lives. The types and timeline of documents are presented in Table 1 below.

Table 1. Types of documents and their production timeline

No.	Timeline	Document Name	Description
1	Once (Permanent)	Family card Birth certificate Death certificate Kindergarten, elementary, junior high , and high school diplomas Decree of Appointment as a Prospective Civil Servant	Population Registration Population Registration Population Registration Education related documents Civil Servant Document
2	Once (Non-permanent)	Marriage certificate (can be more than one document) Divorce certificate (can be more than one document) University diploma Vehicle/car purchase invoice Building permit Electricity installation certificate Land telephone installation certificate Land deed Work experience certificate	People commonly register for all these documents once, but some changes may occur.
2.	Once every five years	Resident ID card (before e-KTP) Passport	Immigration population registration
3.	Once every four years	Vehicle Tax (change vehicle number plate)	
4.	Once every year (annually)	Proof of payment of land and building tax Proof of payment of vehicle registration certificate	
5.	Once every six months	Proof of tuition payment Public transportation vehicle inspection certificate Student report card Student exam result certificate	Kindergarten to senior high school students
6.	Once every month (monthly)	Pay slip Proof of postpaid electricity bill Proof of postpaid telephone bill	For PLN, TELKOM, PDAM Employees Speedy/TELKOM Pendidikan

	Proof of water bill payment	
	Proof of home internet bill payment	
	Proof of tuition payment for students	

Source: Sugiyanto, S., Dorojati, R., Sulistiana, U., & Tiurmida, N. (2020)

Sri Sulasmi (2014) states that managing family documents is a small step towards achieving great things. This means that if document archiving is carried out properly by individuals as family members, the family will be protected from duplication, forgery, and fraud for unlawful purposes. Therefore, every document related to individuals and families must be clearly identified and properly protected because these documents have various powers, such as legal power that can be used for various legal purposes, economic power that affects assets and financial rights, and educational power that serves as a proof of education. In addition, these documents also contain privacy values that are very important to their owners, which must be respected and kept confidential.

The Importance of Managing Family Documents

Properly managing family documents facilitates retrieval when needed and, most importantly, ensures their integrity (Kristianingsih, Nikmah, & Suwarni, 2023). Families may need to manage their archives by destroying or by attempting to outsource or consign them to libraries, specialists, or heritage bodies (Piggott, 2023). Documents held by individuals as family members can be grouped into three main categories: active archives, dynamic archives, and vital archives. Many families manage archives for their collective self-consciousness, curating and collecting them, for example photos, objects, documents which are stored in attics, garages, and closets, and on computers. However, people commonly know relatively little about the content of these archives, their creation, or the messages they convey within the family (Woodham et al., 2017).

The aforementioned categories are based on the document function and importance in everyday life. Active archives refer to documents frequently used in routine activities and require regular management, such as letters related to family administration. Dynamic archives include documents that are temporary in nature or relevant for a certain period of time, but it still need to be kept for reference or specific needs, such as contracts or agreements that will expire. Meanwhile, vital archives include very important and crucial documents, which must be properly maintained because they can serve as legal evidence or ownership rights, such as birth certificates, marriage certificates, and other identity documents that must not be lost or damaged. According to Sugiyanto, S., Dorojati, R., Sulistiana, U., & Tiurmida, N (2020), active archives, dynamic archives, and vital archives can be categorized as follows.

Table 2. Types of documents and their categorizations

No.	Document Type	Category
1	Active Archives	Resident Identity Card (KTP), Driving License (SIM), Vehicle Registration Certificate (STNK), Automated Teller Machine (ATM) Card, Social Security Administration Body (BPJS) Card, etc.
2	Dynamic Archives	Employee card, student card, student card, proof of loss, police record certificate (SKCK), exam result certificate (SKHU), etc.
3	Vital Archives	Family card or C1, Birth certificate, Marriage certificate, Death certificate, Land certificate, Building certificate, Diploma, Purchase invoice, Taxpayer Identification Number Card (NPWP), etc.

Source: Sugiyanto, S., Dorojati, R., Sulistiana, U., & Tiurmida, N. (2020)

As mentioned in the introduction, managing family documents is crucial because it helps preserve important information about family origins and values. By managing family documents, we can connect different generations and strengthen bonds between family members. If the archives are lost, much valuable information, such as important events or personal data, may also be lost. Losing these archives can make it difficult to understand family history and complicate the search for evidence that could be useful in the future. Therefore, it is crucial for every family to understand how to properly archive family documents.

Pasung Village, which is located in Wedi District, Klaten Regency, is one of the villages that are in the process of improving the digital capacity of its residents. Based on observations and interviews conducted by the community service team with Sandyakala Group, community leaders, and village officials, it was found that the

majority of residents lack adequate awareness and skills in storing and managing family documents properly. Sandyakala Group is one of the partners of the Office Administration study program, to which the community service team belongs. Pasung Village was selected as the location because Sandyakala Group runs a CSR program there.

Based on the observations and interviews, it was found that important documents such as birth certificates, family cards, diplomas, marriage certificates, land ownership certificates, etc., are still stored improperly and unsystematically, making them vulnerable to loss, damage, or inaccessibility when needed. This problem is caused by the lack of family administration literacy and the lack of practical training that encourages citizens to understand the importance of family archives as part of social resilience and citizen legality. This situation is further complicated by advances in information technology, which require all forms of administration to be conducted digitally. Central and regional governments have gradually digitized public services, but public readiness to respond to this change is uneven. The government's promotion of the digital public service agenda is an effort to improve SDGs 9 achievement, specifically the proportion of the population served by mobile broadband. Therefore, the more prepared the public is to support digital public services, the higher the SDG 9 score in a region (Hermanto et al., 2024).

The promotion of digital archive transformation needs to be carried out among the public, with particular emphasis on the instrumental and utilitarian values that should be instilled within families. This effort is essential to support the creation of sustainable families in Indonesia, especially among lower-middle-class households whose members generally do not attain university-level education (Sugiyanto et al., 2021). Digitalization, however, is not simply about utilizing technological devices. It also concerns the community's ability to systematically understand, organize, store, and access archives. Therefore, educational and practical interventions are needed to bridge the digital literacy gap at the family level.

This community service initiative was motivated by the need to empower the Pasung Village community, particularly the members of PKK, to become agents of change in building a habit of orderly archiving within their families. This activity was designed as a structured training and mentoring program, covering conceptual material on family archiving, active-dynamic-vital archive classification, efficient manual storage practices, and an introduction to and simulation of simple digital archiving using devices and supporting software. The community service activity not only addresses technical family administration issues but also forms part of a human resource development strategy that adapts to technological advancements. Digital archiving literacy is a concrete form of community empowerment based on real needs that directly impacts daily life, such as easier access to documents for children's school needs, health services, social assistance, and legal requirements. Furthermore, proper management of digital family archives also supports orderly village administration because it can become part of more accurate and easily verified population data.

Furthermore, a community-based approach through PKK was chosen because of the strategic role of women in maintaining order and the sustainability of household management. PKK members who are all women are key actors at the families. They can transform the knowledge they acquire into their surrounding environment, creating a sustainable effect. In the long term, an orderly archiving culture will help villages build population information systems and social services based on valid data. Amidst the complex demands of modern administration and the shift towards digital service systems, this activity was aimed to presents a concrete response to the challenges of digital literacy at the grassroots level. By bringing technology closer to the community through a participatory and contextual approach, it is hoped that a generation of village families will be not only digitally literate but also disciplined in managing their personal information. Through this activity, Pasung Village is expected to serve as an example for other villages in responding to the era of digital transformation in an inclusive and transformative ways, starting with the simplest yet fundamental aspect: managing family documents.

RESEARCH METHOD

This community service activity was carried out due to the challenges of managing family archives, which have characteristics that differ from other administrative issues. Managing family archives is not only related to document storage, but also orderliness, security, accessibility, and awareness of the importance of documents as legal support in various aspects of life. The main problems faced by the community are minimal knowledge about archive classification and low skills in storing and maintaining important documents in an orderly and systematic manner. Along with advances in information technology, the need for archive digitization is becoming increasingly urgent. Digitizing family archives opens up opportunities to store and access important documents more efficiently. In this context, digital archive management is not only about transferring documents to digital format, but also about empowering the community to become technologically literate and understand the importance of documentation as part of family information management. In this community service activity, the solution begins with a deeper identification of the problems faced by the residents of Pasung Village, especially the PKK members who represent housewives. The community service team held initial discussions with village officials and community leaders to understand the social context and community habits in managing important

documents. After successfully mapping the community's needs, the team designed a form of community service that was relevant and solution-oriented.

Training and direct mentoring are the best options for delivering material and improving participants' practical skills. The activity is designed in three stages: delivering material on the importance of family archives, practicing manual classification and archiving, and training in archive digitization using simple technology devices owned by residents. This activity was held at the Pasung Village Hall and facilitated by Mitra CV. Sandyakala Group, the village officials, with participatory support from local PKK members. At the final stage, the community service activity was concluded with an evaluation to gather data both quantitatively using questionnaires and qualitatively through reflective discussions with participants. This evaluation aimed to measure participants' level of understanding, the success of knowledge transfer, and the likelihood of the program's future sustainability.



Figure 1. Stages of the community service implementation

RESULT AND DISCUSSION

The target partner of this community service program is Pasung village officials in Wedi District, Klaten Regency. Thirty representatives from the PKK members, who are also housewives with strategic roles in household management and village community empowerment participated in this program. PKK members were selected as participants because they are key actors most closely involved in family administration and have the potential to become agents of archive literacy in their respective communities.

The community service team from the Faculty of Vocational Studies, Universitas Negeri Yogyakarta, divided the tasks based on their respective expertise and roles. The team leader served as the primary coordinator, ensuring the entire series of activities ran according to plan. She was responsible for communication with partners, internal team coordination, scheduling activities, and ensuring logistics and facilities were available on the day of implementation. Member 1 served as field coordinator and technical organizer. He was responsible for managing activity logistics, preparing training rooms and equipment (such as scanners and laptops), and ensuring the needs of participants and resource persons were met. During the session, member 1 assisted participants in technical activities such as filling out forms, preparing physical archives, and digitizing documents using available tools. He also served as a communication liaison between participants and presenters to ensure the training was interactive and conducive. Member 2 served as the documenter and note-taker. He systematically recorded the entire series of activities, including attendance lists, discussion summaries, and recorded important moments through photos and videos as official documentation. In addition, member 2 archived the results of the participants' pre- and post-tests and assisted in preparing publication materials for the activity in the form of reports and scientific articles.

Students were actively involved in the implementation of the activity, acting as mentors, activity documenters, technical organizers, and facilitators in the digitalization practice sessions. Student involvement also served as part of a collaborative educational effort between lecturers, partners, and students in the community-based service activity. This activity was conducted synchronously (offline) at the Pasung Village Hall. The training took place over two consecutive days, May 29 and 30, 2025. On the first day, the activity began with a

presentation on the importance of family document management and how to manage the documents manually. Participants then engaged in small group discussions, discussing their individual experiences in storing family documents and the challenges they faced. To assess initial understanding, the community service team distributed a pre-test questionnaire before the presentation. This instrument was designed to measure participants' knowledge of the types of family documents, the functions of archives, and their document storage habits. The questionnaire results indicated that most participants did not understand archive classification (active, dynamic, vital) because they generally stored important documents in disorganized containers, such as plastic bags or mixed drawers.

On the second day, participants were provided with materials on digitizing family archives, including an introduction to document scanning applications, managing digital folders, and how to store files in simple cloud storage (Google Drive or local storage on the device). The practical sessions were conducted directly with guidance from the community service team. Participants were trained to scan birth certificates, Family Cards, and diplomas. Those documents are considered vital archives that must be digitally stored. After the practical sessions, a post-test evaluation was conducted to measure the participants' understanding and skills. Initial results showed a significant increase in participants' knowledge of the importance of archive management and their skills in using simple applications for document digitization. Furthermore, the activities included an open discussion session, where participants shared experiences, discussed challenges in storing archives, and tried to solve problems related to archiving. Many participants expressed their motivation to begin organizing family documents systematically and to involve their children so that the culture of family document management can continue across generations.

The community service activity ran smoothly thanks to intensive coordination between the community service team, village officials, and the Pasung Village PKK members. The positive response from participants also indicated the success of the participatory approach used in this training. The community service team is now planning to develop a simple module on digital family archiving as a follow-up and ongoing educational material that PKK members can use in their respective communities.

The table below shows the results of the pre- and post-tests comparing participants' understanding of five key aspects related to family document management. This evaluation was conducted to determine the extent to which the training activities improved participants' knowledge and skills in managing household archives, both manually and digitally. This graph is based on data obtained from a pre-test questionnaire distributed to participants before the training began and a post-test administered after all materials and practical sessions were completed. The purpose of this evaluation was to measure changes in participants' understanding quantitatively and objectively, thus serving as an indicator of the success of the community service program.

Table 3. Comparison of Pre-Test and Post-Test results

Aspect	Pre - Test			Post - Test		
	High Understanding (%)	Moderate Understanding (%)	No Understanding (%)	High Understanding (%)	Moderate Understanding (%)	No Understanding (%)
Family Documents	10.00	80.00	10.00	6.67	93.33	0.00
The Importance of Archives Management	10.00	63.33	26.67	6.67	93.33	0.00
Digital Archiving	6.67	70.00	23.33	6.67	63.33	30.00
Archiving Planning	3.33	76.67	20.00	6.67	93.33	0.00
Managing Family Archive	3.33	73.34	23.33	6.67	80.00	13.33

The table above presents comparative data between the pre-test and post-test. The test was to measure participants' understanding of the five key aspects of the family archives training material, namely:

1. Family Document
Before the training, only 10% of participants stated they understood the basic concepts of family archives. Then, after the training, the percentage increased dramatically to 93.33%. It indicates a significant increase in mastery of the basic material on family archives and their function in family life.
2. The Importance of Archives Management
In the pre-test, 10% of participants understood the importance of archives management, while 63.33% had a moderate understanding, and 26.67% had no understanding at all. After the training, there was a significant increase, with 93.33% of participants stating that they understood, and 6.67% even felt they

fully understood. This indicates that the training successfully raised awareness of the strategic value of archives for families.

3. Digital Archiving

This aspect was new material for most participants. In the pre-test, only 6.67% of participants understood this aspect, while 70% had moderate understanding, and 23.33% did not understand at all. After training and hands-on practice, the level of understanding increased to 63.33% of moderate understanding, 6.67% fully understanding, and 30% of participants still had some understanding. This indicates that despite progress, further training is needed to improve participants' technical skills in document digitization.

4. Family Archiving Planning

Before the training, only 3.33% of participants understood how to create a systematic archiving plan, with the majority falling into the categories of having moderate understanding (76.67%) and no understanding (20%). However, after the training, 93.33% of participants stated they had a moderate understanding, and 6.67% said they fully understood, indicating that the training successfully addressed participants' needs for planning and organizing household archives in a more structured manner.

5. Managing Family Archive

In the pre-test, the level of understanding was low because only 3.33% of participants understood the aspect. After the training, 80% of participants stated they moderately understood, and 6.67% fully understood. This demonstrates the effectiveness of the archiving practices during the training, which directly taught participants how to group and document family documents using practical and efficient methods.

Based on the comparison between the pre-test and post-test data, it is shown that there is a significant increase in understanding across all aspects of the training, particularly in the introduction to family archives and the importance of records management in household life. This training activity has proven to have a positive impact on participants' knowledge and skills, particularly in:

1. Improving basic family administration literacy
2. Instilling awareness of the importance of orderly archives
3. Equipping participants with initial skills in archive digitization

However, in the aspect of digital archiving, despite the improvement, 30% of participants still fell into the category of having little understanding. This indicates the need for follow-up in the form of more technical training focused on the use of digital tools, especially for participants who are not yet accustomed to using technological devices in their daily lives.

CONCLUSION AND SUGGESTION

The community service activity held in Pasung Village, Wedi District, Klaten Regency, successfully provided PKK members with basic knowledge and skills regarding the importance of managing family documents, both manually and digitally. Through this training, participants gained an understanding of basic archiving concepts, types of important family documents, and techniques for storing documents safely, neatly, and easily. This training not only raised participants' awareness of the importance of orderly family document management but also introduced simple archive digitization methods that can be directly implemented in their respective homes. Using available devices, participants were trained to scan, categorize, and store family archives digitally to minimize the risk of document loss or damage. Furthermore, this activity encouraged collaboration among participants through group discussions and practice. The activity can then be developed into small learning communities that share experiences and solutions in managing household archives. It is hoped that the knowledge gained will not stop at those joining the training, but it can be disseminated to other residents in the surrounding community. Strengthening the capacity of PKK members in family archiving is a strategic first step toward realizing a culture of document management at the village level. As a follow-up, subsequent community service activities are planned to focus on advanced training, such as the use of archiving applications, digital security for family documents, the development of a community-based household archives database, and the development of an integrated family documentation system. This is expected to strengthen the use of information technology at the household level as part of an inclusive and sustainable village digital transformation.

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TRAINING ON THE CREATION OF BATIK STAMPS FROM PAPER WASTE AND THEIR INNOVATIVE APPLICATION ON SHIBORI FABRICS FOR HIGH SCHOOL AND ISLAMIC SENIOR HIGH SCHOOL TEACHERS AND STUDENTS

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Abstract. This community service program aimed to enhance the competence and creativity of art and craft education teachers in utilizing paper waste as a medium for making batik stamps and applying shibori dyeing techniques as an innovative learning approach. The training combined lectures, demonstrations, and hands-on practice, emphasizing sustainability, creative exploration, and pedagogical application. Conducted at SMA Negeri 1 Pleret, Bantul, Yogyakarta, the activity involved art and culture teachers from the MGMP SMA Kabupaten Bantul and students from SMA 1 Pleret. The results showed that participants developed new skills in transforming paper waste into reusable batik stamping tools and producing patterned textiles using shibori techniques. The training successfully integrated environmental awareness, artistic innovation, and contextual learning. The outcomes demonstrated that the program effectively encouraged eco-creative practices in art and craft education.

Keywords: paper waste, batik stamp, shibori dyeing, craft education, creative pedagogy

INTRODUCTION

Environmental sustainability and creative learning are crucial themes in 21st-century education. Schools, as centers of learning, also generate substantial amounts of paper waste that often remain underutilized. When reprocessed, this material can become an innovative resource for artistic exploration.

In the context of craft and cultural education (*seni budaya dan prakarya*), learning activities involving sustainable materials not only stimulate creativity but also cultivate environmental awareness and problem-solving skills. However, many teachers have limited exposure to eco-based creative practices, particularly those integrating traditional art forms such as batik with recycled materials.

This program was designed to address these challenges through training on the utilization of paper waste as material for making batik stamps and shibori-patterned fabrics. The collaboration between Universitas Negeri Yogyakarta and the MGMP SMA Seni Budaya Kabupaten Bantul aimed to strengthen teacher capacity in developing environmentally responsible, innovative classroom projects.

LITERATURE REVIEW

Paper Waste as Creative Material in Art Education

Paper waste represents one of the most accessible materials for educational innovation. Previous research indicates that its reuse can foster environmental responsibility and material experimentation in schools (Rahmawati, 2023). In craft learning, paper waste can be processed through layering, molding, or compression techniques to form new textures and surfaces suitable for creative applications such as stamping tools.

Batik and Shibori as Cultural and Educational Media

Batik, as Indonesia's intangible cultural heritage, provides a rich learning context for aesthetic appreciation and cultural identity. Shibori, a Japanese resist-dyeing technique, similarly offers expressive opportunities through color gradation and pattern formation (Ambarwati, 2022). The integration of batik and shibori in classroom projects allows students to explore both local and global textile traditions while fostering intercultural understanding.

Teacher Training through Practice-Based Learning

The effectiveness of training in art and craft education relies on experiential approaches. As Sanjaya (2019) notes, combining lectures, demonstrations, and hands-on practice encourages active participation and deeper learning. This model aligns with constructivist principles (Suparno, 2021), emphasizing direct engagement and reflection as key to professional competence development.

RESEARCH METHOD

This community service applied a practice-based training model with three main methods: lectures, demonstrations, and hands-on practice.

Location and Participants

The training took place at SMA Negeri 1 Pleret, Bantul, Yogyakarta. Participants included art and culture teachers who are members of the MGMP SMA Kabupaten Bantul and students of SMA 1 Pleret. The inclusion of both teachers and students encouraged collaborative learning and cross-generational knowledge exchange.

Training Stages

- **Lectures:** Introduced concepts of environmental art education, sustainable material use, and integration of cultural heritage into creative pedagogy.
- **Demonstration:** Trainers demonstrated how to process paper waste into batik stamping tools (cap batik) by compressing and forming layered waste paper into solid textured molds, and how to apply shibori dyeing on fabric as a creative finishing technique.
- **Hands-on Practice:** Participants created their own paper-based batik stamps and used them to print on cloth surfaces. They then applied shibori dyeing techniques to enrich the color and texture of the fabric.

Evaluation

The evaluation instruments consisted of observation, participant feedback, and pre- and post-training questionnaires. Data were analyzed descriptively to assess improvements in creativity, technical mastery, and pedagogical understanding of sustainable art practices.

RESULTS AND DISCUSSION

Training Implementation

The workshop was conducted interactively, emphasizing collaborative learning. Participants showed strong enthusiasm, especially during the practice sessions. Teachers and students explored various ways to compress, glue, and shape waste paper into functional batik stamps. The stamps produced diverse patterns, ranging from geometric motifs to organic forms inspired by nature.



Figure 1. The training took place at SMA Negeri 1 Pleret, Bantul, Yogyakarta

During the shibori session, participants experimented with different folding, binding, and dipping techniques using natural and synthetic dyes. This combination of batik stamping and shibori created unique hybrid works that reflected both Indonesian and Japanese textile traditions.



Figure 2. Hands-on Practice

Creative Outcomes

By the end of the program, participants successfully produced:

- paper-based batik stamps with durable surfaces for textile printing,
- fabric artworks showcasing shibori patterns combined with stamped motifs, and
- prototype learning media for classroom adaptation.

These outcomes demonstrated increased technical skill and creative confidence among participants. Teachers recognized the potential of these techniques for classroom projects that integrate art, culture, and environmental education.



Figure 3. The participants' creative works or training outcomes

Pedagogical and Environmental Impact

The activity also strengthened the participants' awareness of sustainability in education. Teachers reported that the training inspired them to include eco-creative approaches in lesson plans, emphasizing the transformation of waste materials into artistic media.

The collaboration between teachers and students fostered an inclusive and reflective learning atmosphere. Moreover, participants understood that cultural art practices like batik and shibori can be continuously renewed through material innovation, keeping traditions relevant in modern education

CONCLUSION

The training on the utilization of paper waste for making batik stamps and applying shibori dyeing techniques, conducted at SMA Negeri 1 Pleret, Bantul, successfully improved the creative, technical, and pedagogical capacities of teachers and students. The combination of lectures, demonstrations, and direct practice effectively enhanced participants' understanding of sustainable art-making and its relevance in educational contexts. This activity not only promoted eco-friendly practices but also integrated traditional and contemporary textile art in a pedagogical framework. The results indicate that such training can serve as a replicable model for art education programs aiming to develop sustainability-oriented creativity and cultural appreciation.

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Jumputan Batik Training with Shibori Technique for Teachers at Bakti Siwi Special School in Sleman, Yogyakarta

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Abstract. The training in jumputan batik crafting using the shibori technique for teachers at SLB Bakti Siwi Sleman, Yogyakarta aims to provide an understanding of jumputan batik using the shibori technique; 2) provide knowledge and training on the tools and materials used in making jumputan batik using the shibori technique; 3) provide training on the process of making jumputan batik using the shibori technique. The target outcome of this training is for all teachers to be able to describe: 1) what jumputan batik with the shibori technique is; 2) the tools and materials used in making jumputan batik with the shibori technique; and 3) the process of making jumputan batik with the shibori technique. The activity takes the form of batik-making training for teachers at SLB Bakti Siwi Sleman, Yogyakarta. The methods used are: lectures, demonstrations, discussions, practical work, and mentoring.

INTRODUCTION

Every Indonesian is familiar with batik, whether in the form of fabric, clothing, trousers, or accessories. The popularity of batik in Indonesia has led to it often being regarded as an example of national culture. In Indonesia, not only has the production of batik increased, but so too have the techniques used to make it. Initially, the process involved only the canting tulis technique, which developed into the canting cap technique, and now the jumputan and shibori techniques. These techniques replace the use of wax to cover the fabric during dyeing, whereby the fabric is covered with a specific technique so that it is not affected by the dye, thus creating a motif. Isn't batik a piece of fabric with beautiful motifs, where the motifs are created through a process of covering and dipping? According to Santosa Doellah,¹ batik is defined as a piece of fabric made using traditional methods and mainly used in traditional contexts, featuring various specific patterns and decorative motifs created using the resist dyeing technique with batik wax as a colour resist. Therefore, a piece of fabric can be considered batik if it contains two main points, namely the resist dyeing technique and the diverse decorative patterns characteristic of batik. Batik is a cultural heritage in Indonesia in the form of a very distinctive fabric pattern. It is distinctive in terms of the variety of patterns in each region, as well as the rich values inherent in its production. Batik is made by applying hot wax with a canting tool according to a pattern, then dyeing it, until it is finished. As the next generation, we are obligated to preserve batik by wearing it and understanding how it is made. Efforts to preserve batik are also supported through schools, where many extracurricular activities or batik-making lessons are offered, including at special schools (SLB).

Various techniques in batik making are increasing every year. Jumputan batik with the shibori technique is a type of batik that is made by folding and does not use any tools. The folds produce unique and attractive patterns. The geometric patterns are processed to match the folds. The fabric must be made from natural fibres so that the colours produced from the cotton weave can be absorbed properly and completely. The advantage of synthetic colours is that they are even and solid, as well as durable.

Shibori batik is a new development in batik, using the shibori technique instead of the traditional wax-resist method with a canting tool. The wax-resist technique is replaced with a folding technique, or shibori, to achieve unique line patterns. Although Japan may have influenced this technique, the creativity and persistence of the Indonesian people have resulted in patterns that are different from the original. In Indonesia, the motifs have developed to be more unique and varied, with brighter colours than the original. This technique has been known in Indonesia for quite some time, and the community is familiar with it. It has become one of Indonesia's distinctive features, especially in West Java, where it is called sasirangan.² Sasirangan fabric is not far from batik in Yogyakarta. The various products with the unique batik motifs from the shibori technique add to the richness of the archipelago while introducing the diversity of Indonesia.³ The preservation of jumputan batik using the shibori technique is our shared responsibility.⁴ In line with this responsibility, the Kriya Education Study

Programme, one of the study programmes at Universitas Negeri Yogyakarta that focuses on this field, should also contribute to the preservation of jumputan batik using the shibori technique.

Based on one of the three pillars of higher education, namely community service, Universitas Negeri Yogyakarta, as a higher education institution, has a responsibility to preserve batik jumputan through training in the shibori technique for the community. The training provided covers the techniques and processes of batik jumputan using the shibori technique. The target audience is the teachers of SLB Bakti Siwi Sleman Yogyakarta. The selection of this target audience is considered appropriate in view of the situation and conditions in the field, namely that the teachers of SLB Bakti Siwi Sleman Yogyakarta have not yet mastered the technique of jumputan batik using the shibori technique properly and correctly. Therefore, the teachers at SLB Bakti Siwi Sleman Yogyakarta really hope that there will be training on the process of jumputan batik using the shibori technique to improve the competence of the teachers at SLB Bakti Siwi Sleman Yogyakarta, which will later be passed on to their students as heirs to the nation's culture.

LITERATURE REVIEW

ABK in Indonesian Wikipedia, Encyclopedia explains that children with special needs (Heward/disabilities) are children with special characteristics that differ from those of typical children, without necessarily exhibiting mental, emotional or physical disabilities. Those included in the ABK category include: the blind, the deaf, the mentally disabled, the physically disabled, the emotionally disabled, those with learning difficulties, behavioural disorders, gifted children, children with health disorders, and those with socialisation difficulties. Other terms for children with special needs are exceptional children and disabled children. Due to their characteristics and limitations, children with special needs require special educational services tailored to their abilities and potential. For example, blind children need reading texts to be modified into Braille, and deaf children communicate using sign language (body language).

To see disabilities in children is based on four things, namely 1) disabilities appear or occur only in individuals who experience developmental disabilities, 2) developmental disabilities must be seen in relation to normal development, 3) early signs of disability behaviour must be studied seriously, and 4) pay attention to various benchmarks or characteristics of both normal and abnormal development.

According to Article 15 of Law No. 20 of 2003 concerning National Education, the type of education for Children with Special Needs is Special Education. Article 32 (1) of Law No. 20 of 2003 stipulates that Special Education is education for students who have difficulty participating in the learning process due to physical, emotional, mental, and/or social disorders, and/or who have exceptional intelligence and talent. The technical delivery of Special Education services for students with disabilities or students with exceptional intelligence can be provided inclusively or through special education units at the primary and secondary education levels. Therefore, Special Education is only available at the primary and secondary education levels. It is not yet available at the tertiary education level.

Stated in Law of the Republic of Indonesia Number 23 of 2002, Article 51, "children with physical and/or mental disabilities shall be given equal opportunities and accessibility to obtain regular/special education." Therefore, children with special needs have the same opportunities as able-bodied children. Their potential is achieved in line with that of children in general.

Teachers who assist students with disabilities certainly need the skills to modify media as a means of providing services to students, especially in practices aimed at preventing undesirable outcomes. Based on previous research, it has been suggested that practical media and other media are tools that can bridge the limitations of people with disabilities in acquiring knowledge.⁵ Dwijosumarto⁶ explains that deafness is a condition in which a person experiences partial or total hearing loss due to the malfunction of part or all of the hearing apparatus, so that they cannot use their hearing in daily life, which has a complex impact on their lives. Gurubagi.com⁷ explains that children with special needs who are mentally disabled are not children who have a disease, but rather they have abnormalities due to deviations or obstacles in intellectual function and behavioural adaptation. Mental disability is a condition in which a child's intellectual development is hindered, preventing them from reaching their optimal stage of development. Children with intellectual disabilities have below-normal intellectual abilities. This occurs because their brain development does not proceed as it should. These children have physical, psychological or academic impairments or limitations compared to their peers, depending on the severity of their intellectual disability.

Children with special needs require special education, support, and care. When these children are at school, it is our role to provide them with this special attention. On the other hand, as unique individuals, the needs of students with special needs vary. Educating students with limitations requires acceptance, empathy, patience, and precision. To be understood together, students with special needs are also children with additional or different educational needs compared to students in general. In addition to the physical disabilities and learning disorders mentioned above, students with special needs also include children with sensory, mental or emotional disorders, special talents, and special medical needs. The attitude of teachers towards students with special needs at school

greatly determines the learning experience and development of students. As a substitute for parents at school, we are expected to be able to show a positive attitude towards students with special needs. The role of teachers in dealing with children with special needs is not limited to the academic field, but also includes the individual sphere so that these students can grow with confidence and independence. A teacher who teaches children with special needs (ABK), Ni Gusti Putu Parmiti (44), truly feels that this is the essence of education that must be achieved. Empowering oneself is the capital for a child to grow into an independent person. Because it is useless to be smart if you are not able to do everything independently. Being an ABK teacher has its own challenges. Parmiti did not come from an educational background. However, her conscience told her otherwise. She was only an economics graduate who had worked as a migrant worker abroad. But eventually, she changed course to establish the Yayasan Anak Unik (Unique Children Foundation).⁸ Children with mental retardation have short memories. Therefore, we must simplify the lessons and make them fun. In the past, their parents were too ashamed to take their children out in public. Don't be mistaken—children with intellectual disabilities aren't always ugly. Children with disabilities don't always come from poor families. Many are the children of architects, doctors, or wealthy people. The point is, whether rich or poor, they must still receive education and personal development.

To that end, teachers of children with special needs must increase their knowledge to achieve this goal. Not only must they increase their knowledge, but they must also improve their skills and abilities for students with these deficiencies. One of the skills teachers must improve is batik making, so that they can pass this skill on to their students, enabling them to live independently in the future.

RESEARCH METHOD

This community service activity was carried out on Friday, July 11, Wednesday, July 16, Tuesday, July 22, Wednesday, July 23, Friday, August 8, Friday, August 22, and Friday, August 22, 2025, at the Bakti Siwi Special School. The training method was chosen because the training concept aimed to improve one's knowledge and skills.⁹ The goal was to improve teachers' skills in making jumputan batik using the shibori technique. The community service activity was carried out using a combination of theory and practice or training methods. The theory method was carried out in conjunction with practice or training, which was conducted through mentoring for participants. It began with an explanation of fabrics that can absorb color, followed by the distribution of materials (fabric the size of the participants' clothes). The next day, the instructor showed examples of batik fabrics and explained the techniques used to achieve the colors. Next, the instructor explained the shibori technique (folding fabric), followed by tying the folds and explaining the coloring technique. The next day, the folds were opened, and there was a discussion about the participants' work in relation to the uniqueness that emerged, the factors that influenced it, and the effects of the number of colors, and so on. The fabric was washed with clean water and was ready to be sewn. Finally, there was a discussion about the characteristics of the shibori batik clothing of the SLB Bakti Siwi Sleman Yogyakarta extended family.

RESULTS AND DISCUSSION

This community service was carried out at SLB Bakti Siwi, located on Jalan Dr. Radjiman, Pangukan, Tridadi, Sleman, Yogyakarta. SLB Bakti Siwi was established on October 13, 1986, and received its operational permit from the Education Office on November 29, 1990. SLB Bakti Siwi is led by Mr. Prasetyo, S.Pd. with ten classrooms divided into elementary, junior high, and high school levels with a total of 75 students. Of the total, 32 children are mentally disabled, 40 children are trainable, and 3 children have autism. The school does not require students to pay tuition fees; instead, the school will seek funding for tuition from outside sources.

SLB Bakti Siwi is equipped with an art room facility that is used by students who enjoy playing music, singing, and dancing. Activities that are often carried out at the school include exploring the surrounding environment through healthy walks, so that children with intellectual disabilities and autism can recognize various objects in their surroundings in a concrete way. In addition, the school also conducts monthly health checks carried out by health center staff.

Opening



Figure 1. Opening of the training by the Principal of SLB Bakti Siwi Sleman Yogyakarta, Mr. Prasetyo, S.Pd.



Figure 2. The instructor explains jumputan batik using the shibori technique.

Practice Making Jumputan Batik with Shibori Technique



Figure 3. Distribution of fabric to teachers



Figure 4. Teachers are washing the cloth with TRO to remove the starch and dirt on the cloth.



Figure 5. The instructor is explaining how to fold using the shibori technique.



Figure 6. Teachers practising folding cloth



Figure 7. The instructor is explaining how to fold an equilateral triangle.



Figure 8. Teachers tied the fabric with rubber bands to create the desired pattern.

Dyeing Process



Figure 9. The instructor explains about dyeing and the teachers listen attentively.



Figure 10. Teachers, assisted by lecturers and students, mixed colour recipes.



Figure 11. The teachers mixed the colours and began dipping the fabric.

The Process of Opening Rubber Bands



Figure 12. Teachers and lecturers unravelled the fabric ties.



Figure 13. The teachers untied the cloth and hung it out to dry.

Batik Fabric is Ready



Figure 14. The teachers spread out the finished batik cloth.



Figure 15. The SLB teacher shows his finished work.

The Fabric Has Been Sewn into School Uniforms for Teacher



Figure 16. The Principal of SLB Bakti Siwi, Mr Presetya, S.Pd., accompanied by the Head of PkM, closed the 2025 PkM activities.



Figure 17. Teachers and supervising lecturers took a photo in front of the school.

CONCLUSION

The result of the series of jumputan batik training sessions using the shibori technique was an increase in the knowledge and skills of the teachers at SLB Bakti Siwi Sleman Yogyakarta, who previously did not really understand the technique of making jumputan batik using the shibori technique. Now they know and understand it well enough to create their own works in the form of jumputan batik uniforms using the shibori technique. The participants were very enthusiastic about attending this training activity, as evidenced by the diligent attendance of the teachers and children at each training session and their enthusiasm in following each stage of the jumputan batik creation process using the shibori technique.

In every meeting, they appeared enthusiastic about participating in the training. Joy radiated from almost all participants after they were able to create a jumputan batik using the shibori technique. They sincerely hoped for continuous guidance and coaching from the Kriya Education Study Programme, Department of Fine Arts Education, FBSB, UNY, so that they could pass on their knowledge to their students.

At the end of this activity, the Community Service Team evaluated the training implementation as follows: 1. The enthusiasm in participating in the training was excellent. 2. The teachers' desire to learn and be able to do it themselves was very high, and 3. The cooperation in practice was very good, as they helped each other in completing their tasks.

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THE COMMUNITY EMPOWERMENT IN PROCESSING JATROPHA CURCAS L. SEEDS INTO A RENEWABLE FUEL SOURCE

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Abstract. *Jatropha curcas* L. is a plantation commodity crop, often growing wild and not widely utilized, although it has long been known as a hedgerow, medicinal plant, and lamp oil producer. During the Japanese occupation, castor oil was processed into aircraft fuel. Empowering communities to process the *Jatropha curcas* seeds into a renewable energy source seems necessary to further introduce the benefits of it to the public and enable them to independently process it into an energy source. Mentoring is conducted both online and offline. Online activities are primarily for delivering materials and discussing any challenges encountered in the field. Offline activities primarily involve practical processing of *Jatropha curcas* seeds into castor oil products, which uses a relatively simple pressing method, allowing the target community to perform independently. A pre-test is administered at the beginning of the activity, and a post-test and an evaluation questionnaire are given at the end to better understand the extent to which the mentoring program has been accepted by the participants or target community. The mentoring results showed that participants generally enjoyed the session and actively asked questions. Pre-test and post-test results indicated an increase in participants' understanding of the *jatropha* plant, its benefits, and how to process the seeds into castor oil. The results of the activity evaluation questionnaire showed that participants generally found the activity very beneficial, with excellent delivery of the mentoring materials, and appropriate methods. Overall, participants found the activity very helpful in broadening their horizons, particularly regarding the plant, its benefits, and how to process its seeds into castor oil and biodiesel.

Keywords: empowerment, mentoring, *Jatropha curcas* L., castor oil products

INTRODUCTION

Jatropha curcas L. is a plantation commodity plant that often grows wild and has not been widely utilized.

Its systematics are as follows:

Division: Spermatophyta

Subdivision: Magnoliophyta

Class: Magnoliopsida

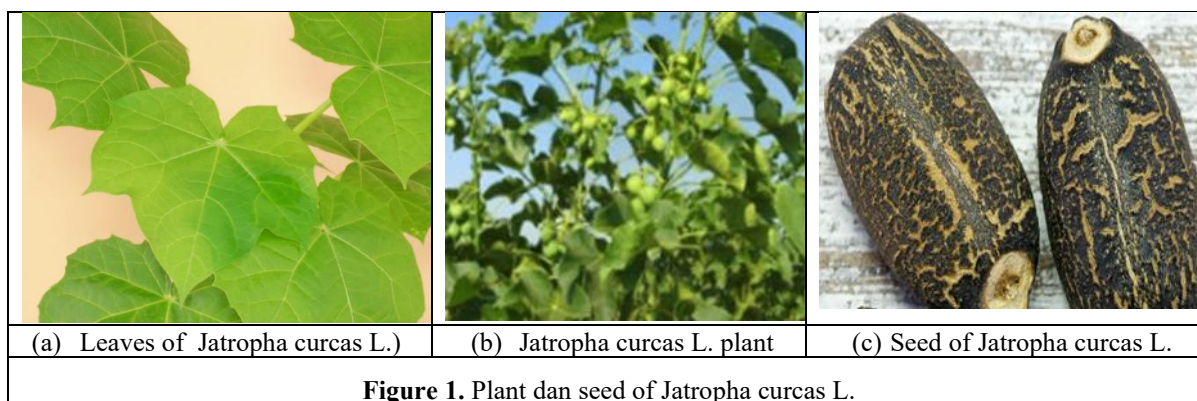
Order: Euphorbiales

Family: Euphorbiaceae

Genus: *Jatropha*

Species: *Jatropha curcas* L.

It has long been known as a hedge plant, medicinal plant, and lamp oil producer. During the Japanese occupation, *jatropha* oil was processed into aircraft fuel (Mahmud, Allorerung, Rivaie, 2008). The plants and fruits are shown in Fig. 1.



It is a versatile, drought-resistant, and fast-growing plant, can be used for firewood, reclamation of eroded land or as a living fence (Mahmud, Allorerung, Rivaie, 2008), can be used as a soap and cosmetic ingredient, is very potential as a producer of vegetable oil which can then be processed into fuel oil (biodiesel) (Akpan, Jimoh, Mohammed, 2006), as a substitute for petroleum (diesel and kerosene). In addition, *Jatropha curcas* also has health benefits, for example to treat infections and skin diseases, such as ringworm, scabies, fungus, tinea versicolor, itching. Mild skin diseases can be treated by utilizing the sap of the *Jatropha* plant, namely by breaking the leaves or stems of the *Jatropha* plant, taking the sap that comes out and applying it slowly to the affected skin area.

Community empowerment in processing *Jatropha curcas* L. seeds into a renewable energy source (Mohamed and Mursy. 2015) seems necessary to further introduce the benefits of it to the community and enable them to independently process it into an energy source. Community empowerment is carried out by providing assistance to the community online and offline. Assistance is carried out by introducing the plant and how to process it into a renewable fuel. In addition to understanding the material about it and how to process it into a renewable fuel source, the target community will also be invited to practice directly processing the seeds into a renewable fuel source, from peeling the fruit to testing product quality, storage and marketing methods. If the knowledge and skills related to processing the seeds into the oil as a renewable energy source have been understood, as well as the problem of product quality testing (Al-Alawi et al., 2006; Akpan, Jimoh, and Mohammed, 2006), storage and marketing methods have been mastered by the target community, then both independently and in groups it is hoped that the community will be able to produce the oil which can be used as one of the superior products or regional icons. The oil products can then be processed into biodiesel which is an environmentally friendly fuel oil, which is renewable in nature so it is known as a renewable fuel. Further mentoring can also introduce entrepreneurial networks and attempt to establish networks between farmers, industry, and markets to foster synergistic collaboration that enables sound and sustainable transactions of agricultural products, particularly *jatropha curcas* and its processed products. This is necessary to foster the entrepreneurial spirit of rural communities, particularly the target community, in developing a business. Successful entrepreneurial strategies, both individually and in groups, should be instilled to further improve the economic well-being of rural communities, enabling them to become self-sufficient and self-sufficient.

MATERIAL AND METHODS

This activity is expected to help alleviate poverty in low-income communities and empower them to look forward to a better and more stable future with their families and surrounding communities, particularly by helping improve the economic well-being of families and rural communities.

The community assistance steps within the proposed community service activities are expected to address the problems within the target community, particularly within the target community itself, including:

The delivery of material about the *Jatropha curcas* L. plant and its processed products, namely castor oil which is a renewable energy source, is carried out in an interesting and informal manner, adjusted to the situation and condition of the target community so that they can receive and understand the material comfortably, without burden or pressure, the atmosphere is created in such a way that the target community becomes happy and excited to participate in the activity. Castor oil is a raw material for making biodiesel, while the skin of the castor fruit can be further processed into briquettes which are solid fuel (Devi and Tanggasari, 2024).

The provision of skills and mentoring is carried out continuously, using a problem solving method to solve all problems that occur during mentoring and carrying out direct practice in processing *Jatropha curcas* L. seeds into castor oil products (Fuelleman. dan Burlison, 1943; Janmohammadi, Abbasi dan Sabaghnia. 2012).

Understanding of product quality testing, packaging and storage methods, and marketing methods for castor oil products also needs to be introduced to the target community.

Furthermore, the target community also needs to be introduced to networks, and efforts should be made to form networks to help resolve problems that arise both during the processing of *Jatropha curcas* L. seeds into castor oil and during its marketing. Networking can be done with farmers, industry partners, banks, and other community components.

Mentoring is carried out primarily to help resolve problems in the areas of production, management and product marketing so that independence is created for rural communities, especially target communities.

This activity requires expertise in the field of agricultural products, especially the *Jatropha curcas* L. plant, its processing, packaging and marketing, therefore it is also necessary for direct practitioners who are able to accompany, provide direction, and help solve any existing problems. The Community Service Team consists of two Chemistry lecturers, one Biology lecturer, two assistant implementers and involves four Chemistry students. The Community Service Team will provide assistance to the target community regarding the processing of *Jatropha curcas* L. seeds into castor oil products, both in terms of knowledge about the *Jatropha curcas* L. plant and castor oil as well as how to process *Jatropha curcas* L. seeds into castor oil products, packaging methods, product quality testing, storage methods, marketing methods and creating networks to establish themselves in the business world. Thus, village communities, especially the target community, become more independent and able to create jobs for local residents, which ultimately can improve the family economy.

The activity method includes lectures, discussions and questions and answers to broaden the village community's insight into the *Jatropha curcas* L. plant and castor oil, processing of *Jatropha curcas* L. seeds into castor oil products, packaging methods, product quality testing, product storage methods, marketing methods and creating a network, as well as conducting direct practice of processing castor seeds into castor oil products. The mentoring is also aimed at broadening the community's insight, especially the target community about "entrepreneurship", especially related to the processing of castor seeds into castor oil products and the marketing of castor oil products.

The success of this community service activity is demonstrated by the enthusiasm of the participants during the training, the increasing insight and skills of the target community, especially related to the *Jatropha curcas* L. plant and castor oil products, the realization of castor oil products as a renewable energy source and the increasing ability of the target community to network and the growing entrepreneurial spirit of the target community.

RESULTS AND DISCUSSION

The “Community Empowerment in Processing *Jatropha Curcas* L. Seeds into a Renewable Fuel Source” activity was carried out in Wirokerten Village, Banguntapan, Bantul, which is approximately 12 km from UNY, the location map of the target partners can be seen in Figure 2. Mentoring was carried out online and offline. Online activities were mainly for delivering materials and discussions if there were obstacles in the field. Offline activities were carried out mainly in practicing processing *Jatropha curcas* seeds into castor oil products using the pressing method. This activity was attended by 21 people. The mentoring participants felt happy and were always active in asking questions both online and offline. At the beginning of the activity, a pre-test was conducted to determine the extent of participants' understanding of the *Jatropha curcas* plant, its benefits and how to process it, likewise at the end of the activity, a post-test was also conducted and an evaluation questionnaire was distributed for the implementation of the activity.

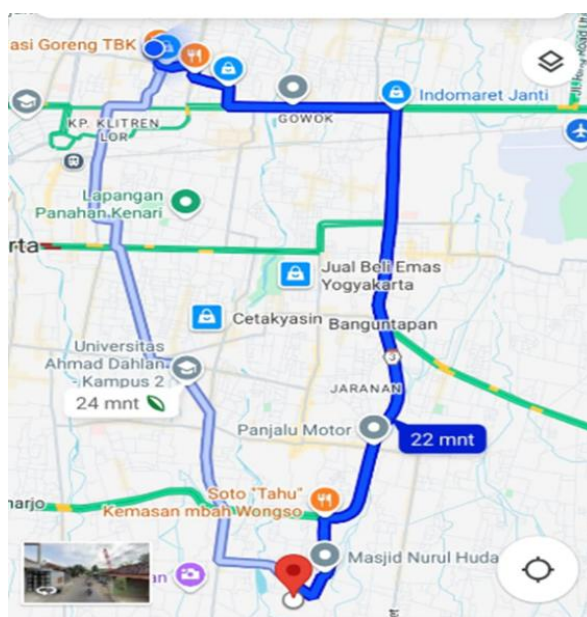


Figure 2. Target partner location map

The pretest and posttest results showed an increase in participants' understanding of the *Jatropha curcas* plant, its benefits, and how to process *Jatropha curcas* seeds into castor oil products. In the pretest, only a few participants were willing to complete the questionnaire, and many did not answer the questionnaire, with only a few numbers being answered and not being satisfactory (not perfect). Meanwhile, at the end of the activity, 13 participants completed the posttest with relatively satisfactory results, and all questions were answered with lengthy explanations. For pretest and posttest questions, please see the Appendix.

The results of the activity implementation evaluation questionnaire showed that in general, participants considered this type of activity to be very useful (53.85%) and useful (46.15%). The delivery of the mentoring material was considered very good (38.46%), good (38.46%) and quite good (23.08%) by participants. In line with the delivery of the material, the method used in the mentoring, participants felt very appropriate (38.46%), appropriate (38.46%) and quite appropriate (23.08%). As for helping to broaden the participants' insights, in general, participants considered this activity very helpful (53.85%), helpful (38.46%) and quite helpful (7.69%)

in broadening their insights, especially regarding the jatropha plant, its benefits and how to process its seeds into Jatropha oil and biodiesel products. The questionnaire sheet can be seen in the Appendix.

Activities that can be carried out as a follow-up to this activity include planting jatropha, preserving the environment, further processing jatropha oil into derivative products, and marketing jatropha oil products. Further activities that are needed and require guidance and assistance for the future include post-harvest fish processing in fish ponds, various food preparations, efforts to maintain clear river water, training for MSME mothers, orchid cultivation, assistance in cooking various dishes for mothers, controlling children not to always play with cellphones, product marketing techniques, waste management, processing of secondary crops, managing narrow land for farming and how to process smoked fish.

CONCLUSION

The “Community Empowerment in Processing Jatropha Curcas Seeds (*Jatropha curcas* L.) into a Renewable Fuel Source” activity in Wirokerten Village, Banguntapan, Bantul was successfully implemented. The pre-test and post-test results showed an increase in participants’ understanding of the *Jatropha curcas* plant, its benefits, and how to process the *Jatropha curcas* seeds into castor oil products. The results of the activity implementation evaluation questionnaire showed that in general, participants considered this type of activity very useful (53.85%). The delivery of the mentoring material was considered very good (38.46%) by the participants. The method used in the mentoring was very appropriate (38.46%) and was very helpful in broadening the participants’ horizons (53.85%), especially regarding the *Jatropha curcas* plant, its benefits, and how to process its seeds into castor oil and biodiesel products.

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Innovative Training for Early Childhood Education Teachers: Creative Learning Strategies to Optimize Early Childhood Development at Sekolah Indonesia Malaysia, Kuala Lumpur

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Abstract. Early Childhood Education (ECE) plays a crucial role in laying the foundation for children's development. However, ECE teachers often face challenges in implementing innovative and creative learning strategies. At Sekolah Indonesia Kuala Lumpur (SIKL), Malaysia, the demand for engaging teaching methods is increasing in order to accommodate the diverse backgrounds of students. This training program aims to equip ECE teachers with innovation-based creative learning strategies to enhance teaching quality. By employing approaches centered on exploration, play, and active interaction, the program supports teachers in designing more effective and enjoyable learning experiences for young children. Furthermore, the training seeks to deepen teachers' understanding of child development and provide methods to optimize children's potential in alignment with early childhood characteristics. The expected outcomes of this training include: (1) improved teacher competence in applying creative learning strategies, (2) the availability of a training module as a practical guide for innovative teaching, and (3) increased motivation and engagement of children in the learning process. With this training, it is expected that the quality of ECE at SIKL will improve, offering more meaningful learning experiences and supporting children's optimal development.

Keyword: innovative training, creative learning strategies, early childhood education teachers.

INTRODUCTION

Early Childhood Education (ECE) plays a vital role in shaping children's growth and development (Nurhayati, 2025). During early childhood, children demonstrate a high level of curiosity toward their environment (Alfirda Dewi Nugraheni, 2019). Within ECE, the main areas of development include cognitive, physical-motor, language, social, and emotional aspects. Recent studies emphasize that optimizing early childhood development requires a holistic approach that encompasses these multiple domains.

Shonkoff & Phillips, (2000) highlight the importance of a stimulating environment and positive teacher-child interactions. Furthermore, UNICEF, (2019) underscores the role of nutrition and health in supporting optimal child development. Osakwe, (2009) found that quality ECE experiences positively influence children's academic performance in primary school. Based on these perspectives, early childhood education represents a critical stage in children's growth and requires appropriate stimulation both from the environment and teachers. However, in today's era of globalization, the challenges have become increasingly diverse, particularly in delivering suitable services for young children.

ECE teachers are therefore expected to possess strong competence and innovation in designing and implementing creative and effective learning experiences. Hayu et al., (2025) argue that ECE teachers play a crucial role in establishing the foundations of literacy, character, and learning ability through creative teaching practices. Dewi (2022) further emphasizes that teachers should act as facilitators, providing not only instructional support but also materials, tools, and engaging environments that align with children's interests and needs to foster their development.

Recent research in the field of ECE strongly affirms the significance of creative learning as a foundation for holistic child development. This approach not only encourages exploration and discovery but also strengthens children's critical thinking and self-expression. Craft, (2012), in *Creativity and Education Futures: Learning in a Changing World*, highlights that creative learning equips children to navigate a rapidly changing world.

Similarly, Sawyer, (2015), in *The Cambridge Handbook of the Learning Sciences*, points to the central role of creativity in the learning process. Creative learning strategies such as role play, storytelling, and crafts discussed by Fler, (2011) in *Early Learning and Development: Cultural-Historical Concepts in Practice* and Russ, (2016)

in Pretend Play and Creative Thought: A Social-Cognitive Developmental Approach have been proven effective in enhancing children's motivation and participation.

The importance of teacher creativity and innovation in developing engaging learning activities is also stressed by Pentury, (2017), Djibrán & Pamungkas, (2023), and Farhana & Cholimah, (2024). These studies underline that a rich learning environment, with ample stimulation and positive teacher–child interaction, is key to optimizing early childhood development. Nonetheless, providing appropriate and effective learning opportunities continues to pose challenges for ECE teachers, including those at Sekolah Indonesia Kuala Lumpur (SIKL), Malaysia.

SIKL is an educational institution that serves Indonesian children living in Malaysia. Operating under the Embassy of the Republic of Indonesia in Malaysia, the school was established to provide educational services for children of Indonesian migrant workers and the Indonesian community residing in Malaysia. Based on recent data, SIKL has approximately 100 students enrolled in its ECE program, supported by a limited number of teachers.

Most of the teachers at SIKL are recruited from Indonesia and come from diverse educational backgrounds. The school also offers programs in economics and entrepreneurship aimed at developing basic entrepreneurial skills among young children. However, teachers still face difficulties in designing creative learning activities. The challenges they encounter include: (a) lack of continuous training; (b) limited learning resources; (c) minimal use of technology in the classroom; and (d) difficulties in accommodating students' diverse backgrounds.

Teachers at SIKL report limited access to professional development opportunities that could strengthen their ability to implement creative teaching strategies. They also struggle with a shortage of innovative learning materials, which makes it difficult to create engaging and effective classroom environments. Furthermore, the integration of technology into teaching at SIKL's ECE level remains underdeveloped. In addition, the diverse social and cultural backgrounds of students require flexible and adaptive teaching approaches, which teachers find challenging to implement.

Based on this background, the researchers propose innovative training for ECE teachers at SIKL. This initiative aligns with the Merdeka Belajar–Kampus Merdeka (MBKM) policy, which seeks to enhance the involvement of university students and faculty in community service programs. The training aims to: a) improve teachers' competence in applying creativity-based learning strategies; b) provide a training module as a guide for developing innovative teaching methods in ECE; c) promote the use of technology in early childhood learning; and d) increase children's engagement and motivation in the learning process, thereby optimizing their development.

LITERATURE REVIEW

Early Childhood Education (ECE) plays a crucial role in laying the foundation for children's cognitive, social, emotional, and motor development. In the era of globalization, ECE teachers are increasingly required to demonstrate strong competence and innovation in designing and implementing creative and effective learning experiences. The Community Service Program (PKM) has emerged as a solution to enhance the competence of ECE teachers, particularly at Sekolah Indonesia Kuala Lumpur (SIKL), Malaysia.

Creative Learning in Early Childhood Education

Recent research in the field of ECE underscores the importance of creative learning as a fundamental basis for holistic child development. This approach not only encourages exploration and discovery but also strengthens children's critical thinking and self-expression. Craft, (2012), in *Creativity and Education Futures: Learning in a Changing World*, emphasizes that creative learning prepares children to adapt to an ever-changing world. Similarly, Sawyer, (2015), in *The Cambridge Handbook of the Learning Sciences*, highlights the central role of creativity in science learning processes. Creative strategies such as role play, storytelling, and crafts—discussed by Fler, (2011) in *Early Learning and Development: Cultural-Historical Concepts in Practice* and Russ, (2016) in *Pretend Play and Creative Thought: A Social-Cognitive Developmental Approach*—have been proven effective in enhancing children's motivation and participation. Furthermore, the importance of teacher creativity and innovation in developing engaging learning is also stressed by Pentury, (2017), Djibrán & Pamungkas, (2023), and Farhana & Cholimah, (2024). These studies emphasize that a stimulating learning environment and positive teacher–child interactions are key to optimizing early childhood development.

Optimizing Early Childhood Development

Recent studies show that optimizing early childhood development requires a holistic approach that encompasses multiple aspects. Shonkoff & Phillips, (2000) stress the importance of a stimulating environment and positive interactions between teachers and children. UNICEF, (2019) highlights the role of nutrition and health in supporting children's optimal development. Osakwe, (2009) found that quality ECE experiences

positively impact children's academic performance in primary school. In terms of pedagogy, Craft, (2012) and Sawyer, (2015) emphasize the significance of creative learning in boosting children's motivation and critical thinking skills. Likewise, Fler, (2011) and Russ, (2016) examine creative strategies such as role play and art, which can be effectively applied in early childhood settings.

The Context of Sekolah Indonesia Kuala Lumpur (SIKL)

SIKL has unique characteristics as an Indonesian school abroad, with students coming from diverse cultural and social backgrounds. ECE teachers at SIKL face challenges in adapting curricula and teaching methods to meet the needs of heterogeneous learners. Teachers are required to be creative in their teaching, as this directly correlates with students' academic achievement, as noted in the study *The Relationship Between Teachers' Teaching Creativity and Students' Academic Achievement* (Monawati, Fauzi. (2018).

RESEARCH METHOD

The training activities were carried out from July to August 2025 as a series of innovative training sessions for ECE teachers with the theme of creative learning strategies to optimize early childhood development at the Early Childhood Education program of Sekolah Indonesia Kuala Lumpur (SIKL), Malaysia. A total of six teachers participated in the training program. The method applied consisted of three stages: preparation, implementation, and evaluation. In the preparation stage, the researchers coordinated with SIKL to identify specific needs, developed a training module tailored to the school's conditions, and arranged the schedule as well as the methods of delivery, both offline and online. The second stage was implementation, which included training sessions for teachers on applying technology-based creative learning strategies, mentoring in the development of innovative teaching materials, and an entrepreneurship workshop designed to help teachers create educational products. The third stage was evaluation, where the researchers conducted observations and interviews with participants to assess the effectiveness of the training. The impact of applying creative learning strategies in the classroom was analyzed, and feedback was provided in the form of recommendations, improvements, and reinforcement.

RESULTS AND DISCUSSION

The series of activities was carried out at the Early Childhood Education (ECE) program of Sekolah Indonesia Kuala Lumpur (SIKL). The activities took the form of face-to-face workshops, practical sessions, and mentoring. The program began with an opening and introductory session, during which the objectives of the program and the urgency of improving teachers' competence, particularly in relation to learning development, were presented. The school welcomed the researchers' initiative, and both the research team and SIKL teachers engaged in discussions about their respective needs, which had been previously communicated. Four main challenges in developing creative and effective learning at SIKL were identified: (a) the lack of continuous training, (b) limited learning resources, (c) minimal integration of technology in learning, and (d) difficulties in accommodating the diversity of students.

The next stage was the delivery of materials and discussion sessions led by the research team. Four main topics were presented. The first session, delivered by Dr. Martha Christianti, M.Pd, addressed the concept of deep learning. She emphasized strategies to stimulate critical thinking skills in early childhood through exploration, discussion, and real-life experiences. Critical thinking, as part of the cognitive domain, is an essential skill that enables children to respond with systematic reasoning (Imamah & Muqowin, 2020). It also helps children solve problems in a measured and thoughtful manner (Sukmawati et al., 2022). A discussion and Q&A session followed the presentation.

The second session was delivered by Nur Hayati, M.Pd, focusing on joyful learning. She presented strategies involving creativity, play, art, and storytelling to actively engage children and make learning enjoyable. Understanding a variety of approaches gives teachers broader perspectives in designing effective lessons. Craft, (2012), in *Creativity and Education Futures: Learning in a Changing World*, emphasized that creative learning prepares children for a constantly changing world. Similarly, Fler, (2011) in *Early Learning and Development: Cultural-Historical Concepts in Practice* and Russ, (2016) in *Pretend Play and Creative Thought: A Social-Cognitive Developmental Approach* demonstrated that creative strategies such as role play, storytelling, and crafts are effective in enhancing children's motivation and participation. A Q&A session followed this presentation as well.

The third session was presented by Dr. Rini Agustiningsih, M.Pd, on the topic of authentic assessment. She explained the importance of understanding, designing, and implementing assessment tools such as portfolios, anecdotal records, and developmental rubrics. This material was intended to equip teachers with the skills necessary to conduct assessments and evaluations that reflect children's learning progress and development.

Authentic assessment has a positive impact on learning outcomes, providing valuable reflection for children, teachers, and parents alike (Khadijah & Amelia, 2020). A discussion and Q&A session was also conducted with participants.

The fourth session was presented by Dr. Eka Sapti Cahya Ningrum, M.M., M.Pd, focusing on ECE institutional management. She explained the principles of effective ECE management, emphasizing planning, organizing, and evaluation to ensure that educational services are delivered professionally and sustainably. This session also included discussion and Q&A with participants. The training activities are illustrated in Figure 1.



Figure 1. Innovative training activities for ECE teachers at SIKL

The fifth activity was simulation or microteaching, in which teachers implemented the learning strategies and assessment methods previously presented by the facilitators (the researchers). This was followed by a reflection and evaluation session, consisting of feedback discussions on participants' understanding of the material and their plans for real implementation. The training program concluded with post-training mentoring, conducted online to support the application of strategies in the classroom. Overall, participants felt that the program provided new insights and deeper understanding regarding joyful learning strategies, child assessment methods, and effective ECE institutional management to support the learning process. Participants also demonstrated remarkable enthusiasm throughout the training activities organized by the researchers.

CONCLUSION

The findings of this study revealed that teachers at the SIKL Early Childhood Education program face four main challenges in developing creative and innovative learning: (a) lack of continuous training, (b) limited learning resources, (c) minimal integration of technology in teaching, and (d) difficulties in accommodating student diversity. To address these issues, the researchers conducted an innovative training program for ECE teachers on creative learning strategies to optimize early childhood development. The results of the training indicate that strengthening ECE teachers' capacity requires a holistic approach that encompasses learning, assessment, and institutional management. The materials presented by the facilitators were highly relevant to the challenges faced by teachers at SIKL, including the need for innovative learning strategies, developmentally appropriate assessment, and professional institutional management. Participants reported that the combination of theory, practice, and simulation was particularly effective in helping them understand and plan implementation in their classrooms. Nevertheless, further mentoring is necessary to ensure the consistent application of these new strategies in teaching and in institutional management.

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Capacity Building through Training on Innovative Learning Media Development for Bahasa Indonesia Instruction among Madrasah Tsanawiyah Teachers in Kebumen Regency

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Abstract. This community service program (PkM) aims to enhance the competencies of Madrasah Tsanawiyah (MTs) teachers in Kebumen Regency in designing and implementing innovative Indonesian language learning media. The training was conducted in five stages, comprising three offline sessions and two online sessions. The methods employed included lectures to convey conceptual foundations, demonstrations to practice the use of digital tools (Zep Quiz, Canva, and PowerPoint), discussions to identify challenges and share experiences, and evaluations to assess the quality of the produced media as well as to reflect on the learning process. The outcomes of the program indicate success in terms of both process and product. In terms of process, participants demonstrated consistent attendance, high levels of enthusiasm, and active engagement in discussions and practical sessions. In terms of product, teachers were able to produce a variety of increasingly refined and innovative instructional media through cycles of presentation, reflection, and revision. These findings were further supported by survey data, showing that 53.3% of respondents strongly agreed and 45% agreed that the training improved their readiness to implement innovative learning media in Bahasa Indonesia classrooms. Furthermore, 66.7% of respondents strongly agreed and 33.3% agreed that the training contributed significantly to enhancing their professional competence as teachers. Accordingly, this PkM initiative can be considered successful and provides a tangible contribution to strengthening teachers' creativity, confidence, and readiness in designing engaging and contextually relevant learning experiences.

INTRODUCTION

The rapid advancement of technology in the era of Society 5.0 demands that human resources (HR) be able to adapt to technological progress in order to avoid obsolescence. To reduce dependency on technology, the quality of Indonesia's human resources must be enhanced so they can keep pace with these rapid transformations. Such improvement is closely tied to the quality of education, which in turn is largely determined by the learning processes implemented within the educational system. The quality of learning is profoundly influenced by both teacher competence and the instructional practices employed.

To ensure that learning processes run effectively, supportive tools such as interactive learning media are essential. Media serve as indispensable aids in education, facilitating teachers in delivering instructional content to students. They also bridge the gap where words or explanations alone may fall short. Learning media function as both facilities and infrastructure that support educational activities, and therefore deserve serious attention from all stakeholders. The integration of media cannot be overlooked if the learning process is to succeed.

Through the use of learning media, teachers can present material in a simpler, more comprehensible manner. The incorporation of media has a demonstrably positive impact: it facilitates student learning, increases engagement, and enhances overall enjoyment in the classroom. Consequently, media are a crucial complement to the learning process. Within the broader educational context, technology is also a key instrument for teachers to improve their professional practice. Law No. 14 of 2005, Article 4 on Teachers and Lecturers, underscores that teachers act as agents of learning who must function as facilitators, motivators, designers of instruction, and sources of inspiration. In today's technological era, professional educators are expected to employ technology judiciously to create engaging and interactive learning experiences.

The use of interactive media—such as game-based learning applications and collaborative platforms—has become increasingly widespread. Studies indicate that interactive media significantly enhance student motivation and participation, fostering contextual and meaningful learning experiences (Irawan & Wirasmita, 2019; Kurniawati & Nita, 2018; Murcahyanto et al., 2022; Pradilasari et al., 2020; Siregar et al., 2020). Therefore, the

careful selection of appropriate learning media is vital for achieving educational objectives effectively and efficiently. Beyond instructional benefits, learning media also serve educational, social, economic, political, artistic, and cultural functions, enriching students' overall learning experience.

According to the Information and Communication Technology Development Index (ICT-DI) released by the International Telecommunication Union (ITU), the ICT Development Index in Central Java Province stood at 5.83 in 2022 and 5.86 in 2023, both categorized as moderate. Despite a slight increase of 0.03, the overall progress remains stable and has yet to show significant improvement. ICT development in education involves three key sub-indices—access and infrastructure, usage, and skills—all of which can be strengthened through structured and sustainable training.

Although students are becoming increasingly adept at using technology, many teachers still lack proficiency in leveraging it for instructional purposes. A considerable number do not utilize digital-based learning media, and even those accustomed to such tools are often unaware of the full range of ICT-based resources available for classroom use. This underscores the urgent need for training programs on the development of innovative digital learning media, as teachers' skills and creativity in employing media directly impact both instructional quality and student learning outcomes.

Priority Issues

Based on the needs assessment, several priority issues must be addressed through this community engagement initiative:

1. Interactive learning media have become an urgent necessity in the era of Society 5.0, where student engagement and interaction are pivotal to achieving optimal learning outcomes. Teachers are therefore required to develop competence in using interactive media that is not only engaging but also effective in delivering content.
2. Intensive and structured mentoring is needed to support teachers in optimizing the use of applications for developing interactive learning media. Without proper guidance, teachers may be unable to fully harness technological tools in their instructional practices.

Proposed Solution

Innovative Indonesian language learning media are essential to foster deep and meaningful learning in schools. To this end, structured mentoring programs are needed for Madrasah Tsanawiyah (MTs) teachers in Kebumen Regency to strengthen their understanding of the concepts, roles, and functions of learning media, and to enable them to develop innovative Indonesian language learning resources. However, limited knowledge of available applications has often hindered teachers from maximizing the use of innovative media in the classroom. Therefore, intensive mentoring is required to empower MTs teachers in Kebumen to design innovative learning media using accessible tools such as PowerPoint and Canva for Education.

Literature Review

The integration of innovative learning media has become increasingly essential in Indonesian language education, particularly within the *Merdeka Belajar* curriculum, which emphasizes differentiated instruction tailored to diverse student needs and learning styles. Learning media serve a crucial function as channels of instructional information, enabling content to be delivered in engaging and interactive ways.

Information and communication technology (ICT)-based media, such as Microsoft PowerPoint and Canva, have been widely adopted to support this objective. *Canva for Education*, in particular, offers user-friendly features that facilitate the design of teaching materials—presentations, posters, and infographics—while saving time and enhancing efficiency (Salewangeng, 2023; Nurhayati et al., 2022). Its application has also been linked to the advancement of digital literacy in educational contexts (Basri et al., 2023).

Recent community service initiatives (PkM) demonstrate the effectiveness of ICT-based media in improving learning outcomes. For example, animated videos created through Canva significantly improved student performance in Indonesian language learning at SDN Srengseng Sawah 11 Pagi, Jakarta (Sari & Yatri, 2023). These findings corroborate Dale's Cone of Experience, which shows that audiovisual media enhance comprehension more effectively than audio- or visual-only formats (Syahroni & Dianastiti, 2021). Further studies also highlight the importance of teachers' digital competence, as digital tools fundamentally reshape how knowledge is constructed and communicated (Talitha et al., 2023).

Overall, innovative learning media are expected to support teachers in creating meaningful learning experiences. Such media should be systematically designed based on student characteristics and aligned with targeted competencies, reinforcing the interconnection between curriculum, teachers, and learners (Miftah, 2013).

METHOD

The training program was delivered in a blended format, combining offline and online sessions, based on coordination with the Indonesian Language Teachers' Forum (MGMP) of Madrasah Tsanawiyah in Kebumen Regency and participating teachers. The implementation of the program was structured into four main stages. The

first stage was the lecture, which introduced the concepts, functions, and roles of learning media in Indonesian language instruction. This session emphasized the optimization of PowerPoint for audiovisual learning purposes and highlighted the potential of Canva for Education as an interactive platform.

The second stage involved demonstration activities. These sessions provided step-by-step guidance on designing and applying innovative learning media using PowerPoint and Canva. Participants were given the opportunity to observe the demonstration process and to practice developing their own instructional products.

In the third stage, discussion sessions were conducted to encourage active engagement between facilitators and participants. These sessions allowed for the exchange of ideas and teaching experiences, with the aim of deepening participants' understanding of the pedagogical value of instructional media and enhancing their creativity in developing innovative learning resources.

Finally, the evaluation stage was implemented to assess participants' comprehension of the training content and to determine the overall effectiveness of the program. This stage utilized various methods, including questionnaires, Q&A sessions, and reflective discussions. Feedback collected from these activities was analyzed to inform improvements in the training content, delivery strategies, and methodologies for future training initiatives.

RESULTS AND DISCUSSION

Results

The community service program titled *Training on the Development of Innovative Learning Media for Indonesian Language Teachers at Madrasah Tsanawiyah in Kebumen Regency* was designed to enhance teachers' capacity in creating more creative, interactive, and meaningful classroom practices. The program responded to the growing need for teachers to master simple yet effective technology-based media aligned with the demands of 21st-century education. Approximately 70 teachers participated, bringing diverse experiences and levels of digital literacy. This diversity posed both challenges and opportunities, prompting facilitators to provide systematic support, from conceptual understanding to practical application. The training was delivered in a blended model—combining offline workshops and online sessions—which enabled intensive interaction, collaborative practice, and sustained mentoring through virtual platforms.

The first stage, an offline workshop held on July 11, 2025, at MTs Negeri 1 Kebumen, introduced participants to the fundamental concepts of innovative learning media, their pedagogical functions, and strategies for aligning media design with student characteristics and instructional goals. Beyond theoretical input, participants engaged in hands-on activities by designing interactive quizzes using the Zep Quiz platform. The session revealed varied levels of readiness among participants: about 40% had prior knowledge and adapted quickly, while the majority required more intensive guidance, especially in integrating pedagogical principles into media development. Group collaboration played a critical role in bridging gaps, as more digitally skilled teachers supported peers with limited experience, fostering mutual learning and professional solidarity.

The second stage, conducted on July 12, 2025, focused on completing the digital quizzes initiated in the previous session. Through intensive mentoring, participants successfully designed and published interactive quizzes using Zep Quiz. Despite technical challenges—mainly due to limited device capabilities—collaborative strategies, including group work and peer support, kept participants actively engaged. This stage highlighted both the persistence of technical barriers in digital education and the compensatory value of peer mentoring.

On July 13, 2025, the third stage centered on developing instructional videos using PowerPoint's recording feature. Teachers practiced creating narrated slide presentations that combined text, visuals, and audio for more communicative delivery. While hardware incompatibility and poor microphone quality posed challenges, collaborative problem-solving enabled continued participation. More importantly, this stage demonstrated teachers' growing confidence in transforming familiar tools—such as PowerPoint—into innovative pedagogical media, suggesting that educational innovation can emerge from creative repurposing of existing resources rather than relying solely on new platforms.

The fourth stage, conducted online via Zoom on July 25, 2025, served as a monitoring and feedback session. Teachers presented their developing media projects—including interactive PowerPoint slides and Canva for Education materials—and received constructive feedback from facilitators and peers. Feedback addressed both technical aspects (design layout, readability, audio quality) and pedagogical considerations (clarity of learning objectives, interactivity, and relevance to students' needs). This reflective stage was instrumental in transforming the training from a skills-based activity into a professional learning dialogue, strengthening teachers' capacity to evaluate and refine their instructional media.

The final stage, conducted online on August 1, 2025, consolidated the training outcomes through final product presentations, critical reflections, and program evaluation. Teachers showcased a range of creative media projects aligned with core Indonesian language skills (listening, speaking, reading, writing, and presenting). Reflection sessions revealed ongoing challenges such as limited infrastructure, uneven digital competencies, and difficulties

in pedagogical integration. However, the sessions also brought forward strategies to sustain innovation in teaching practice. The overall evaluation indicated that the blended training model effectively enhanced teachers' digital literacy while also fostering a collaborative learning culture.

Discussion

The evaluation of the community service program *"Training on the Development of Innovative Media for Indonesian Language Teaching in MTs Kebumen"* demonstrates that the initiative successfully achieved its intended objectives, both in terms of process and outcomes. This finding underscores the significance of targeted, practice-oriented professional development in addressing the evolving pedagogical needs of teachers in the digital era.

From a process perspective, the training was marked by sustained teacher engagement across all sessions. The consistency of participation indicates not only strong commitment but also the perceived relevance of the program to participants' professional contexts. The active exchanges during discussions and workshops further reveal that the training resonated with teachers' actual challenges in the classroom, thereby validating the importance of designing capacity-building programs that are contextually grounded and needs-based. This aligns with prior studies suggesting that teacher professional development is most effective when it is problem-driven, collaborative, and directly connected to instructional practice.

From a product perspective, the training produced tangible improvements in teachers' ability to design innovative instructional media. Baseline data indicated that fewer than half of the participants had prior exposure to digital tools such as Canva, Zep Quiz, or narrated PowerPoint presentations. However, through iterative cycles of practice, peer feedback, and guided revision, most teachers succeeded in developing a variety of products, ranging from quiz-based assessments to multimodal visual learning materials. Importantly, the program emphasized pedagogical integration rather than mere technical application. Teachers were guided to ensure that their media aligned with principles of instructional design, including clarity of learning objectives, logical sequencing of content, readability, visual coherence, and the effective use of multimodal elements. This emphasis distinguishes the program from many conventional training models that often privilege technical skill acquisition without sufficient attention to pedagogical grounding.

The survey results provide quantitative reinforcement of these qualitative observations. A substantial majority of participants (75% "strongly agree," 25% "agree") affirmed the contextual relevance of the training content. Similarly, teachers reported significant knowledge gains regarding innovative media (66.7% "strongly agree," 33.3% "agree"), heightened motivation to integrate digital technology into classroom practice (98.3% positive responses), and increased readiness to apply newly acquired skills (100% positive responses). Beyond technical competence, 66.7% of participants strongly agreed that the program enhanced their broader professional capacity, suggesting that the intervention contributed to the cultivation of reflective, adaptive, and innovative teaching practices. The unanimous demand for program continuation further signals the perceived value and sustainability potential of such initiatives in advancing digital pedagogy.

Taken together, these findings highlight the transformative potential of digital media training when it is systematically designed, pedagogically anchored, and contextually responsive. The program not only introduced teachers to practical digital tools but also fostered a cultural shift toward innovation, positioning teachers as active agents of pedagogical change rather than passive consumers of technology. Such outcomes resonate with the broader discourse on 21st-century teacher professionalism, which emphasizes continuous learning, creativity, and the integration of digital literacies into subject-specific pedagogy.

Nevertheless, the sustainability of these outcomes requires careful consideration. As evidenced by participants' expressed needs, follow-up mentoring, peer-learning communities, and professional networks are crucial to ensuring that initial gains are consolidated and expanded. Without such sustained support, the risk remains that innovative practices may stagnate or regress over time. Therefore, the study affirms that teacher development in the digital age should be envisioned not as a one-off intervention but as an ongoing, iterative process embedded within broader professional ecosystems.

Evaluation

The evaluation of the program indicates that the training was generally well-implemented and effective. All sessions—both offline and online—were delivered according to plan. Offline sessions allowed for richer interaction and immediate feedback, while online sessions provided flexibility for participants with time or location constraints. Despite occasional technical obstacles, particularly unstable internet connections during online sessions, these challenges did not significantly undermine the overall quality of the training, as participants remained highly enthusiastic and actively engaged.

The evaluation also revealed several supporting factors. First, participants demonstrated strong commitment and consistent attendance, which kept the sessions dynamic and productive. Second, a harmonious relationship between facilitators and participants created a conducive learning atmosphere that accelerated the transfer of

knowledge. These elements ensured that the training outcomes extended beyond technical skills, fostering professional confidence and collaborative learning.

Nevertheless, some minor challenges were noted. A few teachers submitted assignments late due to demanding teaching schedules. However, this issue was mitigated through flexible facilitation strategies, including the use of WhatsApp groups for regular reminders, ongoing communication, and motivational support. Such adaptive measures helped maintain participant accountability and ensured the completion of assigned tasks.

Overall, the evaluation suggests that the training was not only technically successful but also transformative, equipping teachers with digital pedagogical skills, stimulating creativity, and strengthening their professional competence. The findings highlight the importance of responsive facilitation and sustained mentoring to ensure long-term impact.

CONCLUSION

The Community Service Program (PkM) entitled “*Workshop on Developing Innovative Learning Media for Indonesian Language Teachers at MTs in Kebumen Regency*” can be considered successful in achieving its objectives. The program not only enhanced teachers’ pedagogical competencies, particularly in designing and utilizing creative digital media, but also generated tangible products such as Canva-based instructional designs, PowerPoint-based video lessons, and interactive quizzes using Zep Quiz. These outputs reflect the effective transformation of theoretical knowledge into practical classroom applications. Equally important, the teachers’ enthusiasm, active participation, and commitment throughout the sessions underscore the program’s relevance and impact. The findings also highlight the need for sustainable mentoring and broader collaboration with educational stakeholders to ensure that the skills acquired are continuously refined, systematically implemented, and institutionally supported. In this regard, the program not only addresses immediate pedagogical needs but also contributes strategically to the long-term improvement of Indonesian language teaching quality at the secondary education level.

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Optimizing the Marketing of Liquid Organic Fertilizer (POC) Through Branding Assistance and Trademark Registration for Women Farmers Group Empowerment

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Abstract. This community service initiative aimed to empower the “Marsudi Luhur” Women Farmers Group (KWT) in Gunungkidul, Yogyakarta, by enhancing their marketing capabilities for Liquid Organic Fertilizer (POC) derived from organic waste. The program included digital marketing training, branding strategy development, and trademark registration assistance. A pretest-posttest design was employed to measure effectiveness, with statistical analysis using SPSS. Results showed a significant increase in participants’ knowledge ($p < 0.001$), and high instrument reliability (Cronbach’s Alpha = 0.827). The intervention successfully improved entrepreneurial capacity, digital literacy, and legal awareness. This model is recommended as a best practice for sustainable community empowerment.

Keywords: branding, community empowerment, green marketing, POC, trademark

INTRODUCTION

The Liquid Organic Fertilizer (POC) produced by the “Marsudi Luhur” Women Farmers Group (KWT) represents a tangible outcome of the group’s persistence in addressing community waste issues. Through the processing of organic waste, the group has successfully created a product that not only holds economic value but also contributes positively to environmental conservation efforts (Suhastyo, 2019). This initiative reflects the group’s contribution to local waste management through a circular economic approach, which emphasizes the reutilization of waste into valuable products.

The economic potential of POC derived from waste processing can be further optimized by expanding its market reach. However, based on field observations, the primary challenge faced by KWT Marsudi Luhur is increasing public awareness of the POC product to encourage its adoption in agricultural practices (Wanita et al., 2025). In this context, brand identity becomes a key factor in successful marketing. According to marketing theory, a strong brand serves as a product differentiator and fosters consumer trust (Khotimah et al., 2023; Purnomo et al., 2024). Therefore, KWT Marsudi Luhur needs to establish a clear and appealing brand identity to ensure that its POC product is easily recognized and remembered by the public.

The challenges faced by KWT Marsudi Luhur are not isolated but rather part of broader structural issues encountered by many Micro, Small, and Medium Enterprises (MSMEs) in Indonesia. Currently, MSMEs contribute approximately 61% to the national Gross Domestic Product (GDP) and absorb up to 97% of the workforce. Nevertheless, most MSMEs, particularly micro-scale enterprises, continue to face limitations in market access, digital literacy, and branding capabilities (Harahap et al., 2024). This condition mirrors the situation of KWT Marsudi Luhur, which is still striving to expand its market reach. Furthermore, global trends indicate a growing demand for environmentally friendly products, including organic fertilizers. This suggests that POC has significant potential to compete, provided it is supported by appropriate marketing strategies and registered trademark legality.

The entrepreneurial spirit already present within KWT Marsudi Luhur constitutes a vital social capital that should be nurtured. However, this spirit requires direction through training and mentoring to foster sustainable innovation and generate tangible financial benefits for its members. Therefore, assisting in marketing and branding strategies (Wahyudi et al., 2025), including the facilitation of trademark registration, is a strategic step to ensure business sustainability. With the right intervention, POC can become not only an eco-friendly product but also a means to improve the economic welfare of group members and support the achievement of Sustainable Development Goals (SDGs), particularly in the areas of industry, innovation, and infrastructure.

LITERATURE REVIEW

Branding is a fundamental aspect of marketing that serves to establish a product's identity, distinguishing it from competitors. Keller (2013) asserts that branding encompasses not only the creation of names or logos but also the perceptions and associations embedded in the minds of consumers. According to Kotler and Keller (2016), a strong brand enhances perceived quality, fosters consumer loyalty, and creates long-term competitive advantages. In the context of MSMEs, branding plays a strategic role as a means of differentiation that can expand market reach and increase product value. In the digital era, brand development can be optimized through various online channels such as social media, websites, e-commerce platforms, and content marketing strategies. Therefore, the ability of MSMEs to utilize digital technology in a planned and strategic manner is a crucial factor in expanding market access and cultivating consumer loyalty (Pramadhika et al., 2025).

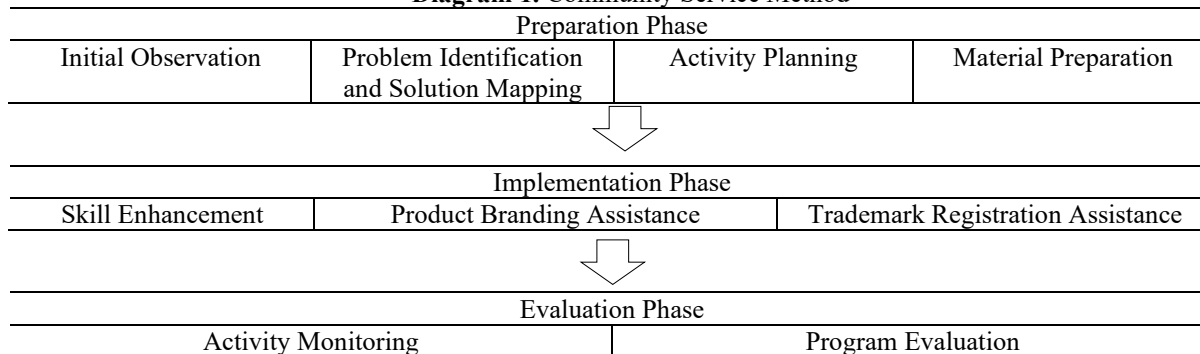
Trademarks serve a vital function as identifiers that distinguish products from competitors while providing legal protection to their owners. According to Law No. 20 of 2016 on Trademarks and Geographical Indications, registered trademarks grant exclusive rights to use the mark and protect owners from claims and imitation by other parties. This means that trademark protection can only be enjoyed if business actors formally register their marks with the Directorate General of Intellectual Property (DGIP). Legal awareness among MSME actors is an essential foundation for achieving comprehensive trademark protection. Such awareness includes not only knowledge that trademarks can be registered but also an understanding of their juridical function, economic value, and the legal risks that may arise if registration is not pursued. In the long term, increasing legal awareness will strengthen the competitive position of MSMEs within both national and global business ecosystems, prevent unfair competition practices, and open opportunities for broader business expansion and collaboration (Samudra et al., 2025). Schiffman and Kanuk (2010) emphasize that consumers often rely on brands when making purchasing decisions, as brands reflect quality and assurance. Therefore, for MSMEs, trademark registration is not only important for legal legitimacy but also serves as a strategy to reinforce consumer trust and enhance competitiveness.

Entrepreneurial spirit refers to an internal drive to take risks, innovate, and manage businesses sustainably. Drucker (1985) defines entrepreneurs as individuals who constantly seek opportunities, take risks, and pursue innovation. McClelland (1961) adds that the need for achievement is a key motivational factor that drives individuals to become resilient entrepreneurs. In the context of women's empowerment, entrepreneurial spirit is a form of social capital that must be nurtured to ensure business growth. Entrepreneurship training for women farmer groups has been shown to significantly improve managerial capacity and business productivity (Majid et al., 2023). Moreover, entrepreneurial mentoring contributes to the development of psychological capital, including optimism, resilience, hope, and self-efficacy (Julianti et al., 2023). Based on these theoretical perspectives, it is evident that branding, digital marketing, trademark protection, and entrepreneurial spirit are interrelated components in building MSME success. When integrated, these elements can enhance product value, strengthen competitiveness, and ensure business sustainability.

RESEARCH METHOD

This community service program employed a participatory action approach to address the marketing and legal challenges faced by the "Marsudi Luhur" Women Farmers Group (KWT) in Gunungkidul, Yogyakarta. The intervention was structured into three main phases: preparation, implementation, and evaluation. These phases are illustrated in the following diagram:

Diagram 1. Community Service Method



Preparation Phase:

A preliminary survey was conducted to assess the group's current marketing practices, branding awareness, and legal understanding of trademark registration. Data collection involved interviews with the group

coordinator, direct observation, and market analysis. Based on the findings, tailored training materials were developed covering digital marketing strategies, branding fundamentals, and trademark registration procedures.

Implementation Phase:

The core activities included:

- Training sessions on branding, packaging design, and digital marketing using social media and e-commerce platforms.
- Practical workshops on brand identity creation, including logo and product naming.
- Technical assistance for trademark registration with the Directorate General of Intellectual Property (DGIP).
- Interactive discussions with practitioners in marketing and intellectual property law.

Evaluation Phase:

Program effectiveness was measured using a pretest-posttest design. Participants' knowledge and skills were assessed before and after the intervention using structured questionnaires. Quantitative data were analyzed using SPSS, with reliability tested via Cronbach's Alpha and significance measured through Paired Samples T-Test.

Target Group:

The program involved 30 women participants from KWT "Marsudi Luhur," selected based on their entrepreneurial potential, commitment to business development, and support from local government.

This methodological framework ensured that the intervention was responsive to the group's needs, academically grounded, and practically impactful.

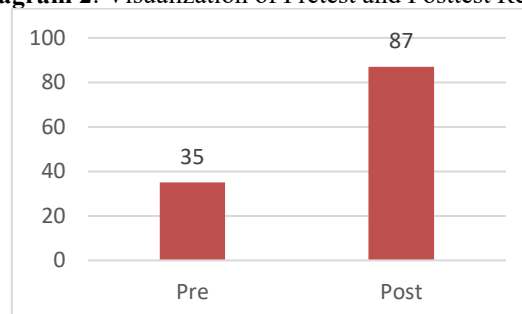
RESULT AND DISCUSSION

The implementation of the community service program yielded significant outcomes in enhancing the marketing capacity and legal awareness of the "Marsudi Luhur" Women Farmers Group (KWT). The intervention was conducted on August 6, 2025, involving 25 active participants. The activities included digital marketing training, branding workshops, and trademark registration assistance.

Knowledge Improvement

The effectiveness of the intervention was measured using a pretest-posttest design. Participants' average scores increased from 35 (pretest) to 87 (posttest), indicating a substantial improvement in knowledge and skills related to product branding and marketing. Statistical analysis using Paired Samples T-Test confirmed the significance of this increase ($p < 0.001$), while the reliability of the instrument was validated with a Cronbach's Alpha of 0.827.

Diagram 2. Visualization of Pretest and Posttest Results



Information:

Pretest average score: 35.00

Posttest average score: 87.00

Mean difference: 52.00

Statistical significance: $p < 0.001$ (Paired Samples T-Test)

Instrument reliability: Cronbach's Alpha = 0.827

Branding and Product Identity Development

Participants gained practical skills in designing product logos, packaging, and brand messaging. The training emphasized differentiation strategies and the importance of consistent brand identity. As a result, the group

successfully developed a visual identity for their Liquid Organic Fertilizer (POC), enhancing product recognition and market appeal.

Digital Marketing Adoption

The program introduced participants to digital marketing tools such as social media platforms and e-commerce channels. Participants were guided in creating promotional content and managing online presence. This aligns with previous studies highlighting the role of digital literacy in expanding market reach for MSMEs (Naibaho et al., 2025; Mirantika et al., 2024).

Legal Awareness and Trademark Registration

The mentoring sessions included technical guidance on trademark registration with the Directorate General of Intellectual Property (DGIP). Participants were assisted in preparing documentation and understanding the legal implications of brand protection. This step is crucial for securing exclusive rights and preventing unfair competition (Samudra et al., 2025).

Entrepreneurial Mindset and Resilience

The intervention also contributed to strengthening the entrepreneurial spirit among participants. Questionnaire items measuring motivation, innovation, and resilience showed a strong correlation with overall learning outcomes. This supports findings by Wardana et al. (2021) and Julianti et al. (2023), which emphasize the role of psychological capital in sustainable entrepreneurship.

Long-Term Impact and Group Independence

The integration of branding, digital marketing, and legal protection laid the foundation for long-term business sustainability. The structured and validated approach ensured that knowledge was internalized and applicable. These outcomes are consistent with longitudinal studies showing that comprehensive mentoring leads to stable and independent group development (Sari & Damayanti, 2020).

CONCLUSION

This community service initiative successfully enhanced the marketing capacity, branding awareness, and legal literacy of the “Marsudi Luhur” Women Farmers Group (KWT) in Gunungkidul, Yogyakarta. Through a structured intervention involving training, mentoring, and technical assistance, participants demonstrated significant improvements in knowledge, entrepreneurial mindset, and digital marketing adoption.

The integration of branding development, trademark registration, and digital literacy proved to be an effective strategy for strengthening product identity and expanding market reach. The statistically significant increase in posttest scores and high instrument reliability further validated the impact of the program.

Beyond technical outcomes, the initiative fostered resilience and independence among participants, laying the foundation for sustainable business practices. This model is replicable and relevant for other community-based enterprises seeking to enhance competitiveness and contribute to the achievement of Sustainable Development Goals (SDGs), particularly in the areas of industry, innovation, and infrastructure.

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Collaboration Between School Counselors and Parents to Enhance Students' Learning Comfort

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Abstract. Learning comfort is an essential factor influencing students' academic and emotional development. School counselors play a strategic role in creating a conducive learning environment by providing guidance and psychological support to students. The purpose of the training activity in this community service program, which focused on collaboration between school counselors and parents to enhance students' learning comfort, was to strengthen the synergy between counselors and parents in supporting students' holistic development. The target audience of this training program consisted of junior high school counselors who are members of the Guidance and Counseling Teachers' Forum (MGBK) of Sleman Regency. The training was carried out through a collaboration between the Community Service Team of the Faculty of Education, Yogyakarta State University, and the MGBK of Sleman Regency. A total of 40 junior high school counselors from various schools within the region participated in this activity. The training method employed in this community service program utilized instructional and mentoring techniques. The effectiveness of the program was demonstrated by an increase in the mean score from 80.73 to 89.73, representing an 11.15% improvement, along with Wilcoxon test results indicating a significant difference between the pre-training and post-training scores. Cognitively, counselors were able to understand the concepts, forms, and strategies for collaborating with parents; affectively, participants showed high levels of enthusiasm, openness, and motivation; and in terms of action, counselors successfully designed more applicable and systematic collaboration strategies. The main challenge encountered was parents' limited availability of time; however, this was addressed through flexible communication using online media and communication groups. Overall, the activity successfully strengthened school counselors' competence in building partnerships with parents, ultimately contributing positively to the creation of a more comfortable learning environment for students at school.

Keywords: Collaboration Between School Counselors and Parents, Students' Learning Comfort

INTRODUCTION

Learning comfort is a crucial factor influencing students' academic and emotional development. Guidance and Counseling teachers play a strategic role in establishing a conducive learning environment by providing appropriate guidance and psychological support (Damanik, 2024). However, these efforts cannot be fully optimized without strong collaboration between guidance and counseling teachers and parents. Parents serve as the primary agents in shaping children's habits and motivation, which significantly affect their learning comfort at school (Irawati & Kasingku, 2024). Collaboration between teachers and parents is essential for understanding and addressing students' academic, social, and emotional concerns (Grubbs, 2013). Effective communication provides teachers with important information about students' conditions at home, enabling them to design more targeted and relevant guidance strategies (Hasibuan & Khairuddin, 2024). Through strong synergy between schools and families, students are expected to receive optimal support both at home and at school (Maemunah et al., 2025; Moore & Day, 2010). Such collaboration contributes to students' learning comfort, motivation, confidence, and ability to manage academic and social challenges effectively (Baroroh, Putri, & Putri, 2024). Achieving these goals requires active involvement from multiple stakeholders, particularly teachers who function as key intermediaries between schools and parents. Effective collaboration can assist in identifying and overcoming barriers students encounter in the learning process. In this context, the Community Service Program partners consist of teachers from junior high schools affiliated with the Junior High School Guidance and Counseling Teachers Association in Sleman Regency. Interviews with teachers in Sleman Regency revealed several challenges in implementing guidance and counseling services, particularly concerning the lack of effective

communication between teachers and parents. Findings indicate that some parents interact with the school only when serious problems occur, resulting in reactive rather than preventive communication.

Additionally, parents' limited time and demanding work schedules hinder their participation in school-related activities. These constraints make it difficult for teachers to encourage parents to engage actively in programs designed to enhance students' learning comfort and academic performance. This situation aligns with the findings of Purnomo, Huda, Agnesti, and Fathoni (2025), who reported that some parents are less involved in their children's education due to limited time or insufficient understanding of their parental roles. Consequently, students may lack the motivation and guidance needed to overcome learning challenges. Furthermore, Purwaningrum, Surur, and Asrowi (2023) noted that many parents feel reluctant to communicate matters occurring at home to teachers. When students face difficulties, some parents show low awareness of seeking professional assistance from teachers. Certain parents perceive counseling services as unimportant, leading to limited engagement in collaborative initiatives. Technological literacy among parents and teachers remains another obstacle (Zakariyah & Hamid, 2020), and low parental education levels contribute to reduced parental involvement in school matters (Mangerang, 2021). These conditions highlight the importance of increasing parents' awareness and understanding of the role of guidance and counseling services in fostering effective collaboration for students' learning success. This issue is closely related to the challenges faced by teachers, namely establishing communication with parents, identifying collaborative forms of engagement, and facilitating students' holistic development through counseling services. The Community Service Program addresses these challenges by focusing on three priority areas to enhance effective collaboration between teachers and parents. Effective communication enables teachers to understand students' family conditions and provide interventions tailored to their needs (Astuti, Suminar, & Rahmat, 2018). Innovative strategies—such as flexible discussion forums—are needed to improve communication between schools and parents (Moran & Bodenhorn, 2015). Strengthening clear forms of collaboration is also essential, as parents must understand their roles in supporting their children's development through regular meetings, parenting seminars, or involvement in school guidance activities (Rahmawati, 2022; Syuhadatina, Rosita, Muhyatun, & Putri, 2024). Moreover, counseling services should be directed toward supporting students' holistic growth. Outreach efforts regarding the importance of guidance and counseling services can help parents better understand their children's learning needs (Mitchell & Bryan, 2007). Through this training program, teachers are expected to enhance their communication competencies and collaboration-based guidance strategies, while parents gain greater awareness of their role in supporting students' learning comfort. Ultimately, this initiative is anticipated to strengthen cooperation between schools and families in creating a learning environment that supports students' optimal development.

LITERATURE REVIEW

Collaboration between teachers and parents plays a decisive role in supporting students' academic success. Parents serve as the primary and earliest educators for their children, as they are the first to provide education within the family setting. Teachers, meanwhile, play an important role in encouraging students to develop their academic potential. According to H. Syarif Hidayat (2013), collaboration between parents and teachers is defined as “a communicative relationship that monitors students' learning progress throughout the teaching and learning process, as measured by: (1) the flow of communication between parents and teachers, (2) parents' involvement in resolving students' learning problems, and (3) parents' participation in enforcing school rules” (p. 95). In educational practice, cooperation between parents and teachers is essential because children's development cannot rely solely on the teacher's role. Children also require the involvement and guidance of their parents. This aligns with the view of Enda Permatasari (2019), who explains that collaboration between parents and teachers allows parents to gain important knowledge and experiences from teachers in educating their children. Conversely, teachers can obtain valuable information from parents regarding their children's characteristics and behavior at home. Such information is highly beneficial for teachers in guiding and educating their students effectively. Similarly, Nanat Fatah Natsir et al. (2018) state that the collaboration between teachers and parents in enhancing the quality of children's education requires synergy and integration between educators in the school (teachers) and educators at home (parents) (p. 317). Therefore, it is clear that collaboration between teachers and parents plays a vital role in improving the quality of students' education. Through such collaboration, teachers and parents can support each other in fostering students' academic development, as teachers can better understand students' progress through information provided by parents, while parents can assist teachers by supporting their children's learning at home—particularly during the pandemic period.

Collaboration between teachers and parents is based on shared goals and responsibilities in educating children so that educational objectives can be achieved effectively and efficiently. According to M. Ngalim Purwanto (as cited in Nur Khosiah, 2020), several forms of teacher–parent collaboration include: (1) organizing parent meetings on student admission day; (2) maintaining written communication between the school and the family; (3) providing report cards; (4) conducting home visits by teachers or school visits by parents; (5) holding school celebrations or exhibitions of students' work; and (6) establishing parent–teacher associations. In a similar

vein, Dwi Pratiningsih (2017) identifies additional forms of collaboration, including: (1) home visits, which strengthen student supervision and foster students' sense of being supported by their school; (2) inviting parents to the school to discuss the child's development directly; (3) case conferences, which involve parents in addressing students' problems collaboratively; (4) forming school support organizations involving parents and teachers; and (5) maintaining written communication between teachers and parents about students' progress. Consistent with these perspectives, Purwanto (as cited in Lestari, Nurhayati, & Udin, 2020) emphasizes similar forms of collaboration, such as parent meetings, written communication, report cards, school celebrations, and parent-teacher associations. Furthermore, Hery Noer Aly and Munzier (as cited in Suryani, 2012) highlight additional collaborative efforts, including: (1) home visits; (2) inviting parents to school events such as class meetings or competitions; (3) case conferences within guidance and counseling services; (4) forming parent-teacher organizations; (5) providing parents with information about their child's academic progress; (6) encouraging parents to report their child's behavior and learning activities at home; (7) providing counseling services for parents regarding effective strategies for supporting students at home; (8) sharing information about school programs and guidance services; (9) maintaining regular consultations between guidance teachers and parents; (10) providing report cards; and (11) creating open-house events to build mutual trust between parents and teachers. Based on the discussion above, forms of collaboration generally include teacher-parent meetings, written communication, and reciprocal home or school visits.

The objectives of teacher-parent collaboration are consistent across literature. According to Jalaludin (as cited in Witasari, 2013), collaboration aims to: (1) provide mutual support; (2) prevent undesirable student behaviors; and (3) jointly plan effective educational strategies for children (p. 37). Collaboration ensures coherence between school and home environments so that children do not experience conflicting expectations. Similarly, Yanti et al. (2013) state that the goals of teacher-parent collaboration include: (1) helping students improve their learning outcomes; (2) assisting students in overcoming learning difficulties; (3) supporting students in developing their potential; and (4) strengthening coordinated educational efforts across formal and informal settings.

RESEARCH METHOD

The training method used in this Community Service Program employed a combination of training and mentoring techniques, in which participants were provided with conceptual understanding, practical skills, and ongoing assistance in building collaboration between Guidance and Counseling teachers and parents to enhance students' learning comfort. Overall, the activities included planning effective communication strategies between teachers and parents, developing synergistic forms of collaboration, and facilitating student development through cooperative efforts within guidance and counseling services. These efforts were designed to improve students' learning comfort at school, particularly in the delivery of guidance and counseling services.

RESULTS AND DISCUSSION

The results of the activity implementation indicate that the training provided was able to improve school counselors' understanding of the importance of building collaboration with parents. Based on the SPSS analysis, there was an increase in the mean score of school counselors' understanding from 80.73 prior to the intervention to 89.73 after the intervention, reflecting an improvement of 11.15%. The Wilcoxon test results showed a Z value of -5.683 with a significance level of .000. This indicates that the significance value (.000) is lower than .05 (5% error level), suggesting that there was a significant difference between the pretest and posttest scores. Thus, the community service program (PkM) was effective in enhancing the competence of school counselors.

This improvement aligns with theories suggesting that parental involvement in children's education contributes significantly to both academic and non-academic development. School counselors who are able to establish effective communication and collaboration with parents can more easily understand students' conditions both at school and at home. Consequently, the interventions provided become not only reactive but also more preventive and comprehensive.

In addition, the discussion of the activity outcomes indicates that the primary challenges in developing collaboration between school counselors and parents are time constraints and parents' busy schedules. However, by implementing more flexible communication strategies such as the use of online platforms, communication groups (e.g., WhatsApp or Telegram), and adjusted meeting schedules, school counselors can maintain engagement with parents without requiring constant face-to-face interactions. This approach has proven to enhance parental participation and strengthen synergy in supporting students' learning experiences.

With the increase in school counselors' understanding and skills, collaboration with parents is expected to become more effective and sustainable. This improvement is likely to create a more conducive learning environment, as students feel supported by both the school and their families. Therefore, this community service

activity not only contributes to the enhancement of school counselors' competencies but also improves the quality of guidance and counseling services that are more responsive to students' needs.

CONCLUSION

The community service activity in the form of training on collaboration between school counselors and parents proved effective in improving school counselors' understanding, attitudes, and skills. This was evidenced by an increase in the mean score from 80.73 to 89.73, representing an 11.15% improvement, as well as Wilcoxon test results indicating a significant difference between the pre-training and post-training scores. Cognitively, school counselors demonstrated an improved understanding of the concepts, forms, and strategies of collaboration with parents; affectively, participants showed high levels of enthusiasm, openness, and motivation; and in terms of action, school counselors successfully designed more applicable and systematic collaboration strategies. The main challenge encountered was parents' limited availability of time, but this was addressed through flexible communication using online platforms and communication groups. Overall, this activity successfully enhanced school counselors' competence in building partnerships with parents, which ultimately had a positive impact on creating a more comfortable learning environment for students at school.

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BATIK WORKSHOP AS CULTURAL BRIDGE: STRENGTHENING INDONESIA–THAILAND ACADEMIC COLLABORATION

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Abstract. This community service program, themed “Building Cultural Bridges through a Batik Workshop at Maejo University, Thailand”, aimed to introduce and preserve batik as an Indonesian cultural heritage while fostering cultural ties between Indonesia and Thailand. This activity was conducted in the form of an offline workshop designed for lecturers and students learning the Indonesian language at Maejo University who have an interest in Indonesian culture as part of their studies. The workshop with a participatory approach covered the history and philosophy of batik, demonstrations of basic techniques, and hands-on batik-making practice. The content included traditional Indonesian patterns such as Parang and Kawung, as well as contemporary designs to illustrate the adaptation of batik in the modern era. Evaluation results showed increased participant understanding of batik culture, positive cross-cultural interaction, and high satisfaction levels. This program also opened opportunities for further collaboration between Indonesia and Thailand in the fields of education and culture, reaffirming the role of batik art as a medium of cultural diplomacy.

Keywords: batik workshop; Indonesian cultural heritage; cross-cultural learning; cultural diplomacy; international cooperation

INTRODUCTION

Batik is one of Indonesia’s cultural heritages that has been recognized as an Intangible Cultural Heritage by UNESCO since 2009. The art of batik-making is not only of aesthetic value but also embodies life philosophy and the cultural identity of Indonesian society (Sudaryanto, 2017; Mahendra, 2021). Efforts to preserve batik while promoting it on the international stage are important so that the younger generation and the global community can appreciate the meanings behind batik motifs (Adi, 2020; Prabowo, 2019). On the other hand, cultural exchange through traditional arts such as batik can serve as an effective form of cultural diplomacy to strengthen international relations (Wang, 2018).

Maejo University in Chiang Mai, Thailand, is a higher education institution that offers an Indonesian Language for Foreign Speakers (BIPA) program as part of its curriculum internationalization efforts. This program aims to equip students with both language competence and cultural understanding of Indonesia to support regional cooperation in Southeast Asia. However, Indonesian language learning at Maejo University has so far tended to be theoretical and text-based, with limited opportunities to provide students with direct cultural experiences. Based on interviews with lecturers, one of the main challenges is the lack of practical activities that allow students and lecturers to personally experience Indonesian culture. This has resulted in a shallow cultural understanding and could reduce students’ motivation to study Indonesian comprehensively. Cross-cultural learning studies show that integrating culture into language teaching can increase students’ motivation and comprehension (Dewi, 2020). Therefore, innovation is needed in the form of interactive, culture-based activities to complement classroom learning (Haryanto, 2015; Hartono et al., 2018).

Based on feedback from lecturers who would participate in this program, several inputs highlighted the following points: a) Neither lecturers nor students had ever directly explored batik-making as part of Indonesian cultural learning. A preliminary survey indicated that only about 20% of students knew what batik was, and almost none had ever tried making it. b) Indonesian cultural learning has so far been mostly theoretical, which made it less attractive to students. Practical activities involving cultural arts were almost non-existent, even though they could increase engagement and provide meaningful learning experiences. c) Collaborative activities based on

cultural arts could strengthen academic and cultural relations between the two countries and enhance the international profile of the Indonesian language program.

Based on these findings, the community service team designed a batik workshop as a solution to bridge the need for direct cultural learning. This activity was considered strategic since batik art can serve as a medium of intercultural communication that is easily appreciated by international participants (Sudaryanto, 2017; Suryanto, 2016). Through the workshop, participants could learn cultural values through experiential learning, which was expected to increase their appreciation of Indonesian art and culture while fostering people-to-people contact between Indonesia and Thailand.

This batik workshop had several main objectives: (1) to enhance Maejo University lecturers' and students' understanding of batik art as Indonesian cultural heritage; (2) to provide participants with hands-on experience in creating batik works so that they could better appreciate its philosophical values; (3) to support Maejo University's internationalization program through innovative and collaborative cross-cultural activities; and (4) to strengthen academic and cultural relations between Indonesia and Thailand by utilizing batik art as a medium of cultural diplomacy. These objectives are in line with Indonesia's Higher Education Key Performance Indicators, which encourage contextual learning outside the classroom and international collaboration to strengthen students' global competencies.

LITERATURE REVIEW

Batik is widely acknowledged not only as a visual artwork but also as a medium of local wisdom and philosophical values. It has gained international recognition as both a national identity marker of Indonesia and a world cultural asset after being designated as Intangible Cultural Heritage by UNESCO in 2009 (Mahendra, 2021). Traditional batik motifs such as *Parang*, *Kawung*, *Truntum*, and *Mega Mendung* reflect profound philosophies including perseverance, purity, affection, and resilience. Introducing the meanings behind these motifs to international learners can serve as an effective bridge for cross-cultural understanding (Sudaryanto, 2017). Prabowo (2019) further explains that batik functions as an engaging cultural learning medium, as both the process of making and exploring the philosophy of its motifs enable participants to comprehend Indonesian perspectives and values.

In the context of language and cultural education, culture-based learning is considered essential in fostering students' intercultural competence. Haryanto (2015) emphasizes that arts-based cultural education not only develops practical skills but also conveys philosophical meanings embedded in cultural traditions. For foreign learners of Bahasa Indonesia (BIPA), motivation and comprehension significantly increase when language teaching is integrated with relevant cultural contexts (Dewi, 2020). Hartono et al. (2018) support this by demonstrating that experiential, culture-based learning can enhance students' appreciation and understanding of the target culture. Similarly, Ismail and Pratama (2019) highlight that incorporating local cultural elements into foreign language teaching enriches learning and makes it more contextual and meaningful.

Kolb's experiential learning theory (1984) provides a strong foundation for implementing culture-based workshops. According to Kolb, learning is a cyclical process that involves concrete experience, reflective observation, abstract conceptualization, and active experimentation. Cultural workshops such as batik-making embody this process by offering learners direct experience, opportunities for reflection, conceptual understanding of cultural philosophy, and the ability to apply new knowledge in practice. Moon (2004) also underscores that reflective and experiential learning fosters intercultural sensitivity, while Eisner (2002) and Rittelmeyer (2004) argue that arts-based education nurtures creativity, imagination, and holistic competencies.

The role of batik in cultural diplomacy is also significant. Wang (2018) asserts that cultural exchange programs that showcase traditional arts can strengthen relations between nations and enhance mutual understanding, particularly within the Southeast Asian context. Nye (2004) conceptualizes such initiatives as a form of "soft power," through which nations influence others by attraction rather than coercion. Batik workshops, therefore, function not only as educational tools but also as grassroots diplomatic efforts that strengthen ties between Indonesia and Thailand. This is supported by Suryanto (2016), who notes that art-based activities create natural spaces for intercultural dialogue, while Susanti and Ahmad (2016) highlight that collaborative art workshops promote social interaction and cross-cultural understanding through shared experiences.

In addition, digital innovation plays an increasingly important role in preserving and teaching batik. Gunawan et al. (2022) emphasize the potential of augmented reality (AR) applications to provide batik simulation, offering new opportunities for global learners without geographical limitations. Andriani et al. (2020) show that digital batik training modules and interactive videos enhance student motivation and comprehension, especially for international learners. However, Wulandari et al. (2021) stress that face-to-face workshops remain superior in building emotional connection and deep cultural appreciation. Community service programs involving active cultural participation foster inclusive and enjoyable learning environments while creating opportunities for sustainable cross-national collaboration (Prasetyo & Lestari, 2017; Wijaya & Rahmat, 2021).

Based on these theoretical perspectives, it can be concluded that batik workshops in international academic settings contribute positively to both educational and intercultural dimensions. They provide learners with hands-on cultural experiences, enhance motivation and appreciation, promote intercultural dialogue, and serve as instruments of cultural diplomacy. Furthermore, the integration of digital innovation alongside traditional workshops broadens access while maintaining the experiential value of face-to-face learning. These insights form the conceptual foundation for implementing batik workshops as a model of experiential, arts-based, and diplomacy-oriented cultural learning.

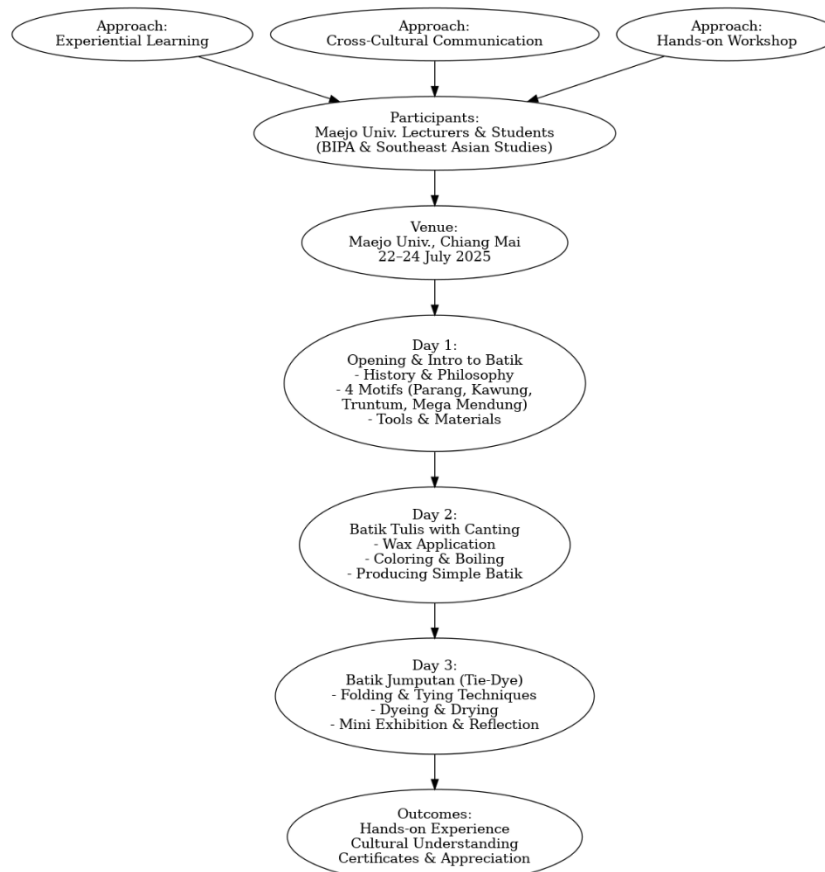
METHOD

The approach used in the implementation of this community service program consisted of three main strategies. First, Experiential Learning, where participants learned through direct experience by practicing batik-making themselves. Second, Cross-Cultural Communication, which emphasized two-way interaction between Indonesian facilitators and Thai participants to foster intercultural understanding in a collaborative atmosphere. Third, a Hands-on Workshop, which focused on practical learning (learning by doing) rather than theory alone, enabling participants to experience the batik-making process from start to finish.

The workshop was attended by lecturers from the Faculty of Liberal Arts, Maejo University—particularly those in the fields of language, culture, and education—as well as students enrolled in BIPA (Bahasa Indonesia for Foreign Speakers) or Southeast Asian language courses. Participants were selected based on their interest in Indonesian culture and their high motivation to engage in applied learning. The involvement of local lecturers as both participants and collaborative partners was expected to enrich discussions and ensure continuity beyond the workshop.

The workshop was conducted offline over three days, from 22–24 July 2025, at the Faculty of Liberal Arts, Maejo University, Chiang Mai. The daily activities were designed as follows:

1. First day: Opening and Introduction to Indonesian Batik. The event began with an official opening ceremony led by the Faculty of Liberal Arts of Maejo University, followed by a welcoming address from the UNY team. The first session introduced the history of batik and the philosophy behind traditional motifs. Participants were presented with four classic batik motifs (*Parang*, *Kawung*, *Truntum*, and *Mega Mendung*), along with their symbolic meanings such as perseverance, purity, affection, and serenity. Facilitators displayed visual examples of each motif and explained their cultural significance, including how some motifs were historically reserved for royal families. Participants were also introduced to the tools and materials of batik-making, such as patterned cloth, canting (wax pen), malam (batik wax), dyes, stove and pans, and the basic techniques of using canting.
2. Second day: Batik Tulis Workshop with Canting. Participants began practicing batik tulis (hand-drawn batik) using canting on prepared patterned cloth. The instructors first demonstrated how to apply melted wax onto the cloth following the given patterns. Each participant then attempted the process under close guidance from the UNY facilitators. After completing the wax application and allowing it to dry, participants proceeded to dye the cloth with textile colors. The fabric was then boiled to remove the wax, revealing the colored patterns. This process allowed participants to experience the challenges of controlling the canting and maintaining patience throughout the procedure. By the end of the second day, each participant had produced a simple piece of hand-drawn batik as their own creation.
3. Third day: Batik Jomputan (Tie-Dye Technique). The facilitators introduced batik jomputan, a simpler form of batik often referred to as tie-dye in universal terminology. Participants were taught various folding and tying techniques on white cloth to create specific patterns such as spirals, fans, and crisscross designs. The instructors demonstrated how to fold, tie, and dip the fabric into dye solutions. Each participant then created their own tie-dye batik with a pattern of their choice. After the dyeing and drying process, the cloth was untied to reveal the final colorful designs. At the end of the session, all works—both batik tulis and tie-dye batik—were displayed in a spontaneous mini exhibition. The workshop concluded with a reflection session, during which participants and lecturers shared their experiences, impressions of batik culture, and lessons learned. As a token of appreciation, the team presented simple awards to several participants with outstanding works, along with certificates of participation officially handed over by representatives of the host faculty.



Results and Discussion

The batik workshop at Maejo University was carried out as planned and ran smoothly. During the three-day implementation, participants' enthusiasm was very high, as reflected in their consistent attendance at each session. On the first day, the presentation on the introduction to batik and the philosophy of its motifs successfully captured participants' attention. Many students expressed their delight in learning the stories and profound values behind each batik motif. They stated that the presentation provided new insights and enriched their understanding of Javanese/Indonesian society. Interaction took place in a two-way discussion, with participants actively asking questions about the origins of motifs and the role of batik in Indonesian culture. The involvement of local lecturers as participants made the discussion even more dynamic. During these exchanges, participants compared Thai textile heritage (such as Thai silk) with Indonesian batik, which generated constructive cross-cultural dialogue.

On the second day, participants engaged in simple batik-making practice. At first, many found it difficult to handle the *canting* (wax pen) and to control the flow of dye while drawing batik designs on the cloth. The facilitators from UNY provided demonstrations and close guidance, gradually enabling participants to master the basic techniques. The moment of applying dye over waxed cloth became a unique experience; several participants—both students and lecturers—remarked that it was their first time realizing how complex the process of making batik truly was. Throughout the process, values such as patience and accuracy were naturally cultivated, as participants had to remain focused and careful to keep the patterns neat. Despite facing minor challenges, such as wax dripping outside the lines or uneven color distribution, participants demonstrated creativity and joy when



observing the final results of their batik pieces. The facilitating team continuously encouraged participants to appreciate each other's work and fostered a collaborative atmosphere.



Figure 1. Participants start coloring batik while UNY lecturers provide direct guidance.

On the third day, during the continuation of the activities, the atmosphere became more relaxed and exploratory with the *jumputan* (tie-dye) batik technique. All participants greatly enjoyed the folding and tying stages, as this technique allowed them more freedom to create without following fixed patterns. The process of dipping the fabric into dye solutions turned into an enjoyable activity. Participants experimented with mixing colors to achieve attractive gradients. When the fabric was unfolded after dyeing, participants showed expressions of amazement and satisfaction as they observed the colorful tie-dye patterns they had created. Each cloth displayed a unique design, delivering the message that every individual is capable of producing different creative works even when using the same technique.



Figure 2. *Jumputan* batik activity and participants' tie-dye batik creations during the workshop.

At the end of the activity, before the closing session, the participants and the community service team organized a mini exhibition by displaying all the participants' batik works at the front of the hall. The participants walked around and admired each other's creations. The community service team gave recognition by selecting several of the best works.



Figure 3. Several of the best works produced by participants.

After the completion of the workshop series, the organizing team conducted an evaluation to measure the success of the program. The evaluation was carried out through the distribution of a participant satisfaction questionnaire (via Google Forms) and informal question-and-answer sessions. The aspects assessed included

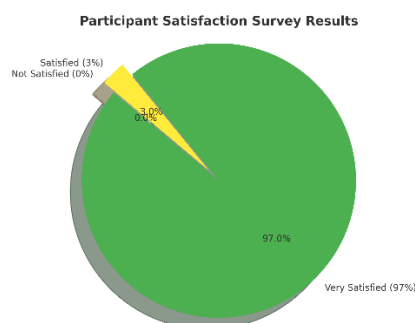


participants' understanding of batik before and after the workshop, their impressions of the delivery methods, their level of engagement, and suggestions for improvement. The data from the completed questionnaires were analyzed descriptively to determine the percentage of satisfied participants as well as qualitative feedback. In addition, the team noted Maejo University's interest in pursuing further collaboration. All of these evaluation findings were used as reflections in preparing the final report and recommendations for future programs.

During the closing ceremony, the Vice Dean I of the faculty attended to officially conclude the event, congratulating participants who produced the best works and expressing gratitude to the community service team. In his remarks, he highlighted that the workshop had provided new skills and would form part of broader cultural understanding on their campus. At the end of the event, the organizing team also conducted direct observations and reflections. Based on these observations, all program objectives were successfully achieved. Participants' understanding of batik art improved significantly. This was evident in the final discussion session, where students were able to explain the philosophy behind several batik motifs and connect them to universal values. Participants also admitted that they had developed a greater appreciation of batik as cultural heritage after experiencing the process firsthand. This direct experience succeeded in fostering both appreciation and new skills. Each participant produced two batik products (hand-colored batik and tie-dye) which they could take home as souvenirs. The experience was expected to leave a lasting impression; as one participant expressed, *"Now I understand why batik is so special; the process requires perseverance and is full of meaning."* This aligns with the program's aim to instill cultural appreciation in participants.

The workshop strongly supported the internationalization of Maejo University's curriculum. Cross-cultural activities such as this provided global exposure for local students and lecturers, allowing them to interact directly with the Indonesian teaching team, learn about culture through practice, and expand academic networks. The faculty described the workshop as a tangible model of international cooperation and expressed hopes to further develop it in the future. Academic and cultural ties between Indonesia and Thailand are expected to strengthen through this program. During the workshop, close bonds formed between the UNY team and the Maejo University community. By the end of the event, both sides had discussed potential follow-up initiatives such as student exchanges, online cultural classes, and joint research on BIPA (Indonesian for Foreign Speakers) learning. Maejo University lecturers expressed their interest in establishing sustainable cooperation, noting that this workshop marked the first step in cultural diplomacy at the institutional level.

The organizing team also conducted an additional evaluation by distributing a participant satisfaction questionnaire via Google Form.



The results of the satisfaction survey showed a very positive response. The overall satisfaction rate reached 100%, with approximately 97% of participants reporting that they were "very satisfied" and 3% stating that they were "satisfied" with the implementation of the workshop. None of the participants indicated dissatisfaction. This was also reflected in participants' feedback, in which they appreciated the materials delivered, especially the combination of cultural explanation and hands-on practice, which they described as *"not boring and very informative."*

Several constructive suggestions were also provided. Some participants wished that the workshop duration could be extended, as they felt that three days was insufficient to master batik techniques more thoroughly. Others recommended that follow-up sessions or post-workshop mentoring be organized in the future to allow participants to further develop their newly acquired skills. These inputs are highly valuable for the improvement of subsequent programs.

From the organizers' perspective, several challenges were also noted during implementation. One of the challenges involved language barriers: some participants were not fluent in Indonesian, so instructors occasionally had to use simple English and rely on local lecturers for clarification. Nevertheless, this issue was resolved and provided lessons for both sides in managing cross-linguistic communication. Another challenge concerned the limited availability of batik-making equipment on site (for example, the number of stoves and pans needed for the

dyeing process), which required the team to improvise. However, participants' enthusiasm ensured that these challenges did not hinder the overall success of the program.

The outcomes of this community service program reinforced previous studies on the benefits of culture-based learning. The increase in participants' motivation and understanding after the workshop is consistent with Hartono et al. (2018), who argue that direct cultural experiences enhance cross-cultural appreciation. The active involvement of students in traditional arts also demonstrated its potential to cultivate respect for cultural diversity (Wijaya & Rahmat, 2021). Furthermore, the creation of warm dialogue and interaction between participants and facilitators from two different countries illustrates how art can serve as a "*common language*" that bridges cultural differences (Suryanto, 2016). These findings also provide concrete evidence of the effectiveness of grassroots cultural diplomacy, echoing Wang's (2018) view that such cultural initiatives strengthen international relations through mutual understanding.

From an academic perspective, this workshop offers a concrete example of implementing experiential learning beyond the classroom and across national borders, while also enhancing institutional networking and international reputation. The expected long-term impact is the continuation of similar programs and collaboration between UNY and Maejo University, possibly through the signing of an MoU or the development of student exchange initiatives. Thus, this batik workshop was not only successful as a standalone activity but also produced a multiplier effect by opening opportunities for further collaboration and inspiring other models of cross-cultural learning.

CONCLUSION

Based on the findings from the community service program, it can be concluded that the cultural workshop on batik held at Maejo University, Thailand, successfully achieved its intended objectives. The activity enhanced the knowledge and understanding of lecturers and foreign students regarding batik as an important element of Indonesia's cultural heritage. Through the combination of cultural presentations and hands-on practice, participants gained insights into both the philosophy and basic techniques of batik-making, which were previously unfamiliar to them. All participants experienced meaningful engagement by creating their own batik works, which fostered appreciation for cultural values such as perseverance, patience, and creativity embedded in the process. The program contributed to the internationalization of education at Maejo University by creating positive cross-cultural interactions and broadening the global outlook of its participants. Furthermore, the workshop functioned as a cultural bridge that strengthened academic ties between Indonesia and Thailand, evidenced by the strong interest in continuing collaboration in the future. Overall, this program confirms that traditional arts such as batik can serve as effective instruments of cultural diplomacy in educational settings, facilitating both cultural transmission and international friendship.

In addition to these positive outcomes, several points are suggested for improvement in future activities. Extension of duration or follow-up sessions is recommended, considering the high enthusiasm of participants and the complexity of batik-making. A longer timeframe would enable participants to complete their batik works more thoroughly and to explore techniques with adequate guidance. It is also suggested that participants' works be exhibited more widely, beyond the classroom level. The closing event could be designed as an open mini exhibition for the broader academic community, and ideally, aligned with Indonesian cultural events on campus to maximize cultural promotion among students and the surrounding community.

The interest expressed by Maejo University for further collaboration should be facilitated through the establishment of a Memorandum of Understanding (MoU) or cooperation agreements in the fields of culture and education. Possible follow-up activities include annual cultural exchange programs, joint research projects on cross-cultural learning, or thematic summer courses, ensuring that the cultural bridge already built can be preserved and developed further.

Cultural workshops such as this serve as a model of community service that not only empowers partner institutions but also strengthens international friendship through cultural pathways.

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IMPLEMENTATION OF EXERCISE THERAPY ON THE QUALITY OF FITNESS ASPECTS OF WELLNESS AT PT. PUTRI KEDATON

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Abstract. Employee physical fitness is an important factor in supporting work productivity and reducing the risk of musculoskeletal disorders in industrial environments. The purpose of this community service activity is to implement light physical exercise therapy as an effort to improve the quality of wellness fitness aspects at PT. Putri Kedaton. This activity involved 20 employees as a sample, and was carried out for 4 weeks with a frequency of three times per week. The implementation method included education, demonstrations, and direct practice of physical exercise therapy focused on stretching and strengthening core muscles. Evaluation was carried out through pre- and post-intervention questionnaires that measured knowledge, physical complaints, sleep quality, and work stress levels. The evaluation results showed average reduction in muscle pain from 6.9 to 3.1. improved sleep quality from a score of 4.5 to 7.7. fatigue decreased from 7.2 to 4.0 And work ability increased from 5.1 to 7.5. This activity received a positive response from participants and was recommended as a regular company program. Simple exercise therapy has proven effective as a promotive and preventative approach to improving employee wellness at PT Putri Kedaton.

Keywords: Exercise Therapy, Physical Fitness, Wellness, Employees, Industry

INTRODUCTION

Physical fitness is a crucial aspect in supporting employee productivity and well-being in the workplace. Physical fitness is defined as the body's ability to perform physical activities efficiently without experiencing excessive fatigue and having sufficient energy reserves to face additional challenges (Caspersen et al., 2021). Various studies have shown that good physical fitness can improve work efficiency, reduce absenteeism due to health issues, and increase employee job satisfaction (Janssen & LeBlanc, 2020). Therefore, companies are beginning to adopt fitness programs as part of their strategies to improve employee well-being and productivity.

Structured wellness programs have been shown to reduce workplace stress levels and improve employees' quality of life (Grawitch et al., 2020). Consistently, companies that implement holistic wellness policies tend to have higher employee retention rates and increased employee engagement in their work.

Physical fitness has been widely implemented in the workplace in various forms, such as regular exercise programs, promoting physical activity, and providing health facilities in the workplace. According to a study by Pronk et al. (2022), companies that provide access to fitness facilities or exercise programs in the office experience a 15-20% increase in productivity compared to companies that do not implement similar programs. Furthermore, physical activity habits in the workplace can reduce the risk of non-communicable diseases, such as obesity and cardiovascular disease, which are often the main causes of absenteeism (Goetzel et al., 2019). The positive impact of physical fitness on employee mental health should also not be overlooked.

Regular physical activity has been shown to increase endorphins, which contribute to stress reduction and improved mood (Rees et al., 2021). Furthermore, workplace wellness programs can reduce anxiety and depression levels in employees, ultimately positively impacting their job satisfaction and performance (Conn et al., 2020). Therefore, integrating physical fitness into the workplace can be an effective strategy for improving employee mental and emotional well-being. Although the benefits of physical fitness and wellness in the workplace have been extensively researched, implementation challenges remain. Some barriers include lack of employee participation, limited company budgets, and the lack of policies supporting the implementation of wellness in the workplace (Bailey et al., 2020). Therefore, a more adaptive and evidence-based approach is needed to improve the effectiveness of workplace wellness programs. With supportive policies and active involvement from company management, physical fitness programs can become an integral part of a healthier and more productive work culture.

Initial observations and interviews with management and several employees identified a number of serious issues related to employees' physical fitness and occupational health. Static and repetitive work activities, such as

prolonged bending over while massaging or standing continuously during treatment, cause muscle tension, joint pain, and chronic fatigue. Furthermore, poor ergonomic postures exacerbate these conditions. Work environments that require high levels of energy and concentration also contribute to significant psychological stress for employees. Data shows that more than 60% of employees complain of muscle tension, particularly in the back, neck, and hands. These complaints largely stem from repetitive work activities without adequate stretching or recovery exercises. Furthermore, employee health surveys indicate that only about 25% of employees regularly engage in physical activity outside of work hours, and most of them report not having sufficient time or knowledge to do so.

There's a lack of structured fitness programs in corporate environments, as well as a lack of education about the importance of physical fitness and wellness for service workers, particularly in the beauty and personal care sector. Yet, therapists and service staff are key representatives of a company's service values, and are expected to appear healthy, energetic, and professional in every customer service session.

METHOD

Community Health Service activities are carried out at PT Putri Kedaton. The implementation method for community service activities (PKM) is divided into several stages as follows:

1. Preparation

- a) Conduct an initial assessment of employees' physical condition and fitness through interviews, questionnaires, and simple fitness tests.
- b) Develop a physical training program tailored to the needs and abilities of employees
- c) Socialization of the program to provide education to employees regarding the benefits of exercise therapy and how to implement it



Figure 1. Fitness and Wellness Exercise Therapy Education
at PT Putri Kedaton

2. Implementation

The implementation of PKM activities will be carried out from July 21 to August 21, 2025, involving 20 employees as samples. The implementation of the activities is as follows:

- a) The activity was implemented using a four-week exercise therapy program, with training frequency three times per week. Each session lasted approximately 45–60 minutes, with a training structure that included a warm-up, core exercises, and a cool-down.
- b) The program is implemented directly with guidance from an implementation team consisting of students and competent supervising lecturers in the fields of sports and health. The exercise therapy program emphasis is placed on correct technique, exercise safety, and participant motivation.
- a) An interactive approach in the form of a light discussion about the benefits of physical activity and the importance of maintaining fitness in the workplace.



Figure 2. Fitness and Wellness Exercise Therapy
at PT Putri Kedaton

3. Evaluation

Monitoring is conducted periodically throughout the program to ensure participant engagement and program effectiveness. Evaluations are conducted midway through and at the end of the program, including physical fitness re-measurements and participant satisfaction and complaint surveys. Evaluation results are used to adjust training materials and provide feedback to the company.



Figure 3. Feedback from the Fitness and Wellness Exercise Therapy Satisfaction Survey at PT Putri Kedaton

4. Preparation of Training Modules

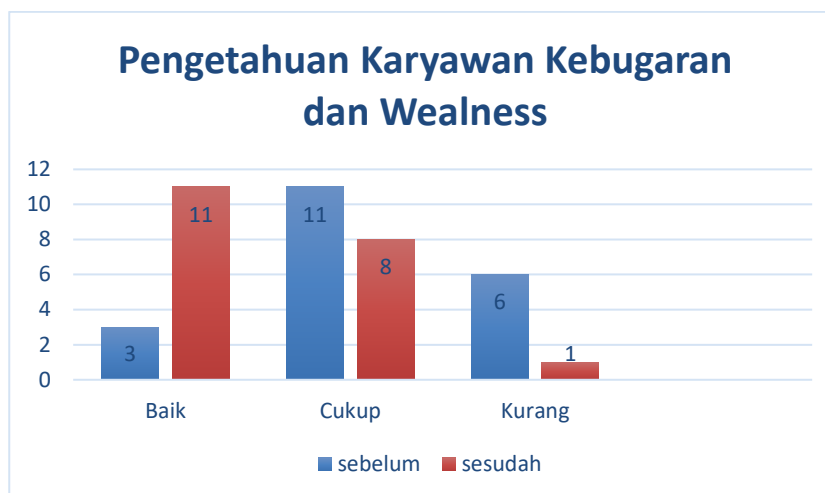
Developing a self-training module for ongoing employee use. Furthermore, the team recommended that PT Putri Kedaton management adopt this program as part of its long-term health and wellness policy.

RESULTS AND DISCUSSION

The Community Service Program was implemented at PT. Putri Kedaton through a four-week exercise therapy program for 20 employees. This program aimed to determine the effectiveness of the intervention. This evaluation was conducted by comparing pre- and post-intervention conditions based on four key parameters directly

related to fitness and wellness..The results of the knowledge evaluation before and after the implementation of the Exercise Therapy program on fitness quality are presented in the following table:

Figure 4. Results of Exercise Therapy Knowledge on the Fitness and Wellness Quality of PT. Putri Kedaton Employees



Based on the results of the evaluation of PT Kedaton employee knowledge, it shows that before the implementation of the activity, the majority of respondents, 11 people (55%) were in the sufficient category and the low category, 6 people (less than 30%). After the program and education session were carried out, there was a significant increase in the good category, 11 people (55%) and respondents with poor understanding decreased to 1 person (5%). This shows that exercise therapy activities accompanied by education have had a positive impact not only on physical aspects, but also increased respondents' knowledge and awareness of the importance of fitness and wellness.

The results of the evaluation before and after the implementation of the Exercise Therapy program on fitness quality are presented in the following table:

Table 1. Results of the Evaluation of Exercise Therapy on the Fitness and Wellness Quality of PT. Putri Kedaton Employees

No	Parameter	Before(n=20)	After (n=20)	Change
1	Muscle Pain	6.9	3.1	Reduce
2	Sleep Quality	4.5	7.7	Increase
3	Fatigue Level	7.2	4.0	Decrease
4	Work concentration	5.1	7.5	Increase

Based on the evaluation results, it was discovered that the exercise therapy program had a significant impact on improving the physical and mental fitness of employees, including:

a. Muscle Pain Reduction

Average muscle soreness decreased from 6.9 to 3.1. This indicates that stretching and body mobilization exercises are effective in reducing muscle tension caused by static work activities, such as massaging in a bent position for a long time or standing continuously while performing the treatment

b. Improved Sleep Quality

Sleep quality improved from 4.5 to 7.7. Progressive muscle relaxation and breathing exercises have been shown to help reduce stress and improve sleep quality.

c. Decreased Fatigue Levels

The fatigue score decreased from 7.2 to 4.0, meaning the body is more ready to face the workload due to improved blood circulation, breathing, and body energy management through light exercise.

d. Improved Work Concentration

Focus ability increased from 5.1 to 7.5. A fitter body and better sleep quality significantly support mental concentration at work.

CONCLUSION

Community service activities Implementation of Exercise Therapy Program on the Quality of Wellness Fitness Aspects at PT. Putri Kedaton has been implemented well and has had a positive impact on knowledge, improving aspects of fitness and the quality of employee wellness, namely reducing muscle pain, improved sleep quality, Reduced fatigue levels and increased work concentration. It is hoped that with this community service activity PT. Putri Kedaton can implement regular programs as part of occupational health promotion activities and providing ergonomics and stress management education to strengthen the results that have been achieved so that the program benefits can last in the long term

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COLLABORATION BETWEEN THE TRADITIONAL MEDICINE STUDY PROGRAM AND TOURISM INDUSTRY PARTNERS: MASSAGE SKILLS TRAINING TO IMPROVE TOURISM SERVICES

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Abstract. The quality of tourism services is determined not only by the beauty of the destination, but also by the professionalism and skills of those involved in the industry. One rapidly growing trend is wellness tourism, where massage services are a crucial part of providing memorable experiences for tourists. This Community Service (PPM) activity aims to improve massage skills for tourism workers through collaboration between the Traditional Medicine Study Program and tourism industry partners. The implementation method included identifying training needs, conducting face-to-face training, and evaluating participant skills through observation. Participants included hotel spa staff, tour guides, and tourism service providers in the Yogyakarta area. The results of the activity demonstrated an increase in technical massage skills and participants' understanding of service standards that meet the expectations of both domestic and international tourists. The majority of participants found the training useful and applicable in their work. This activity is expected to serve as a model for strengthening tourism human resource capacity based on sustainable academic-industry collaboration.

Keywords: community service, massage, tourism, wellness tourism, traditional medicine

INTRODUCTION

Indonesia's tourism sector is a key driver of the national economy, contributing significantly to Gross Domestic Product (GDP) and employment. With increasing global competition, the quality of tourism services has become a key factor in attracting and retaining tourists, both domestic and international. One trend that has grown rapidly in recent years is wellness tourism, which combines recreation with health, fitness, and relaxation services¹.

Massage services are a crucial element of wellness tourism, not only as a means of relaxation but also as a form of service that reflects hospitality, skills, and local wisdom². However, in the field, several obstacles remain, including: a limited tourism workforce with standard massage skills, a lack of training based on a combination of traditional and modern techniques, and suboptimal collaboration between universities and the tourism industry in human resource development.

The Traditional Medicine Study Program excels in mastering massage techniques based on local wisdom that can be synergized with the needs of the tourism industry. On the other hand, tourism industry partners possess networks and experience in tourism services that adhere to professional standards. Collaborating between the two presents a strategic opportunity to produce relevant, applicable training that is oriented towards improving service quality.

This Community Service (PPM) activity aims to address this skills gap by providing massage skills training for tourism workers. This training is expected to not only improve participants' technical competency but also build awareness of the importance of service standards, professional ethics, and cultural understanding in interactions with tourists from diverse backgrounds.

LIBRARY REVIEW

Tourism and Service Quality

Tourism is the activity of traveling by individuals or groups to a specific location for recreation, business, or other purposes within a specific timeframe³. Service quality is a determining factor in tourist satisfaction and the success of a destination. Service quality is influenced by five main dimensions: tangibles, reliability, responsiveness, assurance, and empathy⁴. In the context of tourism, friendly, professional service that meets international standards is an additional attraction for tourists.

Wellness Tourism

Wellness tourism, or health and wellness tourism, is a segment of tourism that focuses on improving the physical, mental, and spiritual health of tourists through various services, including spas, massage, yoga, and traditional therapies⁵. This trend is growing rapidly as global awareness of a healthy lifestyle and self-care increases. In Indonesia, the potential for wellness tourism is enormous, supported by a rich tradition of healing and therapy based on local wisdom.

Massage as a Tourism Support Service

Massage services are an important element in wellness tourism, not only as a means of relaxation, but also as a form of service that reflects friendliness, skills and local wisdom⁶. Massage is a technique for manipulating the body's soft tissues aimed at relaxation, pain relief, improving blood circulation, and balancing the body's energy. In the tourism industry, massage serves not only as a health service but also as part of the customer experience that strengthens the destination's image. Massage performed with appropriate techniques can increase customer satisfaction, reduce stress, and create a positive impression of the overall service⁷. The integration of traditional Indonesian massage techniques with modern methods can provide a unique experience in tourism services.

Skills Training for the Tourism Workforce

Skills development is a systematic process for improving work competencies, encompassing knowledge, technical skills, and professional attitudes. Effective training must be needs-based, use interactive methods, and have clear evaluations to measure success⁸. In the tourism industry, massage skills training requires a combination of technical mastery, service ethics, cross-cultural communication, and knowledge of customer safety and comfort.

Academic–Industry Collaboration in Human Resource Development

Collaboration between universities and industry (university–industry collaboration) is a crucial strategy for bridging the gap between theory and practice. Universities can provide academic expertise, research, and innovation, while industry provides market insights, service standards, and direct access to end users⁹. In the context of PPM, collaboration between the Traditional Medicine Study Program and tourism industry partners enables relevant, applicable, and market-oriented training.

ACTIVITY METHOD

This activity is implemented through a participatory, practical, and applicative approach, combining theory, practice, simulation, and independent assignments. Participants not only gain conceptual knowledge but also direct massage skills that can be applied in the workplace, especially in the tourism sector. During the implementation of the activity, the measurement instruments used include participatory observation and assignment portfolio assessment to measure success descriptively and qualitatively¹⁰. Thus, the level of success can be seen through the improvement of massage skills to improve services in the tourism world.

RESULTS AND DISCUSSION

This Community Service (PPM) activity was implemented as a collaboration between the Traditional Medicine Study Program, Faculty of Vocational Studies, Yogyakarta State University, and tourism industry partners. The training aimed to improve health massage skills as a leading wellness tourism service. The training took place from July 17–20, 2025, at the UNY Hotel Wates and the Faculty of Vocational Studies Massage Laboratory. Participants came from various partners, including Naturindo Fresh, Putri Kedaton, Gallery Prawirotan Hotel, Pengasih Community Health Center, the Makeup & Beauty Study Program, Faculty of Veterinary Medicine, Universitas Negeri Padang, and the M3ASAGI community. The activities were structured in stages, encompassing theory, practice, and implementation of massage techniques on simulated patients.

The first day focused on skeletal anatomy, muscular anatomy, and the fundamentals of health massage based on the Ali Satia Graha method. Participants gained an understanding of the structure of bones, joints, and muscles, including their characteristics, functions, and muscle patterns. This knowledge provided the foundation for applying massage techniques safely and effectively. The second day focused on practical massage techniques, where participants learned stroking, rubbing, and stretching movements on various body parts (legs, trunk, arms,

head, and neck). The third and fourth days focused on hands-on implementation with simulated patients, emphasizing mastery of techniques, service flow, client communication, and the application of safety and comfort principles.

The materials presented were complementary: 1) Skeletal Anatomy provides an understanding of the body's skeletal structure, bone types, and joint movement mechanisms, enabling participants to adapt massage techniques to the physiological limits of the human body; 2) Muscular Anatomy explains muscle characteristics, muscle types (striated, smooth, cardiac), and the specific functions of muscle groups, including factors that influence contraction and relaxation. This is essential for participants to understand massage target areas and prevent client injury; 3) Ali Satia Graha Method Therapy Massage teaches soft tissue manipulation techniques based on local wisdom combined with the scientific principles of anatomy and physiology. These techniques are structured per body part (legs, trunk, arms, head/neck) with preventive, promotive, and curative objectives. The integration of these three materials allows participants to master massage skills comprehensively—relying not only on manual skills but also on the underlying theoretical understanding.

Challenges faced include differences in participants' initial skill levels and limited time to master the techniques in depth. Therefore, it is recommended that this training be followed by regular mentoring programs and skills certification, so that participants' competencies can continue to develop and meet industry standards.

TABLE 1. The Relationship between Material, Activities, Learning Outcomes, Success Indicators, and Assessment Methods

Day/session	Material	Activity	Learning Outcomes	Success Indicators	Assessment Method
Day 1 – Morning Session	Skeletal Anatomy	Explanation of bone structure, types of bones and joints and their movement mechanisms	Participants understand the structure of the body's skeleton, bone function, and joint movement as the basis for massage safety.	Participants are able to name at least 5 main bone structures and 3 types of joint movements correctly.	Q&A test
Day 1 – Afternoon Session	Muscular Anatomy	Explanation of muscle types, characteristics, functions, and contraction-relaxation mechanisms	Participants understand the types and functions of muscles and can identify the target muscle areas for massage.	Participants are able to identify at least 5 main muscle groups that are relevant for massage.	Quizzes and group discussions
Day 1 – Afternoon Session	The Basics of Ali Satia Graha's Massage Therapy Method	Introduction to massage principles, treatment areas, and health benefits	Participants learn basic massage techniques (scouring, rubbing, stretching) and the purpose of their application.	Participants are able to demonstrate at least 2 basic massage techniques according to the instructor's instructions.	Direct observation
Day 2 – Morning & Afternoon Sessions	Massage Techniques for Legs, Body, Arms, Head/Neck	Hands-on practice with instructor guidance	Participants are able to perform massage techniques in the correct sequence and body area with safe pressure.	90% of movements are in accordance with technical procedures and pressure is adjusted to standards.	Practical performance assessment
Day 3 – Morning & Afternoon Sessions	Implementation of Massage on Simulated Patients	Complete massage service simulation from preparation to closing of service	Participants are able to integrate massage techniques with good service ethics and communication.	SOP for friendly service and communication in client simulation	Field observation & SOP checklist
Day 4 – Morning Session	Application of Techniques to Specific Cases	Guided free practice tailored to client needs	Participants can adjust massage techniques and pressure based on the client's condition.	Techniques are tailored to 2–3 different client conditions.	Case practice assessment
Day 4 – Afternoon Session	Evaluation and Feedback	Skills test & reflective discussion	Participants receive feedback for improving techniques and services in the workplace.	Participants identify at least 2 aspects of technical and service improvement.	Self-evaluation and instructor feedback sheet

CONCLUSION

The Community Service (PPM) program, themed "Collaboration between the Indonesian Traditional Medicine Study Program and Tourism Industry Partners: Massage Skills Training to Improve Tourism Services," was

successfully implemented on July 17–20, 2025, at the UNY Hotel Wates and the Massage Laboratory of the UNY Faculty of Vocational Studies. Through a series of lessons covering skeletal anatomy and muscular anatomy, as well as practicing the Ali Satia Graha method of health massage, participants successfully gained a comprehensive understanding and technical skills relevant to the needs of the tourism industry, particularly in supporting the development of wellness tourism. Evaluations showed a significant increase in participants' ability to perform massage techniques correctly, safely, and according to standards, while also fostering awareness of the importance of service ethics and client communication.

In addition to improving the individual competencies of participants, this activity also strengthened collaboration between universities and tourism industry partners, opening up opportunities for follow-up in the form of advanced training, skills certification, and curriculum development based on industry needs. Thus, this activity not only contributed to the development of tourism human resources but also to enhancing the image of tourism services locally and globally.

THANK-YOU NOTE

We extend our gratitude to the massage training participants who represented each agency contributing to the tourism services sector. We hope this dedication will truly improve tourism services, particularly tourist satisfaction.

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Enhancing Teachers' Artificial Intelligence Literacy through AI-Based Teaching Material Revitalization Training

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Abstract. This study reports on a community service program aimed at enhancing teachers' artificial intelligence (AI) literacy through AI-based teaching material revitalization training at SMK Negeri 2 Sewon, Indonesia. The program was designed to address the limited understanding and application of AI among vocational school teachers, many of whom still relied on conventional teaching resources. The training, conducted over four consecutive days with 60 participating teachers from various disciplines, employed a participatory and hands-on approach. Learning activities included lectures, demonstrations, group discussions, and practical assignments focused on AI applications for learning, assessment, administration, and teacher innovation. The evaluation results revealed a significant improvement in teachers' AI literacy, with an average increase of 34.9% in pre- and post-test scores. Furthermore, 78% of the participants successfully produced innovative AI-based teaching materials, ranging from interactive modules to adaptive content aligned with student needs. Participant satisfaction was also high, with an average score of 87.5%, indicating the training's relevance, usefulness, and effective delivery. These findings demonstrate that structured and practice-oriented AI training can substantially enhance teachers' competence in integrating AI into their teaching practice. The program not only improved teachers' conceptual understanding but also fostered confidence and creativity in developing innovative instructional materials. Future initiatives should extend the duration of practice sessions and provide follow-up workshops to ensure sustainability and broader adoption of AI in vocational education.

INTRODUCTION

The rapid advancement of digital technology in the 21st century has profoundly influenced various aspects of human life, including the field of education¹. Among these advancements, Artificial Intelligence (AI) has emerged as a transformative force with significant potential to reshape teaching and learning practices². In education, AI is increasingly recognized for its capacity to support adaptive learning, provide personalized instruction, streamline assessment processes, and reduce teachers' administrative burdens³. These opportunities make AI an essential tool to enhance both instructional quality and the overall learning experience in the digital era⁴.

Vocational schools (Sekolah Menengah Kejuruan/SMK) play a pivotal role in preparing students to meet the demands of an ever-evolving workforce⁵. Teachers in vocational schools are expected not only to master subject-specific content but also to effectively integrate technology into their teaching practices⁶. However, in many contexts, teachers still face challenges in adopting and utilizing AI-based solutions⁷. Preliminary observations conducted at SMK Negeri 2 Sewon revealed that most teachers continue to rely on conventional teaching materials, such as printed modules and basic presentations. While digital technologies have been used to some extent, their application remains limited and does not yet leverage AI's full potential for innovative teaching and learning.

This gap between the technological skills of teachers and the learning needs of students, particularly Generation Z learners who are highly familiar with digital environments, highlights the urgency of equipping teachers with AI literacy⁸. Furthermore, the implementation of the Merdeka Belajar curriculum in Indonesia emphasizes 21st-century skills, including critical thinking, creativity, collaboration, and communication (4C), as well as digital and data literacy. Without adequate knowledge and confidence in applying AI, teachers may struggle to design engaging, relevant, and future-oriented learning experiences for their students⁹.

In response to this need, a community service program (PkM) entitled "Revitalization of Teaching Materials through Artificial Intelligence Application at SMK Negeri 2 Sewon" was conducted. The program aimed to enhance teachers' AI literacy through a structured training that combined conceptual understanding with practical application. The training introduced teachers to AI fundamentals, explored its applications in education, and provided hands-on experience in developing AI-based teaching materials. By adopting a participatory and applied approach, the program sought not only to improve teachers' knowledge but also to foster innovation and confidence in implementing AI in their professional practice¹⁰.

This paper reports on the implementation and outcomes of the training. Specifically, it examines the extent to which the program improved teachers' AI literacy, encouraged the development of AI-based innovative teaching materials, and contributed to teachers' satisfaction and motivation. The findings are expected to offer valuable insights for future initiatives aimed at strengthening AI literacy among educators, particularly in vocational education contexts, to ensure alignment with the demands of the digital age and the goals of sustainable quality education.

LITERATURE REVIEW

Artificial Intelligence (AI) has been defined as the ability of computer systems to perform tasks that typically require human intelligence, such as learning, reasoning, problem-solving, and decision-making¹¹. In recent years, rapid advances in machine learning, natural language processing, and big data analytics have broadened AI's applicability across multiple sectors, including education¹². Within education, AI is widely recognized for its potential to improve instructional practices, support personalized learning, and provide new opportunities for assessment and administration¹³.

In the context of teaching and learning, AI offers several key contributions¹⁴. First, it enables adaptive and personalized learning, allowing instructional content to be tailored to individual students' abilities, pace, and learning styles³. Second, AI-based tools can assist in automating assessments and generating real-time feedback, thereby supporting more objective evaluation processes¹⁵. Third, AI reduces administrative burdens by automating repetitive tasks, enabling teachers to dedicate more time to meaningful interactions with students¹³. Collectively, these contributions align with global educational priorities, such as the United Nations' Sustainable Development Goal (SDG) 4, which emphasizes inclusive and equitable quality education for all¹⁶.

Despite its potential, the integration of AI in education faces challenges¹⁷. In Indonesia, barriers include limited teacher digital literacy, insufficient infrastructure, and a lack of targeted training on practical AI applications¹⁸. Many teachers perceive AI as a complex and intimidating technology, which discourages experimentation and adoption in classroom practice¹⁹. To address this, training programs must be designed to build both confidence and competence, with a focus on practical applications that are directly relevant to teachers' instructional needs²⁰.

The concept of AI literacy has emerged as a critical foundation for successful AI integration in education²¹. AI literacy refers to the knowledge, skills, and dispositions needed to understand, evaluate, and use AI responsibly and effectively²². Key dimensions of AI literacy include understanding AI concepts and limitations, critically evaluating ethical implications, applying AI tools in educational practice, and fostering agency in promoting equitable and ethical AI use²³. For teachers, developing AI literacy not only enhances their instructional capabilities but also positions them as role models in guiding students toward responsible engagement with AI technologies²⁴.

Teacher training is central to developing AI literacy²⁵. According to the Technology Acceptance Model²⁶, individuals are more likely to adopt new technologies if they perceive them as useful and easy to use. Thus, training programs that demonstrate AI's practical benefits for teaching and learning, while also simplifying its application, are crucial for encouraging adoption²⁷. Furthermore, the Kirkpatrick Model of training evaluation provides a framework for assessing the effectiveness of such programs across four levels: reaction, learning, behavior, and results²⁸. Applying this framework allows for a comprehensive understanding of how training impacts teachers' knowledge, practices, and outcomes in their educational environments.

Overall, previous studies emphasize that empowering teachers with AI literacy through structured, practice-oriented training can bridge the gap between technological advancements and classroom implementation²⁹. Such initiatives are particularly significant in vocational schools, where preparing students for the future workforce demands that teachers stay at the forefront of digital and technological innovation.

METHODOLOGY

This study employed a community-based training approach within the framework of a community service program (Pengabdian kepada Masyarakat/PkM) at SMK Negeri 2 Sewon, Bantul, Yogyakarta. The purpose was to enhance teachers' AI literacy and their ability to revitalize teaching materials using AI-based tools. The research method consisted of several stages, namely preparation, implementation, and evaluation.

Research Design

The study adopted a pre-experimental design with a one-group pre-test and post-test approach. This design was chosen to capture the measurable changes in teachers' AI literacy before and after the training intervention. Through this method, researchers were able to identify not only the level of improvement but also the areas of AI literacy where the most significant progress occurred. To strengthen the findings, quantitative data were complemented with qualitative evidence such as observations of participants' engagement and reflections from open-ended feedback. This triangulation of data ensured that the results were not only statistically valid but also rich in contextual understanding³⁰, making the study more comprehensive and aligned with best practices in educational research.

Participants

The participants of this study were 60 teachers from SMK Negeri 2 Sewon, representing a variety of subject areas, including vocational, science, and humanities disciplines. Participants were selected purposively with the consideration that they were actively teaching and directly involved in the preparation of teaching materials. Such diversity allowed the training to address different pedagogical needs while fostering cross-disciplinary collaboration. Importantly, all 60 teachers completed the entire four-day training program, ensuring a 100% response rate for the instruments administered. This high level of participation indicated both the relevance of the training content and the strong motivation of teachers to enhance their technological competence in line with current educational demands.

Training Procedure

The training was carried out over four consecutive days (28–31 July 2025), with a total of 32 contact hours. The procedure was designed to be both participatory and practice-oriented, ensuring that participants were actively engaged rather than passively receiving information. On the first day, participants were introduced to fundamental concepts of Artificial Intelligence and its role in education, providing a shared baseline of understanding. The second day focused on the practical application of AI in classroom teaching and assessment, including demonstrations of AI-powered learning platforms. On the third day, teachers explored the use of AI for educational administration and innovation, reflecting the multifaceted roles of teachers beyond classroom instruction. Finally, the fourth day emphasized teachers' self-development with AI tools and concluded with an assignment that required each participant to design or revise a teaching material using AI applications. This sequence ensured a progressive deepening of knowledge, from conceptual to applied, and from individual to institutional relevance. **TABLE 1** presents the schedule of the four-day AI Literacy training program, including topics, facilitators, and duration.

TABLE 1. Training Schedule of AI Literacy Program.

Day & Date	Topic/Material	Resource Person(s)	Duration
Day 1 (28 July)	Introduction to AI	Prof. Herman Dwi Surjono	4 hours
Day 1 (28 July)	AI Concepts	Dr. Sigit Pambudi	4 hours
Day 2 (29 July)	AI for Teaching	Dzul Fadli Rahman	4 hours
Day 2 (29 July)	AI for Assessment	Teguh Puji Widiyanto	4 hours
Day 3 (30 July)	AI for Educational Administration	Akhsin Nurlyayli	4 hours
Day 3 (30 July)	Teacher Innovation with AI	Zaenal Mustofa	4 hours
Day 4 (31 July)	AI for Teachers' Self-Development	Totok Sukardiyono	4 hours
Day 4 (31 July)	Teaching Material Assignment & Review	Training Team & Facilitators	4 hours

Instruments

To collect comprehensive data, this study employed three different instruments. The first instrument was the AI Literacy Questionnaire, which was adapted from Mills et al.²². It consisted of items measured on a five-point Likert scale (1–5) across five key dimensions: (1) understanding AI concepts and limitations, (2) evaluating AI critically in terms of accuracy, bias, and ethics, (3) applying AI in teaching and learning practices, (4) agency and responsibility in using AI fairly, and (5) integration of AI into education. This questionnaire was administered before and after the training to assess the improvement of teachers' AI literacy.

The second instrument was the Teaching Material Assignment, which required participants to design or revise at least one teaching resource utilizing AI applications, such as automated text generation, assessment tools, or visual media creation. The outputs were then assessed based on their level of innovation, relevance to the subject

matter, and alignment with ethical standards in education. This instrument was essential in determining the extent to which teachers could apply the knowledge and skills gained during the training to create tangible educational products.

The third instrument was the Training Evaluation Survey, designed using the Kirkpatrick Level 1 framework²⁸. It evaluated participants' reactions to the training in terms of content, delivery, facilitators, and overall usefulness. The survey also provided insights into participants' satisfaction, perceived benefits, and suggestions for future improvement.

The three instruments were complementary: the questionnaire captured changes in knowledge and attitudes, the assignment demonstrated practical skills, and the evaluation survey revealed participants' perceptions and satisfaction. Together, they provided a comprehensive picture of the effectiveness of the training program. **TABLE 2** shows the instruments used in this study to collect quantitative and qualitative data from participants.

TABLE 2. Research Instruments and Their Purpose.

Instrument	Purpose	Scale/Format
AI Literacy Questionnaire	Measuring teachers' knowledge, skills, and attitudes before and after training	Likert scale (1–5), 5 dimensions
Teaching Material Assignment	Evaluating teachers' ability to apply AI in developing teaching resources	Product assessment (innovation, relevance, ethics)
Training Evaluation Survey	Measuring teachers' satisfaction with the training	Likert scale (1–5), Kirkpatrick Level 1

Data Analysis

Quantitative data from the AI Literacy Questionnaire were analyzed using descriptive statistics and percentage gain scores to identify improvements in teachers' literacy levels. The results of the teaching material assignments were categorized into three levels: innovative, basic, and incomplete. **TABLE 3** presents the criteria used to evaluate teachers' AI-based teaching materials, categorized into innovative, basic, and incomplete outputs.

TABLE 3. Criteria for Evaluating AI-Based Teaching Materials.

Category	Description	Indicator Example
Innovative	AI-based teaching material is interactive, adaptive, and highly relevant	Interactive quizzes, adaptive learning modules
Basic	AI used in a simple way (summarization, illustration, or test item creation)	Generated summaries, visual illustrations
Incomplete	Product not completed or not integrated with AI tools	Draft without AI application

Meanwhile, qualitative data from observations and open responses were thematically analyzed to provide contextual insights into teachers' engagement, challenges, and recommendations.

Ethical Considerations

All participants provided consent to participate voluntarily in the program. The study ensured confidentiality of responses and emphasized that the training outputs were used solely for academic and developmental purposes.

RESULTS AND DISCUSSION

The training program on AI-based teaching material revitalization at SMK Negeri 2 Sewon was carried out successfully and involved a total of 60 teachers from different subject areas. The results presented in this section highlight both the quantitative and qualitative findings obtained through pre- and post-test questionnaires, teaching material evaluations, and training satisfaction surveys. The discussion also connects these findings with relevant theories and previous studies to provide a broader interpretation of the outcomes.

Overall, the results demonstrate that the program not only improved teachers' knowledge of AI concepts but also enhanced their confidence and creativity in integrating AI into their professional practices. Teachers showed strong engagement during the training, as indicated by full attendance, active participation in discussions, and the successful completion of assignments. The outcomes can be categorized into three main aspects: (1) the improvement of teachers' AI literacy, (2) the development of AI-based teaching materials, and (3) the evaluation of teachers' satisfaction with the training.

Improvement of Teachers' AI Literacy

To evaluate the effectiveness of the training, teachers' AI literacy levels were measured before and after the program using a standardized questionnaire. The assessment focused on three dimensions: conceptual understanding of AI, application of AI in teaching, and awareness of ethical issues in AI use. **TABLE 4** shows the comparative results of teachers' AI literacy before and after the training, indicating substantial improvements across all dimensions.

TABLE 4. Improvement in Teachers' AI Literacy.

Literacy Aspect	Pre-Test Mean	Post-Test Mean	Gain Score	Percentage Increase
Understanding of AI Concepts	2.95	4.08	+1.13	38%
Application of AI in Teaching	3.10	4.16	+1.06	34%
Awareness & Agency in AI Use	3.25	4.01	+0.76	23%
Overall Average	3.12	4.21	+1.09	34.9%

The results indicate that the most significant improvement occurred in understanding AI concepts (38%), suggesting that the training effectively addressed the knowledge gap among teachers. Improvements were also evident in applying AI to teaching practices (+34%), while the increase in ethical awareness and agency (+23%) indicates the beginning of critical reflection on responsible AI use in education. These findings align with the Technology Acceptance Model (Davis, 1989), showing that once teachers perceive AI as useful and manageable, their adoption willingness increases.

Development of AI-Based Teaching Materials

Beyond measuring literacy levels, the program also emphasized practical application by assigning teachers to develop or revise teaching materials using AI tools. The purpose of this assignment was to ensure that teachers could translate their newly acquired knowledge into innovative classroom practices. **FIGURE 1** categorizes the teachers' AI-based teaching materials into innovative, basic, and incomplete products.

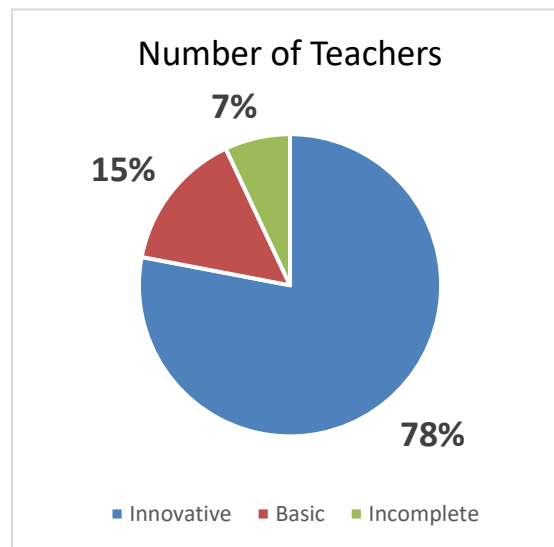


FIGURE 1. Outcomes of Teachers' AI-Based Teaching Materials.

The majority of teachers (78%) successfully produced innovative materials, demonstrating their ability to apply AI beyond simple tasks. This finding underscores the training's effectiveness in bridging theory and practice. However, 7% of teachers failed to complete the assignment, largely due to limited digital skills or inadequate device performance. These challenges highlight the need for differentiated follow-up support.

Teachers' Satisfaction with Training

In addition to literacy improvement and teaching material development, the study also explored teachers' satisfaction with the training. Their feedback was collected using a survey based on Kirkpatrick's Level 1

(reaction), covering aspects such as training content, facilitator performance, delivery methods, and overall usefulness. **FIGURE 2** presents the evaluation results of teachers' satisfaction with the AI training program.



FIGURE 2. Teachers' Satisfaction with the Training Program.

The highest score was obtained for the quality of trainers (89%), indicating that the competence and clarity of the facilitators strongly contributed to participants' engagement. The relatively lower score in methods and delivery (86%) suggests that participants expected more time for hands-on practice, confirming the importance of practice-based learning in teacher training.

Discussion

The findings of this study confirm that targeted, practice-oriented AI training can substantially enhance teachers' literacy and confidence in applying AI to teaching. The observed 34.9% overall increase in AI literacy resonates with earlier studies that emphasize the necessity of structured training for teachers to engage meaningfully with emerging technologies³¹.

Moreover, the fact that 78% of teachers produced innovative AI-based teaching materials demonstrates the training's success in moving beyond theoretical knowledge to practical application. This supports the view of Li et.al.³², who argued that AI in education is most impactful when teachers are empowered to use it creatively.

However, some challenges remain, particularly for teachers with limited digital literacy or device constraints. This suggests that future training should adopt a tiered approach, offering differentiated support and extended time for hands-on practice. Establishing a teacher community of practice around AI could also foster sustainable adoption and peer-to-peer learning.

In sum, the program was effective in improving AI literacy, enhancing teaching material innovation, and achieving high participant satisfaction. It provides a scalable model for professional development programs aimed at preparing teachers for the challenges of digital transformation in education.

CONCLUSION AND RECOMMENDATION

The findings of this study demonstrate that the AI-based training program conducted at SMK Negeri 2 Sewon was successful in enhancing teachers' literacy and competence in utilizing artificial intelligence for educational purposes. The overall literacy of participants increased by 34.9 percent, particularly in the areas of conceptual understanding and the application of AI in teaching practices. This improvement confirms that structured and practice-oriented training can effectively bridge the gap between technological advancements and classroom realities. Furthermore, the majority of teachers, approximately 78 percent, were able to produce innovative AI-based teaching materials, showing that the training not only strengthened knowledge but also translated into practical instructional outputs. The high level of satisfaction reported by participants, with an overall score of 87.5 percent, further indicates that the program met their professional development needs and was facilitated in an engaging and relevant manner.

Despite these achievements, the study also identified areas for further development. Teachers expressed the need for longer sessions devoted to practical exploration, as limited time was a challenge for those with varying levels of digital competence. Some participants also encountered constraints related to device performance and internet stability, which affected the depth of their engagement with AI tools. These challenges suggest that future training should adopt a more differentiated approach, offering tiered modules for beginners, intermediate, and advanced users, as well as additional support to ensure inclusivity. The establishment of a teacher community of practice focused on AI is also recommended as a way to sustain momentum, encourage peer-to-peer learning, and foster innovation beyond the duration of the program. Moreover, while the training touched upon ethical considerations, a stronger emphasis on issues such as bias, data privacy, and fairness in AI use will be crucial for equipping teachers not only as users of technology but also as role models for responsible digital practices.

In conclusion, this program demonstrates the strategic importance of empowering teachers with AI literacy to revitalize teaching materials and innovate classroom practices in vocational education. The success of this initiative suggests its potential scalability to other institutions, contributing to broader educational transformation in line with the goals of Merdeka Belajar and the United Nations Sustainable Development Goal 4 on quality education. By continuing and expanding such programs, teachers can be positioned as active agents of digital transformation, ensuring that education remains relevant, equitable, and future-oriented in the era of artificial intelligence.

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TRADITIONAL SPORTS FESTIVAL AT ELEMENTARY SCHOOL LEVEL TO INCREASE ECOTOURISM VISITS AT THE EMBUNG KRIKILAN BAYAT KLATEN TOURIST OBJECT

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Abstract. The purpose of this PkM activity is to revive tourism in Krikilan Reservoir, Bayat, Klaten and develop educational tourism. Krikilan Reservoir can be used as a place for traditional game educational tourism. Tourism as a means of driving the village economy is very important to be encouraged and developed as well as possible to increase the number of tourists visiting Krikilan Reservoir, Bayat, Klaten. The target audience of this PkM activity is elementary schools in Bayat District. In collaboration with the Regional Coordinator of the Bayat Klaten Education Office, Pokdarwis and Bumdes, Krikilan Village, Bayat, Klaten. The total audience of this PkM activity is 13 elementary schools. This traditional sports festival includes: Gobak Sodor, Egrang, Bakiak, and Tulup/Sumpitan. The implementation of PkM activities involves 13 elementary schools with a total of 169 students. The event was attended by the Regional Coordinator of the Bayat Education Office, the head of Krikilan Bayat Village, the school principals, the accompanying teachers from each school, and the head of the Krikilan Bayat Reservoir Tourism Group (Pokdarwis). This community service activity went well.

Keywords: Festival, Traditional Sports, Educational Tourism Visits.

INTRODUCTION

Krikilan Village is a village in Bayat District, Klaten Regency, Central Java. Krikilan Village boasts the Krikilan Reservoir, a tourist destination for the people of Krikilan Village and its surrounding areas. It is highly attractive and suitable for tourism and educational tourism due to its hilly and sloped terrain, abundant with shady trees. Krikilan Village, Bayat District, Klaten, is geographically unsuitable for agriculture. Tourism development is an alternative for the economic development of the Krikilan Village community. The village's beautiful and unique geography, pristine natural conditions, and lush natural forests, home to a diverse range of flora and fauna, offer significant potential as a tourist destination (Asriwandari et al., 2023) and (Puspodari et al., 2024). Natural and environmental factors that are still original and beautiful and well-maintained are one of the main factors for the development of tourist destination areas (Zakaria & Suprihardjo, 2014) (Istiyanti, 2020).

In the future, it is hoped that the Krikilan Bayat Klaten Reservoir can be further developed and become a new tourist spot and educational tourism for students in the surrounding area which can help increase the income/revenue of the surrounding community, such as by selling several typical Krikilan village foods, souvenirs and so on so as to increase the income/revenue of Krikilan village and the community around the reservoir, so that the economic conditions of the community become better and more prosperous.

The facilities at Krikilan Reservoir support educational tourism, sports tourism, and fishing activities. These include open fields for camping and recreational sports activities, several toilets, numerous gazebos, a campsite, free Wi-Fi, dedicated parking, and a place of worship. Clean water is readily available in the prayer room, toilets, and several other locations. The gazebos are very clean. Several stalls are available for vendors. Thus, Krikilan Reservoir has great potential as a recreational sports tourism destination (Anam et al., 2024).

Many tourist attractions around the Krikilan Reservoir, located in Bayat District, are more crowded and attract more visitors. The religious site of Sunan Pandanaran's tomb, located 1 km from Krikilan Reservoir, attracts visitors from across Java and beyond. The Rowo Jombor tourist attraction is 700 meters from Krikilan Reservoir. Bukit Cinta and Bukit Arjuna, popular selfie spots, attract many visitors.

This Community Service Program (PKM) was held to support the development of the Krikilan Bayat Reservoir, a recreational facility, so that it can develop and become an attractive educational tourism and sports facility for schools around the reservoir. This PkM activity received support from the Bayat District Education Office Regional Coordinator, the Krikilan Village Head, the Krikilan Reservoir Tourism Program (Prokdarwis), and school principals around the reservoir. Until now, the Krikilan Reservoir has rarely been used by surrounding schools for educational tourism.

METHOD

The Community Service (PkM) activity, "Traditional Elementary School Sports Festival to Increase Educational Tourism Visits at the Krikilan Reservoir, Bayat, Klaten," provides understanding and comprehension to the Pokdarwis (Tourism Group) and Bumdes (Village-Owned Enterprises) of Krikilan Village, Bayat, Klaten, regarding the development of the Krikilan Reservoir as a tourist attraction to increase visitor appeal. It also fosters enthusiasm among the Krikilan Reservoir managers to stimulate tourism through educational tourism, a form of activity that combines tourism (recreation) with learning and educational activities through a traditional elementary school sports festival.

The target of this PkM activity is elementary school students in Bayat District and in collaboration with the Bayat District Education Office Coordinator, elementary schools, tourism awareness groups (Pokdarwis) and Bumdes Krikilan Village, Bayat, Klaten in increasing tourist visits through eduwisata (Traditional Sports Festival) at Embung Krikilan Bayat.

The method used in the PkM activity was to hold a traditional sports festival for elementary school students (13 elementary schools in Bayat District) which was held at the Krikilan Reservoir, Bayat, Klaten in collaboration with Pokdarwis, Bumdes, the Head of Krikilan Village, 13 elementary schools, and the Regional Coordinator of the Bayat District Education Office.

RESULTS AND DISCUSSION

At the beginning of the activity, the Community Service (PKM) team applied for permission from the Bayat District Education Office Regional Coordinator on July 1, 2025. Drs. Edi Pranawa, the Bayat District Education Office Regional Coordinator, granted permission for the PkM activity to be held at the Krikilan Reservoir in Bayat. He requested that the schools on the PkM committee and the schools involved be invited to participate, to facilitate transportation and financial costs. The PkM team proposed 13 elementary schools near the Krikilan Reservoir tourist attraction in Bayat, which the Regional Coordinator approved. After the schools were approved, the PkM team immediately sent out invitations.



Figure 1. Speech from the Regional Coordinator for the Education Service at the Opening of the Traditional Sports Festival

Mr Drs. Edi Pranawa

On July 5, 2025, we sent out invitations to the schools and received an immediate response, indicating that every one of the 13 elementary schools was willing to participate in all the traditional sports festival events held at the Krikilan Reservoir in Bayat. The data for these schools is as follows:

Table 1. List of Elementary Schools Participating in the Traditional Sports Festival Activities at Krikilan Reservoir, Bayat, Klaten

No	Nama Sekolah Dasar	No	Nama Sekolah Dasar
1	SD N 2 Krikilan	8	SD N 1 Krakitan
2	SD N 1 Paseban	9	SD N 2 Krakitan

3	SD N 1 Beluk	10	SD N 3 Krakitan
4	SD N 1 Jotangan	11	SD N 1 Wiro
5	SD N 2 Jotangan	12	SD N 2 Wiro
6	SD N 1 Kebon	13	SD N 4 Wiro
7	SD N 2 Kebon		

Schools were very enthusiastic about the traditional sports festival organized by the Recreation Business Management Study Program, Faculty of Vocational Studies. This event received the support of every principal and, as the spearhead, the Physical Education and Health teachers.

On July 12, 2025, the PkM team invited 13 PJOK teachers or class teachers representing 13 elementary schools to a technical meeting. All 13 elementary schools attended the meeting. The meeting discussed the implementation of the match, the alignment of game rules for the four traditional sports, and the determination of the group draw. The technical meeting went well regarding the alignment of game rules and the draw to determine the groups.

On July 14, 2025, he submitted a permit to the Head of Krikilan Bayat Village, Mr. H. Eka Sri Purwanta, SE. The Head of Krikilan Village welcomed the event warmly. The village was very pleased with the traditional sports festival held at the Krikilan Bayat Reservoir to enliven the Krikilan Reservoir tourism.

On July 19, 2025, he applied for permission from the head of the Krikilan Reservoir Tourism Group (Pokdarwis). The head of the Pokdarwis granted permission because on July 26, 2025, the Krikilan Reservoir in the campground area was unoccupied, so it could be used for a traditional sports festival. The area was large enough to accommodate Gobak Sodor, Egrang, Bakiak, and Tulup fields. The Pokdarwis head welcomed the request and was able to enliven the Krikilan Reservoir for educational tourism through a traditional sports festival.

This Community Service (PKM) activity was held on July 26, 2025, and was attended by 13 invited elementary schools. The activity took place at the Krikilan Bayat Reservoir from 8:00 a.m. to 1:00 p.m. WIB. The PKM activity was opened by the head of the community service team, the Regional Coordinator of the Bayat District Education Office, and the Head of Krikilan Bayat Village.

The traditional sports festival ran smoothly, supported by the readiness of each school to send students. The team of lecturers, community service staff, and the enthusiastic Recreation Business Management students were instrumental in the event.



Figure 2. Opening Ceremony of the Traditional Sports Festival and Warm-Up

Before the Start of Activities

The results of the traditional sports festival activities were as follows:

The Gobak Sodor competition winners were: Juara 1 SD Negeri 1 Krakitan

Juara 2 SD Negeri 4 Wiro

Juara 3 SD Negeri 2 Krakitan

Harapan 1 SD Negeri 1 Kebon

The winners of the clog competition were:

Juara 1 SD Negeri 1 Krakitan

Juara 2 SD Negeri 1 Beluk

Juara 3 SD Negeri 1 Paseban

Harapan 1 SD Negeri 2 Jotangan

The winners of the stilt competition were:

Juara 1 SD Negeri 2 Krakitan

Juara 2 SD Negeri 1 Jotangan

Juara 3 SD Negeri 1 Beluk

The winners of the Tulup competition were:

	Harapan 1 SD Negeri 1 Krakitan
Juara 1	SD Negeri 2 Krakitan
Juata 2	SD Negeri 2 Wiro
Juara 3	SD Negeri 1 Beluk
	Harapan 1 SD Negeri 1 Wiro

In accordance with the National Sports System Law, recreational sports can be interpreted as sports carried out by the community with hobbies and abilities that grow and develop in accordance with the conditions and cultural values of the local community for health, fitness, and pleasure (Law No. 3 of 2005 concerning the National Sports System) (Prayoga, 2018). Recreational sports are carried out through traditional sports as part of the process of restoring health and fitness, by every person, educational unit, institution, association, or sports organization, aiming to obtain health, physical fitness, and joy, build social relationships, and/or preserve and enhance regional and national cultural wealth, the government, local governments, and the community all have an obligation to maintain.

Traditional sports (traditional games) are a cultural legacy of our ancestors, possessing the characteristics and purity of past traditions (Siahaan & Sundhari, 2019). Indonesia is renowned for its rich and diverse traditional culture. However, with the passage of time and technological advancements in this era of globalization, this richness of traditional culture is increasingly being eclipsed by digital games.

Traditional games are simple activities that are easy to understand/learn and play. They are relatively inexpensive compared to modern games because they require minimal equipment and tools that can be made at home and can be played anywhere (Rachman et al., 2023). Traditional sports are not only a community activity (for children) aimed at fitness and enjoyment. However, they are also a cultural component that shapes the characteristics and identity of a nation. The revival of traditional games can have implications for the revival of national culture, which is currently under threat from cultural globalization (Azahari, 2017).

The reasons for the decline of traditional games among students (children) are certainly diverse, such as: (Siahaan & Sundhari, 2019)

1. Lack of implementation of traditional games in education through arts and culture and physical education (PJOK) learning.
2. Lack of interest in playing traditional games among students (children).
3. Lack of competitions or festivals for traditional games for students (children) on a tiered, ongoing, and sustainable basis.

Traditional games can foster a spirit of nationalism, cultural awareness, critical thinking, mutual cooperation, cooperation, and good social skills in children.

Traditional sports, which have existed since ancient times, are the result of ancient human cultural processes that are still deeply ingrained with local wisdom. Despite their ancient origins, they play a vital educational role in the learning process of individuals, especially students (Rachmawati et al., 2020).

Edutourism, or educational tourism, is an educational facility conducted outside the classroom, where students learn through enjoyable activities (Pramono et al., 2021). Edutourism is a rapidly growing and increasingly popular economic sector. Edutourism is implemented in a way that education and learning are a primary or secondary component of the trip or tour. The increase in mobility in education is impressive, and it's not just the trip itself; it also provides unique opportunities for students to enjoy nature and the outdoors, be physically active, and participate in sports (Rachmawati et al., 2020).

CONCLUSION

The Community Service (PKM) program has been successfully implemented with the support of various parties, including the Bayat Education Office Regional Coordinator, the Tourism Awareness Group (Pokdarwis), the Krikilan Village Head, and the principals of 13 invited elementary schools. The traditional sports festival included four traditional sports: Terompah Panjang (Clogs), Gobak Sodor (Stilts), Egrang (Stilts), and Tulup (Blowfish). The success of this traditional sports festival was due to the support of the 13 elementary schools, which each sent 13 students, bringing the total number of students participating in the competition to 169. The traditional sports festival was very lively and witnessed by the Bayat Education Office Regional Coordinator, the Tourism Awareness Group (Pokdarwis), the Krikilan Village Head, the principals, and accompanying teachers. At this traditional sports festival, the first, second, third, and first-place winners in each traditional sport received trophies and prize money.

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Optimizing Water Quality through Education, Simple Technology, and Community Assistance: A Case Study in Bumijo Kulon

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Abstract. Clean and safe water is a fundamental necessity that plays a crucial role in maintaining public health; however, water quality problems remain prevalent in densely populated urban areas such as Bumijo Kulon, where limited green spaces and reduced groundwater infiltration increase contamination risks. This community service program aimed to optimize water quality and promote healthy living through an integrated approach combining education, simple filtration technology, and continuous community assistance. The methodology included preliminary observations of local water conditions, environmental health education through lectures and interactive discussions, hands-on training for assembling simple filtration systems, and mentoring during household implementation. The program's effectiveness was evaluated using pre- and post-filtration water tests with a TDS meter across five household samples and participant satisfaction surveys regarding the educational sessions. The results indicated a significant improvement in water quality, with an average reduction of 55% in Total Dissolved Solids (TDS) after filtration, along with noticeably better physical parameters such as clarity and odor. Participants expressed a very high level of satisfaction (average score 4.75/5) with the educational activities, demonstrating that the participatory learning model effectively improved knowledge, awareness, and practical skills in water management. These findings confirm that combining education and simple technology fosters community self-reliance and sustainable behavioral change. Nevertheless, this program has limitations, as it focused only on physical water parameters and involved a limited number of household samples, thus requiring future studies to include microbiological analyses and long-term monitoring. Overall, the program provides an effective and replicable model for enhancing water quality and public health in urban communities through community-based education and appropriate technology.

INTRODUCTION

Water plays a vital role in maintaining human health and well-being, as it directly affects sanitation, hygiene, and disease prevention. In many urban communities, especially in densely populated settlements, access to clean water remains a significant challenge (1). Bumijo Kulon, located in Yogyakarta, represents a typical urban area where water quality degradation has become a growing concern due to household waste, aging infrastructure, and low public awareness of water treatment practices. Poor water quality can lead to various health issues such as diarrhea, skin infections, and other water-borne diseases. These public health challenges underscore the critical need for effective community-based interventions aimed at improving water quality and promoting sustainable health practices (2,3).

Previous community initiatives often focused on temporary solutions, such as distributing bottled or refilled water, which may solve short-term needs but fail to build community capacity for long-term sustainability (4). Therefore, a more holistic approach incorporating education, appropriate technology, and ongoing support is essential for fostering self-reliance and ensuring access to safe water for all residents in such communities (2,5). Therefore, an integrated approach combining education, simple and affordable technology, and community assistance is needed to ensure that people not only gain access to clean water but also understand how to maintain and utilize it properly. This study posits that by empowering communities with knowledge and practical skills, reliance on external aid for basic necessities like clean water can be significantly reduced. This approach aims to

foster local ownership and responsibility towards water resources, thereby contributing to sustainable public health improvements (2,6).

This program aims to optimize water quality and promote healthy living practices among the residents of Bumijo Kulon. It introduces simple, low-cost water filtration technology and community-based education to increase public awareness and self-reliance in maintaining water quality. The study contributes to practical knowledge on how local empowerment and appropriate technology can improve public health outcomes sustainably.

LITERATURE REVIEW

Several studies highlight the crucial link between water quality and community health. For instance, inadequate water quality directly correlates with a higher incidence of gastrointestinal symptoms and diarrheal diseases, particularly in indigenous communities (7). Globally, a significant number of individuals suffer from avoidable waterborne illnesses, emphasizing the critical interplay between clean water, sanitation, and hygiene for overall public health (8,9). In developing regions, including Indonesia, community participation and behavioral change are often identified as the key factors in improving water safety (10).

Community empowerment in water management is a sustainable approach that emphasizes participation, awareness, and ownership (2,11).

Previous research shows that local-level education and training can effectively change daily habits related to water consumption and storage (12).

Meanwhile, the use of simple or “appropriate” technology—such as low-cost filtration systems—has proven effective in improving household water quality without requiring complex technical skills. Such approaches, which often include multi-stage filtration processes like activated carbon filters, reverse osmosis, and UV sterilization, have significantly improved water quality and public health outcomes in various settings (2). Furthermore, integrating community-based water management agencies and establishing village regulations have been identified as crucial elements for the long-term sustainability of clean water programs (13). These integrated strategies are particularly vital given the continuous challenges faced by many nations, including Indonesia, in achieving universal access to safe and adequate water and sanitation services, as stipulated by the Sustainable Development Goals (14).

The integration of education, technology, and continuous assistance aligns with the principles of community-based development, ensuring that people not only receive technical tools but also acquire the necessary knowledge and motivation to sustain their use. This concept provides the theoretical foundation for the current study conducted in Bumijo Kulon.

RESEARCH METHOD

This study adopts a participatory community development approach, emphasizing active involvement of local residents in every stage of the program. The process consisted of four main stages: (1) Preliminary Observation, to identify water quality problems through visual inspection and interviews; (2) Education and Socialization, involving workshops on environmental health, the importance of clean water, and basic filtration concepts; (3) Technology Implementation, where participants were trained to construct and use simple water filtration systems using locally available materials such as sand, carbon, and sponge filters; and (4) Community Assistance and Evaluation, providing mentoring sessions and measuring water quality improvement through changes in color, odor, and turbidity. This iterative process allowed for real-time adjustments and fostered a sense of ownership among community members, contributing to the program's overall effectiveness and sustainability (15).

The effectiveness of the program was evaluated qualitatively and quantitatively. Qualitative assessments included feedback sessions and observation of behavioral changes, while quantitative evaluation involved pre- and post-intervention measurements of water quality parameters, such as turbidity and pH levels (16).

Pre- and post-implementation measurements of water clarity, odor, and taste were conducted, along with participant feedback collected through questionnaires to assess understanding, satisfaction, and perceived benefits. This dual approach provided a comprehensive understanding of the program's impact on both the physical quality of the water and the community's engagement and empowerment in its management.

RESULTS AND DISCUSSION

The implementation of the community service program in Bumijo Kulon was met with strong participation and enthusiasm. A total of 35 households were actively involved throughout the activities, demonstrating a genuine interest in improving water quality and learning about sustainable water management. During the educational sessions, participants received comprehensive materials on water hygiene, environmental health, and

domestic waste management. The sessions began with a presentation on the importance of clean water and sources of contamination, followed by a practical demonstration of simple water filtration systems. Participants were then encouraged to engage in an open question-and-answer session where they discussed real household problems such as cloudy or odorous water. Finally, small-group discussions allowed them to share experiences and collectively formulate strategies for better household water management. This combination of theory, practice, and participatory discussion successfully enhanced the community's understanding and sense of ownership toward maintaining water quality.

1. Participant Satisfaction with Education Sessions

To evaluate the impact of the educational activities, a brief satisfaction survey was conducted among the 35 participants. The survey measured four aspects: relevance of the material, clarity of presentation, effectiveness of discussion, and overall usefulness. The summarized results are presented in **Table 8**, which shows that the majority of participants were highly satisfied with the educational sessions. The average satisfaction score reached 4.75 out of 5, indicating that the learning process was engaging, clear, and practically beneficial. Participants also expressed appreciation for the interactive format, which allowed them to directly ask questions and receive applicable solutions for their household water problems, reinforcing the effectiveness of the education approach implemented in this program.

Table 8. Participant Satisfaction toward the Educational Session

No	Evaluation Aspect	Average Score (Scale 1–5)	Category
1	Relevance of the material	4.8	Very Satisfied
2	Clarity of presentation	4.6	Very Satisfied
3	Effectiveness of discussion/Q&A	4.7	Very Satisfied
4	Overall usefulness of the session	4.9	Very Satisfied
Average		4.75	Very Satisfied

The high satisfaction score reflects that the educational program was well received and effectively improved participants' knowledge and awareness of water quality and hygiene. Many respondents also reported that they were motivated to share the knowledge with their neighbors, indicating a multiplier effect of the program.

2. Experimental Testing of Water Quality

An experimental test was conducted to measure the effectiveness of the simple water filtration technology used during the program. Five samples of groundwater were collected from different households in Bumijo Kulon, representing the general condition of local water sources. Each sample was tested using a TDS (Total Dissolved Solids) meter to determine the level of dissolved impurities before and after filtration. The summarized results are presented in **Table 9**, which clearly show a significant reduction in TDS values after the water passed through the filtration system, indicating improved purity and quality. On average, the filtration process reduced dissolved solids by about 55%, reflecting the effectiveness of the simple, low-cost filtration technology introduced during the program.

Table 9. TDS Measurement of Water Samples Before and After Filtration

No.	Sample Source	TDS Before Filtration (ppm)	TDS After Filtration (ppm)	Improvement (%)
1	Household A	510	230	54.9
2	Household B	480	210	56.3
3	Household C	525	240	54.3
4	Household D	495	215	56.6
5	Household E	505	225	55.4
Average		503	224	55.5

The experimental findings confirm that the simple water filtration system can effectively reduce dissolved solids by approximately 55%, which significantly improves water quality in terms of clarity and taste. In addition to measurable improvements, community members reported greater confidence in using the filtered water for domestic activities such as cooking and washing, further supporting the program's goal of promoting healthy and sustainable living practices.

DISCUSSION

The findings of this program demonstrate that integrating community education, participatory learning, and simple water filtration technology can effectively improve both water quality and public awareness. This aligns with the concept of community empowerment, where education and active involvement are essential to achieving sustainable behavioral change. Furthermore, the direct engagement of residents in learning practical household

water treatment techniques, such as boiling, filtering, or using chlorine, significantly increases the likelihood of sustained adoption of safer water practices (17). This approach not only enhances local capacity for water management but also contributes to a reduction in waterborne diseases, aligning with public health objectives for improved community well-being (7). The participants in Bumijo Kulon not only applied the filtration system but also developed a sense of ownership and collective responsibility to maintain clean water practices within their neighborhood.

The high level of satisfaction shown in Table 1 confirms that the participatory approach—combining lectures, demonstrations, and interactive discussions—was well-received and effective in improving understanding. This robust engagement indicates that communities are receptive to pragmatic solutions for water quality issues, especially when coupled with clear educational frameworks that address local concerns (18). The effectiveness of this educational strategy is crucial for encouraging the adoption of new practices and technologies, as evidenced by the reported willingness of participants to share their newfound knowledge within the community (19–21). The participants' engagement during question-and-answer sessions and group discussions also indicates the formation of social learning networks, where shared experiences strengthen collective problem-solving capacity.

Meanwhile, the experimental results presented in Table 2 reinforce the practical effectiveness of appropriate technology in improving household water quality. The 55% reduction in TDS levels across five samples validates that low-cost filtration methods can provide measurable quality improvement, even in urban areas where groundwater sources are increasingly unreliable due to reduced natural infiltration. Such improvements are particularly vital in densely populated regions where the physical and chemical aspects of groundwater often fall below permissible quality standards, necessitating treatment before consumption (22). This underscores the potential for simple, household-level interventions to significantly enhance public health outcomes by mitigating exposure to contaminants found in unimproved water sources (23). This finding is consistent with previous research, who emphasized that simple filtration systems using locally available materials such as activated carbon and sand are efficient, affordable, and easy to maintain for communities with limited resources (24–26).

Furthermore, the combination of educational and technical interventions creates a synergistic effect. Education raises awareness and promotes behavioral change, while technology provides tangible evidence of improvement, reinforcing community trust in the process. This integration supports the *triple helix* principle of sustainability—knowledge, technology, and community participation—as key components for long-term impact in public health improvement. The Bumijo Kulon program thus serves as a practical model for replicable, low-cost, and scalable community-based water quality initiatives that emphasize empowerment rather than dependency.

However, several limitations should be acknowledged. First, the experimental testing focused only on physical parameters of water quality (TDS, clarity, and odor), without including microbiological or chemical analysis, which may provide a more comprehensive assessment of safety. Second, the study was limited to five household samples, which may not fully represent the entire community's water conditions. Third, the follow-up period after the intervention was relatively short, making it difficult to assess long-term maintenance behavior and system durability. Future programs should therefore expand the testing scope, increase sample size, and include a longer-term evaluation to measure sustainability and real behavioral transformation.

CONCLUSION

This community service program successfully demonstrated that the integration of education, simple technology, and continuous community assistance can effectively optimize water quality and promote public health improvement in Bumijo Kulon. The educational sessions increased participants' understanding of proper water management practices, while the implementation of simple filtration systems provided measurable improvements in water clarity and purity. The participatory approach fostered a strong sense of ownership and collaboration among residents, leading to behavioral changes toward cleaner and healthier living practices.

The experimental results confirmed that locally constructed filtration devices could reduce Total Dissolved Solids (TDS) levels by an average of 55%, proving that low-cost and easy-to-maintain technologies are viable solutions for urban communities facing water quality issues. Furthermore, the high satisfaction ratings from participants indicated that the educational activities were not only informative but also practical and engaging, ensuring knowledge transfer that can be sustained within the community.

Despite these positive outcomes, the program still faced several limitations, including a small number of water samples and a focus on physical rather than microbiological water quality parameters. Therefore, future initiatives should expand testing, including chemical and biological analyses, and extend monitoring periods to evaluate the long-term sustainability of behavioral changes and filtration performance.

Overall, this program provides a replicable model of community empowerment for improving water quality through education and appropriate technology. By strengthening knowledge, practical skills, and community participation, similar programs can be implemented in other urban areas to achieve sustainable improvements in public health and environmental hygiene.

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IMPROVING ACHIEVEMENT MOTIVATION AND RESILIENCE AMONG 'AISYIAH EARLY CHILDHOOD EDUCATION TEACHERS IN YOGYAKARTA Province

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Abstract. Early childhood education teachers play an important role in shaping the golden generation of Indonesia. Therefore, this research aimed to emphasize the need for teachers to possess high achievement motivation and resilience in effectively navigating work and life challenges. Most teachers remain in honorary positions with low incomes, which increases vulnerability to stress and diminishes enthusiasm for work. A training on achievement motivation and self-resilience was held for ABA ('Aisyiyah Bustanul Athfal) teachers in Yogyakarta Province to address the issue. This training enhanced personal skills, enabling participants to maintain professionalism, achieve goals, and remain resilient across various aspects of life. The face-to-face sessions covered achievement motivation, growth mindset, collaborative games, teachers' resilience, and action plans. Meanwhile, the evaluation focused on teachers' emotional responses, participation, and empowerment during the sessions. Participants also assessed the impact of training and relevance to personal development. Teachers' achievement motivation and resilience were increased, as evidenced by scores before and after the training. Achievement motivation increased from 4.4035 to 4.6439, with the difference being statistically significant. The t-test results showed that the scores had a critical value of $0.00039 < 0.05$, showing a significant difference between pre-test and post-test values. Resilience also improved, with scores changing from 4.2719 to 4.5576. This difference was significant according to the t-test, with a p-value of $0.013 < 0.05$. In this context, achievement motivation and resilience were effectively strengthened by early childhood education teachers.

INTRODUCTION

Early childhood education teachers play an important role in nation-building, specifically in nurturing the potential of young children during formative years. The enormous potential of early childhood may remain untapped, increasing the risk of becoming a lost generation. Therefore, early childhood education has become a focus of attention for experts and policymakers over the past twenty years.

In Yogyakarta Province, there are over 800 ABA (Aisyiyah Bustanul Athfal) kindergartens and 5,000 teachers. ABA teachers work diligently and sincerely to educate and care for young children. However, these individuals are underpaid due to insufficient salaries. Teachers are expected to maintain high performance as well as professionalism and show resilience in various aspects of lives.

ABA teachers have participated in various training sessions and workshops to improve skills. According to an interview with the Chairperson of the Yogyakarta Council for Early Childhood, Elementary, and Secondary Education, teachers have gradually engaged in the Inclusive Curriculum, the Seribu Kanal YouTube Channels Technical Guidances, and other workshops and training programs to enhance professional and pedagogical skills. However, these training programs have not addressed personality and social skills. The skills are equally important for becoming a well-rounded teacher. Personality and social skills can be improved through achievement motivation and self-resilience training. In this context, Community Service Team (PKM) believes that the provision of training for ABA teachers to strengthen achievement motivation and self-resilience is necessary.

Achievement motivation is characterized by indicators such as self-efficacy, task values, and goal orientation. Wigfield and Eccles [1] stated that achievement motivation was the desire of an individual to consistently develop certain skills or competencies, maintain high enthusiasm, and effectively show high qualities. Similarly, McClelland (1987) [2] described achievement motivation as the drive to direct behavior toward achieving goals, marked by a resilient attitude, responsibility, and a love of hard work.

Research on achievement motivation has been a longstanding interest among psychologists. Schunk, Pintrich, and Meece (2008) [3] proposed the definition of motivation as "a process by which goal-directed activity is sustained." Achievement motivation has the goal of accomplishing a specific objective. Nicholl (1984) [3] stated



that achievement motivation developed and showed high skill. An individual is considered to have high achievement when success is shown through the development or exhibition of a high level of skill. In addition, achievement motivation is focused on the pursuit of exceptional skill. Damanik [4] stated that achievement motivation was the driving force motivating individuals at different levels.

Connor stated that there were three essential elements of achievement motivation, namely self-efficacy, task values, and goal orientation [5][7]. Self-efficacy refers to an individual's belief in the capabilities to complete a task. Furthermore, task values relate to the conditions under which an individual is faced with a responsibility. The concept includes intrinsic motivation, extrinsic/utility values, as well as spiritual values, which relate to religious appreciation of the world. Goal orientation relates to the targets an individual aims to achieve in a task. This includes mastery and performance goal orientation evident in goal-setting.

Goal orientation elements consist of two aspects: 1) Mastery goals, where individuals have clear objectives and a strong commitment to improving specific skills and developing new skills through academic tasks. 2) Performance goals, where individuals have clear aims and a strong drive to surpass others, seeking public recognition for success. The performance-avoid goal aspect is not considered a separate aspect of goal orientation. This is because performance is seen as a maladaptive pattern of goals. Individuals with performance-avoidant goals are classified as a low-competence group when facing achievement tasks [3].

Resilience is the skill of individuals or communities in adapting to adverse events, situations, and difficult conditions [2]. Resilient individuals can overcome challenges in situations that do not endanger well-being. Challenges and tough life events can offer meaningful opportunities to strengthen mental resilience [6]. Reivich & Shatte reported seven components of resilience as follows.

1. Emotional regulation: The ability to remain calm and focused when faced with problems or pressure.
2. Impulse control: facing sadness/difficulties calmly, patiently, and without anger. Optimism: having hope of becoming successful.
3. Empathy: the skills to understand psychological state and emotional needs.
4. Problem-causing analysis: the skills to analyze problems.
5. Self-efficacy: the belief that an individual will successfully overcome problems.
6. Improving positive aspects: a better personality, striving to achieve new, positive events [2].

Strengthening resilience is essential for improving the quality of life for individuals or groups [7]. Kathryn M. Connor & Jonathan R.T. Davidson [5] reported a resilience scale called the Connor-Davidson Resilience Scale (CD-RISC) due to the importance of the concept. This includes 25 items with a 5-point response scale, namely not true at all (0), rarely true (1), sometimes true (2), often true (3), and true almost all the time (4). The scale measures responses based on the feelings of an individual over the past month. The total score ranges from 0 to 100, with higher values showing greater resilience. The CD-RISC has been tested in both general and clinical samples, showing solid psychometric properties with good internal consistency and test-retest reliability.

Training is expected to increase achievement motivation and resilience among ABA teachers in the Yogyakarta region. Increased achievement motivation supports high resilience, as evident in impulse control (related to goal values), optimism, self-efficacy, and a persistent desire to achieve positive outcomes.

METHOD

The target audience for the training was 40 ABA teachers in Yogyakarta, represented by 7 individuals from each regency or city and 5 representatives of Yogyakarta IGABA (*Bustanul Athfal* Teachers Association) Management. The methods used included lectures, games, group work, and assignments. Activities were conducted through direct meetings with topics covering achievement motivation, growth mindset, collaborative games, teachers' resilience, and action plans. Evaluation focused on emotional response, participation, and empowerment during the training. Additionally, participants were asked to assess the training's impact and relevance to personal development. To measure increases in achievement motivation and resilience, pre-tests and post-tests were administered.

RESULT AND DISCUSSION

Participant Demographics

The training participants comprised 39 teachers from 5 regencies or cities in Yogyakarta Province. The majority of the participants were aged 46-55 years, represented by 89% who held a bachelor's degree. Therefore, teachers met the minimum qualifications necessary for the roles. Most participants had over 20 years of teaching experience, since the training participants were seasoned teachers with a strong background in early childhood education.

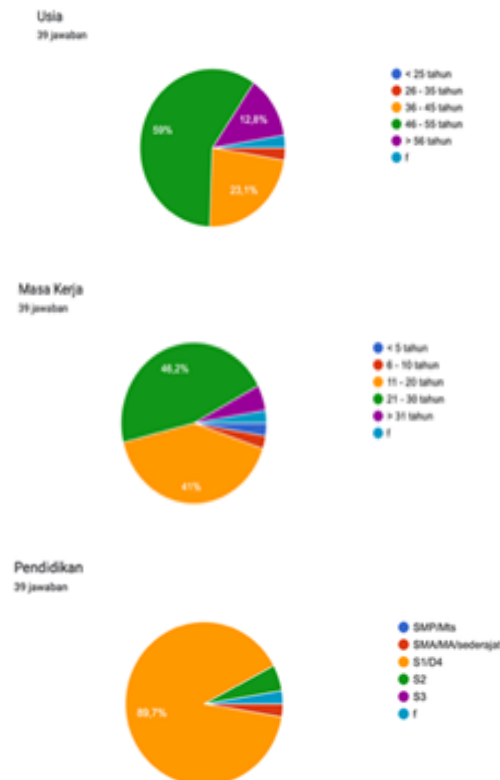


FIGURE 1. Demographics of Training Participants

Training Implementation

Opening

The training took place on June 21–22, 2025, in Yogyakarta, and started at 8:15 a.m. The event commenced with the recitation of Surah Al-Fatiha by Mrs. Jumiati, followed by the singing of the Indonesian National Anthem and the 'Aisyiyah March. The first speech was delivered by Mrs. Dyah, the host from SMA Muhammadiyah 3 Yogyakarta, who emphasized support for the PKM activity in collaboration with the Early Childhood, Primary, and Secondary Education Council of the Regional Leadership of 'Aisyiyah (PWA) DIY. Subsequently, Mrs. Dra. Yuni Purwati, M.Pd, the Chairperson of the Council, expressed appreciation for the participation of ABA kindergarten principals from all regencies/cities in Yogyakarta. Each of the principals had sent 7–8 participants, totaling 38 individuals. The training would continue to reach more schools and improve the quality of principals and institutions. Closing remarks were given by the Leader of the PKM Team, Prof. Dr. Mami Hajaroh, M.Pd., who expressed gratitude for the partnership of the Assembly and affirmed the PKM targets for the ABA kindergarten's headmasters to strengthen achievements and resilience.



FIGURE 2. The PKM Team, the PWA Yogyakarta, and the Participants

Training Implementation

a. Session 1: Achievement Motivation

In the initial session, the first topic, "Achievement Motivation," was presented by Prof. Dr. Mami Hajaroh, M.Pd., with a conceptual explanation. The training combined dialogue and assignment methods. The first assignment focused on uncovering personal motivation by answering the question "Who am I?" Each participant was asked to write three words related to motivation that reflected personality. Participants took turns writing down three words within approximately five minutes. Several participants answered the question "Who am I?" with phrases "passionate, friendly, eager to progress"; "sociable, resilient, enthusiastic"; and "committed, collaborative, flexible." The training continued with a discussion of values and relevance to the development of kindergarten. Subsequently, the session progressed to the second assignment, where participants wrote down the perceptions of others, with personal goals. For example: "Others see me as patient; I want to be a resilient person."



FIGURE 3. Participants reflect on themselves: "Who am I?"

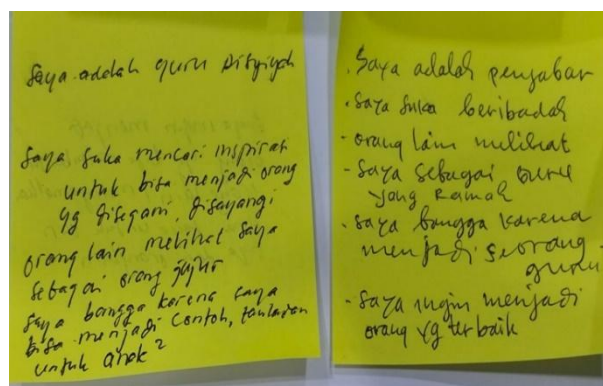


FIGURE 4. Sample of Teachers' Reflection: Who am I?

b. Session 2: Growth Mindset vs. Fixed Mindset

The second session focused on Growth Mindset, presented by Dr. Rukiyati, M.Hum. Achievement stemmed from the right mindset, which refers to a collection of beliefs influencing the perception and interpretation of

situations. There are two types of mindsets, namely fixed and growth. Both types influenced the process of achieving personal goals. Individuals seeking progress are expected to cultivate a growth mindset. In this context, success is attained when mindset and action are consistent. The differences between fixed and growth mindsets are explained through aspects of trust, attitudes toward challenges, effort, obstacles, criticism, and the success of others. After the presentation and dialogue, participants formed a circle to simulate creativity and flexibility. Each individual was instructed to spend five minutes identifying ten potential uses for the pashmina provided by the team. Furthermore, the participants took turns naming one use without repetition. The results included the use of a headscarf, a dance costume, a swaddling cloth, a baby cradle, a tablecloth, and curtains. The only male attendee, Mr. Efendi, showed the use of a pashmina as a superhero costume to conclude the session.

c. Session 3: Collaborative Games

After session two, the third session started at 12:30 PM with a refreshing activity in the form of a war game. Participants named the groups after countries, such as Iran, Israel, America, China, Korea, Japan, the Netherlands, and England. The first person from the back would say "ready," the second would respond with "eklek-eklek," the third would shout "door," and the fourth would loudly call out the name of another country, such as America or England. The named individual had to respond by saying "ready," "eklek-eklek," as well as "door," and calling the targeted country. The energy was full, and laughter filled the air whenever a group lost focus. This game instilled a sense of enthusiasm and happiness, creating an environment where participants could learn to concentrate and have fun.

d. Session 4: Teachers' Resilience

The fourth session focused on resilience, presented by Dr. Suwarjo, M.Si., a lecturer at the Faculty of Psychology, Universitas Negeri Yogyakarta. Dr. Suwarjo, M.Si., was an invited speaker at the PKM activity. This material covered the concept of resilience with interesting and useful examples from various cases handled. Dr. Suwarjo, M.Si., states that a resilient individual is similar to a ball thrown to the floor. A resilient individual can overcome problems, rather than avoid or blame others.

In this section, two individuals posed questions, with the first asking how to support a friend experiencing severe resilience challenges. As a friend, excessive interference should be avoided, while empathetic listening to the individual's concerns should be prioritized. The second participant shared a concern regarding her ambitious child, who was eager to complete a mini-thesis quickly to relieve parents of tuition fees. Despite acknowledging the child's motivation, the mother expressed worry about rushing and the associated health risks. The speaker affirmed the mother's method, appreciating the child's achievements while emphasizing the value of engaging in constructive dialogue, offering attention, and showing affection.

e. Session 5: Action Plan

After all training sessions were completed, each participant was asked to develop a "High-Achieving & Resilient Action Plan" and implement the process independently in the respective schools. The action plan was written concisely in SMART format (specific, measurable, achievable, relevant, and time-bound), containing 3–5 key steps, success indicators, supporting resources, as well as risks and mitigation measures. The plan documents, evidence, and reflections were collected in a single message in a WhatsApp group. The PKM team reviewed the completeness and quality of the SMART plan, provided brief feedback through WhatsApp, and conducted a one-time checkpoint to monitor progress and address obstacles. At the next Zoom meeting on October 12, 2025, from 9:00 AM to 12:00 PM, each participant presented results for 3 minutes using three slides, namely (1) objectives & indicators, (2) steps & evidence, (3) results, lessons learned, and follow-up plans. The completed Google Forms included (1) an assessment of PKM implementation (facilitation, relevance, support, logistics) and (2) a scale of achievement motivation and resilience. These assignments aimed to transform the material learned into measurable, concrete behaviors, while supporting independence, resilience, and reflective habits.

The program is implemented through a multi-layered partnership including the Early Childhood Education and Non-Formal Education Councils of Aisyiyah to ensure Achievement and Resilience Action Plan extends beyond classroom trials. The Yogyakarta Aisyiyah Regional Leadership provides policy guidance, scheduling, and official assignments for implementing teachers. The Aisyiyah Branch and the IGABA serve as peer learning spaces for peer review, lesson research, and program sharing, enabling rapid replication of good practices across regions and kindergartens.

Training Outcomes: Changes in Teacher Achievement Motivation and Resilience

Several investigations show that motivation and resilience are prerequisites for teachers' success in fulfilling work demands and maintaining the quality of learning. Day & Gu state that teacher resilience is closely connected to a school's capacity to sustain quality during policy pressures and systemic change. The connection between motivation and resilience is also emphasized in a comprehensive paper on cultivating teacher resilience, which positions professional development as a crucial arena for improving strategies for coping and thriving, rather than simply surviving. Beltman, Mansfield, and Price (2022) stated that the contemporary challenges faced by teachers in terms of resilience are in the context of early childhood education.

Howard and Johnson (2019) reported that social network support and school leadership had a significant influence on teachers' skills to persist in the face of adversity. Furthermore, Gu and Li (2020) emphasized that teacher resilience was determined by individual factors as well as structural context and supportive educational policies. Junjun Chen and John Chi-Kin Lee (2022) also stated that teacher well-being and performance were factors influencing resilience. This shows that resilience acts as a buffer and booster in amplifying the benefits of work resources. Psychologically, resilience acts as a buffer, mitigating the impact of work demands on well-being and performance, while work resources contribute to teacher resilience. An equally important contextual factor is the collective support of the school environment, which provides space for flexibility, collaboration, and professional development, consistently influencing teacher resilience, work engagement, and leadership.

Early Childhood Education Teacher Achievement Motivation

Teacher motivation increased from a score of 4.4035 to 4.6439. This difference in scores proved significant. The results showed that scores were $0.00039 < 0.05$, reporting a significant difference between the average pre-test and post-test values. Teachers pursued the profession with the intention of worship and love for children. Scores on this item were quite high before participating in the training. The item "Teachers feel satisfied when children in the class show even the slightest progress" was also the strongest motivation. After the training, achievement motivation was the highest in the item "Feeling proud to be early childhood education teachers despite facing many challenges." Other motivations with similar significance were the intention of worship and love for children. These two points scored 4.9091, close to perfect. Another motivational factor is the belief that educating young children is a crucial foundation for the future of the country. Table 1 shows changes in teacher motivation before and after the training.

TABLE 1. Early Childhood Education Teacher Achievement Motivation

No	Statement	Pre-test	Post-test
1	I feel proud to be an Early Childhood Education teacher despite the challenges.	4.4474	4.9091
2	I pursue this profession with the intention of worship and love for children.	4.7105	4.9091
3	I believe that educating young children is a crucial foundation for the nation's future.	4.4474	4.8636
4	I feel satisfied when the children in my class show even the slightest progress.	4.8421	4.6364
5	I continue to learn and grow as a better Early Childhood Education teacher every day.	4.5789	4.6818
6	I do not work solely for the paycheck, but because I love this job.	4.3947	4.6818
7	I actively seek out training and activities that can enhance my teaching skills.	4.1053	4.4091
8	I enjoy trying new method of learning to prevent children from getting bored.	4.1316	4.5000
9	I have a personal goal of becoming an inspiring and competent Early Childhood Education teacher.	4.0263	4.3182
10	I do not give up easily, even when faced with unruly children.	4.3158	4.5455
11	I remain patient and keep trying when facing challenges in class.	4.3421	4.5909
12	I feel responsible for the learning progress of every child in my class.	4.3684	4.6818
	Average	4.4035	4.6439

Early Childhood Education Teacher Resilience

Teacher resilience increased after the training, as showed by the overall score, which changed from 4.2719 to 4.5576. This difference in scores was significant according to the t-test, with a value of $0.013 < 0.05$. In this context, the average post-test score was higher than the pre-test.

The lowest level of teacher resilience before the training was in the lack of confidence in remaining calm when facing difficult classroom situations, with a score of 3.8947. Furthermore, teachers' lack of confidence in skills to creatively solve problems under limited conditions was recorded at 3.8158.

The strongest resilience shown by teachers was the sense of pride in the profession as early childhood teachers, with a score of 4.5. This increased significantly after the training, with a score of 4.9091, representing a significant change.

TABLE 2. ABA Teacher Resilience.

No	Statement	Pre-test	Post-test
1	I can remain calm when facing difficult situations in the classroom.	3.8947	4.4091
2	I bounce back quickly after experiencing failure in teaching.	4.0000	4.4091
3	I am confident in facing challenges in my work as a teacher.	4.0526	4.5455
4	I can control my emotions when dealing with unruly children.	4.0526	4.4091
5	I can solve problems creatively even under limited circumstances.	3.8158	4.3182
6	I feel supported by my colleagues as teachers.	4.1316	4.6364
7	I feel that the school leadership supports me when I face difficulties.	4.1053	4.5909
8	I have someone I can talk to when I feel stressed.	4.2632	4.5000
9	I feel part of a community of teachers who support each other.	4.2368	4.4545
10	I feel less alone when facing problems at work.	4.1579	4.5909
11	I feel that my work as an Early Childhood Education teacher is meaningful.	4.3947	4.6364
12	I feel proud of my profession as an Early Childhood Education teacher.	4.5000	4.9091
13	I feel that what I do has a positive impact on children's futures.	4.3158	4.6818
14	I feel motivated to continue learning to become a better teacher.	4.3947	4.6364
15	I feel that I have a clear purpose in my work.	4.1842	4.6364
	Average	4.2719	4.5576

Based on the t-test results with 22 data pairs, the average pre-test and post-test scores were 63.09 and 68.36, respectively. The test showed a t-value of -4.22 with a p-value of $0.00039 < 0.05$, rejecting the null hypothesis. Therefore, there was a significant difference between the average pre-test and post-test scores, with the post-test having a higher average.

Training Evaluation

The evaluation results showed that the training was excellent. Emotional response was among the five aspects of evaluation assessed. Teachers were rated as enthusiastic, comfortable, and recognized as valued and important during the training process delivered in a fun and engaging manner. The training material was engaging and motivated teachers to continue participating until the end of the session. In the context of participation, teachers rated the experiences of early childhood education teachers as being given space and incorporated into the training discussions. Furthermore, opinions, questions, and personal experiences were expressed. The training was also assessed to gain a deeper understanding of psychological state and motivation. Teachers were actively part of the discussions, reflections, and group activities. Concerning the empowerment aspect, teachers developed creative ideas in educating young children. Furthermore, solutions to challenges were identified, and became more confident in continuously improving competencies and resilience. The facilitators and participants interacted well, creating a collaborative and open learning environment. The impacts felt by teachers after the training were increased knowledge, new experiences, and inspiration in managing emotions and challenges, as well as a sense of calm and greater enlightenment. Another impact was feeling more prepared and motivated to make positive changes.

In the context of suitability, the training content was consistent with the issues and challenges discussed. The delivery method and training materials were appropriate for the capacities and characteristics of early childhood education teachers. This training was highly suitable for re-runs in other regions/regencies for 'Aisyiyah teachers. The quantitative results of assessments are shown in Table 3.

TABLE 3. Evaluation Results

No.	Assessed Aspect	Score
1	Emotional Response	4.5290
2	Participation	4.4355
3	Empowerment	4.4032
4	Impact	4.4355
5	Suitability	4.4597

The evaluation of the training's impact shows a strong relationship between increased achievement motivation and resilience with the sustainability of teacher professionalism. Based on Kirkpatrick's four-level model, training should be measured at the level of reactions, learning, behavior and outcomes reflected in the quality of Early Childhood Education services [8], [9], [10], [11]. Even though significant improvements in motivation and resilience have been observed, there is uncertainty regarding the changes implemented in classroom practice. Guskey [12] stated that post-training teacher behavioral changes were strongly influenced by structural support, including institutional policies and school climate. The sustainability of teacher resilience is more systemic than individual. Therefore, evaluations should combine quantitative analysis with qualitative research of supporting factors in the work environment.

Result and Discussion

The measurement of teacher motivation and resilience after participating in the training is consistent with McClelland's motivation theory, which emphasizes the importance of achievement as a driver of work behavior [13]. Wigfield & Eccles' expectancy-value theory emphasizes that self-confidence and the value given to a task influence individual motivation [1]. Day & Guy identified teacher resilience as a crucial factor in maintaining learning quality despite work pressures [14]. Similarly, Resnick B reported that professional development programs focusing on intrinsic motivation could enhance teacher resilience over time [15]. This shows that social network support plays a significant role in improving teacher resilience. Concerning ABA teachers, this training enhances individual psychological well-being, builds social bonds among teachers, and improves the quality of early childhood education services.

External challenges such as low teacher welfare, limited infrastructure, and high workloads still need attention. Day and Gu stated that teacher resilience was obtained from individual and structural factors, as well as supporting educational policies [14].

CONCLUSION

In conclusion, achievement motivation and resilience training for ABA teachers effectively enhanced psychological capacity to handle work challenges. This improvement shows that personality and professionalism-focused interventions positively affect quality. The success of training was considered by short-term outcomes, such as increased motivation and resilience, as well as the application of changes in learning routines and daily interactions with children. According to Guskey [12] and Day and Gu [14], the durability of training effects is heavily influenced by structural factors such as policy support, school leadership, and teacher well-being. Therefore, professional development programs for early childhood education teachers should go beyond brief training sessions and be part of a comprehensive, ongoing mentoring system. The proposed practical policy recommendations should include the following.

1. Improving teacher welfare and incentives to increase long-term motivation.
2. Strengthening the role of the 'Aisyiyah' organization in providing institutional support and social networks.
3. Incorporating motivation and resilience training programs into local and national government policies related to teacher professional development.
4. Establishing ongoing monitoring and evaluation mechanisms to ensure that the impact of training is reflected in the quality of early childhood education.

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The Internationalization of Indonesian Culture through Nusantara Movement and Song Training for Indonesian Language Learners at Maejo University, Chiang Mai, Thailand

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Abstract. The program of Indonesian Cultural Internationalization through the Training of Nusantara Movement and Song was carried out at Maejo University, Chiang Mai, Thailand, with the aim of introducing the richness of Indonesian culture while simultaneously supporting the learning of Indonesian as a Foreign Language. Through this training, learners not only gained linguistic knowledge but also aesthetic and kinesthetic experiences by mastering simple dance movements and selected Nusantara songs appropriate to their proficiency levels. The methods employed included demonstration, hands-on practice, and a participatory approach, enabling participants to more easily understand the cultural meanings embedded in each movement and lyric. The findings indicate overwhelmingly positive responses: the majority of participants reported that they “extremely enjoyed” the program, gained “a lot” of knowledge about Indonesian culture, and rated the materials and organization as “excellent.” Interaction with Indonesian lecturers was rated between “good” and “excellent,” while all respondents expressed high enjoyment of the workshops, and nearly all stated they would “definitely” recommend the activity to others. These results were further evidenced by the students’ active involvement in practice sessions and their ability to present a simple performance at the end of the program. Overall, the program not only enriched the learning of Indonesian as a Foreign Language (BIPA) but also strengthened Indonesia’s positive image on the international stage through cultural diplomacy, opening opportunities for sustainable collaboration between Yogyakarta State University and Maejo University in the fields of language education and cultural promotion.

INTRODUCTION

Internationalization of Indonesian Culture through Nusantara Song and Dance Training for Indonesian Language Learners at Maejo University, Chiang Mai, Thailand is motivated by the importance of cultural diplomacy in strengthening Indonesia’s position on the international stage. The internationalization of Indonesian culture through the Indonesian Language for Foreign Speakers (BIPA) program abroad has developed rapidly over the past decade. Nevertheless, its implementation continues to face a number of challenges, particularly with regard to the integration of cultural content into language learning. At several BIPA partner institutions overseas, the introduction of Indonesian culture remains limited to visual or descriptive materials and has not yet fully involved direct or participatory experiences.

Cultural diplomacy constitutes an inherent component of diplomatic activity in every country. This practice holds great potential to serve as a powerful medium for enhancing a nation’s reputation, image, and its relationships with other countries¹. In today’s global era, cultural diplomacy—through the exchange of arts, language, and education functions as a means of fostering mutual understanding, bridging differences, and laying a foundation for deeper international cooperation.

Education-based cultural diplomacy, such as student exchange programs and the strengthening of academic institutions, also plays a key role in expanding cultural influence. Khan, Fernald, and Mussa² systematically highlight how international scholarship programs are used as instruments of soft power to enhance a nation’s image, particularly in the context of education and cultural traditions. On the other hand, multilateral initiatives involving organizations such as UNESCO and UNITAR emphasize the importance of utilizing culture to pursue global objectives such as sustainable development and peace. Nawaz³ further explains that cultural diplomacy, through art, education, and cultural exchange, is able to touch emotional and humanistic dimensions, thereby becoming an effective tool to improve global perceptions and encourage cross-border cooperation.



Thus, cultural diplomacy does not merely function as a complementary instrument of interstate relations, but has become a strategic mechanism that integrates cultural soft power, education, and public diplomacy to establish more holistic and sustainable forms of international cooperation.

Thailand is one of the Southeast Asian countries that has maintained a positive and close relationship with Indonesia. In recent years, academic collaboration between universities in both countries has shown significant growth, particularly in the field of Indonesian Language for Foreign Speakers (BIPA). Maejo University in Chiang Mai, Thailand, is among the higher education institutions that actively provide Indonesian language instruction for its students. The BIPA program at this university has been running for several years and has received positive responses from both students and the institution. Nevertheless, its implementation often places greater emphasis on linguistic aspects, while the cultural dimension has not been optimally addressed. In fact, foreign language acquisition, especially within the BIPA context, cannot be separated from an understanding of the culture that underlies it. Language and culture are two interrelated and mutually reinforcing entities. Therefore, the internationalization of Indonesian culture through the teaching of Nusantara songs and dances is considered both relevant and strategic in supporting more comprehensive Indonesian language learning.

Traditional songs and dances from the Indonesian archipelago were chosen as the primary medium in this program because they embody strong local cultural values, are universally accessible, and provide enjoyable learning experiences. Moreover, songs and dances possess the unique strength of combining verbal and non-verbal elements, making them highly suitable for cross-cultural contexts. Many Indonesian folk songs are rich in philosophical meaning, social values, and expressions of local identity, all of which can broaden the cultural perspectives of foreign learners. This is supported by Setyawati and Ambarwati⁴, who emphasize the importance of teaching strategies for foreign students through diverse media, such as folk songs and traditional dances, in order to foster interest and enthusiasm in the learning process. Songs and dances can therefore enhance BIPA learners' engagement with Indonesian culture.

From a pedagogical perspective, songs and dances integrate verbal and non-verbal dimensions. Lyrics and melodies operate within the linguistic domain (vocabulary, intonation, sentence structure), while movement and dance engage the body, motor memory, and visual context. This combination supports multimodal learning. As a result, learners not only "listen" or "read" but also "perform," which facilitates the internalization of vocabulary and cultural meanings through embodied learning experiences. Participation in traditional music and movement further contributes to the development of motor skills, coordination, and memory among participants.

From an intercultural perspective, songs and dances serve as effective tools for fostering intercultural competence. Collective activities such as singing and dancing together create warm social interactions, reduce cultural distance, and encourage empathy and mutual understanding. Firnamita and Noordiana⁵ argue that learning folk songs and traditional dances also supports character formation, including self-confidence, emotional regulation, and politeness qualities that are crucial in the context of multicultural education.

The performing arts of Nusantara, particularly traditional songs and dances, serve as concrete representations of Indonesia's rich cultural heritage. Folk songs and dances not only teach linguistic aspects but also convey social values, local wisdom, and the collective identity of a community. BIPA instruction that incorporates songs and dances is not merely instructional but also transformative for both learners and the local community. Unfortunately, such training activities specifically designed for BIPA learners abroad remain limited, especially those that are systematically developed and adapted to the learners' backgrounds.

The learning context at Maejo University, Chiang Mai, Thailand, also provides strong support for the implementation of this program. Based on initial communication between the community service team and the administrators of the BIPA program at Maejo University, it was found that students enrolled in BIPA classes come from diverse academic backgrounds and show considerable interest in Indonesian culture. Some students have even expressed aspirations to participate in student exchange programs in Indonesia or to pursue further studies at Indonesian universities. This reflects a significant potential to strengthen their interest through participatory and experiential cultural activities such as song and dance training. Furthermore, preliminary observations indicate that most BIPA students at Maejo University are at the beginner or intermediate proficiency level.

Maejo University in Thailand is one of the partner institutions for BIPA instruction whose students demonstrate a strong interest in Indonesian culture. However, based on initial communication with the local partners, it was found that cultural activities such as singing regional songs or dancing have not yet been fully integrated into the learning process. In fact, participatory approaches of this kind hold significant potential to strengthen foreign students' comprehensive understanding of both the Indonesian language and culture. In this context, cultural introduction through physical activities such as singing and dancing can serve as an effective method to enhance their engagement in the learning process.

The program Internationalization of Indonesian Culture through Training in Nusantara Songs and Movements for Learners of Indonesian as a Foreign Language (BIPA) at Maejo University, Chiang Mai, Thailand aims to support the internationalization of Indonesian culture by providing training in traditional arts (songs and movements of the Nusantara) specifically designed for BIPA learners. This initiative seeks to strengthen cultural understanding while also enhancing learners' motivation to study the Indonesian language. The program



introduces the cultural diversity of Indonesia through traditional songs and dances from various regions to BIPA students at Maejo University. Furthermore, the implementing team aims to provide participatory and enjoyable learning experiences through singing and dancing activities, to develop contextual and simplified Nusantara song-and-movement training materials appropriate to learners' language proficiency levels, to improve learners' intercultural competence in understanding Indonesian cultural values through artistic expression, and to encourage sustainable collaboration between Indonesian institutions and partner universities abroad in the field of Indonesian language and culture teaching.

This program was also implemented in the post-COVID-19 context, a period when international mobility began to return to normal and face-to-face interactions became possible once again. This momentum provides an excellent opportunity to revitalize international collaboration and to take advantage of the chance to promote Indonesian culture on a global scale. With the direct presence of the implementation team in Thailand, interactions between instructors and participants became more intensive, allowing cultural learning to occur in a more contextual and communicative manner.

On the other hand, challenges remain in carrying out this program. One of the main challenges lies in the diverse cultural backgrounds and experiences of the participants. Although they have studied the Indonesian language, their understanding of the cultural context of Indonesia is still limited. This limitation arises from differences in cultural background, which makes it difficult for foreign students to adapt to and internalize a new culture⁶. Therefore, in designing the training materials, the team carefully considered delivering the content in a simple, communicative, and easily comprehensible way, while also avoiding cultural terms or symbols that might be too complex without sufficient contextual explanation.

Another challenge is the limited duration of the training. Given the relatively short implementation period, effective and efficient teaching strategies are required to ensure that the program's objectives can be achieved optimally. Therefore, in designing the activities, the implementation team focused on introducing two popular regional songs and dances that are easy to learn and representative of Indonesia's cultural diversity, namely Yamko Rambe Yamko and Si Patokaan.

The Yamko Rambe Yamko dance is a traditional performance from Papua. It represents the daily life of the Yali people, who traditionally sustain themselves through hunting, farming, and gardening. This dance not only serves as a cultural emblem but also reflects the local wisdom and collective identity of the Yali community in Papua⁷. The meaning and symbolism of Yamko Rambe Yamko embody unity, togetherness, and the spirit of mutual cooperation within Papuan society. It also conveys respect for the abundance of nature and reverence for the ancestors who safeguarded it⁸.

The Yamko Rambe Yamko dance features repetitive rhythmic patterns combined with energetic movements, accompanied by distinctive Papuan costumes and props. This integration positions the dance not merely as entertainment, but as a medium for shaping collective identity. As a form of cultural resilience, Papuan dance reinforces local identity while simultaneously serving as a medium of cultural diplomacy at the international level. Paz, Masunah, and Milyartini⁹ emphasize that performances of this dance are frequently presented in both national and international contexts as a symbol of Indonesia's multiculturalism, as well as a tool of cultural diplomacy that highlights ethnic diversity and national unity. Consequently, this dance is particularly suitable for introduction to BIPA learners.

From an educational and cultural preservation perspective, Yamko Rambe Yamko functions as a medium for strengthening noble values such as patriotism, solidarity, and appreciation of diversity. Its use in arts education not only introduces the aesthetics of Papuan movement and music but also encourages younger generations to understand the social, historical, and political contexts underlying the creation of this cultural expression.

On the other hand, the Si Patokaan dance from North Sulawesi conveys a more personal emotional message. This dance depicts the deep affection of a mother for her child, Si Patokaan, who is preparing to enter adulthood and leave the homeland. The narrative reflects a mother's sadness, anxiety, and sincerity as she accepts her child's departure in pursuit of a better future. Beyond its artistic expression, the Si Patokaan dance symbolizes sacrifice and the strong familial values embedded within North Sulawesi society.

The philosophical meaning of Si Patokaan also emphasizes the central role of family in shaping individual character and identity. The integration of song and movement in the dance illustrates how traditional art serves as a medium for transmitting cultural values across generations. Traditional performances such as Si Patokaan play a crucial role in safeguarding national cultural identity, particularly in the era of globalization, which often erodes local values. Thus, the dance embodies not only aesthetic value but also educational and moral functions.

Both Yamko Rambe Yamko and Si Patokaan highlight the cultural diversity of the Indonesian archipelago, which is rich in meaning and local wisdom. These two dances demonstrate that traditional arts can function as vehicles for preserving the social, spiritual, and emotional values of local communities. Furthermore, introducing these dances in the contexts of education, tourism, and cultural diplomacy can strengthen Indonesia's image on the global stage. The integration of traditional culture into international activities can enhance intercultural understanding while simultaneously reinforcing national identity. Therefore, the preservation and development of



Nusantara dance traditions are essential not only for safeguarding cultural heritage but also for strengthening Indonesia's position in the global arena.

Through the training of movements and songs in the Yamko Rambe Yamko and Si Patokaan dances, it is expected that BIPA (Indonesian Language for Foreign Speakers) learners at Maejo University will gain a deeper understanding of Indonesian culture. At the institutional level, support from Maejo University for this activity has been very positive. The faculty and BIPA program administrators have welcomed this initiative by providing space, facilities, and students to actively participate in the training. This demonstrates that the program is aligned with the university's spirit of internationalization and strengthens academic collaboration between Yogyakarta State University and Maejo University.

In general, the social, cultural, and institutional environment at Maejo University reflects a high level of readiness and enthusiasm for the internationalization of Indonesian culture. Through a participatory and interactive approach, this training of Nusantara movements and songs functions not only as an introduction to cultural practices but also as a means of fostering students' emotional connections with Indonesia. Such engagement becomes an important asset for the sustainability of BIPA programs, while also serving as a tangible contribution to Indonesia's cultural diplomacy abroad.

Considering the background and potential that exist, this initiative represents a sustainable model of community engagement. It is not merely a one-time activity but rather a form of strategic cooperation in advancing cross-cultural education and cultural exchange. More than a technical exercise in singing or dancing, the program carries a broader mission: to bridge intercultural understanding, strengthen national identity, and instill values of tolerance, diversity, and cooperation through the medium of Indonesian traditional arts.

The implementation of this community service activity is based on several interrelated theoretical concepts, namely: (1) cultural internationalization, (2) language and cultural learning in the context of BIPA (Indonesian Language for Foreign Speakers), and (3) the role of art as a medium for cross-cultural education. Cultural internationalization is part of cultural diplomacy, which refers to a strategy of disseminating a nation's cultural values to the international community with the aim of strengthening the country's positive image and fostering closer international relations. In the Indonesian context, cultural internationalization is carried out through various means, such as art performances, cultural festivals, teaching Indonesian to foreign speakers (BIPA), as well as training in regional dances and songs. Traditional movements and songs, as part of intangible cultural heritage, have the potential to represent Indonesia's national identity, which is rich in diversity. UNESCO recognizes that intangible cultural heritage, such as traditional dance and music, is an essential element in strengthening social cohesion and promoting intercultural dialogue. Therefore, training in Nusantara movements and songs not only introduces aesthetic aspects but also broadens foreign participants' understanding of the local values embedded in Indonesian society.

In second language teaching, including Indonesian for Foreign Speakers (BIPA), cultural understanding is essential since language is inseparable from its social and cultural context. Bayadilova et al.¹⁰ emphasize that language is a cultural symbol, and learning a language also means understanding the worldview, values, and social systems of its speakers. Therefore, language and culture teaching and learning in the context of BIPA should not only focus on linguistic competence but also encompass sociocultural competence. Culture-based learning enables learners to develop intercultural competence, namely the ability to understand and appreciate cultural differences and to communicate effectively in cross-cultural contexts¹¹. In the Thai context, BIPA learners will more easily absorb and comprehend Indonesian when accompanied by cultural understanding, including through activities such as singing regional songs or practicing traditional dances. Here, art plays a role as a medium of cross-cultural education.

Art, in this case movements and songs, possesses strong symbolic and emotional power, making it an effective medium for cross-cultural learning. Indonesian regional songs, for example, not only present spoken language but also reflect social norms, collective values, and local wisdom of a community. Similarly, traditional dances convey symbolism through body, space, and time that is unique to a particular culture. According to multimodal learning theory by Summaira et al.¹², the use of multiple modes in learning—such as visual, auditory, and kinesthetic—can enhance the effectiveness of knowledge and skill transfer. In Nusantara movement and song training, learners engage their auditory sense (melody and lyrics), visual sense (body movements and expressions), and kinesthetic ability (coordination of movements), making their involvement in the learning process more holistic and immersive. Moreover, this approach aligns with the principles of experiential learning¹³, which emphasize learning through direct experience. When participants not only hear or see but also actively sing and dance, they undergo a more meaningful learning process. In a cross-cultural context, this direct experience creates space for reflection, exchange of perspectives, and the growth of appreciation for cultural diversity.

In the implementation of this program, the problem-solving framework was designed based on a participatory and educational approach aimed at addressing the limited understanding of Indonesian culture in BIPA learning abroad. This framework consists of several stages, namely: needs identification of partners, training material design, training implementation, reflection and feedback, and documentation and publication of results.



The team identified the needs and conditions of BIPA learners at Maejo University through communication with the BIPA program coordinators and local lecturers. The information collected included language proficiency levels, interest in Indonesian culture, and the types of activities expected by the participants. Subsequently, the team developed training materials covering Nusantara movements and songs, selected based on the following criteria: 1) Representing the cultural diversity of Indonesia, 2) Easy to learn for beginners, 3) Containing local cultural values that can be explained contextually, and 4) Including training content such as song introduction (lyrics, meaning, pronunciation), simple vocal exercises, and the introduction and practice of traditional dance movements appropriate to the song's content.

The training activities were conducted directly at Maejo University, involving BIPA students as the primary participants. The training employed the following methods: 1) Demonstration and active participation (learning by doing), 2) A communicative approach in explaining cultural and linguistic meanings, 3) Group collaboration in singing and dancing practice, and 4) Question-and-answer sessions to reinforce cultural understanding.

This program specifically targeted students learning Indonesian at Maejo University, Chiang Mai, Thailand. This group was selected based on the collaboration between the service institution and the Indonesian Language for Foreign Speakers (BIPA) Program, which has been actively running at the university.

The characteristics of the training participants included students currently enrolled in Indonesian as a foreign language (BIPA) classes, either through the university's regular programs or cultural exchange activities, from various faculties particularly the Faculty of Liberal Arts and programs related to language, culture, and international communication. Participants had basic to intermediate proficiency in Indonesian and demonstrated a strong interest in Indonesian culture, as shown by their participation in previous cultural activities such as batik classes, culinary workshops, and art performances.

The program was also open to other Maejo University students interested in Indonesian culture, even if they had not formally taken BIPA classes. Their participation helped broaden cultural exposure and served as a bridge to attract new interest in learning the Indonesian language.

Lecturers and program coordinators at Maejo University supported the activity by acting as facilitators and academic partners in the future development of training materials. By selecting Maejo University students as the primary audience, this activity aimed not only to introduce Nusantara movements and songs as a medium for cultural learning but also to strengthen academic and cultural ties between Indonesia and Thailand through a participatory and enjoyable learning experience.

METHOD

The method employed in this program was participatory and centered on hands-on practice (experiential learning). This approach was chosen to support the training objectives, which were not only informative but also practical and enjoyable for participants—foreign students learning Indonesian language and culture. The training activities were carried out in three main stages: introduction to Nusantara movements and songs, movement and song practice, and mini performance.

In the initial stage, participants were introduced to Nusantara cultural concepts through a brief presentation on the origins and meanings of the traditional songs and dances to be learned. This activity was complemented by video demonstrations and interactive dialogues to build context and participant enthusiasm. Next, participants were guided to practice dance movements step by step under the instructor's supervision. Selected traditional songs were also learned together, focusing on both lyrics pronunciation and melody, adapted to the participants' Indonesian language proficiency. Repetition, correction, and feedback were provided progressively to ensure engagement and comprehension.

As the culmination of the activity, participants presented their practice results in an informal mini-performance, allowing space for cultural expression and appreciation. This stage also aimed to give participants a valuable experience of the artistic production process and performing in front of an audience.

The teaching approach included: 1) direct demonstration by the dance instructor and service facilitators, 2) drill and repetition to reinforce movements and lyrics, 3) contextual learning by explaining the cultural meanings of lyrics and movements, 4) a collaborative approach by dividing participants into small groups for joint practice, and 5) brief reflection after practice sessions to evaluate the process and participants' impressions.

RESULT AND DISCUSSION

Implementation of the Program

The Nusantara Movement and Song Training conducted at Maejo University, Thailand, ran smoothly and received positive responses from the participants. Approximately 30 students learning Indonesian at the university

took part in the activity. From the outset, the program was systematically designed, progressing from introduction to the final performance, ensuring that it was carried out according to plan.

During the introductory session, participants were not only shown the movements and songs but were also provided with an understanding of the meanings, philosophies, and cultural backgrounds embedded in the Nusantara dances and songs. This approach fostered curiosity and motivated the students to deepen their knowledge of Indonesia's rich cultural heritage. The participants' enthusiasm was evident through their active engagement in every session, particularly when attempting to replicate the distinctive expressions found in traditional dance movements.



Figure 1. Participants practicing movements and songs

During the practice sessions, participants demonstrated significant progress. Initially, some dance movements and song lyrics were challenging for them. However, after several repetitions, they gradually became able to follow the movements accurately. Overall, the participants' development was positively reflected in their motor skills in performing the dance movements.

As the culmination of the activity, participants presented a mini-performance in front of supervising lecturers and fellow students. The performance was not only lively but also fostered a warm atmosphere of cultural appreciation. The enthusiastic response from the audience further affirmed that the activity had a tangible impact in strengthening academic and cultural ties between the two countries.

This activity made a meaningful contribution to introducing Indonesian culture to foreign students, particularly learners of the Indonesian language. Through a practical and interactive approach, students did not merely receive theoretical knowledge but also directly experienced the learning process through body movements, voice, and the emotional expressions embedded in the dances and songs. This aligns with Dörnyei and Csizér¹⁴, who emphasize that meaningful learning experiences especially those involving emotional and social dimensions play a crucial role in developing dynamic motivation in language learners.

Marszalek et al.¹⁵ demonstrate that cross-cultural collaborative activities based on art and creative expression can promote a flow experience in language learning—a state in which learners become fully immersed in the learning activity, thereby enhancing both motivation and learning outcomes. By learning traditional dance movements and regional song lyrics, participants gained a contextual understanding of the underlying cultural meanings. Consequently, this activity was able to integrate linguistic, affective, and cultural aspects into a comprehensive learning experience.



Figure 2. Mini performance at the conclusion of the activity

The active participation and high enthusiasm of the participants also indicate that culture-based methods like this can significantly enhance motivation for learning Indonesian. Dörnyei and Ryan¹⁴ emphasize that language learning motivation develops dynamically when the material is communicative, contextual, and relevant to learners' real-life experiences. The mini performance held at the conclusion of the activity served as tangible evidence of successful learning, while also providing participants with the opportunity to practice courage, hone presentation skills, and boost self-confidence in using Indonesian in front of a broader audience. Furthermore, this activity functioned as a cross-cultural bridge connecting Indonesia and Thailand through academic and artistic interaction. Students, as participants, not only acted as learners but also served as cultural ambassadors, helping to expand cross-cultural understanding within their communities.

After the activity concluded, participants expressed various positive impressions. They felt they had gained a new experience that was not only enjoyable but also highly beneficial in deepening their understanding of Indonesian language and culture. Some even expressed interest in learning dances from other regions of Indonesia, such as Balinese dance, Saman dance from Aceh, or traditional Javanese dances. This enthusiasm indicates the success of the training in fostering love and interest in Indonesian culture. Overall, the activity successfully achieved its primary objectives: introducing Nusantara movements and songs to foreign students and enhancing their appreciation of Indonesian culture through an engaging, interactive, and meaningful approach.

The activity's impact extended beyond language and cultural learning, contributing also to cultural diplomacy and the strengthening of inter-institutional relations within the ASEAN region. The cross-cultural interactions that emerged during the program opened opportunities for broader academic collaboration in the future. Moving forward, similar activities could be developed with longer durations, a more diverse range of materials from various regions of Indonesia, and the involvement of more participants from both countries. With an interdisciplinary and collaborative approach, such training activities are expected to enrich students' learning experiences while expanding academic networks and reinforcing cultural ties between Indonesia and Thailand.

Several factors contributed to the smooth implementation of this activity. First, Maejo University students demonstrated a strong interest in Indonesian culture, particularly in learning traditional songs and dances. This enthusiasm was crucial in creating an interactive and productive learning environment. Fathi, Pawlak, Mehraein, and Hosseini¹⁶ emphasize that intrinsic motivation and foreign language enjoyment play a significant role in enhancing participation and willingness to communicate in a foreign language.

Second, collaboration between the implementation team from Yogyakarta State University and Maejo University was effective and mutually supportive, ensuring smooth coordination of the activities. Marszałek et al.¹⁵ also highlight the importance of collaborative learning based on cross-cultural interaction to strengthen the learning experience and enrich students' intercultural competence.

Additionally, support in terms of facilities from Maejo University—such as provision of activity spaces, audio equipment, and adequate practice rooms—contributed significantly to creating a conducive learning environment. A well-structured learning environment, as part of the L2 learning experience, greatly influences the development of learners' dynamic motivation in foreign language acquisition¹⁴.

Another important factor was the cultural affinity between Thailand and Indonesia, which facilitated participants' understanding of the meanings behind Nusantara dance movements and song lyrics. Fathi et al.¹⁶ note that intercultural communicative competence is a strong predictor of successful language learning and the development of willingness to communicate among foreign language learners. With this combination of factors, the activity was implemented smoothly and yielded optimal results.

CONCLUSION

This program was implemented at Maejo University, Thailand, with the theme of introducing Indonesian culture through traditional song and dance training. The program ran smoothly and received positive feedback from the participants. Maejo University students demonstrated high enthusiasm throughout the entire series of activities, from the introductory sessions to the mini performance. Through this training, participants not only acquired basic skills in singing and performing traditional Indonesian dances but also gained an understanding of the cultural values embedded within them. This activity is expected to serve as a means of promoting Indonesian culture in the Southeast Asian region and strengthening academic ties between universities.

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Enhancing Digital Literacy and School Self-Reliance through WiFi Network Education and Optimization at SMPN 12 Yogyakarta

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Abstract. Stable and efficient internet access is an essential requirement for supporting digital learning in schools. SMPN 12 Yogyakarta faced several challenges related to unstable WiFi connections, limited infrastructure, and a lack of technical understanding among teachers and students. This community service project aimed to enhance digital literacy and improve school self-reliance through education and technical training on WiFi maintenance and optimization. The program consisted of four stages: initial assessment, WiFi network optimization, technical training, and mentoring. The activities successfully improved WiFi performance, increasing download speeds from 1–9 Mbps to 19–49 Mbps and upload speeds from 3–9 Mbps to 9–43 Mbps. Additionally, the project improved teachers' and students' ability to perform basic troubleshooting independently and fostered the creation of an internal IT team responsible for regular maintenance. These outcomes demonstrate that a combined approach of infrastructure optimization and capacity building can significantly enhance the sustainability of digital learning environments in schools.

Keywords: *WiFi, digital literacy, optimization, education, community service, school network.*

INTRODUCTION

The rapid advancement of information and communication technology (ICT) has transformed the landscape of education, redefining how teachers teach and how students learn. The integration of digital technologies such as Learning Management Systems (LMS), online assessments, and multimedia-based instruction has become a central component of modern education. As a result, access to a stable and high-speed internet connection is no longer optional—it is a fundamental infrastructure that determines the success of digital learning. Schools are expected not only to provide connectivity but also to ensure its reliability, efficiency, and sustainability.

However, many educational institutions in Indonesia continue to face challenges in this regard. SMPN 12 Yogyakarta, a public secondary school in the city of Yogyakarta, represents one such case. Despite the growing reliance on digital learning platforms, the school's WiFi network was found to be unstable, with frequent disruptions, inconsistent signal coverage, and inefficient bandwidth management. These issues not only hampered the effectiveness of classroom instruction but also hindered the use of digital resources by both teachers and students. Poor connectivity often caused delays in accessing online materials, interrupted online assessments, and discouraged the use of educational technology.

In addition to technical challenges, the school community also lacked adequate digital literacy and technical competence. Most teachers and students used the WiFi network merely as end-users without understanding the underlying principles of how it operates or how to troubleshoot basic connectivity issues. As a result, even minor technical problems required assistance from external technicians, leading to unnecessary costs and longer downtimes. This situation reflects a broader problem in Indonesian schools—limited awareness and capacity in maintaining technological infrastructure for educational purposes.

According to Wei (2013), the management and maintenance of school campus networks are critical to ensuring operational stability and security. Similarly, Yusra and Sesmiarni (2025) emphasize that digital literacy among educators and students plays a significant role in the successful integration of technology in learning environments. In this context, improving both the physical infrastructure and human capacity becomes essential. Schools need to empower their members to manage their own networks through proper training, regular maintenance, and systematic performance monitoring.

To address these issues, a community service program (Pengabdian kepada Masyarakat or PkM) was conducted by lecturers and students from Universitas Negeri Yogyakarta. The program aimed to enhance the

digital literacy and self-reliance of SMPN 12 Yogyakarta through education, training, and practical assistance in WiFi technology management. The initiative combined two strategic approaches: (1) technical optimization of the WiFi network infrastructure to ensure stable and efficient internet access, and (2) capacity building for teachers and students through hands-on training in troubleshooting, maintenance, and network optimization.

This dual approach reflects the growing need for sustainable digital transformation in educational settings—one that balances infrastructure improvement with human resource empowerment. By engaging both teachers and students as active participants in the training process, the program sought to foster a sense of ownership and accountability toward the school's technological ecosystem.

Through this project, SMPN 12 Yogyakarta aimed not only to improve the quality of its internet connectivity but also to build an internal culture of technological awareness and collaboration. The formation of an in-school IT maintenance team and the development of standard operating procedures (SOPs) for network management were integral parts of the initiative. Ultimately, the project serves as a model for how community service programs can bridge technological and educational gaps, helping schools transition toward more independent, resilient, and digitally literate learning environments.

LITERATURE REVIEW

Digital Transformation in Education

The digital transformation of education represents a paradigm shift from traditional teaching methods toward technology-supported, data-driven learning environments. The integration of digital platforms, online resources, and interactive applications has allowed for more flexible, personalized, and student-centered learning experiences (Yusra & Sesmiarni, 2025). According to UNESCO (2023), digital learning is not merely about using technology but about rethinking pedagogy, curriculum design, and assessment through the effective use of digital tools.

However, such transformation is only successful when supported by adequate infrastructure—particularly internet connectivity. Reliable access to WiFi networks serves as the backbone of digital education (Wei, 2013). Schools with unstable or limited connectivity often face barriers in implementing blended learning, remote learning, and digital assessments. Therefore, infrastructure improvement and management are central issues in ensuring equitable and effective access to digital learning environments.

In Indonesia, the push toward digital transformation in education has been accelerated by government initiatives such as *Merdeka Belajar* and the *Smart School* program, which promote the integration of technology into classroom practice. Yet, disparities in infrastructure quality remain evident between urban and rural schools (Wijayanti & Firmansyah, 2023). The case of SMPN 12 Yogyakarta illustrates how connectivity limitations and lack of technical literacy can hinder the full realization of these national initiatives.

Importance of WiFi Network Management in Schools

WiFi technology has become the most widely used method of connecting to the internet in schools due to its accessibility, flexibility, and cost-effectiveness. However, ensuring stable and secure WiFi access requires systematic management involving both hardware maintenance and software configuration. Studies by Anggraheni and Mulyana (2008) and Anwar and Akbar (2024) highlight that bandwidth management plays a crucial role in maintaining fair and efficient distribution of internet traffic among users.

One of the most widely adopted tools in educational environments is **Mikrotik RouterOS**, which provides advanced network management features such as *Per Connection Queue (PCQ)* to ensure balanced bandwidth allocation. By implementing proper bandwidth management, schools can minimize congestion, prevent misuse of resources, and ensure that critical educational applications receive sufficient connectivity (Senoria et al., 2023).

In addition to bandwidth management, **access point placement** and **signal optimization** are vital for maintaining consistent coverage. Improper positioning of access points can create *dead zones* or overlapping frequencies that reduce network efficiency. According to Wei (2013), regular monitoring and preventive maintenance are essential to minimize downtime and avoid long-term degradation of network quality. Preventive maintenance includes firmware updates, cable inspections, and configuration audits—all of which require technical competence that school staff must develop through training.

Digital Literacy and Capacity Building

Digital literacy is a multidimensional concept encompassing not only the ability to use digital tools but also to understand, evaluate, and create digital content responsibly (UNESCO, 2022). In the context of education, digital literacy extends beyond students to include teachers and administrators who play key roles in designing and facilitating digital learning experiences.

Yusra and Sesmiarni (2025) argue that teacher competence in digital literacy is directly linked to the successful implementation of technology-based learning. Teachers who possess higher digital literacy are more capable of integrating digital platforms into their teaching, managing online assessments, and guiding students in safe and effective internet use.

Moreover, developing digital literacy among students is essential to prepare them for future careers that increasingly demand ICT-related skills. However, digital literacy cannot be developed in isolation from infrastructure readiness. A stable and accessible WiFi network provides the technical foundation upon which digital skills can be nurtured.

The **capacity-building approach** emphasizes the empowerment of individuals and institutions to manage technology effectively. Amasiri et al. (2024) demonstrated through the *WiFinder Project* that practical, hands-on training in telecommunications and networking for secondary school students significantly increased their technical understanding and interest in STEM fields. This model of experiential learning—combining theory with direct practice—has proven effective in bridging the gap between knowledge and application.

In the case of SMPN 12 Yogyakarta, the capacity-building approach was implemented through collaborative workshops that allowed teachers and students to engage directly in the troubleshooting and optimization of their WiFi network. Such engagement not only improved technical skills but also fostered a sense of ownership and responsibility toward the school's technological infrastructure.

School Self-Reliance and Sustainability in Technology Management

School self-reliance in technology management refers to the ability of educational institutions to independently maintain and optimize their technological systems without over-reliance on external service providers. According to Kholili (2025), empowering schools to manage their networks internally promotes sustainability, reduces operational costs, and enhances responsiveness to technical problems.

Self-reliance in technology management is closely related to the concept of *technological sustainability*. A sustainable digital ecosystem in schools requires not only functional hardware and software but also competent human resources, institutional policies, and continuous professional development programs.

The creation of in-school IT teams—comprising teachers and students—has been identified as an effective strategy for promoting sustainability. These teams can handle routine maintenance, perform minor troubleshooting, and monitor network usage. Moreover, involving students in IT management serves an educational purpose by developing their practical skills in real-world contexts.

Several studies (Nurhayani et al., 2025; Wijayanti & Firmansyah, 2023) emphasize that schools that actively maintain their networks experience fewer connectivity disruptions and demonstrate higher levels of technology adoption in classrooms. Hence, building self-reliance should be viewed not merely as a technical initiative but as part of a broader pedagogical strategy to cultivate a digital culture within educational institutions.

To support long-term sustainability, standard operating procedures (SOPs) are necessary. These SOPs typically include guidelines for troubleshooting, maintenance schedules, security protocols, and network access policies. When implemented consistently, such frameworks help institutionalize good practices, ensuring that technological progress continues beyond the duration of external assistance or specific projects.

In the SMPN 12 Yogyakarta project, the establishment of an internal IT maintenance team and the development of SOPs marked an important step toward sustainability. These efforts align with the goals of the Sustainable Development Goals (SDG 17: Partnerships for the Goals), which emphasize collaboration between universities and schools to strengthen local capacities for sustainable development.

Integrating Technical Optimization and Educational Empowerment

The intersection between technical optimization and educational empowerment represents a holistic model for technological advancement in schools. Technical interventions alone—such as upgrading routers or increasing bandwidth—may yield short-term improvements but often fail to sustain long-term benefits if human resources are not adequately trained. Conversely, training programs without corresponding infrastructure upgrades can be frustrating for participants due to persistent technical limitations.

Hence, integrating both aspects leads to a synergistic effect. According to Amasiri et al. (2024), projects that combine network optimization with user education achieve higher satisfaction rates and longer-lasting outcomes. The SMPN 12 Yogyakarta project exemplifies this approach: network performance improved significantly (up to a 400% increase in download speed), while teachers and students gained the ability to perform independent troubleshooting.

This model aligns with the principles of *community engagement in education*, wherein universities collaborate with schools to address real-world problems through participatory approaches. Such partnerships create reciprocal benefits: schools receive technical and pedagogical support, while universities gain opportunities for applied research and student learning experiences.

Furthermore, this model supports Indonesia's *Tri Dharma Perguruan Tinggi*—the three pillars of higher education: education, research, and community service. The project demonstrates how community service initiatives can directly contribute to educational innovation and local capacity building in the digital era.

Although numerous studies discuss the importance of digital literacy and WiFi optimization separately, limited research has explored their integration as a dual strategy for sustainable school transformation. Most existing studies focus either on network performance metrics or on digital skills development, without addressing how these dimensions interact to build institutional self-reliance.

The literature also indicates that while large-scale national programs promote digital education, there remains a need for context-specific, grassroots-level initiatives that empower individual schools to manage their own infrastructures. The SMPN 12 Yogyakarta initiative fills this gap by demonstrating how local-level interventions—combining infrastructure improvement, training, and mentoring—can yield measurable technical and educational impacts.

Therefore, this study contributes to the growing body of knowledge on sustainable digital education by proposing an integrated model that bridges technological and human capacity development. It emphasizes that true digital transformation in schools must encompass both physical connectivity and cognitive empowerment.

RESEARCH METHOD

Research Design

This study employed a **participatory action research (PAR)** approach integrated within a **community service framework (Pengabdian kepada Masyarakat – PkM)**. The PAR model was selected because it emphasizes collaboration between researchers and the target community—in this case, SMPN 12 Yogyakarta—in identifying problems, implementing solutions, and evaluating outcomes. Such an approach aligns with the objectives of university-based community engagement, where knowledge transfer and local empowerment are equally important outcomes (Amasiri et al., 2024).

The project was designed not only to optimize the school's WiFi network but also to build sustainable digital capacity among teachers and students. The intervention combined **technical optimization** (improving infrastructure and network configuration) with **educational empowerment** (training, mentoring, and participatory learning). This dual strategy was intended to achieve both short-term improvements in internet performance and long-term school self-reliance in digital infrastructure management.

The methodological framework of this project demonstrates a balance between **technical engineering solutions** and **educational capacity building**. By involving school stakeholders as active participants throughout the process, the project created a sense of ownership and accountability, ensuring long-term sustainability. The mixed-method evaluation approach enabled the measurement of both tangible outcomes (improved internet speed, reduced downtime) and intangible outcomes (enhanced literacy, empowerment, collaboration).

This integrative methodology can serve as a replicable model for other schools seeking to strengthen their digital learning infrastructure through community–university collaboration.

Implementation Site

The program took place at **SMPN 12 Yogyakarta**, a public junior high school located in the urban area of Yogyakarta City, Indonesia. The school has over 700 students and approximately 40 teachers. Prior to the intervention, the school's WiFi network consisted of several access points distributed unevenly across classrooms, with some areas (especially upper-floor classrooms and laboratory spaces) experiencing weak signal coverage and unstable connectivity.

Bandwidth sharing among users was unregulated, resulting in congestion during peak hours. In addition, the school lacked a dedicated IT team or clear maintenance procedures. These challenges made SMPN 12 Yogyakarta a suitable case for implementing and evaluating a holistic WiFi education and optimization program.

Program Stages

The implementation process consisted of **four major stages**, conducted sequentially over a period of four months (May–August 2025). Each stage involved collaboration between the university team, school management, and participants.

Stage 1: Needs Assessment and Baseline Survey

The initial phase focused on diagnosing technical and human resource challenges. The research team conducted:

- A **site survey** of existing WiFi coverage using tools such as WiFi Analyzer to identify weak-signal zones and overlapping frequencies.
- **Interviews** with teachers and students to capture user experiences and challenges in using digital learning platforms.
- **Observation and documentation** of hardware conditions, including routers, access points, and cabling systems.

The baseline data were used to map out areas requiring technical intervention and to design appropriate training materials. The assessment revealed three key issues: (1) inadequate access point placement, (2) inefficient bandwidth allocation, and (3) limited user knowledge of troubleshooting.

Stage 2: Network Optimization and Infrastructure Improvement

Based on the assessment, the technical optimization phase was carried out by the university team, assisted by students from the Department of Informatics Engineering. The interventions included:

- **Repositioning and adding access points** in classrooms with poor coverage, particularly in Grades 7E, 8A–8D, and 9A.
- **Configuring router and bandwidth management** using *Mikrotik RouterOS* with the *Per Connection Queue (PCQ)* method to ensure fair bandwidth distribution.
- **Channel separation** (using CH1, CH9, CH13) to reduce signal interference among nearby access points.
- **Testing connection stability** before and after optimization to record improvements in speed and latency.

The optimization process was intentionally conducted in collaboration with selected teachers and students, allowing them to learn practical aspects of network maintenance. This participatory process was a critical component of the educational design.

Stage 3: Education and Technical Training

The third phase involved conducting **educational workshops** aimed at building digital literacy and technical competence among the school community. The training program was divided into theoretical and practical sessions.

- **Theoretical sessions** introduced participants to fundamental concepts of computer networking, WiFi technology, bandwidth management, and network security.
- **Practical sessions** focused on troubleshooting techniques, router configuration, signal mapping, and basic maintenance routines.

Training materials were prepared in both printed and digital formats, including a guidebook titled “*WiFi Network Maintenance and Optimization Manual for Schools*.” The hands-on approach allowed participants to simulate real-life problems such as slow connectivity or device disconnection and apply troubleshooting methods directly.

To encourage active learning, participants worked in small groups comprising teachers and students, fostering collaboration and peer-to-peer knowledge sharing. The program concluded with an **evaluation test** measuring participants’ understanding and ability to apply network maintenance procedures.

Stage 4: Mentoring, Monitoring, and Sustainability Planning

The final stage focused on ensuring the continuity of the project outcomes. For three months after the training, the university team conducted regular mentoring sessions through on-site visits and online consultation. The main objectives of this phase were:

- To assist the school in **forming an internal IT maintenance team** consisting of five teachers and five students.
- To develop **Standard Operating Procedures (SOPs)** for routine network maintenance, including inspection schedules, reporting mechanisms, and troubleshooting documentation.
- To monitor network performance and gather user feedback regarding improvements in speed, stability, and accessibility.

The monitoring results indicated a substantial increase in network performance and user satisfaction. Moreover, the school management officially recognized the IT team as a permanent task force responsible for digital infrastructure maintenance.

Participants

The participants in this program were divided into three groups:

1. **Primary beneficiaries:** 25 teachers and 30 students from SMPN 12 Yogyakarta who directly attended the workshops and participated in the optimization process.

2. **Supporting facilitators:** 5 lecturers and 6 university students from Universitas Negeri Yogyakarta serving as instructors, mentors, and technical assistants.
3. **Stakeholders:** The school principal and administrative staff who provided policy and logistical support for the implementation.

Participants were selected based on their willingness to engage actively in the training and their role in supporting digital learning at the school. The student participants were chosen from the technology and science clubs to maximize long-term impact.

Data Collection Instruments

Multiple instruments were used to collect both quantitative and qualitative data to evaluate the effectiveness of the program:

- **Speed Test Logs:** Measurement of download and upload speeds before and after optimization using *Ookla Speedtest*.
- **Observation Checklists:** To record changes in WiFi coverage, signal strength, and equipment condition.
- **Pre-test and Post-test Assessments:** To measure participants' knowledge gain in WiFi management and troubleshooting.
- **Questionnaires:** Distributed to teachers and students to assess satisfaction levels and perceived improvements in internet quality.
- **Interviews and Focus Group Discussions (FGDs):** Conducted with key stakeholders to explore qualitative insights on program outcomes and sustainability challenges.

Data Analysis

The data analysis was carried out using a **mixed-method approach** combining quantitative and qualitative analysis. Quantitative data from speed tests, pre–post assessments, and surveys were analyzed descriptively using percentage comparisons and mean difference scores.

For example, internet speed improvements were calculated using percentage change formulas:

$$\text{Improvement (\%)} = \frac{\text{After Optimization} - \text{Before Optimization}}{\text{Before Optimization}} \times 100 \quad \text{i)}$$

Qualitative data from interviews and observations were analyzed through **thematic analysis**, focusing on three dimensions: technical improvement, digital literacy development, and school empowerment. Emerging themes were categorized to interpret the overall impact and sustainability potential of the intervention.

Evaluation Criteria

Success indicators were defined according to the following measurable outcomes:

TABLE 1. Evaluation Indicator.

Indicator	Target Achievement	Measurement Tool
Network stability and coverage	≥80% improvement from baseline	Signal mapping, speed test
Participant competence	≥80% participants able to perform troubleshooting	Post-test, observation
User satisfaction	≥75% satisfaction score	Questionnaire
School self-reliance	Formation of internal IT team and adoption of SOPs	Document review, interviews

All indicators were met or exceeded. The school reported a 400% increase in download speed, a 60% reduction in connectivity complaints, and strong enthusiasm among teachers and students for ongoing digital maintenance.

Ethical Considerations

This project adhered to ethical standards of community engagement. All participants were informed of the program objectives, and participation was voluntary. Data collected during the project were used solely for

academic reporting and improvement purposes. The activities were approved by the **Directorate of Research and Community Service, Universitas Negeri Yogyakarta (DRPM UNY)**, under the 2025 PKM funding scheme.

RESULTS AND DISCUSSION

Overview of Implementation Outcomes

The implementation of the WiFi optimization and education program at SMPN 12 Yogyakarta generated significant technical, educational, and institutional outcomes. The program addressed two interrelated objectives: (1) improving the performance and stability of the school's WiFi network, and (2) developing the digital literacy and technical self-reliance of teachers and students.

Overall, the four-month intervention period demonstrated that combining **infrastructure improvement** with **capacity-building education** yields measurable and sustainable benefits. The results are presented below in terms of (a) network performance improvement, (b) digital literacy enhancement, and (c) empowerment and sustainability outcomes.

Improvement in WiFi Network Performance

1. Network Speed and Stability

The technical optimization process resulted in substantial improvements in both download and upload speeds, as well as signal stability across school zones. Measurements were conducted using the *Ookla Speedtest* tool at identical locations before and after optimization.

Before Optimization:

- Download speed: 1–9 Mbps
- Upload speed: 3–9 Mbps
- Average latency: 72 ms
- WiFi coverage satisfaction: 45% (based on user surveys)

After Optimization:

- Download speed: 19–49 Mbps
- Upload speed: 9–43 Mbps
- Average latency: 24 ms
- WiFi coverage satisfaction: 91%

These data indicate an **average 400% increase in download performance**, a significant reduction in latency, and near-total elimination of coverage gaps. Classrooms that previously experienced weak signals—especially in the second-floor corridor and computer laboratory—reported seamless connectivity.

This improvement is attributed to three technical interventions:

1. **Optimized access point placement** based on WiFi Analyzer signal mapping.
2. **Channel redistribution (CH1, CH9, CH13)** to reduce co-channel interference.
3. **Bandwidth regulation using PCQ** on the Mikrotik router to ensure fair traffic distribution among users.

The results align with findings from Anwar & Akbar (2024), who demonstrated that implementing bandwidth management techniques can significantly improve internet performance in high-density network environments such as schools and universities.

2. Reliability and Maintenance Efficiency

Post-intervention monitoring also revealed reduced frequency of disconnection incidents. During the baseline period, the school reported an average of **six major connectivity disruptions per month**. After optimization, this dropped to **one or none**, demonstrating improved reliability.

Furthermore, school staff reported that minor connectivity issues could now be resolved internally within minutes, rather than requiring external technician visits that previously took days. This improvement not only saved operational costs but also minimized learning interruptions.

The introduction of structured **maintenance routines and SOPs** ensured continuous network health checks. These SOPs included regular access point reboots, monthly firmware updates, and documentation of troubleshooting logs. This operational standardization is a crucial component of long-term sustainability, as emphasized by Wei (2013) in the context of campus network management.

Enhancement of Digital Literacy and Technical Competence

1. Training Evaluation Results

The educational workshops conducted during the program had a strong impact on teachers' and students' understanding of WiFi technology. Pre-test and post-test assessments were used to measure knowledge gains across four domains: (1) basic networking concepts, (2) WiFi configuration, (3) troubleshooting techniques, and (4) network management ethics.

TABLE 2. Training Evaluation Results.

Competency Area	Average Pre-test Score	Average Post-test Score	Improvement (%)
Basic Networking	58.3	87.2	+49.5%
WiFi Configuration	42.5	83.0	+95.3%
Troubleshooting	37.4	81.7	+118.5%
Network Ethics	61.0	91.4	+49.8%

The results reveal an average improvement of **78% in knowledge competency**, indicating that the training successfully enhanced participants' digital literacy and technical confidence.

Teachers reported greater autonomy in managing classroom internet connections, while students expressed enthusiasm about applying troubleshooting skills at home. This experiential learning approach aligns with constructivist principles, where participants learn best through direct engagement and reflection on real-world problems (Amasiri et al., 2024).

2. Participant Engagement and Learning Motivation

Feedback from post-training questionnaires indicated high satisfaction levels:

- **95% of participants** found the training relevant and useful.
- **88%** preferred the practical workshop format over lecture-based instruction.
- **92%** stated increased confidence in solving minor connectivity issues independently.

Participants appreciated that the sessions were contextualized to the school's actual network conditions rather than abstract theory. Moreover, pairing teachers and students in mixed learning groups encouraged peer learning and collective problem-solving—a key element of participatory education.

This result supports the view of Yusra & Sesmiarni (2025), who emphasized that technology integration in schools should be accompanied by participatory learning that fosters both digital skills and collaborative values.

Institutional Empowerment and Formation of IT Maintenance Team

1. Establishing a School-Based IT Team

A major outcome of the project was the creation of a **School IT Maintenance Team**, consisting of five teachers and five students selected based on their engagement and technical aptitude. The team was formally recognized by the school principal through an internal decree, giving it authority to manage maintenance tasks and coordinate with the technical service provider when necessary.

The responsibilities of this team include:

- Conducting monthly WiFi inspections.
- Logging technical issues and maintenance actions.
- Managing the router's bandwidth control and security settings.
- Assisting peers with connectivity problems.

The establishment of this team demonstrates a shift from dependency to self-reliance. It also provides a platform for students to develop leadership and problem-solving skills relevant to STEM fields. Similar outcomes were reported in Kholili (2025), where students involved in WiFi-based school projects exhibited higher motivation to pursue technology-related studies.

2. Development of Standard Operating Procedures (SOPs)

To ensure consistency in maintenance and usage, the program facilitated the co-creation of **WiFi Management SOPs**. These documents covered:

- Hardware inspection schedules.
- Password management and access control policies.
- Troubleshooting flowcharts for common issues.
- Reporting templates for network performance logs.

The SOPs were written collaboratively by the IT team and project mentors, ensuring both technical accuracy and contextual relevance. This participatory authorship increases ownership and adherence among users, echoing the sustainability principles outlined by Wijayanti & Firmansyah (2023).

Impact on Learning Activities and Educational Quality

The improvements in WiFi performance and digital literacy had a tangible impact on the learning environment. Teachers reported smoother integration of online learning resources such as Google Classroom, YouTube-based instructional videos, and digital examinations.

Specific benefits observed include:

1. **Enhanced access to digital learning materials** — Teachers could upload and share multimedia files without delays.
2. **Increased participation in online assessment systems** — The school successfully conducted end-of-semester exams using online platforms with minimal disruptions.
3. **Reduction in digital frustration** — Students experienced fewer connection errors, improving focus and engagement.

Furthermore, teachers began experimenting with blended learning approaches, combining face-to-face instruction with digital assignments and interactive discussions. The improved network reliability also encouraged administrators to adopt online data management systems for attendance and grading, reflecting institutional progress toward digital governance.

These developments align with UNESCO's (2023) framework for digital education transformation, which highlights that infrastructure readiness and human capacity must evolve simultaneously to achieve meaningful learning outcomes.

Discussion: Lessons Learned and Theoretical Implications

The findings of this project provide several key insights relevant to both practice and theory.

First, the data confirm that **technical interventions are most effective when coupled with human capacity development**. The 400% increase in internet speed would have limited long-term value if the school community lacked the skills to maintain it. The dual approach—network optimization plus digital literacy training—created synergy that amplified the benefits of both components.

Second, the project illustrates how **participatory action research** can enhance community ownership of technological initiatives. Teachers and students were not passive recipients but active co-learners and problem-solvers. This participatory ethos reflects the *connectivist learning theory*, which views knowledge as a process of forming and navigating networks—both social and digital (Siemens, 2005).

Third, the project demonstrates that **school self-reliance in technology management** is achievable through modest, targeted interventions. Empowering internal teams and developing SOPs may seem small-scale actions, but they collectively foster long-term sustainability. These findings resonate with the sustainability framework proposed by Kholili (2025), which emphasizes institutional empowerment over external dependency.

Finally, from a broader perspective, this project reinforces the role of **university-school partnerships** in driving grassroots digital transformation. The collaboration between Universitas Negeri Yogyakarta and SMPN 12 Yogyakarta exemplifies how higher education institutions can contribute directly to educational innovation at the community level—fulfilling the *Tri Dharma Perguruan Tinggi* mandate.

Limitations and Future Directions

Despite its success, the project faced several limitations. The duration of mentoring (three months) may have been insufficient to fully test long-term sustainability. Additionally, network optimization focused primarily on coverage and bandwidth; future interventions could explore advanced aspects such as cybersecurity, data analytics, and cloud integration.

Moreover, the evaluation relied heavily on self-reported data, which might contain biases. Subsequent research should include longitudinal studies and objective performance monitoring to validate long-term impact.

Nevertheless, the framework developed in this project provides a replicable model for other schools, particularly in developing regions where technological literacy and infrastructure gaps remain significant barriers.

In summary, the WiFi optimization and digital literacy program achieved the following:

1. **Technical improvements:** Download speeds increased up to 49 Mbps; latency reduced by 67%.
2. **Educational improvements:** Participants' technical knowledge increased by 78% on average.
3. **Institutional empowerment:** Formation of a 10-member school IT team and creation of WiFi maintenance SOPs.
4. **Sustainability outcomes:** Establishment of regular maintenance schedules and school policy integration.
5. **Pedagogical impact:** Enhanced digital learning adoption and higher teacher engagement in online teaching.

These results collectively demonstrate that combining infrastructure enhancement with capacity-building education leads to holistic, sustainable improvements in digital learning environments.

CONCLUSION

This community service project successfully demonstrated how a combination of **technical intervention and educational empowerment** can transform a school's digital ecosystem. The program at SMPN 12 Yogyakarta addressed long-standing issues of unstable internet access and limited digital competence through a structured approach encompassing **WiFi network optimization, capacity building, and institutional empowerment**.

From a technical perspective, the optimization of the school's WiFi infrastructure led to substantial performance improvements. The average download speed increased from 1–9 Mbps to 19–49 Mbps, while latency dropped by 67%. The redistribution of access points, implementation of bandwidth management using the *Per Connection Queue (PCQ)* method, and channel separation (CH1, CH9, CH13) significantly enhanced network reliability. These improvements ensured that all classrooms had stable connectivity, enabling uninterrupted access to digital learning platforms.

From an educational standpoint, the training workshops effectively strengthened teachers' and students' digital literacy. Participants not only learned theoretical aspects of networking but also gained hands-on experience in troubleshooting, configuration, and performance monitoring. Post-training evaluations revealed an average 78% improvement in technical knowledge and confidence. Teachers reported greater independence in maintaining classroom internet connections, while students developed problem-solving skills that extended beyond the school environment.

Institutionally, the project fostered a culture of **self-reliance and sustainability**. The formation of a dedicated IT Maintenance Team empowered the school to take ownership of its technological infrastructure. This team now performs regular maintenance, monitors bandwidth usage, and manages troubleshooting with minimal external support. The collaboratively developed **Standard Operating Procedures (SOPs)** provide a clear framework for ensuring the consistency and accountability of these maintenance practices.

The integrated results of this project show that digital transformation in education requires more than just technological upgrades—it demands an ecosystemic approach that includes people, processes, and policies. By positioning teachers and students as active stakeholders rather than passive users, the project encouraged collective responsibility for sustaining the school's digital infrastructure. This approach aligns with the broader national goal of fostering technologically capable and independent educational institutions under the *Merdeka Belajar* initiative.

In a broader context, this program also contributes to the goals of the **United Nations Sustainable Development Goals (SDG 4: Quality Education and SDG 9: Industry, Innovation, and Infrastructure)** by promoting equitable access to technology and enhancing local capacity for innovation. The successful implementation at SMPN 12 Yogyakarta demonstrates how small-scale, community-based initiatives can have scalable and sustainable impacts when guided by participatory, evidence-based methods.

In conclusion, the WiFi network education and optimization project at SMPN 12 Yogyakarta exemplifies a **replicable model of sustainable digital transformation in schools**. It bridges the gap between technological infrastructure and human competence, proving that the success of digital education depends equally on devices and the people who use them. Through collaboration between higher education institutions and schools, this initiative offers a blueprint for empowering communities to build resilient, inclusive, and future-ready learning environments.

Recommendations

Based on the outcomes and reflections from the project, several recommendations are proposed for schools, educators, policymakers, and future researchers:

1. For Schools:

- Establish dedicated IT maintenance teams involving both teachers and students to ensure the continuity of digital infrastructure.
- Allocate specific budget lines for periodic maintenance, upgrades, and training in school financial planning.
- Adopt clear SOPs for WiFi management, security protocols, and access control to prevent misuse and maintain performance consistency.

2. For Teachers and Students:

- Continue developing digital literacy through peer learning, mentoring, and participation in online technology communities.
- Integrate digital skills into daily classroom activities, fostering routine engagement with technological tools beyond formal training sessions.

- Promote ethical and responsible use of internet resources to support constructive and safe digital citizenship.
- 3. **For Educational Authorities and Policymakers:**
 - Encourage collaborative programs between universities and schools to address local digital infrastructure challenges.
 - Provide incentives and recognition for schools that demonstrate successful self-reliance in managing their ICT environments.
 - Develop regional resource-sharing systems (e.g., open-source training modules, shared technical support networks) to expand the impact of such initiatives.
- 4. **For Future Programs and Research:**
 - Extend the duration of mentoring phases to monitor long-term sustainability and behavior changes among participants.
 - Explore integration with advanced technologies such as cloud-based storage, network security systems, and AI-driven monitoring tools.
 - Conduct longitudinal studies to evaluate the long-term educational and institutional impacts of community-based digital empowerment projects.

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SOCIALIZATION OF MATCH AND CHAMPIONSHIP MANAGEMENT FOR U-17 VOLLEYBALL: ENHANCING PROFESSIONALISM AT THE CLUB LEVEL

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Abstract. The community Service Activity aims to provide education to coaches, officials and clubs under the auspices of the PBVS Sleman Regency regarding the management of the U-17 volleyball championship in Sleman Regency. In this activity, there are several things that need to be analyzed, including Planning Management (Planning), Organizing Management (Organizing), Actuating Management (Actuating), and Controlling Management (Controlling). The result of the implementation of PkM show: (1) Planning is controlled and aligned with the goals of holding the U-17 Sleman Regency volleyball championship. (2) The chairman's organizational skills are important in the successful management of the U-17 Sleman Regency volleyball championship. (3) The chairman successfully guided so the U-17 volleyball championship without significant issues. (4) All parties provided optimal supervision in order to create a safe and successful championship. The community Service (PkM) uses two approaches, the socialization method and the practice of organizing U-17 volleyball matches. The socialization activity was attended by representatives from 13 volleyball clubs in Sleman Regency, totaling 26 people. The practice of organizing the U-17 volleyball championship match was held on July, 19-20 2025 at Yogyakarta State University Sports Hall Sleman Regency. The match was held for 2 days, starting from the filing round to the final which was attended by 9 men's teams and 7 women's teams. The men's section won 1st place for the Yuso Sleman volleyball club, 2nd place for the Sleman United volleyball club and 3rd place for the Mutiara volleyball club. The women's section won 1st place for the Yuso Sleman volleyball club, 2nd place for the POPSIVO volleyball club and 3rd place for the Puspa Indah volleyball club.

Keywords: Socialization, Management, Match, Competition, and Volleyball Championship

INTRODUCTION

Volleyball matches are one of the most popular sporting events among the public and are very entertaining to watch because of the various attractive activity. This aligns with the Fédération Internationale de Volleyball (FIVB) in the Official Volleyball Rules 2020-2024, which states that volleyball is one of the most successful and popular competitive, and recreational sports in the world (Purwanto et al., 2022). The game is fast, exciting, explosive, and consists of several interactive elements that make it unique among other rally games (Irwanto et al., 2023). This will be achieved if the volleyball tournament can be held with good match management and prioritizes standard match rules and services.

Understanding and skills in managing a sports tournament are one of the basic competencies that every volleyball coach and official should possess to advance sports development. In general, students' career prospects after graduation will be greatly influenced by the amount of experience they have, no matter how modest, in relation to the possibilities they have during their studies, both practical and applied (Sistiasih et al., 2024). A similar opinion is also expressed by Hartmann & Kwauk (2011), stated that education, guidance, skills training and direct intervention should be central focus of the sports program itself in the context of self-improvement,

aiming to develop theoretical understanding and practical skills. The success of sporting events, both small and large-scale, is inseparable from good management (McKay et al., 2022)

Good sports performance management skills are necessary for running a good and professional competition. Excellent sports management is the one that programmed and is carried by professionals who are responsible in their field (Sudarwati et al., 2023). Sport event management, especially for volleyball matches includes implementation, planning, reporting and evaluation (Holden et al., 2019). Volleyball matches should be meticulously planned, as the success of the event depends on the ability of the management to organize and control every committee member working (Satrio & Winarno, 2019). An activity will not have a good run if it is not well managed through a structured management (Wirata et al., 2024). Sport management, specifically in volleyball matches, must be in line with the main characteristics of the sport (Teixeira et al., 2023). The principle of success in the activity need to be the main focus of implementation in arranging volleyball matches (Apriyanti et al., 2021). Success in organizing activities is a shared responsibility of every team member and everyone have to work together to make sure the success of the event so the coaches and officials are equipped for organizing matches (Erta et al., 2023).

Therefore, it is very necessary to conduct regular training as a strategy to provide various experiences for coaches and officials to gain and improve their understanding and also skills in sports activity management. Aspect of understanding and skills can be achieved and improved if coaches and officials have real experience related to the management of sport activities or matches include planning, implementation and evaluation. According to Yusup et al. (2023), a well-organized sporting event can contribute prestige to each participant, allowing every team to compete to the best of their abilities. Furthermore, setting up sporting events that follow official rules will give participants the opportunity to become educated about the rules of the game. So that they can enhance their performance and achievements as champions.

The first steps in organizing a sporting event is determining the number of participants as well as forming a committee, the chair, vice chair, secretary, treasurer, referee committee (disciplinary commission) and other sections. Moreover, there are two things that need to be considered in forming a committee, the selection and the assignment (Firmansyah & Hariyanto, 2019). Meanwhile, match administration is the activity of planning and implementing sport matches or competitions, which includes: 1) Preparation, 2) Before the Match, 3) During the Match, and 4) After the Match (Nurkasana et al., 2022).

The Community Service for Socializing Match Management and the U-17 Inter-Club Volleyball Championship in Sleman Regency aims to develop the skills of young athletes in volleyball and match management, as well as strengthen the bonds of brotherhood between clubs in this region. The age of 17 is a crucial transition period for an athlete's physical and mental development, which requires a platform to hone their technical, tactical, and physical skills. In accordance with numerous studies, early sports competition can enhance athletes' technical and mental skills, as well as impact character development and motivation to achieve goals (Gullich & Emrich, 2014).

It is anticipated that this championship will provides a platform for young athletes to show their greatest skills and get ready for competition at the regional and national levels. According to Wiersma (2000), early participation in sport events serve as a tool to measure the development of an athlete's skills and achievement, while also giving a general idea of the mental toughness needed to face the pressures of competition. It is also expected that this championship would bring volleyball to Sleman Regency and make it more popular there, to inspire more young people get involved in sports.

A well-organized sports activities have benefits in the social and psychological development in teenagers, such as increasing self-esteem, discipline, and teamwork skills (Gould & Carson, 2008). This championship is also serve as a medium to build better teamwork between volleyball clubs in Sleman Regency area, while building a healthy, fair and competitive environment, in accordance with the principles of fair play in sports. (Weiss & Wiese-Bjornstal, 2009). Embracing the spirit of sports development in the younger generation, this championship is anticipated to make a positive contribution to creating quality volleyball athletes who are ready to compete at a higher level. Based on research by Barker et al. (2014), the success of a sports championship can be determined by its impact on athlete talent development and increased motivation to achieve higher performance.

The purpose of organizing the U-17 Inter-Club Volleyball Championship in Sleman Regency is to address several issues faced in sports development, especially volleyball among teenagers. Some of the main issues include:

1. Lack of Competitive Platforms for Young Athletes

One of the main challenges in developing young volleyball athletes is the limited opportunities to participate in structured competition. A lot of young athletes lack adequate platforms to develop their technical and mental skills through real matches. This leads to many potential talents going unidentified or being unable to develop further. This championship is planned to provide an opportunity for young athletes to compete in an organized way, stimulate their competitive spirit, and hone their skills on the field.

2. Lack of Continuous Training Programs

Plenty of volleyball clubs in Sleman Regency do not have continuous training programs for young athletes, especially at the teenage age level. Unsustainable training may slow an athlete's development in the long run. With this championship, it is hoped that more intensive and sustainable training programs for athletes can be established, and that will serve as a beginning for their career development.

3. Lack of Volleyball Match Management Socialization in the Community

Although volleyball is a quite popular sport in Indonesia, many people, especially in rural areas, have less understanding of proper match management. Through this activity, it is hoped that more people learn how to manage volleyball competitions.

4. Insufficient Collaboration Between Volleyball Clubs

In Sleman Regency, youth volleyball groups continue to lack communication and cooperation with each other. This usually leads to lack of opportunity for clubs to share experiences, strategies, and lessons. It is believed that this tournament will increase interaction between the athletes and coaches, knowledge sharing, and strengthen relationships between clubs.

5. Raising Young Athletes' Motivation

Lack of significant challenges outside their local surroundings causes many young athletes to lose motivation to practice and compete. A bigger and more difficult competitive environment will be offered by this championship, may inspire young athletes to raise their game. According to research, structured competition can motivate players to keep improving and honing their skills, which can result to greater development in the sport (Weiss & Wiese-Bjornstal, 2009).

6. Limited Facilities and Infrastructure

Several volleyball clubs in Sleman Regency still struggle with limited adequate training facilities. This championship can be used as an opportunity to draw the attention of the right parties to upgrade the quality of sports facilities in the region and encourage funding for infrastructure that supports the development of sports, particularly volleyball.

THEORETICAL STUDY

1. Sports Match and Championship Management

Management of sports matches and championships is a process that involves planning, organizing, implementing, and controlling all activities related to sports competition. The inter-club volleyball championship, especially in U-17 category, need a systematic and efficient approach to achieve the goals, such as creating fair competence, educating young athletes, and improving the quality of matches. This management covers a various aspect, starting from preparing match schedules, managing human resources, facilities, to post-match evaluations.

According to Suryadi (2015), sports management can be defined as the application of managerial principles in the sports world, which includes match management, team organization, and facility management. One of the most recent and relevant studies in this field is that carried out by Syamsul (2020), which suggest the importance of technology in managing sports match and championship data. The technology used for scorekeeping, athletes performance analysis, and match statistics monitoring plays a big role in improving efficiency and transparency of event implementation in volleyball competitions.

2. The Use of Technology in Sports Championship Management

In the digital era, information technology has brought significant changes to the way sports tournaments are managed. Various web-based systems and mobile applications have been created to make match management easier, including scorekeeping and team management. In the context of volleyball tournaments, applications like Sports Engine and TeamSnap have been frequently used by clubs and tournament organizers to manage match schedules, inter-team communication, and match statistics (Kurniawan, 2018).

Cloud-based information systems are also becoming popular in sports championship management. According to Haryanto (2017), cloud-based platforms allow match data to be stored and accessed in real-time by tournament organizers, teams, and participants, facilitating a more efficient coordination process and results reporting.

Additionally, advancements in data analytics provide additional benefits, such as improved monitoring of athlete performance, identification of individual strengths and weaknesses, and improved game strategies.

3. Management of Youth Volleyball Championships

Volleyball championships for young players, like U-17, require special attention, both in terms of the technical aspects of the game and the development of the athletes' character and skills. As stated in Indriani's (2019) research, it was found that the management of championships for young age categories needs to be balanced with educational programs that prioritize holistic athlete development, including physical, mental and social aspects. Well-managed championships can provide a platform for young athletes to develop technical skills, physical endurance, and mental resilience.

Furthermore, according to Rosidin (2021), the management of volleyball championship for this age group must also pay attention to compliance with applicable regulations and prioritize the values of sportsmanship and teamwork. Community service program focused on developing championships management for U-17 volleyball clubs in Sleman Regency can utilize the results of this research to design a curriculum that not only prioritizes competition but also development of participants' character and interpersonal skills.

4. Development of a Local Needs-Based Match Management System

The majority of volleyball championships are still handled manually, which makes it at risk of human error, information delays, and oversight issues. One of the main issues in match management is the lack of resources for data and logistical management, states Setiawan (2020). Thus, it is important to develop a web-based information system or mobile application for local volleyball championships, like Sleman Regency. The Indonesian Volleyball Association (PBVSI), which created an application-based management system to oversee several national and regional competitions, is an example of a project that successfully established an effective management system. This program is not only used to manage match schedule, but also to analyze team and athlete performance, as well as monitor the administrative and financial facets of the championship events (Rohman, 2022).

5. Community Service Program' Effectiveness in Championship Management

According to research by Sukma (2020), community service programs that prioritize technology in the management of sports championships, such volleyball tournaments, can enhance the quality of event implementation and contribute to the growth of sports at the regional level. This program encourages cooperation between various parties, including volleyball clubs, sponsors, and local government, and gives communities the chance to use technology in event management.

The outcome of community service programs that established similar processes into place also show that championship management can be made more efficient and transparent with well-structured system. In addition, enhancing the skills and understanding of championship managers and committee members through training is essential (Agustin, 2019)

IMPLEMENTATION METHOD

Implementation of activities using the method:

1. Socialization methods for match management, which will include the main functions of management, such as: (a) Planning is a management function that focuses on defining goals for organizational performance in the future and deciding on the tasks and resources required to achieve those goals. (b) Organizing is a management function that involves allocating resources to departments and assigning and organizing work into departments. (c) The management function of actuating focuses on using influence to motivate team members to achieve organizational goals. (d) Controlling is a management function that focuses on monitoring employee activities to ensure that the company stays on course to achieve its goals and making corrections as needed. The socialization was held on July 19-20, 2025. A total of 26 attendees from 13 volleyball clubs and 3 representatives from PBVSI Sleman participated in the socialization activity.
2. Field practice method for organizing the U-17 volleyball competition between clubs in Sleman Regency.

RESULT AND DISCUSSION

This program aims to improve the event management skills for volleyball coaches and officials under the auspices of the Sleman Regency PBVSI. When doing the activities, the planning, organizing, directing, and supervising must be taken into attention.

1. Planning

The planning process for this service activity involves creating a predetermined plan to support the success of the activity through observation, selecting resource persons for the delivery of material by experienced speakers, preparing service materials, and also forming the organizing committee for the U-17 volleyball competition in Sleman Regency. Each member has their respective roles, including:

- a. The chairman is responsible for the implementation of the event from beginning to end.
- b. The activity coordinator is tasked with determining speakers, compiling the event rundown, and forming the organizing committee for the U-17 volleyball competition in Sleman Regency.
- c. The head of each field and its members are responsible for carrying out their duties according to their respective job descriptions.

In the planning process, from training to match execution, it must begin with determining the number and forming the list of committee members on duty, starting from the chairman, vice-chair, secretary, treasurer, referee committee (disciplinary commission), and sections to achieve the success of organization in match execution (Maula, 2024).

Coordinating with sponsors, participants, spectators, and the parent sports organization to prepare all the requirements for the tournament are among the preparations made before the start of the competitions. According to Harsuki (2012), time is one of the characteristics that set various planning styles apart. All committees helped in the planning process, which began with the needs for equipment and training to make sure the event ran successfully. This is in line with the statement made by Maesih (2017) that facilities for all members must be taken seriously during development. To ensure the match runs smoothly, the equipment is prepared before the match begins.

2. Organizing

Organizing is a set of tasks that members of the group must perform in the planned division of labor (Siswanto, 2005). The U-17 volleyball competition in Sleman Regency is quite good, as seen by the methodical work distribution for every division. The management of the U-17 volleyball tournament in Sleman Regency uses the organizational process to describe how each member's experience helps the competition reach its goals. This aligns with Harsuki's (2012) opinion, which states that establishing relationships between the task performed, the participants, and the required physical elements is essential to reaching goals in activity. Coordination with other committees to help in preparation is one strategy to ensure the match runs well. In this case, coordination between committees plays an important role in achieving a goal. (Faizin, 2025).

3. Actuating

According to Reza (2016), actuation is a relationship aspect in management that provides guidance or instructions to subordinates to carry out tasks effectively and efficiently to achieve predetermined goals. The direction process in the U-17 volleyball match management in Sleman Regency, carried out by the chief organizer when there are issues that could disrupt the implementation of the match. The committee chair consulted with various parties to find solutions to these problems, the result of this coordination were used as information for all members of the U-17 volleyball match committee in Sleman Regency. This needs to be done so that it can be fully understood by the members. This align with Faizin's (2015) opinion that direction or coordination is carried out by the committee chair by coordinating with his members to ensure the goals of an activity are achieved effectively.

4. Controlling

Controlling of the U-17 volleyball tournament in Sleman Regency was carried out by various parties to make sure the smooth running of the event. The match controlling process takes place every time a match is held, for the organizing committee, participants, and spectator. The purpose of controlling management is to identify possible errors and issues while simultaneously making corrections to facilitate the successful achievement of the goals (Reza, 2016).

Every member of the committee is regularly updated on preparations and any challenges faced during the competition by the chair of the committee. This helps monitor the performance of the coordinators, who have been assigned their respective job descriptions. The chair also performs evaluations after the competition. This aims to improve the upcoming competitions. According to Faizin (2015), corrective action is necessary if there is any activity or stage does not go as planned.

The practice of organizing the U-17 volleyball championship match was held on July, 19-20 2025 at Yogyakarta State University Sports Hall Sleman Regency. The match was held for 2 days, starting from the filing round to the final which was attended by 9 men's teams and 7 women's teams. The men's section won 1st place for the Yuso Sleman volleyball club, 2nd place for the Sleman

United volleyball club and 3rd place for the Mutiara volleyball club. The women's section won 1st place for the Yuso Sleman volleyball club, 2nd place for the POPSIVO volleyball club and 3rd place for the Puspa Indah volleyball club.

CONCLUSION

Understanding and educating people about the management of the U-17 volleyball match at Sleman Regency is the goal of the community service program. Accordingly, it can be said that the volleyball match management training in Sleman Regency at the UNY Sports Hall effectively gave participants a starting point for developing their skills, even though it is acknowledged that the results of the observational analysis showed that the impact on participant's understanding was not yet optimal. This program provides insight into volleyball match management through theoretical and practical approaches, including developing activity proposals, organizing committees, and conducting matches. Participants responded positively to this community service activity, considering that similar activities have never been formed in Sleman Regency, Special Region of Yogyakarta. To get more impact and quality, participant's match management skills also need to be improved. In order to strengthen the skills of coaches and athletes in Sleman Regency to handle volleyball matches in the future, follow-up actions based on the activity's outcomes include more intensive education and mentoring. In addition, infrastructure and facility upgrades, government support, and sponsorship are all essential requirements that must be consistently used to support the expansion of the sports sector in Sleman Regency, Special Region of Yogyakarta.

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Socialization of Fitness Exercise Intensity for The Elderly

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Abstract. Exercise or physical activity must be designed with the appropriate dosage. Exercise is like medicine, the dosage and type must be appropriate. Exercise must also be appropriately dosed; if the dosage is insufficient, it cannot improve fitness or health, while an excessive dosage can lead to *overtraining*. A deep understanding of exercise dosage is crucial, especially for the elderly. The declining physical condition of the elderly requires the establishment of appropriate exercise intensity, type, duration, and control. Many cases of sudden death occur in the community, one of which is due to loss of exercise control, exceeding a person's maximum heart rate. Therefore, it is very important to provide information about exercise dosage to the elderly so that they can exercise safely, comfortably, and obtain optimal results. The first step taken to solve this problem was to provide information about exercise intensity for the elderly in theory and practice. The community service activity was attended by 50 participants in the category of active elderly people who exercise. The participants were very enthusiastic about the material provided and gave the service team a satisfaction rating with an average score of 3.91 (very satisfactory). The participants also successfully participated in the community service activities very well, as can be seen from the pretest and posttest scores on their understanding of the material. There was an increase in the average pretest and posttest scores, from an average of 5.56 to 7.88. Based on this data, it can be concluded that there was an increase in participants' understanding of the material provided.

Keyword: Socialization, fitness exercise intensity, elderly

INTRODUCTION

The elderly is an abbreviation for advanced age. The elderly are one of the stages of development of living beings as a result of the aging process. The aging process is natural and will be experienced by each individual. According to the World Health Organization (WHO), elderly are people who have reached the age of 60 or older. Elderly are a group of people who have entered the final stage of human life. In this group, *the aging process* has occurred [1]. The physical condition of a person who has entered old age will decline. The elderly will also experience physical changes characterized by decreased hearing, deteriorating vision, decreased muscle strength resulting in slow movements. Physical changes in the elderly result in physical mobility disorders that can limit the independence of the elderly in carrying out daily activities.

The aging process can be mitigated by doing physical exercise. The recommended exercises or physical activities for the elderly are not the same as those for children and young adults. Elderly people over the age of 65 are recommended to reduce strenuous activities or exercise. Exercise or physical activity has benefits for the body, especially for the elderly. These benefits include improving body balance for greater stability, preventing disease, and maintaining mental health. Recommendations for exercise or physical activity for the elderly must be tailored to their abilities and conditions. Based on the WHO, the recommended physical activity for the elderly [2] is: A minimum duration of 150 minutes for moderate physical exercise or 17 minutes for strenuous physical exercise per week. Each practice, supervisor, or elderly person concerned must ensure that the duration lasts at least 10 minutes. If participants are already accustomed to the recommended duration, then they should engage in moderate-intensity exercise for 300 minutes or vigorous-intensity exercise for 150 minutes per week. Most elderly have difficulties with body coordination, so they need balance training sessions at least three times a week, while muscle training is recommended at least twice a week.

Exercise or sports must be designed with the right dosage. Exercise is like medicine; the dosage and type of medicine must be appropriate. Medicine with an insufficient dosage cannot cure disease, while an excessive dosage can cause an overdose. Exercise must also be appropriately measured. If the dosage is insufficient, it

cannot improve fitness or health, while an excessive dosage can lead to *overtraining*. The dosage of exercise for fitness must meet the FITT components [3]. FITT stands for *Frequency*, *Intensity*, *Time*, and *Type*. First, exercise should be done 3-5 times a week. Second, *the intensity* should be moderate, not too light and not too heavy, as evidenced by the ability to speak fluently during exercise. If speech is interrupted (*talk test*), it is a sign that the intensity is excessive. Third, the time/duration required for exercise is 30-45 minutes, excluding warm-up and cool-down. Fourth, the correct *type* of exercise involves rhythmic, continuous movements that engage large muscle groups (e.g., legs and arms).

A deep understanding of exercise intensity is very important, especially for older adults. The declining physical condition of older adults requires the determination of appropriate exercise intensity, type of exercise, duration, and exercise control. Sudden death cases are common in the community, one of which is due to loss of exercise control, leading to exceeding an individual's maximum heart rate. Therefore, educating the elderly about exercise intensity is vital so they can exercise safely, comfortably, and achieve optimal results.

METHOD

In general, this community service uses methods to solve problems through theoretical and practical approaches. Participants are given material on (1) providing various theories on fitness exercise intensity for the elderly, (2) measuring maximum heart rate, (3) providing theories on how to control exercise. The expected competencies or outcomes for participants are: understanding maximum heart rate, understanding fitness exercise measurements for the elderly, understanding how to control exercise, being able to measure maximum heart rate, being able to determine and practice fitness exercise measurements for the elderly, and being able to practice how to control exercise. The evaluation or assessment of the success of this community service is through a satisfaction questionnaire and answering questions from the material on fitness exercise levels for the elderly.

RESULT AND DISCUSSION

The community service activity was attended by elderly who actively exercise in the Sedayu area, Bantul. Total of 50 seniors participated in this socialization. The socialization was held in the meeting room of the Argomulyo village hall, Sedayu, Bantul. Participants were very enthusiastic about the socialization activity. They gained a lot of new knowledge and insights from this community service activity. Participants were very enthusiastic throughout the event, both during the presentation of theoretical material and practical activities. Various questions were raised by the participants. To determine the level of participant satisfaction, a satisfaction survey was conducted on the implementation of community service. The following are the results of the participant satisfaction survey on community service activities:

Tabel 1. Participant Satisfaction Results

Number	Statement	Score	Category
1	Alignment of community service activities with community needs	3.92	Very good
2	Collaboration between community service providers and the community	3.90	Very good
3	Empowering the community	3.8	Very good
4	Increasing community motivation to develop	3.94	Very good
5	Attitude/behavior of volunteers at the volunteer site	3.96	Very good
6	Alignment of implementation timing with community activities	3.96	Very good
7	Alignment of volunteer expertise with volunteer activities	3.96	Very good
8	Ability to encourage community independence/self-reliance	3.86	Very good
9	The results of community service can be utilized by the community	3.90	Very good
Average		3.91	Very good

Based on Table 1 regarding participant satisfaction with the implementation of community service activities, an average of 3.91 (very good) was obtained. This was possible because the service team had prepared very well.

The community service team prepared the venue in the Argomulyo village hall meeting room with LCD facilities, projectors, tables, chairs, speakers, and fans so that participants could sit and follow the event comfortably. In terms of resource persons, the material was delivered by academics and practitioners in the field of physical fitness so that the material was appropriate and delivered very well. The speakers had bachelor's degrees (in physical fitness), master's degrees (in sports health), and doctorates (in sports health). The speakers had 8 years of practical experience as fitness trainers. The participants' satisfaction with this community service program was certainly a positive thing for the community service team and the institution in developing cooperation with all levels of society.

To evaluate the mastery of the material presented, the service team provided several questions to the participants. There were ten multiple-choice questions. The questions were given before the socialization (pretest) and after the socialization was conducted (posttest). The following are the average scores of the pretest and posttest:

Table 2. Pretest and posttest scores of community service participants

	N	Minimum Score	Maximum Score	Average
Pre-test	50	2	7	5.56
post-test	50	6	9	7.88

Based on Table 2, it can be seen that there was an increase in the average pretest and posttest scores, from an average of 5.56 to 7.88. The increase in scores can also be seen from the minimum score obtained in the pretest, which was 1, increasing to a minimum score of 6 in the posttest. The increase in scores is also evident in the maximum score obtained during the pretest, which was only 7, while during the posttest it increased to 9. Based on this data, it can be concluded that there was an increase in participants' understanding of the material presented.

This increase in scores certainly reflects the success of the material delivered by the resource persons. In addition, the enthusiasm of the participants was also an important factor that increased their understanding of the material. The participants were very enthusiastic in asking questions during the discussion session. Various questions about cases experienced by elderly participants when exercising were answered very well by the resource persons.

During the practice session on measuring maximum heart rate and exercise control, the participants performed well. There were a few participants who experienced difficulties, but with the help of the volunteer team and students, the participants who experienced difficulties were guided so that they could practice well

CONLUSSION

The community service activity was held in the meeting room of the Argomulyo village hall, Sedayu, Bantul, and was attended by 50 participants in the category of active elderly people who exercise. The participants were very enthusiastic about the material provided and gave an average score of 3.91 (very satisfactory) for the volunteer team's level of satisfaction. The participants also successfully participated in the community service activities very well, as can be seen from the pretest and posttest scores on their understanding of the material. There was an increase in the average pretest and posttest scores, from an average of 5.56 to 7.88. The increase in scores can also be seen from the minimum score obtained in the pretest, which was 1, increasing to the minimum score of obtained, which was 6 in the pretest. The increase in scores is also seen in the maximum score obtained during the pretest, which was only 7, while during the posttest it increased to 9. Based on this data, it can be concluded that there was an increase in participants' understanding of the material provided.

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STRENGTHENING FAMILY HEALTH THROUGH PKK EMPOWERMENT: A COMMUNITY-BASED APPROACH TO STUNTING PREVENTION IN GUWOSARI VILLAGE, BANTUL

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Abstract. Stunting remains one of the most prevalent chronic nutritional problems in Indonesia and has serious implications for the future quality of human resources. Bantul Regency, Yogyakarta, is among the regions facing this challenge. This community service program was designed to strengthen family health through the empowerment of PKK as change agents in stunting prevention. A community-based approach was employed to ensure that the program is relevant to the real needs of the local population. The implementation methods included the development of educational modules on balanced nutrition and responsive parenting, practical training in infant massage to stimulate growth and development—particularly to improve appetite—and the establishment of parenting learning groups facilitated by PKK cadres. Evaluation was conducted through pre-test and post-test assessments, observations, and documentation of activities. Results showed an increase in parents' knowledge by $\geq 20\%$ after training, the creation of educational modules (nutrition and parenting), the implementation of at least two nutrition and parenting trainings per village, and the establishment of parenting learning groups serving as platforms for experience sharing and consultation. These findings indicate that PKK empowerment effectively strengthens the role of families in stunting prevention and serves as a replicable community-based intervention model. This effort is expected to contribute to the sustainable acceleration of stunting reduction.

Keywords: PKK, community empowerment, balanced nutrition, parenting, stunting

INTRODUCTION

Stunting remains one of the chronic nutritional problems in Indonesia that has a serious impact on the future quality of human resources. Based on the 2022 Indonesia Nutritional Status Survey (SSGI), the national prevalence of stunting reached 21.6%, with a target reduction to 14% by 2024. The government, through various regulations such as Presidential Regulation No. 72 of 2021 and Yogyakarta Special Region Governor Regulation No. 40 of 2023, emphasizes accelerating stunting reduction through strengthened commitment, improved nutrition intervention services, and cross-sectoral convergence (Handayani et al., 2023; Kemenkes RI, 2023).

Bantul Regency, Yogyakarta Special Region, is among the areas facing significant challenges in efforts to reduce stunting rates. Guwosari Village in Pajangan Sub-district was chosen as the location of this program because it was designated as a pilot project village for stunting management as well as a child-friendly village. Results of a Focus Group Discussion (FGD) with Posyandu cadres and the community revealed that parents' knowledge of balanced nutrition and early childhood parenting remained low. Given this condition, the PKK women's group is considered to have strong potential as change agents who can bridge the dissemination of essential information to the community (Chima Abimbola Eden et al., 2024; Sitaresmi et al., 2022).

In addition to nutrition factors, inappropriate parenting practices are a major contributor to the risk of stunting. Many parents still provide food that is not age-appropriate, lack menu variety, and offer minimal developmental stimulation. On the other hand, limited access to information and socioeconomic constraints further exacerbate the problem. Therefore, interventions are needed that not only emphasize nutrition education but also integrate responsive parenting aspects according to the child's developmental stages.

The empowerment of PKK women's groups is a strategic approach to addressing these challenges because they have close relationships with families and strong social networks in the community. This program was designed to strengthen the role of PKK as facilitators of behavioral change through training, mentoring, and the establishment of parenting learning groups. This article aims to describe the implementation of the program and analyze its impact on enhancing family capacity in stunting prevention.

LITERATURE REVIEW

Stunting is defined as a condition of growth failure in children under five caused by chronic malnutrition, recurrent infections, and inadequate parenting practices. The First 1,000 Days of Life (HPK) is a critical period that determines the quality of a child's growth and development (Ikatan Dokter Anak Indonesia, 2017). Lack of nutritional intake during this period will lead to long-term impacts such as impaired physical growth, cognitive development delays, and reduced productivity in adulthood.

Parental parenting styles are proven to have a close relationship with a child's nutritional status. An authoritative parenting style that is responsive, nurturing, and communicative supports children's growth and development more optimally compared to authoritarian or permissive styles. Positive interactions, age-appropriate stimulation, and feeding based on hunger and satiety cues known as responsive feeding are effective in improving nutritional intake (Morawska & Mitchell, 2018; Rao et al., 2020).

Beyond the individual family aspect, socio-cultural factors also influence parenting practices and nutrition fulfilment (Lally, 2016). Traditional feeding practices for children are often shaped by myths or inherited habits that are not aligned with health recommendations. Therefore, community-based interventions are crucial to build collective awareness and change societal behavior as a whole.

PKK (Family Welfare Movement) plays a strategic role in public education efforts. As a women's organization close to families, PKK has great potential to become an agent of change in stunting prevention. Several studies show that empowering PKK and Posyandu (community health post) cadres can increase community knowledge of nutrition and parenting by more than 30% compared to conventional extension methods. This approach is in line with recommendations from previous studies, which highlight the importance of integrating responsive feeding into child nutrition intervention policies (Rahmon Aslanovich, 2024; Winahyu, 2023a).

METHOD

The implementation method used a participatory community-based approach involving PKK as the main partner. The stages of the activities included:

1. **Program Socialization**
Conducted with village government, Posyandu cadres, and PKK members to present objectives and build commitment.
2. **Training**
Divided into two main themes: (a) balanced nutrition and responsive feeding education, and (b) early childhood parenting. The training was carried out in the form of interactive workshops and baby massage practice for growth and development stimulation.
3. **Application of Technology and Educational Media**
Development of illustrated educational modules, short educational videos, and child growth monitoring sheets to support learning.
4. **Mentoring**
Trained PKK cadres assisted parents through parenting learning groups, home visits, and regular discussion forums.
5. **Evaluation**
Using pre-test and post-test instruments, observations, and activity documentation to assess knowledge improvement and behavior change.

RESULTS AND DISCUSSION

RESULTS

The community service program in Guwosari Village produced several key outcomes:

1. **Increased Parental Knowledge**
Based on pre-test and post-test results, there was a $\geq 20\%$ increase in parents' knowledge related to balanced nutrition, child health, and parenting after the training.
2. **Development of Educational Module**
The program produced one educational module entitled "*Prevention and Management of Stunting at Home*." This module contains integrated materials on balanced nutrition, child health, and parenting according to developmental stages. The module was developed using an applicative approach based on local wisdom and distributed to PKK cadres as sustainable educational material.
3. **Nutrition, Parenting, and Baby Massage Training**
Two training sessions were conducted, namely balanced nutrition training and parenting training, combined with baby massage practice. Baby massage was introduced to parents as one method to stimulate child development and a strategy to increase appetite.
4. **Establishment of Parenting Learning Groups**
Parenting learning groups were formed in several hamlets, functioning as forums for experience-sharing among parents and consultation spaces facilitated by PKK cadres.

DISCUSSION

The $\geq 20\%$ increase in parental knowledge after the program indicates that community-based interventions involving PKK are effective in bridging the gap in information regarding nutrition, child health, and parenting. This aligns with the concept of health literacy, where increased family understanding of health translates into better daily practices. Education delivered through participatory workshops and group discussions made the material easier to comprehend and retain, thus leading to real changes in knowledge levels (Austin et al., 2020).

The development of the module "*Prevention and Management of Stunting at Home*" was an important achievement because it provides integrated information that parents can study independently. The module, which covers balanced nutrition, child health, and parenting, serves as a practical reference relevant to everyday life. Its visual design, simple language, and incorporation of local wisdom improved readability and relatability. These findings support research emphasizing the importance of contextual reading materials for PKK cadres in strengthening family literacy (Jaya & Dalle, 2024).

The implementation of nutrition and parenting training combined with baby massage practice was a significant innovation. Baby massage has been proven to benefit child growth stimulation, improve sleep quality, and enhance appetite. By teaching this skill to parents, the program provided not only theoretical knowledge but also practical skills that could be directly applied at home. This is consistent with studies that show responsive care practices, such as baby massage, can support responsive feeding and thereby optimize children's nutritional intake (Azwar et al., 2023; Killion et al., 2024).

The establishment of parenting learning groups added a sustainability dimension to the program. These groups function not only as spaces for sharing experiences but also as consultation forums facilitated by PKK cadres. With these groups in place, parents continue to receive guidance even after formal training sessions concluded. This strategy strengthens the role of the community in creating a sustainable and participatory learning ecosystem. Other studies confirm that parenting groups can enhance family social networks while boosting parental confidence in childcare (Gaunt & Scott, 2014; Willya Achmad, 2023).

Overall, the results of this program demonstrate that empowering PKK as change agents is highly relevant in stunting prevention. The success in increasing knowledge, developing educational modules, conducting applied training, and forming parenting groups illustrates a synergy between theory and practice. This aligns with the *community-based intervention* approach, which emphasizes the importance of community participation in designing and implementing health solutions. Through PKK empowerment, communities are no longer positioned merely as beneficiaries but as active agents in planning, executing, and evaluating stunting prevention programs (Waisawati et al., 2024).

Furthermore, this community-based approach reinforces the concept of *social capital*, referring to social trust, networks, and norms within society. PKK, with its extensive networks and strong credibility among families, serves as a bridge between government, academia, and the community in disseminating health education. This is in line with the *empowerment* theory, which emphasizes the importance of providing capacity, opportunity, and control to local groups so they can make decisions that impact their own lives (Chima Abimbola Eden et al., 2024; Sitaresmi et al., 2022; Waisawati et al., 2024).

These findings also support research on the importance of integrating responsive feeding into nutrition intervention policies, where feeding that pays attention to children's hunger and satiety cues is proven to be more effective in preventing malnutrition. In addition, other studies show that responsive care practices, including baby massage, can enhance appetite and support holistic child development. These outcomes strengthen the validity of a program that emphasizes not only education but also practical skills that parents can directly apply (Azwar et al., 2023; Winahyu, 2023b).

On the other hand, other studies emphasize the effectiveness of local cadres in stunting prevention, highlighting that their involvement improves community access to information and health services. The results from Guwosari Village reflect a similar pattern: PKK cadres successfully facilitated family learning, built parenting groups, and ensured the continuity of education beyond formal sessions. Thus, this program not only impacts family capacity improvement but also serves as a replicable model for other regions facing similar challenges, particularly in areas with limited formal health resources.

CONCLUSION

The PKK empowerment program in Guwosari Village proved effective in increasing parents' knowledge of balanced nutrition and early childhood parenting. The outcomes achieved included a $\geq 20\%$ increase in participants' knowledge, the development of an educational module, the implementation of nutrition and parenting training, as well as the establishment of parenting learning groups.

Empowering PKK as change agents is an appropriate strategy for community-based stunting prevention. This program can be replicated in other regions with the support of cross-sector collaboration and contributes to accelerating stunting reduction toward achieving national targets and the Sustainable Development Goals.

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