Digital Literacy Training for Primary School Teachers to Support Deep Learning in Semarang Regency, Indonesia

Niam Wahzudik*, Wardi Wardi, Achmad Farchan, Bagus Winarko Nugroho, Viona Santika, Ayuk Ronndiyah, Disrun Aji Prabowo

Department of Educational Technology, Faculty of Education and Psychology, Universitas Negeri Semarang, Semarang, Indonesia

*Corresponding Author: niam.wahzudik@mail.unnes.ac.id

Abstract. The rapid digital transformation in education requires teachers to possess strong digital literacy to support meaningful and technology-integrated learning. However, many primary school teachers in rural areas still face limitations in utilizing digital tools and artificial intelligence for instructional purposes. This community service program aimed to improve teachers' digital literacy to support the implementation of deep learning in primary education. The program was conducted in Timpik Tourism Village, Semarang Regency, involving 25 teachers from local primary schools. Training activities were implemented using the ADDIE model through needs analysis, training design, workshops on AI-based learning tools, and evaluation. The results indicated that the program improved teachers' digital competencies with an average evaluation score of 3.53 categorized as very good. Participants demonstrated improved ability to utilize digital platforms for instructional design and assessment. This program strengthens teachers' readiness for deep learning implementation and promotes educational innovation in rural communities.

Keywords: digital literacy training; deep learning; primary school teachers; artificial intelligence; teacher empowerment

INTRODUCTION

The rapid digital transformation in education has fundamentally changed the way learning is designed, implemented, and evaluated. In the digital era, teachers are no longer expected to function solely as transmitters of knowledge but as facilitators who are capable of integrating technology into meaningful learning experiences. Consequently, teachers are required to develop new competencies that go beyond conventional pedagogical skills. One of the most essential competencies in this context is digital literacy. Digital literacy is not limited to the ability to operate digital devices; rather, it encompasses a broad set of skills including critical thinking, digital ethics, creativity, information management, and the pedagogical ability to integrate digital technologies into effective learning environments. Teachers with strong digital literacy can utilize technological tools not only for administrative purposes but also to create innovative learning strategies that support students' cognitive and metacognitive development. In primary education, the role of digital literacy becomes increasingly important

because teachers are responsible for building the foundational learning experiences that shape students' readiness to participate in the knowledge-based society of the twenty-first century (Bozkurt et al., 2021; Jafari et al., 2022; Lestari et al., 2025).

Globally, educational systems are increasingly integrating digital technologies and artificial intelligence into teaching and learning processes. Educational technologies provide opportunities to design more interactive, collaborative, and personalized learning experiences. The integration of digital tools in the classroom also enables teachers to develop data-driven approaches for monitoring student progress and providing timely feedback. These developments require teachers to possess not only technical competence but also the ability to critically evaluate digital resources and apply them in pedagogically meaningful ways. Digital literacy therefore becomes a key component of professional teacher competence in the digital era. Teachers who lack digital literacy may experience difficulties in adapting to rapidly evolving educational technologies, which can ultimately affect the quality of learning

experienced by students (Jafari et al., 2022; Navío-Marco et al., 2024).

In Indonesia, the government has introduced the Merdeka Curriculum as part of a broader educational reform aimed at promoting student-centered and flexible learning environments. The Merdeka Curriculum emphasizes the development of higher-order thinking skills, creativity, collaboration, and problem-solving abilities among students. To achieve these objectives, teachers are encouraged to integrate technology into learning activities in order to create contextual and engaging learning experiences. However, the successful implementation of such policies depends heavily on teachers' readiness to utilize digital technologies effectively. Several studies indicate that the level of digital literacy among primary school teachers in Indonesia remains uneven, particularly in rural and peripheral regions. Limitations in digital infrastructure, lack of professional training opportunities, and low self-confidence in using digital tools often hinder teachers from integrating technology into classroom practice. As a result, a gap emerges between the policy goals of educational digital transformation and the actual practices implemented in schools (Isdaryanti et al., 2023).

Another important concept in contemporary educational discourse is deep learning. Deep learning refers to an approach to learning that emphasizes conceptual understanding, critical thinking, reflection, and the application of knowledge to real-world contexts. This learning paradigm encourages students not only to memorize information but also to analyze, evaluate, and apply knowledge in meaningful ways. Deep learning is closely related to the development of higher-order thinking skills and metacognitive awareness. For deep learning to occur effectively, teachers must design learning environments that stimulate inquiry, reflection, collaboration, and authentic problem solving. Digital technologies and artificial intelligence can serve as powerful tools to support such learning environments. For example, digital platforms can facilitate interactive learning materials, online collaboration, and reflective assessment activities that help students monitor their own learning progress. Therefore, the integration of digital literacy and deep learning approaches becomes an important strategy for improving the quality of primary education (Nguyen, 2023).

Despite the increasing importance of digital literacy and deep learning, many schools in rural areas still face significant challenges in implementing technology-supported learning. One such area is Timpik Tourism Village, located in Susukan Subdistrict, Semarang Regency, Indonesia. The village has considerable potential to develop educational innovation due to its growing tourism activities and community engagement. However, preliminary observations conducted by the community service team indicated that most primary school teachers in the area were not yet accustomed to utilizing digital applications in lesson planning, instructional media development, or formative assessment practices. Many teachers continued to rely on conventional teaching methods and printed learning materials. In addition, limited exposure to artificial intelligence technologies in education has resulted in low awareness among teachers regarding the potential benefits of AI-assisted learning tools. These conditions reflect the broader digital divide that often exists between urban and rural educational institutions (Van Heerden & Bas, 2021).

The challenges faced by teachers in Timpik Tourism Village highlight the need for systematic capacity-building initiatives aimed at strengthening teachers' digital literacy and pedagogical competencies. Professional development programs that combine theoretical understanding with practical training are necessary to help teachers develop confidence and skills in using digital technologies. Training programs can provide opportunities for teachers to explore digital tools, experiment with innovative instructional strategies, and collaborate with peers in designing technology-integrated learning activities. Through such programs, teachers can gradually shift their perceptions of technology from being a complex or intimidating tool to becoming a valuable resource that supports effective teaching and learning (Alabbas & Alomar, 2024).

Based on these considerations, a community service program was designed to enhance digital literacy among primary school teachers in Timpik Tourism Village. The program focuses on providing structured training and mentoring to help teachers integrate digital technology and artificial intelligence into learning practices that support deep learning. The training activities were developed using the ADDIE instructional design model, which consists of five systematic stages: analysis, design, development, implementation, and evaluation. This model was selected because it enables the training process to

be organized in a structured and contextual manner while ensuring that the training materials are relevant to teachers' needs and local conditions (Tsani & In'am, 2024).

The objectives of this community service activity are twofold. First, the program aims to improve teachers' competencies in utilizing digital technologies and artificial intelligence for instructional purposes. Second, it seeks to support teachers in implementing deep learning approaches that encourage students' critical thinking, reflection, and problem-solving abilities. By strengthening teachers' digital literacy, the program is expected to contribute to improving the quality of learning in primary schools within the village. In addition, the program seeks to foster collaborative professional learning among teachers so that the knowledge and skills acquired during the training can be sustained and further developed within the school community (Bozkurt et al., 2021).

The significance of this community service program extends beyond the immediate context of teacher training. From a scientific perspective, the program contributes to the growing body of knowledge on teacher professional development in the digital era, particularly in rural educational settings. From a societal perspective, strengthening teachers' digital literacy supports the broader goal of reducing the digital divide between urban and rural schools. The program also aligns with national educational policies aimed at promoting digital transformation and improving the quality of human resources through education. Ultimately, the empowerment of teachers through digital literacy training can contribute to building a more adaptive, innovative, and sustainable educational ecosystem in rural communities.

METHODS

This community service program employed a structured training approach based on the ADDIE instructional design model, which consists of five stages: Analysis, Design, Development, Implementation, and Evaluation. The ADDIE model was selected because it provides a systematic framework for designing and implementing training programs that are aligned with participants' needs and learning objectives. The model also allows continuous evaluation and improvement throughout the training process. The activities were conducted in Timpik Tourism Village, Susukan Subdistrict, Semarang Regency,

involving 25 public primary school teachers as participants. The program was implemented through three main phases: preparation, implementation, and evaluation.

The preparation phase focused on identifying the needs and challenges faced by teachers in integrating digital technology into learning activities. A preliminary needs assessment was conducted through informal interviews, observations, and discussions with teachers and school administrators. The assessment aimed to identify teachers' current level of digital literacy, their familiarity with digital learning platforms, and the obstacles they encountered when attempting to integrate technology and artificial intelligence into classroom instruction.

The needs analysis revealed that most teachers had limited experience using digital tools for instructional design, assessment, and reflective learning activities. Many teachers were familiar with basic digital devices such as smartphones and presentation software, but they lacked confidence in applying more advanced digital tools for pedagogical purposes. In addition, teachers reported difficulties in understanding how artificial intelligence applications could be integrated into the learning process.

Based on these findings, the community service team designed a training program aimed at strengthening teachers' digital literacy competencies and introducing practical applications of artificial intelligence in primary education. During the design stage, a training module entitled "Digital Literacy and Artificial Intelligence for Deep Learning in Primary Education" was developed. The module included theoretical materials, practical guidelines, and hands-on exercises related to digital learning tools. In the development stage, learning materials and instructional media were prepared using various digital platforms, including Canva AI for instructional media design and Google Forms for formative assessment activities.

The implementation stage involved the delivery of the training program through workshops, demonstrations, and guided practice sessions. The training was conducted for a total of 32 instructional hours over several sessions. The sessions were designed to combine theoretical understanding with practical experience so that teachers could directly apply the knowledge gained during the training.

The training activities began with a socialization session that introduced participants to the concept of digital literacy and its

importance in supporting the implementation of deep learning in primary education. This session also discussed the role of teachers in adapting to digital transformation and highlighted the potential benefits of using digital technologies and artificial intelligence in learning.

The next sessions focused on practical workshops that introduced participants to various digital tools that could support teaching and learning processes. Teachers were guided to explore the use of Canva AI to design interactive learning materials and visual teaching aids. They also learned how to use Google Forms to create formative assessments and reflective learning activities. In addition, the participants practiced designing lesson scenarios that incorporated deep learning principles such as inquiry, reflection, collaboration, and problem-solving.

Simulation activities were conducted to allow teachers to test their newly acquired skills in designing technology-integrated learning activities. During these simulations, participants worked collaboratively to create digital learning resources and presented their instructional designs to other participants for feedback and reflection.

The evaluation stage was conducted to measure the effectiveness of the training program and to assess participants' perceptions of the training activities. Evaluation data were collected using response questionnaires distributed to all participants at the end of the training program. The questionnaire included several indicators related to program quality, relevance of training materials, learning experience, and supporting facilities.

The evaluation indicators were designed to measure the extent to which the training program achieved its objectives. The main indicators included participants' understanding of digital literacy concepts, their ability to utilize digital tools for instructional purposes, and their readiness to implement deep learning approaches in classroom practice. Participants were asked to rate each indicator using a Likert scale ranging from 1 (very poor) to 4 (very good).

The collected data were analyzed using descriptive quantitative methods. The analysis involved calculating the average scores of each indicator and interpreting them according to predetermined evaluation categories. A higher average score indicated a more positive evaluation of the training program and a higher level of participant satisfaction.

The evaluation results provided insights into the strengths and limitations of the program implementation. The findings also served as the basis for recommendations for future community service activities aimed at strengthening teachers' digital literacy and supporting the sustainable integration of digital technologies in primary education.

RESULTS AND DISCUSSION

Implementation of Digital Literacy Training Activities

The digital literacy training program for primary school teachers in Timpik Tourism Village was implemented as a structured community empowerment initiative aimed at strengthening teachers' competencies in integrating digital technology and artificial intelligence into learning practices. The program involved 25 teachers from four public primary schools located in Timpik Village, Susukan Subdistrict, Semarang Regency. The training was designed not only to introduce digital tools but also to cultivate reflective pedagogical awareness regarding the role of technology in supporting deep learning practices in primary education.

The training activities were conducted over a total of 32 instructional hours and consisted of several sessions, including program socialization, workshops on digital literacy and artificial intelligence applications, hands-on practice using digital tools, collaborative lesson design, and reflective evaluation sessions. The activities began with an introductory session aimed at raising participants' awareness of the importance of digital literacy in contemporary education. During this session, participants were introduced to the concept of digital transformation in education and the increasing role of artificial intelligence in supporting innovative learning environments.

Following the introductory stage, participants engaged in practical workshops focusing on the use of digital platforms that could support instructional design and assessment activities. Teachers were introduced to Canva AI for designing interactive instructional materials, ChatGPT for generating ideas and learning resources, and Google Forms for developing formative assessments and student reflection activities. The workshops emphasized practical learning experiences so that participants could directly apply the tools in designing learning scenarios relevant to their classroom contexts.

During the training sessions, participants

demonstrated high levels of engagement and enthusiasm, particularly when exploring AI-based learning tools. Many teachers expressed curiosity and excitement about the possibility of integrating artificial intelligence into their teaching practices. Observations conducted by the training facilitators showed that collaborative learning activities played an important role in helping participants overcome initial difficulties in using digital tools. Teachers frequently exchanged ideas and supported each other in solving technical problems, creating a collaborative learning environment that facilitated knowledge sharing and peer mentoring.

Figure 1. Digital literacy training activities for primary school teachers in Timpik Tourism Village

The hands-on practice sessions were particularly effective in helping teachers understand how digital technologies could support deep learning practices. Participants worked in small groups to design lesson scenarios that incorporated digital media and reflective learning activities. These collaborative exercises encouraged teachers to experiment with new instructional approaches while receiving feedback from facilitators and peers. Through these activities, teachers gradually developed confidence in applying digital tools to enhance classroom learning.

Training Evaluation Results

The effectiveness of the digital literacy training program was evaluated using response questionnaires distributed to all participants at the end of the training activities. The questionnaire consisted of several indicators designed to measure participants' perceptions of the quality of the training program, the relevance of the learning materials, and the adequacy of supporting facilities. The evaluation used a Likert scale ranging from 1 (very poor) to 4 (very good).

The results of the evaluation showed that the overall average score of the training program was 3.53, with a standard deviation of 0.15, indicating that the majority of participants rated the program as very good. This result suggests that the training activities were well received by the participants and effectively addressed their learning needs. The relatively small variation in scores also indicates a high level of consistency in participants' evaluations of the training program.

A more detailed analysis of the evaluation indicators revealed that the relevance of training materials received the highest average score of 3.58, followed by the quality of the program implementation with an average score of 3.55. These results indicate that participants perceived the training materials as highly relevant to their professional needs and classroom contexts. Teachers reported that the training provided practical knowledge that could be directly applied to their teaching activities.

Meanwhile, the facilities and technical support component received a slightly lower average score of 3.40. Although still categorized as very good, this score reflects some limitations related to infrastructure, such as internet connectivity and the availability of digital devices during the training sessions. These findings highlight the importance of improving digital infrastructure in rural educational settings to ensure the sustainability of technology-based learning initiatives.

Figure 2. Workshop session on the use of AI-based digital tools in instructional design

In addition to the quantitative evaluation results, qualitative feedback obtained through brief interviews with participants provided further insights into the effectiveness of the training program. Many teachers stated that the training helped them gain a deeper understanding of the potential of artificial intelligence in education. Several participants reported that it was their first experience using AI-powered applications such as Canva AI and ChatGPT for educational purposes.

Teachers also highlighted the usefulness of Google Forms in designing formative assessments and reflective learning activities. They explained that digital assessment tools allowed them to collect student responses more efficiently and analyze learning outcomes more systematically. This experience helped teachers recognize that digital technologies could enhance both the efficiency and effectiveness of instructional practices.

The positive responses from participants demonstrate that the training program successfully addressed the initial objective of increasing teachers' awareness and understanding of digital literacy and artificial intelligence in education. These findings are consistent with previous studies emphasizing that professional development programs play a crucial role in improving teachers' digital competencies and readiness to integrate technology into teaching practices. Teachers who participate in structured digital literacy training tend to develop stronger confidence and motivation to explore innovative teaching methods.

Furthermore, the training activities also contributed to building a supportive learning community among participants. During the workshops, teachers frequently engaged in discussions about challenges they faced in integrating technology into their classrooms. This collaborative environment enabled participants to share experiences and strategies for overcoming practical difficulties in technology integration. Such interactions are important in fostering a culture of continuous professional learning among teachers, particularly in rural educational settings where access to professional development opportunities may be limited.

The evaluation results indicate that the digital literacy training program effectively achieved its initial objectives of enhancing teachers' knowledge, skills, and confidence in using digital technologies for educational purposes. The combination of theoretical explanations, practical workshops, and collaborative learning activities proved to be an effective approach for supporting teachers' professional development in the digital era.

Improvement of Teachers' Digital Literacy Competence

One of the most significant outcomes of the digital literacy training program was the improvement of teachers' digital literacy competencies, both in technical skills and in reflective pedagogical awareness. Prior to the training, many participants reported limited experience in using digital tools beyond basic applications such as word processors and presentation software. The training activities therefore played an important role in introducing teachers to more advanced digital tools that could support interactive learning, formative assessment, and collaborative knowledge construction.

From a technical perspective, teachers demonstrated improved abilities in operating digital platforms for instructional purposes. Participants learned how to design visual learning materials using Canva AI, develop online quizzes and reflection sheets using Google Forms, and explore artificial intelligence tools such as ChatGPT to assist in preparing instructional content. These skills enabled teachers to design more engaging and interactive learning materials compared to traditional lecture-based approaches. Teachers also developed greater confidence in experimenting with new technologies, which is an essential component of professional growth in the digital era.

Beyond technical proficiency, the training also contributed to the development of reflective digital pedagogy among participants. Teachers began to understand that digital technology

should not be used merely as a tool for delivering information but as a medium for facilitating deeper student engagement and critical thinking. This shift in perspective represents an important transformation in teachers' professional mindset. Instead of viewing technology as a complex or intimidating tool, teachers began to recognize its potential as a strategic partner in designing meaningful learning experiences.

These findings are consistent with research indicating that digital literacy significantly influences the professional competence of teachers. Teachers who possess higher levels of digital literacy are more likely to adopt innovative teaching strategies and integrate technology effectively into classroom practice. Digital literacy enables teachers to access diverse learning resources, design interactive learning environments, and evaluate students' progress through digital assessment tools. In this context, the training program not only improved teachers' technical capabilities but also strengthened their capacity to adapt to technological developments in education.

Another important dimension of digital literacy addressed in the training was digital ethics and responsible technology use. Participants were introduced to principles related to data privacy, responsible use of artificial intelligence, and ethical considerations in the use of online resources. This aspect of the training helped teachers develop awareness of the ethical responsibilities associated with the use of digital technologies in educational contexts. The development of ethical awareness is essential to ensure that technology is used responsibly and supports positive learning outcomes.

Furthermore, the training activities encouraged teachers to engage in reflective discussions regarding the role of technology in supporting student-centered learning. Teachers shared experiences about challenges they faced in integrating technology into their classrooms and discussed possible solutions through collaborative dialogue. These reflective discussions contributed to the development of a professional learning community among participants, which is an important factor in sustaining innovation in education.

Integration of Digital Literacy with Deep Learning

Another important finding of this community service activity was the increasing readiness of teachers to integrate digital literacy with deep learning approaches in primary education. Deep learning emphasizes the development of higher-order thinking skills, including analysis, evaluation, creativity, and reflective thinking. Such learning approaches require teachers to design learning environments that encourage inquiry, collaboration, and meaningful problem solving.

Through the training program, teachers gained practical experience in designing learning activities that combine digital technology with deep learning principles. For example, several participants developed digital reflection sheets using Google Forms that allowed students to evaluate their learning experiences after completing classroom activities. This practice encouraged students to engage in metacognitive reflection, which is an essential component of deep learning. By reflecting on their learning processes, students become more aware of their strengths and areas that require improvement.

Teachers also explored the use of artificial intelligence applications to generate ideas for learning activities and instructional materials. AI-based tools enabled teachers to develop personalized learning resources tailored to students' learning needs and abilities. For instance, teachers experimented with generating discussion prompts, learning scenarios, and formative assessment questions using AI-based platforms. These practices demonstrate how artificial intelligence can support teachers in designing adaptive and reflective learning experiences.

The integration of digital literacy and deep learning also encouraged teachers to adopt more collaborative teaching strategies. During the training simulations, participants worked in groups to design project-based learning activities that required students to analyze real-world problems and develop creative solutions. Digital tools were used to facilitate group discussions, collect student responses, and present project outcomes. Such activities illustrate how digital technologies can support collaborative knowledge construction and active student participation.

The use of digital tools in deep learning contexts also contributes to improving the quality of formative assessment. Digital assessment platforms allow teachers to collect student responses in real time and analyze learning outcomes more efficiently. This capability enables teachers to provide immediate feedback and adjust instructional strategies based on

students' learning needs. In this way, digital literacy becomes a foundation for implementing data-informed teaching practices.

The findings indicate that the integration of digital literacy and deep learning has the potential to transform teaching practices in primary schools. Teachers who are equipped with digital literacy competencies are better prepared to create learning environments that encourage critical thinking, creativity, and reflective learning. Such environments are essential for preparing students to face the complex challenges of the digital age.

Challenges and Implementation Reflections

Despite the positive outcomes of the training program, several challenges were identified during the implementation of digital literacy practices in schools. One of the most significant challenges was related to digital infrastructure. Some schools in Timpik Tourism Village still face limitations in internet connectivity and the availability of digital devices. These constraints can hinder teachers' ability to fully implement technology-based learning activities (Alabbas & Alomar, 2024; Van Heerden & Bas, 2021).

Another challenge relates to teachers' varying levels of technological proficiency. Although the training program helped improve teachers' skills, some participants required additional time and practice to become fully comfortable with digital tools and artificial intelligence applications. Continuous mentoring and follow-up training programs are therefore necessary to ensure that teachers can gradually develop more advanced digital competencies (Jirout, 2020; Vargas-Madriz & Konishi, 2025).

Institutional support also plays an important role in sustaining technology integration in schools. Some teachers reported that limited time for professional collaboration made it difficult to consistently develop digital-based learning materials. Without strong support from school leadership and education authorities, the sustainability of digital innovation initiatives may be difficult to maintain (Kamalov et al., 2023; Wijayanti et al., 2024).

Nevertheless, the training program successfully fostered a sense of collaboration among participating teachers. After the completion of the training activities, participants formed a professional learning group known as the Timpik Digital Teacher Community (KGDT). This community serves as a platform for sharing experiences, exchanging learning resources, and providing peer mentoring among teachers. The establishment of such a community is an important step toward sustaining the impact of the training program (Nguyen, 2023; Qiu et al., 2022).

Professional learning communities have been widely recognized as an effective strategy for supporting teacher professional development. Through collaborative networks, teachers can continuously share knowledge, reflect on their teaching practices, and develop innovative instructional strategies. In rural educational contexts, such communities are particularly valuable because they provide opportunities for teachers to access peer support and collective learning (McIntosh & Nenonene, 2020; Shipton, 2022).

Implications for Primary School Development in Timpik Tourism Village

The impact of the digital literacy training program extends beyond the improvement of individual teacher competencies. The program also contributes to the broader development of primary education in Timpik Tourism Village. By strengthening teachers' digital literacy and pedagogical skills, the training helps create a more innovative and adaptive learning environment in local schools (Villalobos et al., 2024; Yafie et al., 2024).

Teachers in Timpik Village play an important role not only as educators but also as community leaders who can contribute to local development initiatives. The integration of digital literacy in education can support the development of an educational ecosystem that aligns with the village's identity as a tourism village. For example, teachers began exploring ways to integrate local cultural and environmental themes into digital learning activities. Students were encouraged to use digital platforms to document local cultural practices, environmental conservation efforts, and community activities related to tourism development (Benediktsson, 2021; Vanitha & Narasimhan, 2025).

Such learning activities demonstrate the potential of combining digital literacy with place-based education. By connecting classroom learning with local contexts, teachers can create more meaningful and relevant learning experiences for students. Students are encouraged to explore their local environment, analyze real-world issues, and develop solutions that contribute to community development (Navío-Marco et al., 2024; Nazari et al., 2024).

From a broader perspective, the digital literacy training program also contributes to reducing the digital divide between urban and rural schools. By providing teachers with access to digital training and resources, the program helps ensure that students in rural areas can benefit from the same technological opportunities as those in urban schools. This effort aligns with national educational goals aimed at promoting equitable access to quality education (Bozkurt et al., 2021; Lestari et al., 2025).

The program also contributes to the advancement of knowledge in the field of teacher professional development and educational technology. The findings demonstrate that community-based training programs can effectively enhance teachers' digital competencies and support the implementation of innovative learning approaches. The experience gained from this program can serve as a reference for similar initiatives in other rural communities seeking to strengthen digital literacy in education (Jafari et al., 2022; Nithyavani & Nagaraja, 2025).

The results of this community service activity highlight the importance of empowering teachers through digital literacy training as a strategy for improving the quality of education in rural areas. By combining technological skills, reflective pedagogy, and community collaboration, teachers can play a key role in creating sustainable educational innovation that benefits both students and the broader community.

CONCLUSION

The digital literacy training program for primary school teachers in Timpik Tourism Village successfully improved participants' competencies in utilizing digital technology and artificial intelligence to support deep learning implementation in primary education. The evaluation results, with an average score of 3.53 categorized as very good, indicate that the program effectively enhanced teachers' digital literacy, instructional design skills, and reflective pedagogical awareness. One of the main strengths of the program lies in its practical training approach that combines hands-on workshops, collaborative learning activities, and the use of AI-based digital tools to support innovative teaching practices. In addition, the formation of the Timpik Digital Teacher Community provides an important platform for sustaining professional collaboration among teachers and ensuring the continuity of digital learning innovation. However, several challenges remain, particularly related to limited digital infrastructure and the varying levels of teachers' technological readiness in rural schools. Therefore, future initiatives should focus on strengthening institutional support, improving digital infrastructure, and providing continuous mentoring programs to ensure sustainable integration of digital literacy and deep learning practices in primary education.

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