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Artificial Intelligence (AI) Training for Teachers at SMP NU Tebat Jaya: Efforts to Improve Digital Competence in the 21st Century Learning Era

Destia Afitri[1], Berlian Nanda Saputra[2], Anisa Syinta Bella[3], Thoha Firdaus[4]
Universitas Nurul Huda[1234]

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ABSTRAK

Artificial intelligence (AI) training for teachers at SMP NU Tebat Jaya is a form of community service that aims to improve teachers' digital skills in facing the challenges of 21st-century learning. In this activity, teachers are given basic knowledge about the concept and development of AI, as well as practical training to use AI-based applications such as ChatGPT, Gamma, and InVideo in creating interactive and adaptive learning media. This activity was carried out using the Participatory Action Research (PAR) approach through four main phases, namely preparation, socialisation, training, and mentoring. The results of the activity showed that the training had succeeded in increasing teachers' understanding of the importance of AI in education and teachers' ability to incorporate this technology into the learning process. Evaluation was carried out to assess the extent to which the training was effective, which then became the basis for further development, such as ongoing guidance and improving supporting facilities. This activity is expected to encourage educational changes that are more adaptive and in accordance with the latest technological developments.

Corresponding Author:

Destia Afitri
Universitas Nurul Huda, Sumatera Selatan, 32361, Indonesia
Email: destiaafitri23@gmail.com

1. INTRODUCTION

21st-century education requires teachers to possess strong digital literacy to meet global challenges and rapid technological advancements. Unfortunately, at SMP NU Tebat Jaya, most teachers are still unfamiliar with using interactive digital media in teaching. The lack of relevant training and limited access to devices and internet infrastructure are major barriers to improving their competencies. Based on a preliminary survey of 15 teachers, 80% stated they had never used AI-based applications in the classroom. This reveals a clear gap in digital competence that must be addressed through intensive training. Therefore, the AI training program becomes a strategic solution to enhance educational quality [1].

This training program was systematically designed into three main phases: planning, core implementation, and evaluation [1]. During the planning phase, teachers' needs were assessed, and training modules were developed to cover both theoretical foundations and practical AI applications such as ChatGPT, InVideo, and Gamma AI. The core phase was carried out over two days using workshops, interactive discussions, and hands-on practice. The program involved 15 teachers from SMP NU Tebat Jaya, with varying levels of experience in using technology. During the sessions, participants engaged in case studies and simulations on AI integration in real teaching scenarios. Evaluation included pre- and post-tests, along with perception surveys to measure understanding and satisfaction.

The training results showed a significant improvement in teacher competence, both conceptually and practically. The average post-test scores increased from 58 to 83, indicating a stronger understanding of AI concepts and applications. Additionally, 12 out of 15 teachers were able to create AI-integrated teaching modules in the form of video content and interactive presentations. Teachers also showed great enthusiasm in using AI tools to simplify content preparation and assessment processes. However, some challenges remained, such as limited access to devices and unstable internet connectivity [2]. These issues highlight the need for follow-up actions and further program enhancements.

Although the training successfully improved teacher competence, several limitations must be addressed. One issue is the unequal readiness of school infrastructure to support full-scale AI implementation [2]. Moreover, the short duration of the training restricted in-depth exploration of materials. Future efforts should include continuous mentoring and provision of supporting infrastructure, like laptops and stable internet access. Similar programs could also be extended to other schools with comparable needs. Involving local education authorities in policy and budget support is crucial to prevent the program from remaining a one-time initiative. With a more holistic approach, AI training can become a transformative movement in improving the quality of education in the digital era.

2. METHOD

This study uses a quantitative method because the data analysed is in the form of numbers and the data processing is carried out statistically. This type of research is descriptive, which aims to systematically and factually describe the increase in teachers' digital competence after participating in Artificial Intelligence (AI) training. This training also adopts the Participatory Action Research (PAR) approach, because the training is designed collaboratively and oriented towards real action with participants, with the following stages of activity: preparation, socialisation, training, and mentoring. The objects of this study were teachers of SMP NU Tebat Jaya who participated in direct training activities on the use of AI in learning. This research was conducted on May 23, 2025, located directly at SMP NU Tebat Jaya, East OKU Regency, South Sumatra Province [3].

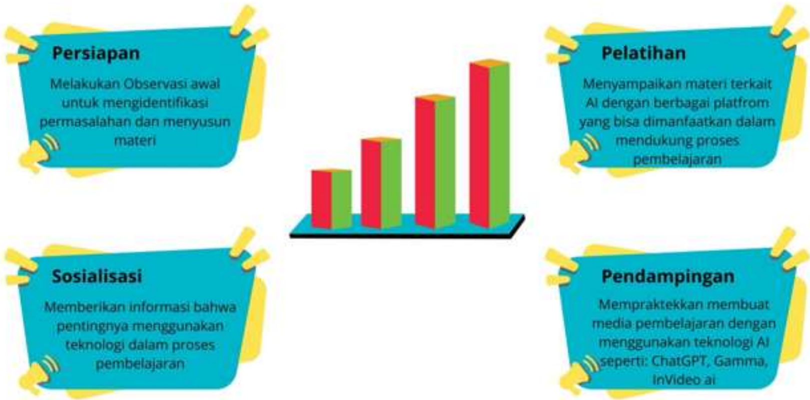

Figure 1. Stages in the Training Method

This study used a structured quantitative approach to evaluate the effectiveness of the AI training program. The evaluation instrument consisted of 10 closed-ended statements, arranged using a 4-point Likert scale to capture teachers' perceptions. The indicators measured included understanding of AI fundamentals, application of AI tools in classroom settings, and interest in further AI integration. All data were collected through an online questionnaire distributed via Google Forms at the end of the training session. Responses from a total of 14 participants were downloaded in Excel format for processing. This systematic approach ensured uniform data collection across all respondents.

The data analysis process focused on measuring participant competency using three main calculations. First, the mean score for each of the 10 questionnaire indicators was calculated. Second, the achievement percentage was determined by comparing the participants' actual scores with the maximum possible score. Third, competency levels were classified into four categories: very low (1.00–1.75), low (1.76–2.50), high (2.51–3.25), and very high (3.26–4.00). This classification made it easier to interpret and communicate the outcomes of the training program. Each indicator's score was analysed separately before aggregating the results into an overall conclusion.

In addition to descriptive statistics, further analysis was performed to strengthen the validity of the findings. The average score analysis provided insight into the general trend of participants' understanding and skills after training. The highest average scores were found in indicators related to interest in AI and willingness to explore new teaching methods. Meanwhile, lower scores were found in the technical mastery of specific AI tools, indicating areas where further support is needed. This pattern helped identify both strengths and improvement areas in the training curriculum. Such insights are crucial for enhancing future training designs.

The percentage achievement test added a more detailed understanding of performance outcomes. By comparing each indicator's total score to the maximum score, the research identified how close the teachers were to achieving full competency. For instance, if a particular indicator had a 92% achievement rate, it suggested high familiarity and confidence among the teachers in that area. These percentages were then averaged to provide a general performance metric across all indicators. This method helped quantify the success rate of the training in measurable terms. It also ensured that subjective perceptions were translated into concrete values.

To complete the analysis, the researchers conducted a score category distribution test. This involved calculating how many respondents fell into each competency range. The results showed that a majority of teachers scored within the "high" and "very high" categories, indicating that the training was generally effective. However, a small number of participants were still in the "low" category, which signals the need for differentiated follow-up support. This categorisation also helped tailor recommendations for future training adjustments. It ensured that the program's impact could be fairly assessed across various teacher profiles.

Overall, the combination of mean analysis, achievement percentage, and score category tests provided a comprehensive understanding of the training outcomes. This triangulated approach increased the reliability and depth of the evaluation process. The use of numeric indicators and standardised interpretation scales allowed the research to present findings clearly and objectively. Furthermore, the online-based data collection and analysis methods made the process efficient and replicable. These strengths position the research methodology as a model for evaluating similar teacher capacity-building programs. In the future, more advanced statistical tests could also be introduced to explore causal relationships and long-term impact.

In addition, to assess the extent to which the training was effective in improving teacher competence, the technique of N-Gain was used. Rumus yang digunakan adalah sebagai berikut:

$$N - Gain = \frac{(X_{post} - X_{pre})}{(X_{maks} - X_{pre})}$$

With the following description:

Xpost is the average score after training (post-test),

Xpre is the average score before training (pre-test),

Xmaks = 4.

By using this technique, it is hoped that the study can provide real and measurable evidence regarding the extent to which AI training contributes to improving teacher competence, both in terms of conceptual knowledge and application skills in the learning process.

3. HASIL DAN PEMBAHASAN

3.1. Data Description

Tabel dibawah akan menunjukkan data hasil pelatiahn utuk tiga indikator utama yaitu, rata-rata pretest, rata-rata postest dan peningkatan.

Table 1. Pretest, posttest and participant score improvement data

Name	Average pretest	Average posttest	Improvement
Desi Apriani	2.6	3.8	1,2
Desi Rianti	3.2	3.6	0,4
Dewi Rosa'adah	3.2	3.5	0,3
Dian Lestari	3.0	3.6	0,6
Sabila Anandini	3.0	3.8	0,8
Sri Jama'ati	2.5	3.2	0,7
Yeni Rusmawati,S.Pd	3.1	3.7	0,6

The training results were measured using three key indicators: average pretest score, average posttest score, and individual score improvement. Data were collected from seven participants, each representing a unique baseline of understanding regarding AI concepts before the training. The pretest scores ranged from 2.5 to 3.2, indicating that most participants had a moderate level of familiarity with AI. After completing the training, all participants showed improvements in their scores, with posttest averages ranging from 3.2 to 3.8. The highest individual improvement was recorded by Desi Apriani, who experienced a 1.2-point increase. These results demonstrate that the training program had a measurable impact on enhancing teachers' AI-related competencies.

More specifically, Desi Apriani's score rose from 2.6 to 3.8, while Sabila Anandini improved from 3.0 to 3.8, marking a significant 0.8-point gain. Other participants, such as Dian Lestari and Yeni Rusmawati, also showed positive improvements of 0.6 points each. Although Dewi Rosa'adah had the smallest increase of 0.3 points, her scores still reflect high competency levels after training. The consistency of scores across all participants validates the program's effectiveness. These results indicate not only increased understanding of AI but also greater confidence in its application. Such patterns provide strong evidence for the success of hands-on, practice-oriented training.

This quantitative evidence is crucial for evaluating the program's outcomes and planning future improvements. The use of pretest and posttest instruments helped measure actual learning gains rather than relying on subjective impressions. By comparing individual progress, facilitators were able to identify participants who may benefit from further mentoring or extended training sessions. Additionally, this data can inform instructional adjustments for future cohorts to ensure all learning styles and needs are addressed. The collected data also serves as a performance baseline for future longitudinal studies. Through systematic tracking, it is possible to measure retention and the long-term impact of the training.

In broader terms, the results of this data analysis can be used to advocate for more widespread implementation of AI training in schools. When presented to school administrators and policymakers, this evidence demonstrates that even a short-term training program can produce meaningful outcomes. It also helps in justifying the allocation of resources toward similar professional development initiatives. The use of simple, structured indicators like average scores and improvements provides clarity for all stakeholders. Furthermore, this approach empowers teachers by quantifying their learning progress in a transparent manner. In conclusion, the analysed data clearly reflects the effectiveness and necessity of AI training for teachers in today's educational landscape.

3.2. Training Activities

The AI training activities were carefully organised to provide both theoretical understanding and hands-on experience for all participants. The program started with an opening session that included welcoming remarks from school leaders and the training facilitator. This was followed by an introductory session covering the history, development, and current role of AI in modern life. Teachers were then introduced to the application of AI in education, including tools such as ChatGPT, Gamma, and InVideo. These platforms were demonstrated as solutions to assist teachers in lesson planning, content creation, and assessment. The training emphasised real-world applicability by integrating educational scenarios relevant to classroom challenges.

After the theoretical sessions, participants engaged in practical workshops. They experimented directly with the AI tools, using them to generate teaching materials tailored to their subjects. This hands-on phase allowed teachers to learn through trial and error while being guided by facilitators. Collaborative activities, such as peer review and group discussions, further enhanced learning by promoting knowledge exchange. Teachers were encouraged to reflect on their practices and redesign their lessons with the help of AI. This step not only built technical competence but also increased confidence in exploring new educational technologies [4].

The training also featured an interactive Q&A session to address challenges and clarify misconceptions. Many teachers shared their initial doubts and how the training helped them overcome the fear of using AI in the classroom. Discussions revolved around ethical use, the limitations of AI, and the importance of human judgment in teaching. Teachers highlighted the need for continuous learning, especially when dealing with emerging technologies. They appreciated the opportunity to interact with peers who faced similar challenges. These discussions strengthened the community of practice among educators and encouraged long-term collaboration.

The final stage of the training involved the creation of personalised prompts by each teacher. Participants were tasked with generating prompts tailored to their lesson topics, simulating how AI could be integrated into their daily teaching routines. A final group reflection was held to evaluate the training and collect feedback. Teachers expressed a desire for more frequent and longer-duration training. The session concluded with a commitment from the school and facilitators to support the continuous professional development of teachers. This comprehensive training model ensures that learning does not stop at the event but continues into practice and policy.

3.3. Pretest and Posttest Improvement

The analysis of pretest and posttest scores revealed substantial improvement in participants' knowledge and skills. Before the training, the average pretest score was 2.9, indicating a low baseline of understanding in AI fundamentals. Most teachers were unfamiliar with how AI works or how it can be practically applied in educational settings. Misconceptions about AI being complex or irrelevant were prevalent among participants. This baseline reflected the need for structured, targeted interventions to bridge the knowledge gap. The pretest helped identify which areas of knowledge required the most focus during training.

Following the training, the average posttest score increased to 3.6, demonstrating a marked improvement. Teachers showed better understanding of AI applications and could articulate the role of tools like ChatGPT in content development. Many reported feeling more confident in navigating AI platforms and creating their own materials. The interactive nature of the training contributed significantly to these gains. By engaging with real-world scenarios and simulations, teachers internalised the use of AI in meaningful ways. This proves that practical, hands-on learning is essential in digital literacy programs.

The score increase also signalled the training's alignment with participants' learning needs. Improvements were especially notable in indicators related to interest and readiness to apply AI in the classroom. Teachers transitioned from passive consumers of technology to active integrators. They not only learned how to use tools but also how to think critically about their implementation. Such development is vital for long-term adoption and sustainability. Moreover, the structured feedback loop allowed facilitators to adjust strategies based on real-time participant progress.

The assessment process was essential in validating the effectiveness of the training. The gap between pretest and posttest scores served as an indicator of program impact. Teachers could visualise their growth, which increased motivation and satisfaction. For facilitators, the test results provided data to refine future training content. This cycle of assessment and improvement supports continuous learning and adaptation. Ultimately, the pretest-posttest method reinforced a culture of evidence-based practice in teacher development.

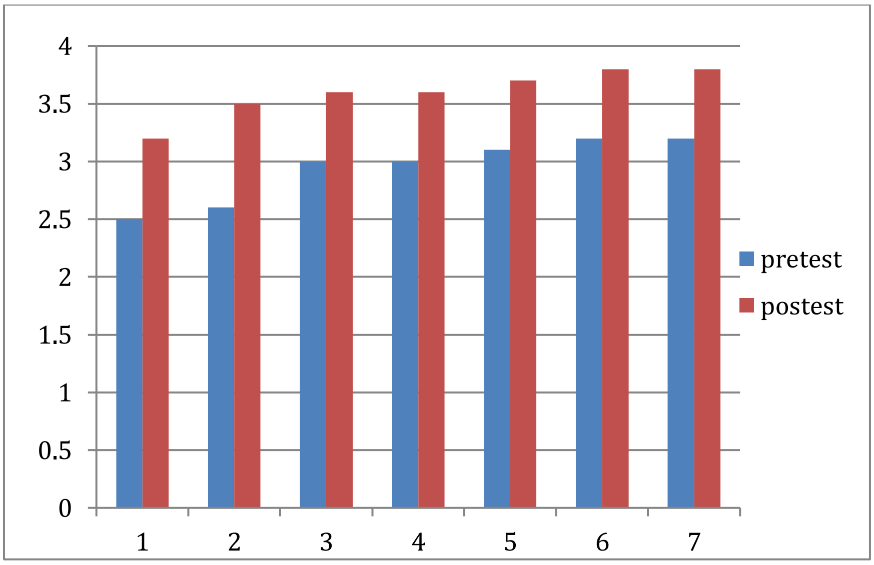

Figure 2. Bar graph of mean values of Pretest and Posttest

The analysis of pretest and posttest results was supported by three bar charts that illustrate changes in participants' average scores. *Figure 2* presents a combined bar chart comparing both pretest and posttest averages for all participants, highlighting the upward trend in their understanding. It is clear from the chart that every participant experienced an increase, although the level of improvement varied. The highest gain was achieved by Desi Apriani, who jumped from 2.6 to 3.8. On the other hand, the smallest improvement was recorded by Dewi Rosa'adah, from 3.2 to 3.5. This visualisation reinforces the conclusion that the training effectively enhanced participants' AI competencies.

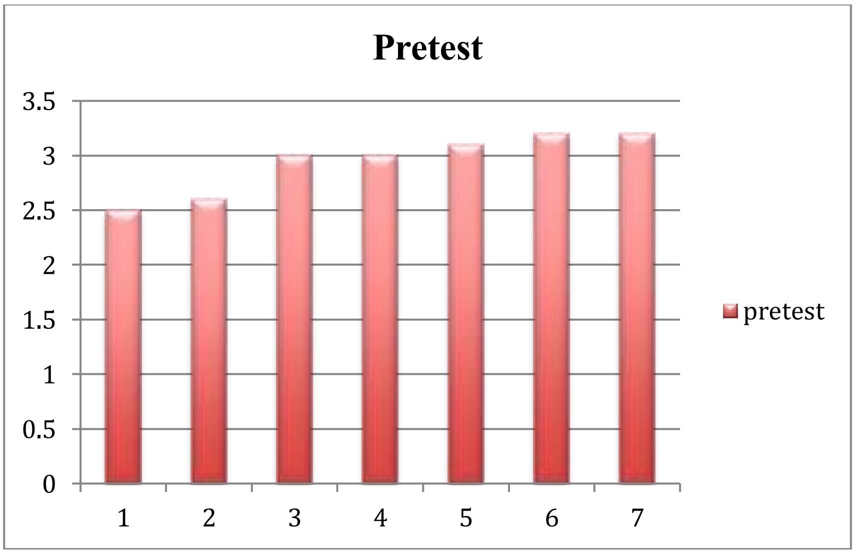

Figure 3. Pretest Bar graph of Pretest mean score

Figure 3 focuses solely on the pretest scores, providing a baseline overview of participants' initial knowledge. The distribution shows that most participants had scores ranging between 2.5 and 3.2, which aligns with a "moderate" competency level. This suggests that teachers had general awareness of AI but lacked depth in understanding its educational applications. The relatively close range of pretest scores indicates a common starting point among participants. This also helped facilitators tailor the training to match the collective knowledge level. Understanding this baseline is important for evaluating the proportional effectiveness of the training.

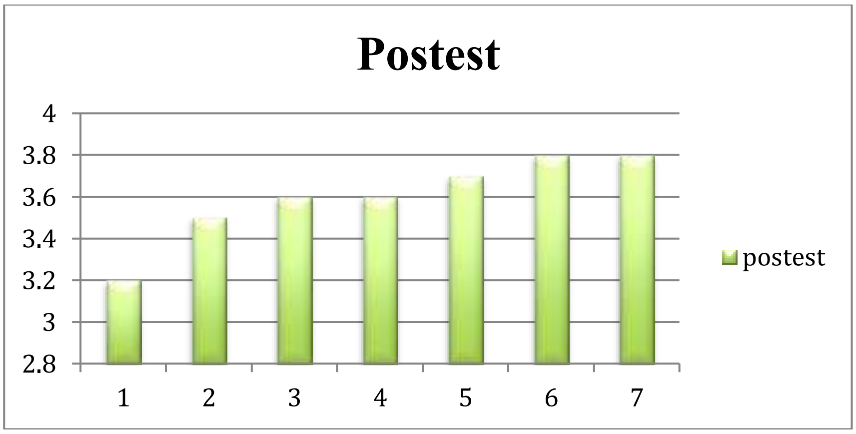

Figure 4. Bar graph of Posttest mean scores

Figure 4 displays the posttest scores, which consistently increased for all participants. The highest posttest scores reached 3.8, recorded by Desi Apriani and Sabila Anandini. These values fall within the "very high" competency range based on the classification scale used. This pattern demonstrates that the training materials were well-received and effectively absorbed. Most participants reached scores above 3.5, indicating not only improved understanding but also readiness to implement AI tools in their teaching. The visual representation in this figure confirms the quantitative data discussed earlier.

Overall, the bar charts serve as strong visual evidence of the training's success. They make it easy to identify both individual and group progress, which is essential for reporting and strategic planning. By comparing the three figures, stakeholders can gain a holistic understanding of the learning progression that occurred. Visual data also enhances transparency and supports decision-making related to future professional development programs. The clear positive trend shown across all figures reinforces the effectiveness of hands-on, practice-based training models. In conclusion, both the numerical scores and the charts confirm that the training significantly improved teachers' knowledge and skills in using AI for education.

3.4 Activity Implications

The AI training provided significant implications for enhancing teacher competence in digital-era education. Teachers who once relied heavily on traditional methods became more open to integrating technology into their teaching practices. By mastering AI tools, they gained new ways to design engaging, personalised learning experiences for students. This transformation supports the broader goals of modern education, which emphasise flexibility, creativity, and responsiveness. It also reinforces the idea that technology should not replace teachers but empower them. When used correctly, AI can be a powerful assistant in achieving learning objectives.

Another important implication was the rise of digital awareness among educators. Teachers realised that digital literacy is not optional but a necessity for professional relevance. The training helped shift their mindset from resistance to innovation. With greater digital confidence, teachers began to explore beyond the AI tools introduced in training. Some even initiated their own experiments using other educational apps and platforms. This self-directed exploration signals a positive change in teacher agency and lifelong learning attitudes.

The training also encouraged collaboration among teachers within the school. By working together on AI-based lesson designs, teachers shared ideas, provided feedback, and supported one another. This fostered a culture of innovation and mutual growth. Joint projects and peer mentoring became more common after the training. The school environment became more dynamic, with teachers actively seeking solutions to common instructional challenges. Collaboration is key to scaling AI adoption across subjects and grade levels.

In the long term, integrating AI in schools can improve overall educational quality. It accelerates the personalisation of learning, supports differentiated instruction, and enables data-informed teaching. When teachers are empowered with the right tools and mindset, they become more effective facilitators of learning. This contributes to a more modern and competitive educational ecosystem. The training serves as a foundational step toward sustainable digital transformation. Its success offers a model that can be replicated and expanded in other educational institutions [5].

4. CONCLUSION

The Artificial Intelligence (AI) training program conducted at SMP NU Tebat Jaya proved effective in improving teachers' competencies in understanding and applying AI technology in the classroom. This is evidenced by the significant increase in posttest scores compared to the pretest, indicating a tangible gain in both conceptual knowledge and practical skills. Participants were able to utilise AI tools such as ChatGPT and InVideo to develop learning materials, assessments, and interactive content. This outcome reflects the success of the training design, which emphasised participatory learning and hands-on experience. Teachers not only increased their knowledge but also demonstrated growing confidence in integrating AI into their pedagogical practices. This shift signifies a positive step toward digital transformation in the school's instructional ecosystem.

However, despite these positive results, the program also revealed some limitations that should be acknowledged. One of the main challenges was the unequal starting point in digital literacy among teachers, which impacted the pace of learning during the training. In addition, time constraints limited the opportunity to explore more advanced features of AI tools. Several teachers expressed the need for follow-up mentoring and deeper technical support. These challenges suggest that a one-time training is insufficient to achieve long-term transformation. Continuous support and differentiated learning pathways are needed to sustain the progress and ensure that all teachers can apply what they have learned effectively.

To ensure long-term impact, it is recommended that the school integrate AI-related content systematically into regular professional development programs. Scheduled follow-up sessions, peer coaching, and microlearning modules could provide ongoing support and address specific challenges encountered by teachers. Moreover, the school should invest in upgrading its digital infrastructure, including reliable internet access and access to devices, to maximise the benefits of AI implementation. Encouraging school-wide collaboration and knowledge sharing through teacher learning communities will also enhance the sustainability of change. These steps are necessary to move beyond initial enthusiasm and embed AI usage into daily instructional routines. Strategic alignment between training goals and institutional policy is crucial for long-term success.

At a broader level, this training initiative holds potential as a scalable model for other schools facing similar challenges in digital readiness. With proper documentation, assessment, and refinement, the program can be replicated across different educational contexts. Collaboration with education offices and policy-makers is essential to ensure wider access, funding support, and regulatory alignment. As education continues to evolve in the digital era, empowering teachers with AI literacy should become a national priority. Future programs should be designed not only to introduce tools but also to build critical thinking, digital ethics, and pedagogical innovation. By doing so, the Indonesian education system can better prepare teachers and students to thrive in a rapidly changing technological landscape.

5. ACKNOWLEDGEMENT

This community service activity can be implemented through cooperation with partner schools, and we would like to thank you for your participation in the activity. In addition, gratitude is conveyed to all parties involved to help the activity run well.

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