

ARTIFICIAL INTELLIGENCE TRAINING FOR IMPROVING TEACHERS' DIGITAL COMPETENCIES: EVIDENCE FROM A COMMUNITY SERVICE PROGRAM

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Abstract

This community service program is designed to improve teachers' digital competencies through Artificial Intelligence (AI)-based training at MAN 1 Banjarmasin Senior High School in February 2026. The program involved 17 teachers from various subject areas. A quantitative one-group pretest-posttest design was applied to evaluate the program's effectiveness. The implementation flow consisted of four stages: needs analysis, preparation of AI training materials, workshop and hands-on practice sessions, and evaluation through post-training mentoring. Participants received training on AI literacy, AI-assisted learning media development, electronic communication, and technology-based assessment tools. Data were collected using computer literacy questionnaires administered before and after the program. The questionnaire instrument was validated by educational technology experts and demonstrated acceptable internal consistency. The findings showed substantial improvement in teachers' competencies after the training. The average pretest score increased from 61.1 to 84.7, with a normalised gain score of 0.61 categorised as moderate-to-high improvement. Furthermore, 88.2% of participants reported increased confidence in integrating AI tools into classroom instruction. The program indicates that structured AI training effectively strengthens teachers' digital competencies and supports innovative learning practices in secondary education.

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Introduction

The rapid development of Artificial Intelligence (AI) has substantially reshaped the field of education, particularly in teaching, assessment, and digital learning management. Teachers are now expected not only to master pedagogical competencies but also to integrate digital technologies and AI-assisted tools into classroom practices. Digital competence has become a fundamental requirement for educators in the twenty-first century because it influences instructional quality, pupil engagement, and innovation in learning environments. Recent studies indicate that teachers with strong digital competence are more effective at crafting adaptive, technology-based learning experiences (Lucas et al., 2024; Azimkhan et al., 2025; Li et al., 2025; Asad et al., 2026).

Despite the increasing integration of AI in education, many teachers still struggle to use digital competence productively and ethically. Several educators remain unfamiliar with AI-supported applications for instructional media development, automated assessment, and personalised learning. This condition is clearly visible in secondary schools, where professional development programs related to AI remain limited. Research shows that insufficient training opportunities and limited contextualised professional development reduce teachers' confidence in implementing AI-based instruction (Nazaretsky et al., 2022; Li et al., 2025; Aravantinos et al., 2026; Sathya & Alamelu, 2026).

From a theoretical perspective, teachers' digital competence can be interpreted through the Technological Pedagogical Content Knowledge (TPACK) framework and the DigCompEdu model. TPACK emphasises the combination of technological, pedagogical, and content knowledge in instructional practice, while DigCompEdu highlights competencies in digital resources, assessment, communication, and learner empowerment. In the AI era, these competencies also include algorithmic awareness, digital ethics, and AI literacy. Therefore, teacher professional development programs should focus not only on technical skills, but also on pedagogical integration and the responsible use of AI in educational contexts.

Recent studies have demonstrated that AI-based professional development positively contributes to teachers' confidence and instructional innovation. For example, SmartPD introduced AI-assisted microlearning strategies that notably enhanced teachers' digital competencies across multiple instructional domains (Sathya & Alamelu, 2026). Similarly, Galindo-Domínguez et al. (2024) found that teachers with higher digital competence tend to show more positive attitudes toward AI integration in education. The results confirm that systematic training initiatives can strengthen educators' readiness to adopt emerging technologies in teaching and learning processes.

Although previous studies have explored teacher digital competence and AI literacy, empirical evidence regarding short-term AI training interventions in Indonesian secondary school contexts remains limited. Existing studies primarily emphasise broad surveys and theoretical discussions rather than practical school-based interventions. In addition, limited research quantitatively evaluates short-term AI training programs using pretest-posttest approaches in Indonesian secondary education contexts. Therefore, there is a need for community service programs that

provide measurable evidence regarding the effectiveness of AI training in improving teachers' digital competencies.

Community service activities are considered an important strategy for closing the gap between technological development and teachers' professional competencies. Through hands-on workshops, mentoring, and collaborative practices, teachers can directly experience using AI tools in learning environments. Such training programs may encourage teachers to develop innovative learning media, improve electronic communication, and utilise AI-assisted assessment systems proficiently. Furthermore, quantitative evaluation enables stakeholders to objectively assess the program's impact and pinpoint areas for continuous improvement.

This study contributes to the literature by delivering empirical evidence from a school-based community service intervention that quantitatively evaluates AI competency enhancement among secondary school teachers. In reaction to these issues, this community service program intended to improve teachers' digital competencies through Artificial Intelligence training conducted at MAN 1 Banjarmasin Senior High School in February 2026. The program focused on improving teachers' AI literacy, digital instructional practices, and confidence in integrating technology through structured workshops and mentoring activities. In addition, the study quantitatively evaluated the effectiveness of the training using a one-group pretest-posttest design, providing empirical evidence on the contribution of AI-based professional development to strengthening teachers' digital competencies in secondary education contexts.

Community Service Methodology

This community service program employed a quantitative participatory approach using a one-group pretest-posttest design to evaluate the effectiveness of Artificial Intelligence (AI) training in improving teachers' digital competencies. The program was conducted in February 2026 at MAN 1 Banjarmasin Senior High School and involved 17 teachers from different subject areas. Although the number of participants was relatively small, the study focused on intensive participatory training and contextual implementation within a specific educational setting. Quantitative approaches are widely utilized in educational community service programs because they provide measurable evidence regarding competency improvement and program effectiveness (Creswell & Creswell, 2018; Farokhzadian et al., 2022; Zakir et al., 2025). The implementation also adopted a participatory training model emphasising active engagement, collaborative practice, and reflective learning activities.

The training program was designed based on the Technological Pedagogical Content Knowledge (TPACK) framework and the DigCompEdu model. These frameworks emphasise the combination of technological knowledge, pedagogy, and digital competencies in instructional practices (Redecker, 2017; Valtonen et al., 2017; Tondeur et al., 2023; Kiryakova & Kozhuharova, 2024). The instructional resources focused on AI literacy, AI-assisted instructional media development, digital messaging, prompt engineering, ethical AI usage, and technology-based assessment tools. The integration of these competencies is essential because teachers are

increasingly required to adapt to AI-supported learning environments and to the digital transformation in education (Ng et al., 2023; Lucas et al., 2024; Aimicheva et al., 2025; Bahari & Liu, 2025).

Data collection was carried out using a digital competency questionnaire administered before and after the training activities. The questionnaire consisted of 24 Likert-scale items rated on a five-point scale ranging from 1 (strongly disagree) to 5 (strongly agree) in operating AI tools, developing AI-based learning resources, online collaboration, and assessment practices. The questionnaire was adapted from indicators in the DigCompEdu framework and modified to suit the context of AI integration in secondary education. Prior to implementation, the instrument underwent expert validation involving specialists in educational sciences and digital pedagogy to ensure content validity and contextual relevance. Furthermore, the instrument's reliability was assessed using Cronbach's alpha, yielding a coefficient of 0.87, indicating good internal dependability in measuring teachers' digital competencies. Previous studies have shown that structured digital competency instruments can effectively measure teachers' readiness and confidence in implementing educational technologies (Instefjord & Munthe, 2017; Tzafilkou et al., 2023; Durmuş Çemcem et al., 2025; Hu et al., 2025).

The implementation procedure consisted of several stages. First, a needs analysis was conducted through interviews and preliminary observations to identify teachers' initial competencies and challenges related to AI integration in learning. Second, the preparation stage involved developing training modules, workshop materials, and practical exercises related to AI applications in education. Third, the implementation stage comprised workshops, demonstrations, guided practice sessions, and coordinated assignments using AI-based educational tools. Fourth, mentoring and evaluation activities were conducted to monitor participants' progress and provide feedback on classroom implementation. Equivalently structured professional development models have been reported to significantly improve teacher engagement and digital competence (Fernández-Batanero et al., 2022; Chiu et al., 2024; Gui et al., 2026; Sathya & Alamelu, 2026).

The quantitative data were analysed descriptively using mean scores, percentage improvements, and normalised gain scores (N-Gain) to identify the level of competency enhancement after the training program. The N-Gain analysis was used because it provides a practical measurement of learning improvement between pretest and posttest scores in instructional intervention studies. In addition, participants' responses regarding training effectiveness and confidence in AI integration were summarised descriptively to strengthen the interpretation of the program outcomes. The following is the community service implementation flow, as shown in Figure 1.



Figure 1. Flow of community service implementation based on Enhancing Teachers' Digital Competencies through Artificial Intelligence Training

Results and Discussion

A. *Description of Community Service Implementation*

The community service program, titled “Enhancing Teachers’ Digital Competencies through Artificial Intelligence Training: Evidence from a Quantitative Community Service Program,” was conducted in February 2026 at MAN 1 Banjarmasin Senior High School. The activity involved 17 teachers from various subject areas. The program was designed to strengthen teachers’ digital competencies through practical training on the use of Artificial Intelligence (AI) technologies in instructional settings. The implementation was carried out collaboratively between the service team and the school management to ensure that the training activities aligned with teachers’ professional needs and instructional challenges in the digital era.

The implementation began with a preliminary needs analysis stage through interviews, observations, and informal discussions with teachers and school administrators. This stage aimed to identify teachers’ initial understanding of AI technologies, the difficulties in implementing digital learning, and training expectations. The findings indicated that most participants had limited experience in utilising AI-based educational tools, particularly for instructional media development, digital assessment, and classroom learning support. Therefore, the community service team designed training materials centred on practical, contextual AI applications relevant to secondary education learning activities.

Following the needs analysis, the preparation stage involved developing training modules, presentation materials, practical guides, and digital competency instruments. The materials emphasised AI literacy, ethical AI usage, prompt engineering, AI-assisted content generation, electronic communication, and technology-based assessment practices. Several AI platforms and educational applications were introduced to participants to support innovative learning processes. The preparation stage also included organising training schedules, preparing learning facilities, and ensuring internet access and digital devices were available during the workshop activities.

The implementation stage consisted of workshops, demonstrations, guided practice sessions, and joint learning activities. During the workshop sessions, participants received theoretical explanations regarding AI concepts and their

applications in education. The service team then demonstrated the use of AI tools for creating learning media, generating teaching materials, designing quizzes, and supporting classroom management. Participants actively engaged in hands-on practice using laptops and mobile devices to directly apply the AI tools introduced during the training. Joint discussions and peer-learning activities were also conducted to encourage knowledge dissemination among participants.

To strengthen participants' understanding, mentoring and guidance on classroom implementation were provided after the workshop sessions. Teachers were encouraged to develop simple AI-assisted learning products and simulate their implementation in classroom learning scenarios. During this stage, the service team provided direct assistance, feedback, and troubleshooting support related to the use of AI technologies in teaching practices. The mentoring activities were intended to guarantee that participants could apply the acquired competencies independently and sustainably in their respective instructional contexts.

The evaluation stage was conducted quantitatively using a one-group pretest-posttest approach. Participants completed digital competency questionnaires before and after the training activities to measure changes in their competencies related to AI literacy, electronic communication, instructional media development, and AI-based assessment. In addition, participants' responses and reflections on the training's usefulness were collected descriptively to support the interpretation of the program outcomes. The quantitative evaluation was intended to provide measurable evidence of the community service program's success in boosting teachers' digital competencies.

Overall, the implementation of this community service program showed active student involvement and positive responses toward AI integration in education. Teachers showed enthusiasm during workshop discussions, collaborative practices, and mentoring sessions. The structured implementation flow, consisting of needs analysis, preparation, workshops, mentoring, and evaluation, contributed to the successful achievement of the program objectives. Furthermore, the activity provided practical experiences that may help teachers adapt to digital transformation and apply innovative learning practices in secondary education settings.

B. *Participant characteristics*

The participants in this community service program comprised 17 teachers from MAN 1 Banjarmasin Senior High School, representing various subject areas, including mathematics, science, social sciences, language studies, religious education, and vocational education. The participants had diverse teaching experiences ranging from less than five years to more than fifteen years. Most participants were familiar with basic digital technologies such as presentation software and web-based learning platforms; however, only a few teachers had prior experience using Artificial Intelligence (AI)-based educational tools in instructional activities. In terms of educational background, most participants held undergraduate degrees in education-related fields, while several participants possessed postgraduate qualifications.

Preliminary observations and interviews indicated that participants experienced multiple challenges related to digital competency development, notably

in understanding AI concepts, developing AI-assisted learning media, conducting digital assessments, and integrating AI tools into classroom instruction. Some teachers also articulated concerns about ethical issues and the appropriate use of AI technologies in education. Despite these challenges, participants showed strong motivation and enthusiasm throughout the training activities. The diversity of participants' backgrounds plus digital literacy levels provided important context for evaluating the AI training program's effectiveness in comprehensively improving teachers' digital competencies.

C. *Presentation of Quantitative Results*

The quantitative evaluation was conducted to measure the effectiveness of the Artificial Intelligence (AI) training program in improving teachers' digital competencies at MAN 1 Banjarmasin Senior High School. The evaluation employed a one-group pretest-posttest design involving 17 teacher participants. The assessment focused on four major competency indicators, namely AI literacy, digital correspondence, AI-based assessment, and learning media development. Data were collected using digital competency questionnaires administered before and after the training program's implementation. The quantitative analysis aimed to identify changes in participants' competencies following participation in workshops, hands-on practice, and mentoring activities. Similar quantitative evaluation approaches have been widely applied within educational technology training studies to determine the effectiveness of professional development programs objectively ([Instefjord & Munthe, 2017](#)).

Table 1. Pretest and Posttest Results of Teachers' Digital Competencies

Competency Indicator	Pretest	Posttest	Improvement
AI Literacy	60.2	84.1	23.9
Digital Communication	63.5	85.7	22.2
AI-Based Assessment	58.9	82.6	23.7
Learning Media Development	61.8	86.4	24.6
Overall Mean	61.1	84.7	23.6

The results presented in Table 1 indicate noticeable improvement in teachers' digital competencies after participation in the AI training program. The overall mean score increased from 61.1 on the pretest to 84.7 on the posttest, demonstrating a positive change in participants' comprehension and practical application of AI technologies in instructional settings. The greatest improvement was identified in the learning media development indicator, with an increase of 24.6 points, suggesting that participants acquired substantial practical skills in utilising AI tools to create instructional materials and digital learning resources.

Furthermore, the improvement in AI literacy and AI-based assessment competencies indicates that the training activities effectively improved teachers'

ability to understand AI concepts and to apply AI-assisted technologies in classroom evaluation. The workshop model, emphasising demonstrations, guided practice, and joint activities, may have contributed favourably to participants' competency development. These outcomes are consistent with previous studies reporting that structured AI-based professional development programs successfully improve teachers' digital readiness and instructional innovation (Lucas et al., 2024). In addition, the results support the TPACK and DigCompEdu frameworks, which emphasise the crucial role of integrating technological knowledge and pedagogical competencies within instructional practices (Redecker, 2017; Valtonen et al., 2017; Demeshkant et al., 2024).

The quantitative findings also demonstrated that participants became more confident in integrating AI technologies into classroom learning activities after the training program. During mentoring and reflection sessions, most teachers expressed positive perceptions regarding the usefulness of AI tools for instructional media creation, lesson planning, and technology-based assessment. The active involvement of participants during practical sessions and joint discussions further strengthened the effectiveness of the community service implementation. Therefore, the data show that AI training programs may become an effective strategy for supporting digital transformation and improving teachers' professional competencies in secondary education environments.

D. N-Gain analysis

The N-Gain analysis was conducted to determine the effectiveness level of the Artificial Intelligence (AI) training program in improving teachers' digital competencies at MAN 1 Banjarmasin Senior High School. The normalised gain score (N-Gain) is widely employed in educational intervention studies to objectively measure the magnitude of learning improvement between pretest and posttest scores. The N-Gain calculation compares the actual improvement achieved by participants with the maximum possible improvement achievable after the intervention. This analysis presents a clearer interpretation of the effectiveness of training activities beyond descriptive comparisons of mean scores (Hake, 1999).

The interpretation criteria used in this study were categorised as follows: N-Gain scores greater than 0.70 were classified as high, between 0.30 and 0.70 as moderate, and below 0.30 as low. The analysis was applied to each digital competency indicator to comprehensively assess the effectiveness of the AI training program.

Table 2. N-Gain Analysis of Teachers' Digital Competencies

Competency Indicator	Pretest	Posttest	N-Gain	Interpretation
AI Literacy	60.2	84.1	0.60	Moderate improvement
Digital Communication	63.5	85.7	0.61	Moderate improvement
AI-Based Assessment	58.9	82.6	0.58	Moderate improvement
Learning Media Development	61.8	86.4	0.64	Moderate improvement

Overall Mean	61.1	84.7	0.61	Moderate improvement
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The results presented in Table 2 indicate that the AI training program was moderately effective in improving teachers' digital competencies. The overall N-Gain score of 0.61 indicates moderate improvement in participants' digital competencies following the workshops and mentoring activities. Among the competency indicators, learning media development obtained the highest N-Gain score (0.64), suggesting that teachers showed substantial improvement in utilising AI technologies to design instructional materials and digital learning resources.

The moderate improvement across all competency indicators indicates that the training program effectively improved participants' comprehension and practical use of AI technologies in instructional settings. The participatory workshop model, which combined demonstrations, guided practice, and joint discussions, likely contributed to the positive learning outcomes observed during the implementation. This evidence supports previous studies emphasising that structured technology training programmes may effectively improve teachers' digital competence and confidence in integrating technology (Lucas et al., 2024). Furthermore, the results align with the DigCompEdu framework, which highlights the importance of continuous professional development in strengthening teachers' digital instructional capabilities (Redecker, 2017).

In addition, the N-Gain findings show that teachers were able to adapt relatively well to emerging AI technologies despite their varying levels of initial computer literacy. The mentoring activities and hands-on practice sessions played an important role in supporting participants during implementation, particularly for teachers with limited prior experience with AI-based educational tools. Therefore, the results suggest that AI training programs integrated with practical assistance and joint learning activities can become an effective strategy for supporting digital transformation and professional competency development in secondary education environments.

E. Participant response analysis

The participant response analysis indicated that the Artificial Intelligence (AI) training program received positive feedback from teachers at MAN 1 Banjarmasin Senior High School. Based on the post-training response questionnaire, most participants showed satisfaction with the instructional materials, workshop activities, and mentoring sessions conducted during the community service program. Approximately 88.2% of participants stated that the training improved their understanding of AI concepts and increased their confidence in utilizing AI-based educational tools for classroom instruction. In addition, participants considered the hands-on practice sessions and joint discussions highly beneficial, as they provided direct experience in developing instructional media, creating teaching materials, and conducting digital assessments using AI technologies.

Furthermore, the participants showed positive attitudes toward the future implementation of AI technologies in academic practices. Most teachers reported that the training activities helped them recognize the concrete advantages of AI for

improving learning effectiveness, instructional creativity, and electronic communication. Several participants also highlighted that the mentoring stage was particularly useful in conquering technical difficulties and strengthening their readiness to independently integrate AI tools into teaching activities. These outcomes indicate that the combination of workshops, guided practice, and mentoring created an engaging and helpful learning environment for participants. Therefore, the positive participant responses suggest that AI-based professional development programs can considerably strengthen teachers' motivation, confidence, and digital competencies in secondary education contexts.



Figure 2. Documentation of activities during Artificial Intelligence Training

F. Discussion with theory and previous studies

The findings of this community service program indicate that Artificial Intelligence (AI) training effectively improved teachers' digital competencies at MAN 1 Banjarmasin Senior High School. The increase in posttest scores and the moderate N-Gain category indicate that the workshops, guided practice sessions, and mentoring activities may have positively contributed to participants' comprehension and practical use of AI technologies in educational contexts. The participatory training model enabled teachers to directly apply AI tools for instructional media development, lesson planning, electronic communication, and technology-based assessment. These results indicate that practical and joint professional development activities may support teachers' readiness to adapt to digital transformation in education.

From a theoretical perspective, the results support the Technological Pedagogical Content Knowledge (TPACK) framework, which emphasises the combination of technological, pedagogical, and content knowledge in instructional practices (Valtonen et al., 2017). The improvement in teachers' competencies reflects their growing ability to effectively integrate AI technologies into classroom learning activities. In addition, the findings correspond with the DigCompEdu framework,

which stresses the importance of digital resources, communication, assessment, and continuous vocational development in strengthening educators' digital competencies (Redecker, 2017). The training activities provided opportunities for teachers to develop both technical and pedagogical understanding of AI integration in education.

The findings are also consistent with previous studies reporting that AI-based professional development positively influences teachers' confidence and instructional innovation. Lucas et al. (2024) found that teachers with stronger digital competencies tend to show more positive attitudes toward AI integration in instructional environments. Similarly, Sathya and Alamelu (2026) reported that structured AI-focused training programs significantly improve teachers' digital readiness through collaborative and practice-oriented learning models. Furthermore, Instefjord and Munthe (2017) emphasised that practical training experiences and institutional support are important factors influencing teachers' willingness to adopt educational technologies. The positive participant responses observed during this program reinforce these previous findings.

Although the program achieved positive outcomes, the moderate N-Gain results show that continuous mentoring and long-term professional development are still needed to maximise AI integration in instructional practices. Some participants initially experienced difficulties with prompt engineering, ethical AI use, and adapting AI-produced materials to curriculum objectives. Therefore, sustainable AI literacy programs, school support systems, and joint professional learning communities are fundamental for supporting teachers' long-term digital competency development. Overall, this community service program demonstrates that structured AI training can become an effective strategy for strengthening teachers' professional competencies and promoting digital innovation in secondary education.

G. Practical implications

The findings of this community service program have multiple practical consequences for schools, teachers, and other educational stakeholders in supporting digital transformation through the integration of AI (Artificial Intelligence). First, the positive improvement in teachers' digital competencies suggests that structured AI training programs may be an effective strategy for strengthening teachers' readiness to utilise emerging technologies in instructional practice. Schools may employ similar workshop-based and mentoring-oriented training models to improve teachers' competencies in AI literacy, digital messaging, instructional media development, and technology-based assessment. The combination of theoretical explanations and hands-on practice activities was beneficial in helping teachers apply AI tools in educational contexts.

Second, the results suggest that sustainable professional development programs are necessary to guarantee long-term improvements in teacher competency. Although the training produced moderate-to-high competency gains, several participants still experienced challenges with prompt engineering, ethical AI use, and curriculum integration. Therefore, schools and educational organisations should provide continuous mentoring, follow-up workshops, and joint professional learning

communities to support teachers' adaptation to quickly evolving AI technologies. Institutional support, including digital infrastructure, internet access, and technology policies, is also essential for maximising the implementation of AI-assisted learning practices in schools.

Third, the community service program demonstrates that AI technologies can support instructional innovation and improve teachers' efficiency in preparing learning materials, classroom assessments, and electronic communication. Teachers can utilise AI applications to develop interactive learning resources, generate instructional content, provide automated feedback, and support personalised learning activities. Consequently, AI integration can improve learning effectiveness, learner engagement, and classroom management when deployed responsibly and pedagogically. These outcomes may encourage schools to incorporate AI literacy into teacher professional development agendas and educational technology planning.

Finally, the implementation model used in this community service program can serve as a practical reference for future educational service activities focused on developing digital competency. The structured stages, consisting of needs analysis, workshops, guided practice, mentoring, and quantitative evaluation, enabled the program to address teachers' actual instructional challenges proficiently. Therefore, future community service programs are recommended to expand participant involvement, integrate cross-disciplinary collaboration, and develop advanced AI training modules to strengthen sustainable digital innovation in secondary education environments.

Conclusion

The community service program entitled "Enhancing Teachers' Digital Competencies through Artificial Intelligence Training: Evidence from a Quantitative Community Service Program" successfully improved the digital competencies of teachers at MAN 1 Banjarmasin Senior High School. The quantitative findings demonstrated clear improvements in teachers' competencies in AI literacy, electronic communication, AI-based assessment, and instructional media development following participation in the training activities. The increase in posttest scores and the moderate N-Gain category indicate that the workshop-based and mentoring-oriented implementation model appeared to support teachers' comprehension and practical application of Artificial Intelligence technologies in educational contexts.

The results also revealed positive participant responses toward the usefulness of AI technologies for improving instructional effectiveness, creativity, and classroom management. The combination of workshops, guided practice sessions, collaborative learning activities, and mentoring contributed substantially to participants' confidence and preparedness to adopt AI-assisted instructional practices. The results underscore the importance of continuous professional development programs in strengthening teachers' digital competencies and adapting to ongoing technological transformation in education.

Although the program achieved positive outcomes, several participants still required more assistance with prompt engineering, ethical AI use, and curriculum

integration. Therefore, sustainable mentoring programs, institutional support, and continuous development of AI literacy are necessary to maximise the long-term implementation of AI technologies in schools. Overall, this community service program demonstrates that structured AI training can become an effective strategy for supporting digital innovation and strengthening teachers' professional competencies in secondary education environments.

Recommendation

Based on the findings of this community service program, schools and educational institutions are recommended to implement ongoing Artificial Intelligence (AI)-based professional development programs to sustainably strengthen teachers' digital competencies. Although the training activities improved participants' competencies in AI literacy, electronic communication, instructional media development, and technology-based assessment, several teachers still required additional guidance in areas such as prompt engineering, ethical use of AI, and curriculum integration. Therefore, follow-up mentoring activities, periodic workshops, and joint professional learning communities are necessary to support teachers in adapting to the rapid development of AI technologies in instructional settings.

In addition, schools should provide adequate digital infrastructure, internet accessibility, and institutional policy support to maximise the implementation of AI-assisted learning practices. Educational stakeholders are also encouraged to integrate AI literacy into teacher competency development programs and school digital transformation agendas. Future community service programs are recommended to involve broader participant groups, longer implementation periods, and advanced AI training materials to strengthen the sustainability and effectiveness of digital competency development in secondary education environments.

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