



# Bridging the Digital Divide: Empowering Teachers with AI Tools in Rural Indonesian Schools

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## ABSTRACT

The integration of artificial intelligence (AI) in education has the potential to revolutionize teaching and learning, particularly in under-resourced areas. This community service project aimed to empower 20 primary school teachers in Kecamatan Yosowilangun, Lumajang, with the skills and knowledge to integrate AI tools into their instructional practices. Over a six-month period, the project provided a series of workshops, hands-on training, and ongoing support to enhance teachers' digital literacy and confidence in using AI. The results demonstrated significant improvements in both teacher competency and student engagement. Post-training surveys revealed that teachers' confidence in using AI tools for classroom management, lesson planning, and grading increased from an average of 2.1 (pre-training) to 4.3 (post-training) on a five-point Likert scale. In-class observations indicated that AI-powered platforms such as Google AI and Scratch enhanced student motivation and personalized learning, leading to a 20% improvement in test scores. However, the project also identified challenges, including limited technological infrastructure, teacher resistance, and disparities in student access to devices. These findings underscore the need for continued professional development, investment in technology infrastructure, and policy support to ensure the sustainability of AI integration in education. This study contributes to the growing body of research on AI in education by providing insights into the practical implementation of AI tools in rural schools. The success of this project highlights the transformative potential of AI for improving educational equity and empowering teachers in under-resourced settings.

**Keywords:** Artificial Intelligence, Primary Education, Teacher Empowerment, Personalized Learning; Rural Schools

## INTRODUCTION

In the rapidly evolving landscape of education, the integration of technology is no longer an option but a necessity. With the rise of artificial intelligence (AI), education systems around the world are undergoing significant transformation. AI has been proven to enhance personalized learning, automate administrative tasks, and improve student engagement (He et al., 2021). In Indonesia, where educational inequality persists, leveraging AI could provide the tools needed to address these challenges. This project focuses on empowering primary school teachers in Kecamatan

Yosowilangun, Lumajang, to effectively integrate AI into their teaching practices.

The rapid development of AI technologies has opened up new possibilities for educational innovation, particularly in under-resourced areas. AI tools can help create personalized learning paths for students, enabling teachers to tailor instruction based on individual needs (Baker et al., 2020). However, a significant gap exists in teacher training regarding the use of such tools, particularly in rural areas like Kecamatan

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Yosowilangun. Many teachers in these regions are unfamiliar with AI technologies and their application in the classroom (Rachmawati et al., 2022). This gap hampers the ability of educators to harness AI's potential in improving educational outcomes.

The integration of AI in educational settings can help teachers address a range of instructional challenges. For instance, AI can assist in automating grading, providing real-time feedback to students, and generating data-driven insights that support teachers in adapting their instructional strategies (Luckin et al., 2020). Furthermore, AI-powered tools can enable teachers to focus more on higher-order thinking skills and less on routine tasks, thus improving the overall learning experience (Kulik et al., 2021). Given these advantages, it is crucial to equip teachers with the skills and knowledge required to use AI tools effectively.

In Indonesia, the Ministry of Education and Culture has recognized the importance of digital literacy and is actively promoting the use of technology in schools (Purnamasari & Kusnadi, 2021). However, the implementation of AI in classrooms is still in its infancy, particularly in rural areas where access to resources is limited. There is a clear need for targeted interventions that empower teachers to utilize AI effectively in their teaching practice. This project addresses that need by focusing on primary school teachers in Kecamatan Yosowilangun, where educational disparities are exacerbated by limited access to technology and teacher training programs.

The primary objective of this community service project is to empower teachers in Kecamatan Yosowilangun with the skills and knowledge necessary to integrate AI into their teaching practices. Specifically, this project aims to:

1. Enhance teachers' understanding of AI technologies and their applications in education.
2. Provide hands-on training for teachers to use AI tools for personalized learning and classroom management.
3. Support teachers in developing strategies for integrating AI into their daily instructional practices.
4. Evaluate the impact of AI on student engagement and learning outcomes.

This project targets 20 teachers from various primary schools in Kecamatan Yosowilangun. These teachers will undergo a series of workshops and training sessions designed to introduce them to AI tools and their educational applications. The workshops will focus on practical, hands-on learning, ensuring that teachers can immediately apply their new skills in the classroom.

### **The Importance of Teacher Empowerment**

Empowering teachers with AI tools is essential for creating a more effective and equitable learning environment. In many rural schools, teachers are often overwhelmed by large class sizes and limited resources, making it difficult to provide individualized instruction to students. AI offers a solution by automating routine tasks, such as grading and attendance, allowing teachers to focus on personalized learning (Greene et al., 2023). Additionally, AI-powered adaptive learning systems can help identify students' learning needs and provide customized support, which is particularly beneficial in diverse classrooms with varying levels of student ability.

Moreover, the introduction of AI in classrooms can enhance teachers' professional development. By learning how to use AI tools, teachers can improve their digital literacy, a critical skill in today's technology-driven world. Teachers who are well-versed in AI can also serve as mentors and leaders within their schools, fostering a culture of innovation and continuous improvement (Zhu et al., 2023).

### **Challenges and Opportunities**

While the potential benefits of AI in education are significant, there are also challenges to its implementation, particularly in rural areas. Limited access to reliable internet, outdated technological infrastructure, and a lack of professional development opportunities for teachers can hinder the successful integration of AI in schools (Farida et al., 2022). Additionally, there may be resistance from teachers who are unfamiliar with AI technologies or who feel overwhelmed by the prospect of learning new tools (Wibowo et al., 2020). To address these challenges, this project incorporates

ongoing support and mentorship for teachers, ensuring that they feel confident and capable of using AI in their classrooms.

In conclusion, the integration of AI in primary education presents a unique opportunity to enhance teaching and learning outcomes, particularly in under-resourced areas like Kecamatan Yosowilangun. By equipping teachers with the skills and knowledge to use AI tools effectively, this project aims to empower educators and improve the quality of education for their students. The success of this project could serve as a model for similar initiatives in other rural areas, contributing to the broader goal of educational equity and innovation in Indonesia.

## **MATERIALS AND METHODS**

### **Research Design**

This community service project was designed as a multi-phase intervention aimed at enhancing teachers' ability to integrate artificial intelligence (AI) into their daily teaching practices. The research adopts a mixed-methods approach, utilizing both qualitative and quantitative data to evaluate the program's effectiveness. The study was carried out over six months and consisted of three primary stages: preparation, implementation, and evaluation.

The preparation phase involved identifying the target schools, selecting participant teachers, and designing the training modules. The implementation phase included hands-on workshops, training sessions, and follow-up support activities. Finally, the evaluation phase consisted of both formative and summative assessments to measure the impact of the program on teachers' knowledge and the practical application of AI in their classrooms.

### **Participants**

The project was conducted with 20 primary school teachers from various schools in Kecamatan Yosowilangun, Lumajang. These participants were selected based on their willingness to engage in professional development activities and their availability during the project timeline. The selection was purposive, aiming to include a mix of teachers with varying levels of digital literacy, as this allowed the research team to better understand the diverse needs of educators in rural settings (Sani et al., 2022).

All participants had a minimum of two years of teaching experience and were currently employed at public schools in the district. The participant group was evenly distributed in terms of gender, with 11 female teachers and 9 male teachers. Importantly, none of the participants had previous formal training in AI or other advanced educational technologies, which underscored the relevance of this project to their professional development.

### **Instruments and Materials**

The training curriculum and instructional materials were designed to be practical, user-friendly, and tailored to the context of primary education in rural Indonesia. The primary materials used during the training sessions included:

1. **AI Tools for Education Module:** This module provided an overview of AI applications in education, focusing on tools that teachers could integrate into their classrooms. The module covered various AI platforms such as machine learning-powered student assessment systems, chatbots for tutoring, and automated grading systems (Sun et al., 2020).
2. **Classroom AI Software:** Specific software such as Google AI Education Tools, Scratch, and IBM Watson Tutor was introduced to teachers. These applications were selected for their accessibility and suitability for primary education, offering features such as adaptive learning pathways and automated feedback systems (Cohen et al., 2021).
3. **Practical AI Integration Guide:** This guide was developed by the research team to assist teachers in applying AI tools in everyday classroom tasks. The guide included step-by-step instructions on how to use AI for lesson planning, grading, and student feedback.

4. **Survey and Evaluation Tools:** Pre- and post-training surveys were administered to gauge teachers' knowledge, attitudes, and confidence levels concerning AI before and after the intervention. Additionally, classroom observations and interviews were conducted to gain qualitative insights into how teachers applied AI tools in practice (Jiang & Wang, 2021).

## **Procedure**

The procedure for this project was divided into three distinct phases:

### **1. Preparation Phase**

During this phase, the project team conducted a needs analysis to identify the specific challenges teachers faced in integrating AI into their teaching practices. This involved a series of focus group discussions (FGDs) with both teachers and school administrators. The FGDs highlighted a significant gap in teachers' understanding of digital technologies and their application in education (Nugraha et al., 2023). Based on this feedback, the project team designed the training modules to focus on the most relevant AI applications, ensuring that the content was aligned with the teachers' practical needs.

In addition to designing the training materials, this phase also included the development of assessment tools. These tools were essential for evaluating the program's impact on teachers' skills and knowledge. Baseline data on teachers' digital literacy levels and familiarity with AI tools were collected through an initial survey.

### **2. Implementation Phase**

The implementation phase comprised a series of workshops and training sessions delivered over a period of three months. The workshops were conducted in both online and face-to-face formats, allowing teachers to practice using AI tools in a supportive learning environment.

The training sessions were divided into three key modules:

- a **Introduction to AI in Education:** This module provided participants with a foundational understanding of AI and its potential applications in primary education. Theoretical concepts were explained through practical examples, ensuring that teachers could immediately see the relevance of AI to their classroom practice (Teguh et al., 2021).
- b **Hands-On AI Tools Workshop:** In this workshop, teachers were introduced to AI platforms such as Google AI and Scratch. They practiced using these tools to create lesson plans, grade student assignments, and provide personalized feedback. Teachers were also shown how to use AI to monitor student progress and identify areas where students needed additional support (Wang & Ng, 2022).
- c **AI Integration in Lesson Planning:** This final module focused on helping teachers integrate AI tools into their daily teaching routines. Teachers collaborated in small groups to design lesson plans that incorporated AI-driven tools, such as adaptive learning platforms and automated feedback systems. The collaborative nature of this module allowed teachers to share ideas and strategies for overcoming challenges in AI integration (Yulianti et al., 2022).

Throughout the implementation phase, teachers were encouraged to experiment with AI in their classrooms. Ongoing support was provided by the project team through a combination of mentoring sessions, online tutorials, and classroom visits.

### **3. Evaluation Phase**

The final phase of the project involved a comprehensive evaluation of the program's impact on teachers' competencies and classroom practices. A post-training survey was administered to measure changes in teachers' confidence and ability to use AI tools. In addition, the research team conducted follow-up interviews and classroom observations to assess how teachers were applying the skills they had learned in the workshops (Rahmawati & Setiawan, 2023).

The data collected from these assessments provided valuable insights into the effectiveness of the training program. Quantitative analysis of the survey results indicated a significant improvement in teachers' knowledge and confidence in using AI tools. Qualitative data from interviews and

observations revealed that many teachers had successfully integrated AI into their teaching practices, with some reporting improved student engagement and learning outcomes as a result.

### **Ethical Considerations**

The project adhered to ethical guidelines regarding informed consent, confidentiality, and the voluntary nature of participation. All participants were informed about the purpose of the project, their roles, and their right to withdraw at any time without any negative consequences. Data collected from surveys, interviews, and classroom observations were anonymized to protect participants' identities. Additionally, the project ensured that all AI tools introduced to teachers complied with data privacy regulations to protect student information (Hidayat et al., 2021).

## **RESULTS AND DISCUSSION**

### **Result**

The community service project yielded significant outcomes in both teacher competency and classroom application of AI tools. The results of this study are divided into three main categories: (1) teacher engagement and learning outcomes, (2) the integration of AI in classroom practices, and (3) challenges and limitations experienced during the program. Data from pre- and post-training surveys, classroom observations, and follow-up interviews were triangulated to provide a comprehensive understanding of the program's impact.

#### **1. Teacher Engagement and Learning Outcomes**

The project's primary objective was to enhance teachers' knowledge and skills in using AI tools in education. Based on pre- and post-surveys, significant improvements were observed in several key areas of teacher competency. Before the training, the majority of teachers expressed limited familiarity with AI concepts and tools. Only 15% of participants reported having any prior experience with AI-driven educational technologies. This initial lack of exposure was evident in teachers' responses during focus group discussions, where they voiced concerns about the complexity of integrating AI into traditional classroom settings (Santoso et al., 2021).

However, by the end of the training sessions, over 85% of participants reported feeling confident in their ability to use AI tools for basic educational tasks, such as grading, lesson planning, and providing student feedback. Post-training surveys indicated a substantial increase in teachers' digital literacy, with many participants expressing enthusiasm for continued professional development in this area (Sukmawati & Alamsyah, 2022). On a five-point Likert scale, teachers' confidence levels in using AI tools improved from an average of 2.1 (pre-training) to 4.3 (post-training), representing a significant positive shift.

In addition to quantitative measures, qualitative feedback gathered from interviews highlighted the transformative effect of the training on teachers' perceptions of technology in education. Many participants expressed that they had previously viewed AI as inaccessible or irrelevant to primary education but now recognized its potential to improve teaching and learning outcomes. Teachers also noted the practical value of the hands-on workshops, which provided them with concrete skills they could immediately apply in their classrooms.

One participant shared: "Before this program, I had no idea how AI could fit into my classroom. Now, I feel confident using AI tools to grade assignments and even to help students who are struggling. It has made my job easier and more effective" (Teacher 3, personal communication, 2023)

#### **2. AI Integration in Classroom Practices**

The practical implementation of AI tools in the classroom was a core focus of the project. Teachers were encouraged to experiment with various AI-driven platforms and to integrate them into their lesson plans. The most commonly adopted AI tools included Google AI for Education, Scratch (an introductory programming platform), and IBM Watson Tutor. Each of these tools offered unique

features that were tailored to the needs of primary education, from automating grading to providing personalized learning pathways for students (Kurniawati & Sari, 2023).

### **Lesson Planning and Delivery**

By the end of the project, approximately 75% of teachers had successfully incorporated AI tools into their lesson planning and delivery. One of the most notable changes was the use of AI to create adaptive learning environments. Teachers utilized AI-powered platforms to monitor student progress in real-time, allowing them to differentiate instruction based on individual student needs. This personalized approach was particularly beneficial in large, mixed-ability classrooms, where it had previously been challenging for teachers to provide tailored support to every student.

For example, a teacher using IBM Watson Tutor was able to create customized quizzes for students based on their performance in previous assessments. The AI system automatically generated questions that targeted each student's specific areas of weakness, enabling the teacher to focus on facilitating deeper understanding rather than manually grading or curating tasks (Rini & Alifah, 2022).

### **Student Engagement and Learning Outcomes**

Observations of classroom dynamics indicated that students were highly engaged with the AI tools introduced by their teachers. Many students responded positively to the interactive and individualized nature of AI-powered lessons, expressing increased motivation and interest in their learning tasks. This observation was supported by feedback from teachers, who noted that students were more attentive and participated more actively in AI-assisted lessons than in traditional teaching sessions (Rahman et al., 2022).

Quantitative data collected from student performance assessments showed an average improvement of 20% in test scores after the introduction of AI tools, particularly in subjects such as mathematics and science, where AI-driven platforms like Scratch were used to explain abstract concepts through visualizations and simulations. The adaptive learning algorithms also helped to identify students who were struggling, allowing teachers to intervene early with additional support.

### **AI for Administrative Efficiency**

Another significant benefit reported by teachers was the use of AI to streamline administrative tasks, such as grading and attendance tracking. Google AI for Education, for instance, was used to automate the grading of multiple-choice quizzes, saving teachers considerable time. This freed up valuable classroom time for teachers to engage in more meaningful instructional activities rather than routine administrative work (Ariani & Sari, 2021). Several teachers remarked that AI tools allowed them to allocate more time to working with students one-on-one, particularly those who required additional assistance.

## **3. Challenges and Limitations**

While the overall results of the project were highly positive, several challenges and limitations emerged during the implementation phase. The first significant challenge related to the technological infrastructure in rural schools. Although the project provided access to basic AI tools and platforms, limited access to high-speed internet and up-to-date computer hardware in some schools hindered full implementation. Teachers in more remote areas reported difficulties accessing cloud-based AI tools, which required stable internet connections to function effectively (Halim et al., 2023).

### **Teacher Resistance to Change**

Another challenge encountered was resistance from a small number of teachers who were apprehensive about the use of AI in education. Despite the hands-on workshops and ongoing support, some participants remained skeptical about the practicality of using AI in their classrooms. These teachers cited concerns about the reliability of AI tools, fearing that over-reliance on technology could lead to a loss of personal interaction between teacher and student (Hartono & Setyawan, 2023). For

these teachers, ongoing mentorship and professional development will be necessary to gradually build confidence and address their concerns.

### **Time Constraints**

Teachers also faced time constraints when attempting to integrate AI into their already packed teaching schedules. Many participants expressed frustration at the initial time investment required to learn how to use AI tools effectively. While they recognized the long-term benefits of AI for reducing administrative burdens, the short-term learning curve proved challenging. This finding highlights the importance of continued support and perhaps even incentives to encourage teachers to persist through the initial stages of AI adoption (Suryanto & Azizah, 2023).

### **Student Access to Technology**

Finally, it is important to note that while AI tools have the potential to enhance learning, disparities in student access to technology posed a challenge. In classrooms where students lacked access to individual devices, teachers were forced to adapt AI lessons for whole-group instruction, which somewhat diminished the personalized learning benefits that AI is capable of providing. Moving forward, ensuring equitable access to devices and infrastructure will be crucial for maximizing the impact of AI in these educational settings (Widiastuti et al., 2022).

## **4. Long-Term Impact and Sustainability**

The results of the project suggest that AI integration has the potential to transform teaching and learning in primary schools, particularly in rural settings like Kecamatan Yosowilangun. Teachers who participated in the program demonstrated marked improvements in their ability to use AI tools and reported positive outcomes in student engagement and performance. However, for the long-term sustainability of these benefits, several recommendations can be made.

First, ongoing professional development will be critical to ensuring that teachers continue to develop their AI competencies. The dynamic nature of technology requires continuous learning, and without further training opportunities, teachers risk falling behind in their ability to effectively use AI in the classroom (Suharto & Hidayah, 2023). Second, it will be essential to address the infrastructural challenges that were identified during the project, particularly in terms of access to reliable internet and devices for both teachers and students. Finally, fostering a culture of collaboration and peer support among teachers will help ensure that AI adoption is seen not as an additional burden but as a valuable tool for enhancing educational outcomes.

## **Discussion**

### **The Role of AI in Enhancing Education**

The findings from this community service project strongly support the argument that AI can play a transformative role in education, particularly in rural and under-resourced settings like Kecamatan Yosowilangun. The ability of AI to automate routine administrative tasks and provide personalized learning experiences has significant implications for improving teaching efficiency and student outcomes. As previous research has demonstrated, the integration of AI in education can reduce the workload of teachers, allowing them to focus on higher-order tasks such as critical thinking and creative problem-solving (Luckin et al., 2020). This project confirms these benefits, particularly in the context of primary education, where teachers face the dual challenges of large class sizes and limited resources.

The successful adoption of AI tools by the majority of teachers in this project aligns with findings from other studies that have emphasized the value of professional development in fostering digital literacy among educators. Training and ongoing support are crucial in ensuring that teachers not only understand how AI works but also feel confident in integrating it into their pedagogical practices (Greene et al., 2023). This project provided participants with the skills and knowledge to use AI tools

effectively, and their successful implementation in the classroom suggests that targeted interventions can bridge the gap between technological advancements and practical application in education.

### **Empowering Teachers Through Professional Development**

One of the key themes emerging from this project is the importance of teacher empowerment in the successful adoption of AI technologies. Teachers who participated in the training reported significant improvements in their confidence and competency in using AI tools, a finding consistent with the literature on teacher professional development in the digital age (Rachmawati et al., 2022). As AI becomes increasingly integrated into educational systems worldwide, it is essential that teachers are provided with the necessary support and resources to adapt to these changes.

Teacher empowerment is particularly important in rural areas, where educators often lack access to the professional development opportunities available in more urban settings. In this project, teachers expressed gratitude for the opportunity to engage with cutting-edge educational technologies, noting that such opportunities are rare in their professional context. By offering hands-on, practical training, this project addressed the specific needs of these teachers and equipped them with the tools to succeed in a rapidly changing educational landscape.

In addition to improving teachers' technical skills, the project also fostered a sense of community and collaboration among participants. Teachers were encouraged to share their experiences, challenges, and successes with their peers, creating a supportive network that extended beyond the formal training sessions. This finding aligns with previous research suggesting that peer collaboration is a critical component of successful professional development programs (Zhu et al., 2023). By fostering a collaborative learning environment, this project not only improved individual teacher competencies but also contributed to a broader culture of innovation and professional growth within the participating schools.

### **AI and Personalized Learning**

A major finding of this project was the significant improvement in student engagement and learning outcomes following the introduction of AI tools in the classroom. Teachers reported that AI-powered platforms, such as adaptive learning systems and automated feedback tools, allowed them to provide more personalized instruction tailored to the individual needs of their students. This aligns with previous studies that have demonstrated the potential of AI to support personalized learning by analyzing student data and generating customized learning paths (Baker et al., 2020).

The ability to offer personalized learning is particularly valuable in primary education, where students often have diverse learning needs and abilities. In this project, AI tools enabled teachers to monitor student progress in real-time and provide targeted interventions for those who were struggling. For example, the use of IBM Watson Tutor allowed teachers to generate customized quizzes that focused on the areas where students needed the most improvement. This not only enhanced student learning outcomes but also reduced the burden on teachers, who no longer had to manually create and grade individualized assignments.

The positive impact of AI on student engagement was also evident in the classroom observations conducted during this project. Teachers noted that students were more motivated and attentive during AI-assisted lessons, particularly when using interactive platforms like Scratch to explore complex concepts. This finding is consistent with previous research that suggests AI-driven technologies can enhance student motivation by making learning more interactive and engaging (Sun et al., 2020). The ability of AI to offer immediate feedback and adapt to the pace of each student's learning also contributed to increased student satisfaction and improved learning outcomes.

However, it is important to note that the effectiveness of AI in supporting personalized learning depends on several factors, including the availability of appropriate technological infrastructure and the digital literacy of both teachers and students. As this project demonstrated, access to reliable internet and adequate devices is essential for the successful implementation of AI in education. Without these resources, the full potential of AI to support personalized learning may not be realized.

## Challenges of AI Integration in Rural Schools

Despite the overall success of the project, several challenges were encountered during the implementation of AI tools in the participating schools. The most significant barrier was the lack of technological infrastructure in some of the more remote schools. Teachers in these areas reported difficulties accessing cloud-based AI tools, which require stable internet connections to function effectively. This finding highlights a key limitation of AI in education: while the technology itself is highly advanced, its implementation is often constrained by external factors such as infrastructure and resources (Halim et al., 2023).

In addition to infrastructural challenges, some teachers expressed resistance to the use of AI in the classroom. This resistance was primarily due to concerns about the reliability of AI tools and the fear that technology could undermine the traditional teacher-student relationship. These concerns are not unique to this project and have been documented in other studies on AI adoption in education (Hartono & Setyawan, 2023). For some teachers, the introduction of AI represented a significant shift in their teaching practices, and they were hesitant to fully embrace the technology without a clearer understanding of its long-term implications.

Addressing these concerns will require ongoing professional development and support. As with any technological innovation, the successful integration of AI in education depends on teachers' willingness to adapt to new methods and tools. Providing teachers with the time, resources, and mentorship needed to explore AI at their own pace may help alleviate some of the resistance encountered in this project. Moreover, emphasizing the complementary role of AI—rather than positioning it as a replacement for traditional teaching—can help build teachers' confidence in using the technology (Wibowo et al., 2020).

## Sustainability and Long-Term Impact

The long-term success of AI integration in education depends on several factors, including sustained professional development, adequate technological infrastructure, and ongoing support from educational policymakers. This project demonstrated the immediate benefits of AI for both teachers and students, but ensuring the sustainability of these outcomes will require continued investment in teacher training and infrastructure development.

One of the key recommendations emerging from this project is the need for continued professional development opportunities for teachers. As AI technologies continue to evolve, it is essential that teachers remain up-to-date with the latest tools and practices. Without ongoing training, there is a risk that teachers will revert to traditional methods, particularly if they encounter difficulties with the technology (Suharto & Hidayah, 2023). Providing teachers with access to online resources, workshops, and peer networks can help ensure that they continue to develop their digital competencies and remain confident in using AI tools.

Additionally, addressing the infrastructural challenges identified in this project will be critical for the long-term success of AI integration in rural schools. This includes not only improving internet access and providing adequate devices but also ensuring that schools have the technical support needed to maintain and troubleshoot AI systems. Policymakers must prioritize investment in educational technology infrastructure, particularly in under-resourced areas, to ensure that all students have equitable access to the benefits of AI in education.

Finally, fostering a culture of innovation and collaboration among educators will be essential for sustaining the impact of this project. Teachers who participated in the training reported that collaboration with their peers was one of the most valuable aspects of the program. By continuing to support collaborative learning and professional development, schools can create an environment where teachers feel empowered to experiment with new technologies and share their experiences with their colleagues (Yulianti et al., 2022).

## Implications for Future Research

The findings from this project suggest several avenues for future research on the role of AI in education. First, further studies are needed to explore the long-term impact of AI integration on

student learning outcomes, particularly in rural and under-resourced schools. While this project demonstrated significant short-term improvements in student engagement and performance, the sustainability of these outcomes over time remains an open question.

Second, future research should investigate the specific challenges faced by teachers in integrating AI into their pedagogical practices. Understanding the factors that contribute to teacher resistance and identifying effective strategies for overcoming these barriers will be critical for the widespread adoption of AI in education. Finally, studies exploring the impact of AI on different student populations, particularly those with special educational needs, would provide valuable insights into the potential of AI to support inclusive education.

## CONCLUSION

This community service project successfully demonstrated the transformative potential of artificial intelligence (AI) in enhancing primary education, particularly in rural and under-resourced settings such as Kecamatan Yosowilangun. By equipping teachers with the necessary skills and knowledge to integrate AI tools into their classroom practices, the project empowered educators to improve their teaching efficiency and student outcomes. The results revealed significant improvements in both teacher competency and student engagement, with AI tools facilitating personalized learning, automating routine administrative tasks, and enabling more effective classroom management. However, the project also highlighted several challenges to the successful implementation of AI in rural schools, including infrastructural limitations, teacher resistance to change, and disparities in student access to technology. Addressing these challenges will be crucial for ensuring the long-term sustainability of AI integration in education. Continued professional development, investment in technological infrastructure, and ongoing support from policymakers are necessary to maintain the positive impacts observed during this project. The implications of this study extend beyond the immediate context of Kecamatan Yosowilangun, offering valuable insights for educators, policymakers, and researchers interested in the potential of AI to address educational inequities. Future research should focus on the long-term effects of AI on student learning outcomes and explore strategies for overcoming the barriers to AI adoption in under-resourced schools. In conclusion, AI has the potential to revolutionize education by providing teachers with the tools to deliver more personalized, efficient, and engaging instruction. By empowering teachers with the knowledge and skills to utilize AI effectively, this project contributes to the broader goal of educational equity and innovation in Indonesia.

## Conflict of Interests

The authors declared that no potential conflicts of interest with respect to the authorship and publication of this article.

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