EMPOWERING MADRASAH TEACHERS IN MOJOKERTO THROUGH AI-BASED APPLICATIONS: ENHANCING TEACHING COMPETENCE AND CLASSROOM ENGAGEMENT

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ABSTRAK

Program pengabdian masyarakat ini bertujuan untuk meningkatkan Pengetahuan Pedagogis Teknologi (TPK) guru madrasah di Mojokerto melalui integrasi aplikasi Kecerdasan Buatan (AI) dalam pengajaran di kelas. Sebanyak 70 guru berpartisipasi dalam program ini, yang mengikuti model instruksional ASSURE. Penilaian pra-pelatihan mengidentifikasi tantangan seperti keterbatasan paparan terhadap alat AI dan kurangnya kepercayaan diri dalam menerapkan AI dalam pengajaran. Pelatihan ini mencakup lokakarya langsung, pendampingan satu-satu, dan sesi microteaching yang berfokus pada penggunaan alat AI seperti ChatGPT untuk pembuatan konten, Grammarly untuk bantuan penulisan, serta platform berbasis AI seperti Google Classroom. Evaluasi pasca-pelatihan menunjukkan peningkatan signifikan dalam kepercayaan diri dan kompetensi guru dalam menggunakan alat-alat AI untuk meningkatkan keterlibatan kelas dan mempersonalisasi pengalaman belajar. Guru memperoleh keterampilan praktis dan menunjukkan peningkatan kemampuan dalam mengintegrasikan AI ke dalam perencanaan dan pelaksanaan pelajaran. Keberhasilan program ini menyoroti efektivitas pelatihan berbasis praktik langsung dalam mengatasi resistensi awal terhadap integrasi AI. Namun, pengembangan profesional yang berkelanjutan dan dukungan lebih lanjut akan sangat penting untuk memastikan integrasi AI yang berkelanjutan dalam pendidikan madrasah.

Kata Kunci*: Kecerdasan Buatan, integrasi AI, pendidikan madrasah, pelatihan guru*

ABSTRACT

This community service program aimed to enhance the Technological Pedagogical Knowledge (TPK) of madrasah teachers in Mojokerto through the integration of Artificial Intelligence (AI) applications in classroom teaching. Seventy teachers participated in the program, which followed the ASSURE instructional model. Pre-training assessments identified challenges such as limited exposure to AI tools and lack of confidence in applying AI in teaching. The training incorporated hands-on workshops, one-on-one coaching, and microteaching sessions that focused on using AI tools like ChatGPT for content generation, Grammarly for writing assistance, and AI-driven platforms such as Google Classroom. Post-training evaluations revealed a significant increase in the teachers' confidence and competence in using these AI tools to enhance classroom engagement and personalize learning experiences. Teachers gained practical skills and demonstrated improved abilities in integrating AI into lesson planning and delivery. The program's success highlights the effectiveness of hands-on, practice-oriented training in overcoming initial resistance to AI integration. However, continued professional development and support will be essential to ensure the sustainable integration of AI in madrasah education.

Keywords: Artificial Intelligence, AI integration, madrasah education, teacher training

INTRODUCTION

The demand for improving the quality of education through the utilization of Artificial Intelligence (AI) has become increasingly critical in today's rapidly evolving digital landscape. AI technologies, such as adaptive learning platforms, AI-driven assessments, and intelligent content creation tools, have proven effective in enhancing student engagement, providing personalized learning experiences, and supporting teachers in creating more interactive and engaging classroom environments [1]. AI has the potential to significantly transform traditional teaching methods by offering personalized, data-driven insights, allowing for real-time adaptation to student needs, and automating repetitive tasks such as grading and content delivery [7]. However, despite the potential benefits, the widespread use of AI in education remains limited, particularly in regions such as Mojokerto, where madrasah teachers may not have the necessary access or training to implement these tools effectively. According to the Technological Pedagogical Content Knowledge (TPACK) framework, the ability to integrate AI into teaching requires a balanced understanding of technology, pedagogy, and content. Teachers are expected not only to master content and pedagogy but also to possess a solid foundation in AI integration to enhance student learning outcomes [2]. This need is particularly critical for madrasah teachers, who must combine Islamic education with modern teaching methodologies.

Despite the recognized benefits of AI, many madrasah teachers in Mojokerto and other regions face significant challenges in adopting AI-based teaching strategies. Research has indicated that a lack of understanding about AI applications for educational settings, combined with insufficient training, presents a major barrier to the successful integration of AI in classrooms [3], [4]. While AI offers the potential to optimize learning and improve teacher efficiency, many educators remain hesitant due to a lack of familiarity with the tools, limited professional development opportunities, and concerns regarding ethical issues such as data privacy and algorithmic bias [9]. The effective use of AI in education heavily depends on teachers' confidence and their ability to perceive AI tools as meaningful and valuable for teaching and learning. Unfortunately, many teachers lack the confidence to apply AI technologies in practical classroom settings, which limits the transformative potential of AI in enhancing educational experiences [5].

Previous research highlights the role of AI in improving teaching practices, especially in personalized learning and real-time feedback mechanisms [7], [9]. Moreover, AI has proven to foster interactive and emotionally rich teaching environments, which can help in maintaining

student interest and participation [11]. However, challenges persist, such as the need for continuous teacher training programs that address the integration of AI into everyday classroom practices [12], [13]. To address these challenges, it is essential to design training programs specifically tailored to the needs of madrasah teachers. These programs should focus on enhancing teachers' Technological Pedagogical Knowledge (TPK) in the context of AI, enabling them to understand the potential of AI in education, develop skills in using AI-based applications, and improve their ability to plan and implement AI-driven lessons. As proposed by the Self-Determination Theory, intrinsic motivation is critical in fostering a positive attitude toward adopting new educational approaches, such as AI integration. Teachers need to feel competent, autonomous, and connected to the process for AI adoption to be successful [6].

Providing madrasah teachers with appropriate training and support can nurture this motivation, leading to more confident and effective use of AI technologies in the classroom. This community service program has two main objectives. First, it aims to provide an educational platform for madrasah teachers in Mojokerto to learn about AI-based tools and applications, thereby strengthening their TPK. Second, the program seeks to enhance teachers' confidence in using a wide range of AI technologies in their teaching practices, which could lead to improved teaching quality and better learning outcomes for students. Additionally, the program fosters a collaborative relationship between the university and local madrasah communities, promoting sustained cooperation for future educational improvements.

The theoretical foundation of this program is grounded in key concepts such as the TPACK framework, which emphasizes the importance of integrating technological, pedagogical, and content knowledge to create effective learning environments [2]. Understanding the interplay between these domains is essential for educators to implement AI technologies effectively in their classrooms. Furthermore, the model of teacher technology adoption highlights the need to address both extrinsic factors (such as access to resources) and intrinsic factors (such as teacher beliefs and attitudes) to overcome barriers to AI integration [5]. Teachers need to cultivate positive beliefs about the value of AI in education, supported by adequate training and resources to build their confidence and competence. Additionally, Self-Determination Theory (SDT) underscores the importance of meeting teachers' needs for competence, autonomy, and relatedness to enhance their motivation for adopting and integrating AI into their teaching practices [6].

The implementation of this training program aims to address the identified challenges by equipping madrasah teachers with the necessary knowledge and skills to effectively integrate

AI into their teaching practices. Focusing on both technical and motivational aspects, the program will contribute to the overall improvement of educational quality in Mojokerto's madrasah system, ultimately benefiting both teachers and students.

METHOD

This community service program involved *madrasah* teachers in Mojokerto as the main subjects. The program was conducted at *Madrasah Aliyah Negeri* Kota Mojokerto, with the goal of enhancing teachers' abilities to integrate AI-based applications into their teaching practices using the Technological Pedagogical Knowledge (TPK) framework. Seventy teachers participated in both the planning and implementation phases of the program, which began with interviews and pre-training questionnaires to identify the key challenges they faced in using AI within their teaching. The active participation of teachers was crucial to ensure the training met their specific needs.

The program followed the ASSURE instructional model, consisting of six stages: Analyze Learners, State Objectives, Select Media and Materials, Utilize Media and Materials, Require Learners' Participation, and Evaluate and Revise. This structured approach ensured that each stage contributed to the improvement of teachers' AI skills. Initially, interviews and questionnaires were used to assess participants' familiarity with AI tools and to pinpoint areas where they felt underprepared. The objectives of the training were then set to enhance the teachers' competence in utilizing AI applications, such as ChatGPT for content generation, Grammarly for writing assistance, and adaptive learning platforms for personalized learning experiences.

The media selected for the training included AI-based tools that were highly relevant to the teaching environment, such as ChatGPT, Grammarly, and AI-driven platforms like Google Classroom with AI capabilities. These tools were chosen to demonstrate how AI can play a practical role in developing engaging and personalized lessons. Workshops, one-on-one coaching, and hands-on practice sessions were provided, allowing teachers to work directly with AI tools, create AI-supported lesson plans, and explore how AI can be used to enhance their teaching. The teachers were required to apply their knowledge during *microteaching* sessions, where they demonstrated how AI could be integrated into classroom activities.

The final stage of the program involved post-training evaluations to assess the effectiveness of the training. Questionnaires were distributed to measure the participants' understanding of AI tools and their confidence in applying these technologies in their lessons.

The program was conducted over two sessions, on April 22 and May 16, 2024. The first session focused on coordination with the *madrasah* and distributing pre-training questionnaires to evaluate teachers' initial knowledge of AI. The second session consisted of workshops, coaching, *microteaching*, and post-training evaluations, all designed to strengthen the teachers' ability to integrate AI into their teaching practices, improving the overall quality of learning in *madrasah* settings.

FINDINGS

The community service program aimed to enhance the capacity of madrasah teachers in Mojokerto to integrate AI-based applications into their classroom teaching. The program employed the ASSURE instructional model, which ensured that each stage of the training was methodically designed to be practical, relevant, and aligned with the specific needs of the participants. Conducted in two sessions on April 22 and May 16, 2024, the program involved 70 teachers from Madrasah Aliyah Negeri Kota Mojokerto. The core activities of the program included workshops, one-on-one coaching, microteaching, and hands-on tasks, which allowed participants to engage directly with various AI tools, such as ChatGPT for content generation, Grammarly for real-time writing assistance, and AI-driven adaptive learning platforms like Google Classroom with integrated AI capabilities.

The training sessions began with a comprehensive needs assessment, which was conducted through interviews and pre-training questionnaires. The assessment revealed that a significant number of the participants had limited exposure to AI in educational contexts and lacked the confidence to effectively integrate these tools into their teaching practices. Most teachers reported that, prior to the training, they were unfamiliar with how AI tools such as ChatGPT and Grammarly could be leveraged for pedagogical purposes, and many expressed concern about the complexity and applicability of these technologies in real-world classroom settings.

During the workshops, a targeted approach was employed to familiarize the teachers with the practical functionalities of AI tools in enhancing classroom engagement and personalized learning. For instance, ChatGPT was demonstrated as an advanced content generation tool capable of producing interactive learning materials, such as discussion prompts, quiz questions, and real-time answers to student inquiries. The participants were trained on how to use ChatGPT to simulate student interactions, create adaptive teaching materials, and generate classroom discussions that are tailored to the varying comprehension levels of students. This

feature was particularly appreciated for its capacity to assist teachers in real-time classroom scenarios, where the tool could supplement teaching efforts by offering instant explanations or elaborations on complex topics, thus enhancing student understanding.

In addition, Grammarly was introduced as an AI-powered tool for improving students' writing skills. The participants learned to integrate Grammarly into writing-based assignments, allowing it to provide immediate, automated feedback on grammar, punctuation, and style. This capability not only saved time for teachers in reviewing student work but also empowered students to self-correct and learn from their mistakes through real-time suggestions. Teachers were also shown how to use Grammarly to scaffold writing instruction, helping students develop clearer and more coherent written outputs.

The integration of AI-powered adaptive learning platforms, particularly Google Classroom with AI enhancements, was another key component of the training. Teachers were introduced to the platform's ability to automatically assess student performance, provide personalized learning pathways, and offer timely interventions for students who were falling behind. This automation of assessment processes was highly valued by the participants, especially for its potential to reduce the administrative burden on teachers and enable them to focus more on direct instruction and student engagement. The ability to tailor lesson pacing and content based on individual student progress was noted as a transformative feature, allowing for a more differentiated and inclusive approach to teaching.

Table 1. Program Schedule and Activities

Session	Date	Activity
1.	22 April	Coordination, Pre-training Questionnaire
2.	16 May	Workshop, One-on-one Coaching, Microteaching, Post-training Questionnaire

In the hands-on practice sessions, teachers were required to apply the knowledge they had gained from the workshops through microteaching exercises. These sessions provided opportunities for participants to demonstrate how AI tools could be integrated into their classroom instruction. For instance, teachers used ChatGPT to generate real-time answers to student questions during mock classroom discussions, showcasing the tool's capability to support dynamic learning environments. Teachers also employed Grammarly in writing-based lessons, allowing students to receive instant, automated feedback on their writing assignments, which facilitated a more interactive and engaging learning experience. Furthermore, AI-

powered features in Google Classroom were used to automate grading and track student progress, enabling teachers to efficiently manage classroom activities and individualize learning pathways based on student needs.

Figure 1. Meeting with the Principal and *Madrasah* Teachers

Figure 2. Teachers Practicing Using AI-Based Applications

The feedback collected from post-training questionnaires highlighted a significant increase in the teachers' confidence in utilizing AI-based applications in their teaching practices. Participants noted that the training enabled them to develop a deeper understanding of how to select and implement AI tools like ChatGPT, Grammarly, and Google Classroom, which made their lessons more interactive, personalized, and effective. Many teachers expressed enthusiasm for integrating AI into their teaching, citing the ability to create more engaging and differentiated learning experiences as a key benefit.

The practical application of AI tools was identified as the most valuable aspect of the training. Teachers reported that they were particularly impressed with ChatGPT's ability to generate tailored content and offer real-time support during lessons. Additionally, Grammarly's instant feedback system for students was praised for its potential to enhance student writing quality while reducing the time teachers needed to spend on manual grading. Google Classroom's adaptive learning features were also lauded for their capacity to provide real-time insights into student performance, allowing teachers to make timely adjustments to their instructional strategies.

DISCUSSION

The results of the training program demonstrate that a structured, hands-on approach to AI education significantly improved the technological knowledge and confidence of the participating madrasah teachers. Prior to the training, many teachers expressed a lack of familiarity with AI applications, such as ChatGPT, Grammarly, and AI-driven adaptive learning platforms, and were overwhelmed by the idea of integrating these tools into their lessons. These findings align with prior research that highlights common barriers to adopting AI technologies in education, such as limited access to resources and insufficient training [3], [4].

The program effectively addressed these challenges through the application of the ASSURE model, which provided a clear, step-by-step framework for identifying the specific needs of the teachers and tailoring the training accordingly. Workshops focused on practical applications, allowing participants to engage with AI tools in a supportive, low-pressure environment. Teachers were able to practice using AI-based tools like ChatGPT to generate content and simulate real-time classroom interactions, Grammarly for providing immediate writing feedback, and AI-powered platforms like Google Classroom to automate student assessments and personalize learning pathways. This hands-on approach not only helped teachers overcome their initial reluctance but also equipped them with both the technical skills and pedagogical strategies necessary for effective AI integration.

When comparing these results to previous studies, several patterns and contrasts emerge. For example, Zhang et al. [7] emphasized the need for continuous AI-based teacher education programs that not only introduce AI tools but also address inclusivity and digital literacy. This resonates with the Mojokerto training, which provided foundational knowledge but suggested the need for ongoing professional development. Goenka et al. [8], on the other hand, focused

on the role of AI in enhancing virtual learning environments through real-time feedback mechanisms, whereas the Mojokerto program focused more on traditional classroom settings rather than virtual learning. Shukurova and Ma'murov [9] raised ethical concerns, particularly around data privacy and potential job displacement, which were acknowledged in the Mojokerto program but not deeply explored. Wang and Rao [10] highlighted the enhancement of digital capabilities in AI-blended teaching, a concept somewhat mirrored in this program, although the Mojokerto training leaned more towards direct instruction using AI rather than blended learning processes. Hazaymeh et al. [11] discussed AI's potential in EFL instruction, which parallels the enthusiasm shown by the Mojokerto teachers for increasing student engagement using AI, though their study had a more focused emphasis on language learning. Al-Saiari et al. [12] found that specialized training in generative AI can significantly improve teaching methods in higher education, which underscores the value of ongoing support for AI tools in the Mojokerto program.

The training also significantly enhanced the teachers' Technological Pedagogical Knowledge (TPK) in relation to AI, a critical component for effectively integrating AI into teaching. Through a combination of technical training and pedagogical strategies, the program helped teachers understand not only how to use AI tools but also how to incorporate them into their instructional design. The microteaching sessions, where participants practiced using AI tools like ChatGPT for generating interactive learning materials and Grammarly for improving student writing, provided immediate feedback and helped teachers refine their approaches. This aligns with Self-Determination Theory, which emphasizes the importance of competence and autonomy in motivating teachers to adopt new practices [6].

The feedback from participants demonstrated that the program had a positive impact on their teaching practices. Many teachers reported feeling more capable of designing lessons that incorporated AI tools to enhance student engagement. The use of real-time AI-driven quizzes and intelligent learning platforms, such as Google Classroom, allowed teachers to make lessons more interactive and personalized, effectively addressing individual student needs. These findings support previous research that highlights the role of AI-enhanced learning environments in significantly improving student motivation and learning outcomes [1].

Although the training successfully enhanced the teachers' skills and confidence in AI integration, it also highlighted the need for ongoing professional development. Several participants expressed interest in follow-up sessions and continuous support to deepen their understanding of more advanced AI tools and teaching strategies. This finding is consistent

with previous studies, such as Zhang et al. [7], which advocate for sustained AI-based training for teachers to ensure the continuous development of digital skills and pedagogical integration. Expanding this training to other madrasah institutions in the region could further enhance the AI capabilities of teachers and address broader challenges in integrating AI into religious education.

The community service program successfully improved the technological knowledge and confidence of madrasah teachers in Mojokerto, equipping them with the skills needed to integrate AI into their teaching practices. The structured, hands-on approach was particularly effective in building the teachers' competence and motivation to use AI tools, which is critical for creating more engaging and effective learning environments. However, to ensure the long-term success of AI integration in madrasah education, ongoing support and professional development will be essential [5], [6].

CONCLUSION

The community service program successfully enhanced the Technological Pedagogical Knowledge (TPK) of madrasah teachers in Mojokerto through the integration of AI-based applications in their teaching practices. The structured training, utilizing tools like ChatGPT for content creation, Grammarly for writing support, and AI-driven platforms for personalized learning, addressed the teachers' initial unfamiliarity with these technologies. The hands-on experience gained during the program not only increased their confidence but also improved their ability to practically apply AI tools in planning and delivering lessons, making AI integration more tangible in classroom settings.

The outcomes of this program demonstrate its potential to transform education in madrasah settings by fostering AI-enhanced learning environments. The teachers were able to explore and incorporate AI tools into real-world classroom practices, thereby personalizing instruction and increasing student engagement. This progress aligns with the program's objectives of addressing the gap in AI knowledge and boosting teachers' confidence to effectively integrate AI into their teaching. The findings also highlight the need for continuous support and follow-up sessions to deepen teachers' understanding and ability to use more advanced AI applications.

However, to ensure the long-term success of AI integration in madrasah education, sustained professional development and ongoing support are crucial. Continuous training will help teachers stay updated on emerging AI tools and instructional strategies, ensuring that they

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can fully leverage these technologies to improve the quality of education. This program lays a strong foundation, but its impact will be maximized with further development and expansion to other regions, making AI integration a lasting and effective component of teaching and learning in madrasah contexts.

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