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Guidance on the Utilization of Artificial Intelligence (AI) in the Development of Instructional Materials

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ABSTRACT

Using AI in primary education can enhance teachers' efficiency in developing instructional materials aligned with the Merdeka Curriculum, reduce their workload, and improve the quality of learning through contextual and continuous training. This activity was conducted at Madrasah Ibtidaiyah Swasta Darul Ulum Lamongan due to its diverse student population, strong commitment to improving educational quality, and the pressing need to develop technological innovations in the teaching and learning process in the region. The method involved tutorials, hands-on practice, and discussions carried out in three phases: needs assessment, intensive training with mentoring, and evaluation through reflection and feedback. Results indicate that the AI-assisted learning management support program was successfully implemented and received positive responses from participating teachers. The process began with a needs analysis through discussions and surveys, revealing low levels of digital literacy and limited experience among teachers using AI tools. The core training phase was delivered through tutorials and practical sessions using applications like ChatGPT and Merlin AI to help design teaching materials. Interactive discussions encouraged active participation and boosted teachers' confidence. The final evaluation showed that teachers felt significantly supported, became more efficient in performing administrative tasks, and were motivated to integrate AI into their teaching activities sustainably. Conclusion: The integration of artificial intelligence through tutorials, practical sessions, and discussions effectively enhanced teachers' ability to design innovative and efficient instructional materials, while also promoting the integration of technology into the learning process.

Keywords: *Artificial Intelligence, Materials, Learning, teacher.*

A. INTRODUCTION

Technology integration in learning media is closely related to using technology (including AI) in learning (Sabariah et al., 2024). Students' digital literacy skills in using gadgets are closely related to technology in the learning process (Tabrani et al., 2024). Primary education is crucial in shaping children's intellectual foundation and character. Children develop academic, social, and emotional skills during this formative stage, significantly influencing their future. However, traditional teaching methods often hinder student engagement, highlighting the need for innovation in classroom learning management (Tamrin, 2023). Teachers must regularly prepare instructional documents, such as teaching modules, which may negatively impact their mental well-being due to heavy workloads (Saepurrohman & Pitaloka, 2025). Although the

government has provided digital learning resources, studies indicate that these open-access materials do not fully align with the specific characteristics of students (Diana et al., 2024). Therefore, it is essential for teachers to contextually develop instructional tools, one of which involves leveraging Artificial Intelligence (AI) (Diana & Kusuma, 2025).

AI can potentially enhance the efficiency and effectiveness of teachers' tasks, ranging from lesson planning to administrative work (Dawis et al., 2022). Research has shown that integrating AI in instructional design can reduce teacher workload (Verawati et al., 2024). Furthermore, using AI creates more effective learning materials (Rahmawati, 2024). As such, training teachers to use AI tools is critically important. AI-based training supports teachers' professional development by providing intelligent applications and tools that enhance skill development. AI facilitates the design of educational software and training paths tailored to individual teachers' needs, preferences, and skill levels, making the training process more effective and personalized (Al-Zyoud, 2020; Fakhar et al., 2024).

The practical application of AI in teaching offers numerous benefits for educators, especially in streamlining lesson preparation. AI can automate administrative tasks such as assessments and feedback, allowing teachers to focus more on direct instruction and student engagement (Vinutha et al., 2022; Ramos et al., 2024). Additionally, AI supports the integration of innovative teaching approaches, such as adaptive learning and personalized instruction, which can potentially enhance both the effectiveness and efficiency of the learning process (Ren et al., 2024; Caijun et al., 2021). However, teachers need to understand the ethical implications of using AI, including awareness of potential ethical violations and the importance of responsible implementation in the classroom (Çoban & Durnali, 2025; Alam & Mohanty, 2023).

To make AI training more impactful, programs should be designed to enhance teachers' motivation by providing hands-on experiences with current technologies (Aljemely, 2024). On the other hand, while technology offers numerous advantages, human interaction remains an irreplaceable component of education. Therefore, AI should enrich the learning experience rather than replace the role of the teacher entirely (Pérez, 2024). For effective AI integration, a clear framework is needed within teacher education, including a thorough mapping of challenges and opportunities (El Din, 2025). Furthermore, teachers must continuously update their knowledge through ongoing professional learning (Rajput & Sharma, 2025).

Based on the above rationale, the primary focus of this community service activity is to assist in optimizing learning management by guiding teachers in the development of instructional materials aligned with the *Merdeka Curriculum* using AI. This includes the development of teaching modules, learning materials, and project-based modules that adhere to the *Merdeka Curriculum* framework and prioritize student needs. Through this approach, teachers are expected to enhance their effectiveness and creativity in teaching and be better equipped to address varying student abilities within the classroom. The assistance will encompass initial training and continuous mentoring to produce AI-assisted instructional products.

Similar initiatives have been conducted by Mariyani et al., resulting in positive responses from teachers and improved understanding of AI in developing teaching materials and media (Mariyani et al., 2025). Other programs have focused on training elementary school teachers to use AI tools for reviewing journal articles as supplementary teaching resources (Witarsa et al., 2023).

For several reasons, this activity was conducted at Madrasah Ibtidaiyah Swasta Darul Ulum in Lamongan. First, the school has a diverse student population with varying backgrounds and abilities, making it an ideal setting to support teachers in developing efficient, innovative, and student-centered instructional tools. Second, the school is firmly committed to improving educational quality, supported by highly motivated teachers seeking to create more meaningful learning experiences. Third, its location is in a region that still requires attention in terms of educational innovation, particularly in the use of learning technologies. Therefore, this initiative is expected to improve educational quality and strengthen collaboration among school stakeholders.

B. METHOD

This community service program was conducted using a structured approach involving three primary methods: tutorials, practical application, and discussion. The implementation process was divided into three stages: the initial stage, the core stage, and the closing stage. In the initial stage, a needs assessment was conducted through direct discussions with the school principal and the distribution of an online survey to teachers. This survey, created using Google Forms, aimed to collect preliminary data regarding the teachers' understanding and prior experience with using Artificial Intelligence (AI) in teaching and learning processes. This phase aimed to map existing challenges and determine the most appropriate training strategies based on the teachers' needs. The core stage constituted the main execution of the program. In this stage, the service team delivered tutorial materials using tools such as PowerPoint presentations and demonstration videos. To support the learning process, facilities including an LCD projector, laptops, and stable internet connectivity were provided, enabling participants to access various AI-based applications such as ChatGPT and Merlin AI. Teachers were then guided through hands-on practice using their laptops, with intensive mentoring from the service team, to create teaching modules, assessment items, and other instructional materials utilizing AI technology. At the end of each session, interactive discussions were held to identify challenges, share experiences, and collaboratively formulate solutions to ensure more effective AI implementation in the classroom. The closing stage consisted of an evaluation and joint reflection with the participating teachers to assess their understanding and readiness to apply AI in their teaching practice. Feedback was gathered through oral Q&A sessions and a digital evaluation form to ensure technology integration's sustainability and continuous improvement in the learning process.

C. RESULTS AND DISCUSSION

The mentoring program for optimizing learning management through utilizing Artificial Intelligence (AI) at *MIS Darul Ulum* was successfully implemented and received highly positive responses from the participating teachers. In the initial stage, the primary methods used were discussion and needs identification. Direct discussions enabled the facilitators to recognize the real issues and challenges faced by the school. As Wekke (2022) emphasizes, early-stage discussions are crucial for mapping the problems to be addressed. A discussion with the school principal revealed that *MIS Darul Ulum* had never received specific training on using AI in learning management. The principal only mentioned that the Ministry of Religious Affairs

(KEMENAG) had offered AI-related webinars through the *Si Pintar platform*, though teacher participation levels were unclear. The facilitators distributed an initial needs assessment questionnaire to the teachers via Google Forms.

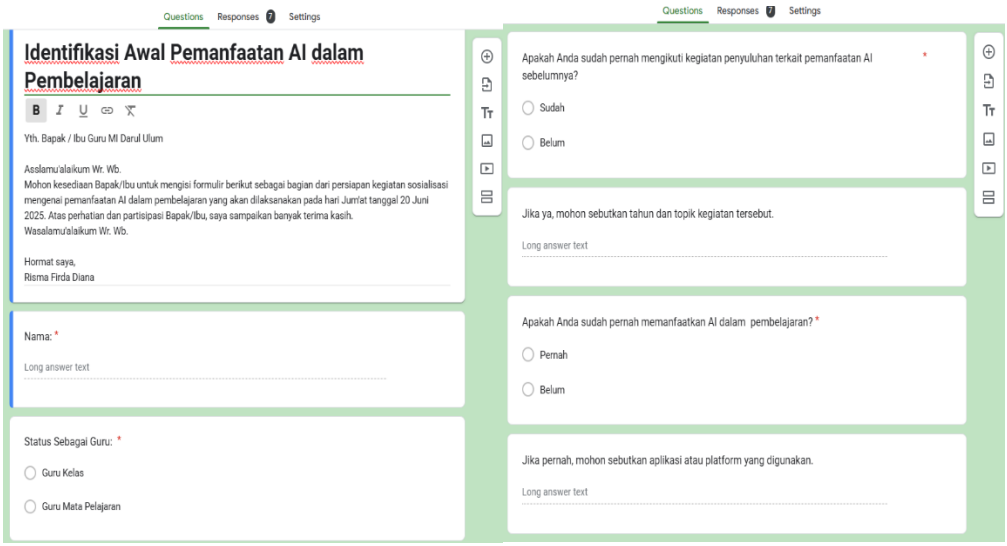

Figure 1. Initial Identification Google Form

Survey results showed that only one teacher had previously attended training and used AI in the classroom, specifically with the ChatGPT application, though its use was still suboptimal. These findings indicate that the teachers' digital literacy was still limited, supporting the need for AI utilization training to improve their digital competence (Sudipa et al., 2025). In the core stage, direct on-site mentoring was conducted as a training session on June 20, 2025. The session began with an AI tutorial, introducing ChatGPT and Merlin AI applications for developing instructional materials. Teachers received comprehensive explanations about AI concepts and practical steps for their use. The facilitators guided the teachers in hands-on practice to develop teaching modules, assessment blueprints, and other instructional tools using AI technology.

During the practice session, the teachers were enthusiastic in experimenting with practical and exploratory prompts to generate outputs that fit their classroom needs. The interactive nature of the practice sessions allowed teachers to explore AI features directly, helping to establish more productive and innovative work habits. Teachers gained conceptual knowledge and could apply it in developing teaching documentation tailored to their specific contexts. This aligns with findings from Syahroni et al. (2020), which highlight the effectiveness of practical training methods in enhancing participants' skills in technology-based training programs. Intensive discussions occurred throughout the training process, with teachers actively asking questions and sharing their experiences regarding challenges during implementation. Such ongoing discussions significantly contributed to a collaborative learning environment and helped build confidence among participants (Wulandari et al., 2024). This fostered collective awareness of the importance of technology adoption in education.

Final evaluations revealed that the teachers at *MIS Darul Ulum* were ready to integrate AI into their lesson planning and daily teaching practices. In the closing stage, a reflection and evaluation session assessed the program's impact and benefits. Teachers acknowledged that AI

had significantly lightened their administrative workload, sped up the preparation of teaching materials, and broadened their understanding of technology integration in education. Feedback from the participants indicated that this mentoring initiative had increased their confidence in using AI for daily school activities. This echoes the findings of Munsarif et al. (2025), who report that technology utilization can enhance teachers' self-confidence in achieving learning objectives.

Figure 2. Documentation of On-Site Mentoring Activities

This mentoring activity demonstrated that collaboration between facilitators and school partners can improve teachers' ability to integrate AI into learning management. The systematic implementation, starting with needs identification, followed by training (tutorials, practice), and concluding with evaluation, proved effective in supporting the mastery of new skills. This is also reinforced by Mulyono et al. (2016), who emphasized the positive impact of structured training methods on participants' competency development. Overall, this community service project confirms that choosing appropriate mentoring methods significantly influences the success of AI-based learning management optimization, structured direct guidance, and active participation from all involved. The activity helped teachers enhance their teaching skills, making them more innovative and confident in the classroom (Hyseni Duraku et al., 2022). Furthermore, integrating AI in teaching can improve professionalism in preparing and implementing instruction (Diantama, 2023).

The application of AI in Learning Management Systems (LMS) has enabled more personalized learning experiences through adaptive algorithms that tailor content to students' needs, preferences, and abilities (Nadimpalli et al., 2023; Raja et al., 2024). Adaptive platforms and intelligent tutoring systems offer real-time feedback that enhances student engagement and performance. Additionally, AI-driven assessment systems accelerate evaluation processes and provide in-depth feedback, helping learners independently identify and correct their mistakes (Mohammed et al., 2025; Bondarenko et al., 2025). However, the integration of AI in LMS also raises privacy concerns, emphasizing the need for robust ethical frameworks to safeguard user data (Babu et al., 2025).

AI also plays a critical role in data-driven decision-making in education. Through learning analytics, teachers and school administrators can gain accurate insights into student progress and the effectiveness of teaching strategies (Zhang, 2024). Predictive analytics helps

identify at-risk students early, allowing timely interventions to improve retention and academic success (Murwaningsih et al., 2024; Hafdi & El Kafhali, 2025). Additionally, AI boosts administrative efficiency by automating routine tasks such as scheduling, resource allocation, and performance tracking (Lopez-Zevallos et al., 2025; Zhao et al., 2024). Nonetheless, the successful implementation of AI requires adequate infrastructure and teacher training to ensure educators possess the necessary technical competencies (Ngubane, 2025). Therefore, investment in capacity-building and technical support is essential.

The implementation of AI in education also faces several ethical and technical challenges. One such issue is the potential for algorithmic bias, which could compromise fairness in educational outcomes. It is thus vital to ensure that AI systems are developed and used based on principles of inclusion and equity (Shtayyat & Gawanmeh, 2025). Another crucial factor is user acceptance. Teachers and students need to experience tangible benefits from AI to support its widespread adoption. User-friendly interfaces and clear benefits communication can enhance acceptance (Krauss et al., 2023). Moving forward, further research is needed to assess the long-term impacts of AI on learning outcomes and educational equity (Alotaibi, 2024). Moreover, a comprehensive ethical framework is necessary to support responsible and sustainable use of AI in education (Xu, 2025; Naseer & Khawaja, 2025).

D. CONCLUSION

The results of the mentoring program on the utilization of Artificial Intelligence at Madrasah Ibtidaiyah Swasta Darul Ulum demonstrated a significant improvement in teachers' knowledge and skills in integrating technology into learning management. Teachers with a limited understanding of AI concepts now grasp the basics. They can practically apply AI in developing instructional devices such as learning modules, assessment blueprints, and other administrative documents. This is evidenced by their ability to design learning materials more efficiently and innovatively using AI-based applications. The teachers were enthusiastic during the practice sessions and gradually became accustomed to crafting precise commands to ensure the AI system outputs met their teaching needs. This activity also fostered new habits in technology utilization that were previously absent. The teachers received theoretical knowledge and could apply it directly and independently.

Beyond technical skill enhancement, mentoring positively influenced teachers' attitudes and confidence. They became more open to using technology and recognized the direct benefits of AI implementation in daily school activities. The ongoing discussions during the program strengthened teacher collaboration and fostered a supportive learning environment. This mentoring encouraged teachers to be more professional in lesson planning and broadened their perspectives on educational technology developments. Teachers felt that AI helped accelerate administrative tasks, improved the quality of learning planning, and made the teaching process more engaging and relevant to contemporary needs**.**

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We express our deepest gratitude for the successful implementation of the Community Service activity in the form of guidance on utilizing Artificial Intelligence (AI) in developing instructional materials at Madrasah Ibtidaiyah Swasta Darul Ulum Lamongan. This activity has had a significant positive impact, particularly in enhancing the quality of learning by introducing relevant technological

innovations that cater to the diverse needs of students. Through this PkM, teachers and educational staff have been increasingly supported in creating more effective, interactive, and engaging instructional materials, facilitating a more optimal teaching and learning process. We hope this activity will continue and provide tangible contributions to the region's education development. We sincerely thank all parties involved for their support and collaboration.

AUTHORS' CONTRIBUTIONS

Author 1 : Designed the AI training module tailored to the needs of the madrasah and led workshop sessions to enhance teachers' abilities in developing innovative technology-based instructional materials.

Author 2 : Developed interactive instructional material examples utilizing AI and guided teachers using AI software to make teaching-learning more engaging and efficient.

Author 3 : Coordinated communication with the madrasah, prepared supporting technological equipment during the training, and assisted teachers in overcoming technical challenges related to AI use in instructional material development.

Author 4 : Provided direct mentoring to teachers in the practical application of AI, identified challenges, and organized discussion sessions to share experiences among training participants.

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