



Utilization Of Artificial Intelligence in Preparing Teaching Modules for Madrasah Teachers

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Abstract:

This study aims to improve madrasah teachers' digital competence in developing teaching modules for the Merdeka Curriculum through the utilization of Artificial Intelligence (AI). This research employed a descriptive qualitative approach with a participatory strategy. Data were collected through participant observation, structured interviews, and documentation during a mentoring program focused on using ChatGPT as an AI-based tool for developing teaching module content. The results showed a significant improvement in teachers' understanding and skills, indicated by an increase in the proportion of teachers categorized as having "very good" knowledge from 0% in the pre-test to 75% in the post-test. The mentoring activity enabled teachers to utilize ChatGPT to develop teaching modules more efficiently, systematically, and in accordance with the principles of the Merdeka Curriculum. Furthermore, the activity enhanced teachers' creativity in designing learning materials, work efficiency, and confidence in integrating technology into teaching practices. The findings imply that practical and contextual AI mentoring can strengthen teachers' digital readiness, improve the quality of instructional materials, and support effective curriculum implementation. However, teachers' professional judgment remains essential in selecting, adapting, and contextualizing AI-generated content based on educational objectives and values.

INTRODUCTION

The rapid development of digital technology has transformed various aspects of human life, including education, which requires learning institutions to adapt to technological changes and emerging societal needs. Artificial Intelligence (AI) has become one of the most influential innovations because it provides opportunities to improve the efficiency, accessibility, and quality of educational services. The integration of AI in education is considered important because it can support teachers in designing learning resources, developing instructional strategies, and responding to diverse student needs. Generative AI technologies, such as ChatGPT, offer practical solutions by assisting educators in producing structured learning materials and supporting more adaptive learning processes (Mundiri et al., 2025; Javaid et al., 2023; Mittal et al., 2024). Therefore, empowering

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teachers with AI literacy becomes an important social effort to ensure that technological advancement contributes positively to improving educational quality (Ali et al., 2024).

The importance of AI integration in education is also closely related to the demand for developing student-centered learning systems in the 21st century. The implementation of the Independent Curriculum in Indonesia emphasizes differentiated learning, contextual approaches, and flexible teaching strategies based on students' characteristics and learning needs (Purwowidodo & Zaini, 2023). However, these demands require teachers to have not only pedagogical competence but also digital competence to utilize technology effectively. Previous studies indicate that AI can support teachers in preparing learning materials, improving productivity, and creating innovative educational practices when accompanied by appropriate guidance and ethical considerations (Sain et al., 2024; Zohaib Hassan, 2025; Kong & Yang, 2024). Thus, improving teachers' ability to utilize AI is not merely a technological issue but also a broader educational necessity to strengthen the quality and equity of learning services in society.

Despite the potential benefits of Artificial Intelligence, many educational institutions, particularly elementary schools and madrasahs, still encounter challenges in implementing AI-based educational practices. The main problems include limited teacher digital literacy, lack of practical training, and insufficient institutional support for technology adoption. Many teachers still perceive AI as a complex technology because they have limited experience interacting with AI-based applications. This condition creates a gap between the rapid development of educational technology and teachers' readiness to utilize it effectively. Research on AI implementation in Islamic education highlights that technological transformation requires systematic assistance because teachers need not only technical skills but also an understanding of how AI can be integrated with educational values and curriculum objectives (Irsyad & Zakir, 2023; Muis et al., 2025; AlJemely, 2024).

In the context of madrasah education, this problem becomes increasingly relevant because teachers are required to develop teaching modules that comply with the Independent Curriculum while considering students' characteristics, local contexts, and Islamic values. However, many teachers still experience difficulties in designing comprehensive teaching modules due to limited understanding of module components, learning objectives, assessment design, and technology integration. Previous studies revealed that teachers continue to face challenges in preparing Independent Curriculum teaching modules because the transition from conventional lesson plans to curriculum-based modules requires new competencies and deeper pedagogical understanding (Amelia, 2023). This phenomenon shows that curriculum reform cannot be separated from teacher empowerment programs that provide practical assistance and sustainable professional development (AlJemely, 2024; Elice et al., 2025).

Several previous studies have discussed the role of AI in improving educational practices, particularly in supporting teaching material development and increasing teacher productivity. Studies have shown that ChatGPT can assist educators in generating learning resources, organizing teaching materials, and accelerating the preparation process of instructional documents (Juni et al., 2025;

Park & Choo, 2024; Lee & Zhai, 2024). However, most previous studies have focused on the general potential of AI adoption in education rather than examining how teachers can be practically guided to use AI for developing contextual teaching modules. In addition, previous discussions have paid limited attention to the implementation of AI in madrasah environments, where learning materials must integrate academic objectives with religious values and local wisdom. Therefore, there is a need for community-based intervention that bridges technological opportunities and teachers' practical needs.

Furthermore, previous research has also indicated that AI implementation requires continuous mentoring to ensure that technology is used critically and responsibly. AI should not replace teachers' professional roles but function as a supporting tool that strengthens teachers' creativity, reflection, and instructional decision-making. Although studies have explored AI literacy and technology acceptance among educators, limited attention has been given to structured mentoring programs that directly train teachers to formulate prompts, evaluate AI-generated content, and adapt materials according to their classroom context. This limitation represents an important research and community engagement gap. The present activity contributes by providing direct assistance to madrasah teachers in utilizing ChatGPT for teaching module development while emphasizing content adaptation, pedagogical considerations, and alignment with the Independent Curriculum.

Based on these conditions, the main problem addressed in this community engagement activity is the limited competence of madrasah teachers in developing quality teaching modules that meet the demands of the Independent Curriculum and utilize technological innovations. Before the mentoring activity, teachers experienced difficulties in understanding AI concepts, creating effective prompts, and integrating AI-generated information into meaningful learning materials. Therefore, the problem formulation of this activity focuses on how AI-based mentoring through ChatGPT can improve teachers' knowledge, confidence, and skills in developing teaching modules. This initiative is important because strengthening teacher competence has a direct impact on improving learning quality and supporting educational transformation at the madrasah level.

This community engagement activity aims to improve madrasah teachers' competence in developing AI-based teaching modules through practical mentoring using ChatGPT. The activity covers AI introduction, prompt-writing training, teaching module development practice, content adaptation, and evaluation through pre-test and post-test instruments. The program is designed to support teachers in producing systematic, contextual, and student-centered teaching modules that align with the Independent Curriculum. Through this initiative, AI is positioned as an educational partner that supports teacher professionalism rather than replacing educators. The expected contribution of this activity is the creation of a sustainable model for technology-based teacher empowerment, particularly in madrasah environments, to strengthen digital literacy, pedagogical innovation, and the quality of learning practices in response to contemporary educational challenges.

RESEARCH METHODS

This activity employed a descriptive qualitative research design with a participatory approach to describe the process, experiences, and outcomes of Artificial Intelligence mentoring for madrasah teachers in developing AI-based teaching modules. A qualitative approach was selected because it enables researchers to explore participants' experiences, perceptions, and changes in competence during the intervention process in a natural educational setting. The participatory strategy was applied because teachers were actively involved in every stage of the program, including identifying needs, practicing ChatGPT utilization, developing teaching modules, and reflecting on the results. This approach is appropriate for educational technology interventions because technology adoption requires not only technical understanding but also teacher engagement and contextual adaptation (Irsyad & Zakir, 2023; Muis et al., 2025). Therefore, the design allowed researchers to capture both measurable improvements and qualitative changes in teachers' confidence and digital competence.

The activity was conducted at MI Hikmatul Hasanah, Tigasan Kulon, Leces, Probolinggo Regency, East Java, involving eight participants consisting of grade I–VI teachers and the madrasah principal. This location was selected because the madrasah represented an educational institution experiencing challenges in developing teaching modules aligned with the Independent Curriculum while simultaneously requiring technology integration to improve learning quality. Previous studies have shown that many teachers still experience difficulties in preparing Independent Curriculum teaching modules due to limited understanding of module structures, digital literacy, and technology-based instructional planning (Amelia, 2023). The activity was implemented in December 2025 through three main stages: preparation, mentoring, and evaluation. The preparation stage included coordination with the madrasah, identification of teacher needs, preparation of AI training materials, and administration of the pre-test. The mentoring stage involved AI introduction, ChatGPT demonstrations, prompt-writing practice, and direct assistance in developing teaching modules.

Data were collected through pre-tests, post-tests, structured interviews, and documentation. The pre-test and post-test instruments were used to identify changes in teachers' understanding before and after the AI mentoring program, while interviews explored teachers' perceptions regarding the usefulness, accessibility, and application of ChatGPT in developing teaching modules. Documentation, including mentoring activities and AI-based teaching modules produced by teachers, was used as supporting evidence of program implementation. The data were analyzed descriptively and qualitatively by organizing findings into several themes, including improvement of teacher competence, ease of module development, challenges in AI utilization, and changes in teacher confidence (Qudratuddarsi et al., 2024; Susanto et al., 2025). Data validity was strengthened through triangulation by comparing test results, interview responses, and documentation findings. Additionally, reflection and discussion among the research team were conducted to ensure accurate interpretation of the activity outcomes, following qualitative research principles.

RESULTS AND DISCUSSION

Results

Research results show that mentoring on the use of Artificial Intelligence at MI Hikmatul Hasanah has a positive impact on improving the competence of madrasah teachers in developing teaching modules. In the initial stages of mentoring, some teachers showed doubt and lacked confidence because they had never interacted with Artificial Intelligence chatbot-based technology. However, after being given a simple explanation of the basic concepts of AI and how ChatGPT works, teachers began to understand the function of the technology and were able to use it as a tool in developing teaching modules. Teachers were trained to write simple prompts, which then produced a teaching module framework quickly and systematically, including learning objectives, main material, learning activities, and assessments.

During the mentoring process, teachers not only received ChatGPT output directly but were also trained to curate and adapt content. Teachers revised the resulting draft teaching modules by incorporating the local context of the madrasah, student characteristics, and relevant Islamic values and local wisdom. This process demonstrated that teachers used Artificial Intelligence as a supporting tool while maintaining their role in reviewing, adapting, and improving the generated content. After the mentoring, teachers were able to develop teaching modules that were more systematic and aligned with the Merdeka Curriculum structure compared to those developed before the mentoring.

Table 1. Pre-Test and Post-Test Evaluation Materials

Indicator	Instrument Type	Number of Questions	Question Details
Understanding the basic concepts of creating teaching modules	Pre-test	6	Understanding teaching modules, functions of teaching modules, components of teaching modules
Preparation of learning objectives and teaching materials	Pre-test	6	Formulation of learning objectives, suitability of material, relevance of competencies
Design of teaching module structure	Pre-test	5	Arrangement of module sections, sequence of activities, logical flow of learning
Basic knowledge of using AI in module development	Pre-test	5	Utilization of AI, examples of use, potential AI support in learning
Total Pre-test Questions		22	
Perception of program impact on increasing understanding	Post-test	3	Understanding increased after mentoring, clarity of material, relevance of activities
Improving the ability to compile AI-based teaching modules	Post-test	3	Skills increase, ease of practice, confidence increases
Interest and readiness to apply AI in learning	Post-test	2	Willingness to try, sustainability of AI use
Total Post-test Questions		8	

Table 1 presents the evaluation instruments used to assess teachers' knowledge before and after the mentoring program. The pre-test focused on teachers' initial understanding of teaching module development and AI utilization, while the post-test measured improvements in understanding, practical skills, and readiness to implement AI in learning.

After completing the pre-test, the activity continued with guidance on understanding Artificial Intelligence concepts and a demonstration of using ChatGPT as a tool for developing teaching module content, accompanied by independent practice sessions and direct guidance. The guidance included interactive lectures, step-by-step tutorials, hands-on practice, and personal mentoring so teachers could immediately apply the skills they had acquired.

Another direct impact felt by teachers is the time efficiency in developing teaching modules. While previously it took teachers considerable time to manually develop teaching modules, after participating in the mentoring program, they were able to design teaching modules in a shorter time and with better quality. Teachers stated that ChatGPT helped them quickly acquire ideas, structures, and learning references. This finding indicates that the mentoring program improved teachers' efficiency and confidence in developing teaching modules.

This activity was also supported by visual documentation in the form of mentoring photos that represent the active involvement of teachers during the activity. The documentation shows a collaborative mentoring atmosphere, where teachers actively tried to write prompts in ChatGPT and discussed the results obtained. The enthusiasm and active participation of teachers recorded in the documentation prove that the applied and participatory training approach effectively increased teachers' confidence in utilizing new technologies.



Figure 1. Mentoring Creating AI- Based Teaching Modules

Figure 1 illustrates the mentoring process in which teachers actively participated in AI-based teaching module development. Teachers practiced writing prompts, discussed the generated outputs collaboratively, and received direct feedback from the mentoring team throughout the activity.

The evaluation phase is the final stage of the teaching module development program, which aims to assess the effectiveness of program implementation, the achievement of its objectives, and the impact of the activities on teachers. A comprehensive evaluation was conducted using quantitative and qualitative instruments to capture improvements in teachers' knowledge and understanding

of developing quality AI-based teaching modules. In this context, the evaluation focused on the pre-test and post-test results, which measured participants' level of understanding before and after the mentoring session.

Table 2. Pre-Test and Post-Test Results AI-Based Teaching Module Creation Program

Knowledge Level	Initial Test (N)	Initial Test (%)	Final Test (N)	Final Test (%)
Very good	0	0.0	6	75.0
Good	3	37.5	2	25.0
Bad	4	50.0	0	0.0
Very bad	1	12.5	0	0.0
Total	8	100	8	100

Table 2 shows a substantial increase in teachers' knowledge after participating in the mentoring program. During the pre-test, no participants reached the "very good" category, while half of the participants were still classified as having poor understanding. After the mentoring activities, 75% of teachers achieved a "very good" level of understanding, and the remaining 25% reached the "good" category. These findings indicate that all participants demonstrated satisfactory knowledge after completing the mentoring activities.

MODUL AJAR IPAS KELAS VI		6	Kreatif
INFORMASI UMUM		D. SARANA DAN PRASARANA	
A. IDENTITAS PENYUSUN MODUL		1	Bahan ajar
1	Nama penyusun	2	LKPD
2	Institusi	3	Alat Tulis
3	Tahun pelajaran	4	Proyekto, LCD
4	Jenjang sekolah	5	Multimedia pembelajaran
5	Kelas	6	Sound
6	Mata pelajaran	E. TARGET PESERTA DIDIK	
7	Alokasi Waktu	1	Menidentifikasi dan menjelaskan ciri-ciri serta peran masing-masing anggota tata surya, seperti Matahari, Bumi, Bulan, Planet, dan Asteroid.
8	Bab/ pokok bahasan	2	Peserta didik dapat memberikan respon yang sesuai setelah mendengarkan, baik melalui pertanyaan maupun pendapat terkait topik yang didengar.
		3	Menyebutkan fakta-fakta penting terkait tata surya dan hubungannya dengan kehidupan di Bumi.
B. KOMPETENSI AWAL		F. JUMLAH PESERTA DIDIK	
1	Peserta didik sudah memahami konsep dasar tentang benda-benda di sekitar kita, seperti matahari, bumi, bulan, dan beberapa planet.	1	Peserta didik pada kelas VI yang berjumlah 20 siswa
2	Peserta didik sudah mampu mengikuti pembelajaran berbasis diskusi dan aktivitas kelompok.	G. MODEL PEMBELAJARAN	
C. PROFIL PELAJAR PANCASILA		1	Game Based Learning
1	Beriman dan bertakwa kepada Tuhan YME, dan berakhlak mulia	H. METODE PEMBELAJARAN	
2	Berkebinekaan global	1	Istima, bermain, tanya jawab, diskusi.
3	Bergotong royong (peserta didik dapat bekerja sama dan berbagi untuk mencapai tujuan)	KOMPETENSI INTI	
4	Bernalar kritis	A. TUJUAN PEMBELAJARAN	
5	Mandiri	1	Menyebutkan nama-nama planet dalam Tata Surya.
			Menjelaskan peran dan ciri-ciri Matahari, Bumi, Bulan, dan planet-planet dalam Tata Surya.

Figure 2. AI-based teaching module

Figure 2 presents an example of the AI-based teaching module developed during the mentoring program. The module demonstrates a more systematic structure, including learning objectives, learning activities, teaching materials, and assessment components that were refined and adapted by teachers according to the characteristics of their students and the context of the madrasah.

The mentoring activities resulted in significant improvements in teachers' ability to develop AI-based teaching modules. Teachers produced teaching modules with clearer learning objectives, more organized learning activities, and more comprehensive assessment components. They also became more confident in utilizing AI to support lesson planning while maintaining responsibility for reviewing and adapting the generated content.

Overall, the results of this activity indicate that the use of Artificial Intelligence through ChatGPT can improve the competence of madrasah teachers in developing quality teaching modules. Teachers not only experienced improved technical skills but also positive changes in attitudes and confidence regarding the use of technology in learning. The resulting teaching modules demonstrated improvements in pedagogical structure and content, supporting teachers' readiness to implement differentiated and contextual learning according to the Independent Curriculum. These findings indicate that practical and sustainable AI-based mentoring can effectively strengthen teachers' competence and improve the quality of learning practices in the madrasah environment.

Discussion

The findings indicate that the mentoring program effectively improved teachers' competence in developing AI-based teaching modules. Before participating in the program, most teachers had limited knowledge of Artificial Intelligence and were hesitant to use AI applications in instructional planning. This condition reflects a common challenge faced by educators during the early stage of AI adoption (Ali et al., 2024; AlJemely, 2024). Through intensive demonstrations, guided practice, and individual mentoring, teachers gradually became more confident in writing prompts, evaluating AI-generated responses, and organizing learning components systematically. Rather than depending entirely on ChatGPT outputs, participants actively revised and refined the generated content to ensure its suitability for learning objectives and classroom implementation. These findings demonstrate that teacher competence can be strengthened when AI integration is accompanied by structured professional development, allowing technology to function as a practical instructional assistant while preserving teachers' central pedagogical roles.

The mentoring activities also improved teachers' ability to design teaching modules that complied with the structure and principles of the Independent Curriculum. Participants successfully developed clearer learning objectives, organized learning activities more logically, and prepared assessment strategies that better reflected curriculum expectations. Similar improvements have been reported by Lee and Zhai (2024), who found that ChatGPT supports lesson planning when teachers critically evaluate generated content, while Berg and Du Plessis (2023) emphasized that generative AI enhances instructional planning without replacing teachers' professional judgment. In this program, teachers demonstrated the ability to integrate AI-generated ideas with their own pedagogical knowledge and classroom experience. Consequently, the resulting teaching modules became more coherent, contextual, and aligned with students' learning needs. This finding confirms that AI serves primarily as a catalyst for improving instructional quality rather than as an automatic content creator.

The substantial improvement in pre-test and post-test results demonstrates that practical mentoring plays an important role in increasing teachers' understanding of Artificial Intelligence and its educational applications. Initially, participants showed limited confidence because they had never interacted with AI-assisted instructional technologies. Following continuous practice and direct guidance, teachers became more capable of utilizing ChatGPT independently to

develop teaching modules. Previous studies have similarly reported that teachers' willingness to adopt AI is strongly influenced by technology self-efficacy and continuous learning opportunities (Wang et al., 2024; Zhang et al., 2023). Likewise, improving AI literacy through structured professional training significantly encourages teachers to integrate AI into instructional activities (Ayanwale et al., 2024; Shuaiyao & Lei, 2024). The present findings therefore suggest that successful AI implementation depends not only on technological availability but also on systematic mentoring that develops teachers' confidence and practical competence.

Another important finding is that teachers did not simply copy AI-generated content but critically evaluated and adapted it before classroom implementation. During the mentoring sessions, participants modified learning activities, examples, assessments, and instructional language according to students' characteristics, local conditions, and Islamic educational values. Such reflective practices indicate that AI functioned as a collaborative educational partner instead of replacing teachers' professional decision-making. A human-centered approach to AI integration has also been emphasized by Kong and Yang (2024), who argued that generative AI should strengthen self-regulated instructional design rather than automate teaching completely. Similarly, Mittal et al. (2024) explained that the educational benefits of generative AI depend on educators' ability to review, validate, and contextualize AI-generated information. Therefore, reflective adaptation became one of the most valuable competencies developed through this mentoring program.

The mentoring program also generated practical benefits by improving teachers' efficiency in preparing teaching modules. Participants explained that ChatGPT accelerated the preparation of learning objectives, teaching materials, learning scenarios, and assessment components, enabling them to devote more attention to improving instructional quality. Similar evidence has been reported by Javaid et al. (2023), who highlighted the ability of ChatGPT to reduce teachers' administrative workload while supporting instructional creativity. Consistent with these findings, Juni et al. (2025) demonstrated that AI-assisted teaching materials tend to be more systematic and easier to organize than conventionally prepared materials. Nevertheless, this study also shows that efficiency alone is insufficient because teachers still need to examine the accuracy, relevance, and pedagogical suitability of every generated output. Consequently, AI contributes most effectively when technological efficiency is combined with teachers' professional expertise.

This community engagement activity extends previous discussions by demonstrating that AI mentoring can be successfully implemented within the context of Islamic elementary education. Unlike many previous studies that mainly investigated AI adoption in general educational environments, this program emphasized the integration of AI with Islamic values, local wisdom, and the characteristics of madrasah students. The importance of aligning technological innovation with Islamic educational principles has previously been discussed (Irsyad & Zakir, 2023; Muis et al., 2025). Furthermore, sustainable AI implementation in Islamic education requires educational practices that remain culturally and ethically responsive (Saiduzzaman et al., 2025; Elice et al., 2025). The findings therefore demonstrate that technological innovation and religious

educational values are complementary rather than contradictory when teachers receive appropriate mentoring and opportunities to adapt AI-generated content according to their instructional context.

The main contribution of this study is the development of a practical mentoring model that integrates AI literacy, prompt engineering, teaching module preparation, and contextual content adaptation into a comprehensive teacher empowerment program. Previous studies have largely examined AI acceptance, teachers' perceptions, or the general educational potential of ChatGPT, whereas this activity provides empirical evidence of how structured mentoring directly improves teachers' competence in producing curriculum-aligned teaching modules. In addition, the novelty of this program lies in combining AI-assisted module development with the integration of Islamic values and local wisdom within the madrasah context, an aspect that remains rarely discussed in existing literature. This finding strengthens the argument that sustainable AI implementation requires continuous professional assistance rather than technology adoption alone. Therefore, the proposed mentoring model offers a practical contribution that can be replicated in other madrasahs and educational institutions seeking to strengthen teachers' digital competence and instructional innovation.

CONCLUSION

The most important finding of this activity is that structured mentoring in the use of Artificial Intelligence (AI), particularly ChatGPT, can meaningfully support madrasah teachers in strengthening their digital competence and developing teaching modules aligned with the Independent Curriculum. The main lesson learned is that effective AI adoption requires more than technical familiarity; teachers need to critically curate, adapt, and contextualize AI-generated content based on students' characteristics, Islamic values, and local wisdom. The implication of these findings is that AI integration in madrasah education should be accompanied by continuous pedagogical guidance that positions AI as a supporting tool rather than a substitute for teachers' professional judgment. The strength of this study lies in its contribution to educational technology scholarship by providing an empirical model of AI-based teacher empowerment that integrates technological competence with pedagogical, contextual, and ethical considerations in the madrasah setting. Nevertheless, this activity is limited by the small number of participants, short implementation period, and evaluation that primarily focused on improvements in teacher competence rather than long-term changes in teaching practices and student learning outcomes. Future research should therefore involve larger and more diverse participants, employ longitudinal designs, and investigate sustainable AI integration models, ethical dimensions of AI use, and the effects of AI-supported teaching modules on student learning outcomes.

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CONFLICTS OF INTEREST

The author declares that there are no conflicts of interest associated with this study.

USE OF ARTIFICIAL INTELLIGENCE (AI)-ASSISTED TECHNOLOGY

AI-assisted technology was used during the preparation of this manuscript to support language refinement, structural organization, and improvements in academic writing. All AI-generated content was thoroughly reviewed, revised, and validated by the author. The author assumes full responsibility for the accuracy, originality, and integrity of the final manuscript.

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