Vol. 3 No. 1 Edisi Januari 2026 E. ISSN. 3032-2472
Multidisciplinary Indonesian Center Journal (MICJO)
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SMART THEACING WITH AI IN LEARNING DEVELOPMENT

PEMBELAJARAN CERDAS DENGAN AI DALAM PENGEMBANGAN PEMBELAJARAN

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DOI: https://doi.org/10.62567/micjo.v3i1.2050

Abstract

The rapid digital transformation in education has redefined the role of teachers, necessitating the integration of Artificial Intelligence (AI) to enhance pedagogical efficiency. This study aims to analyze the needs of primary school teachers regarding AI, describe the implementation of AI-assisted smart teaching training, and evaluate its impact on teachers' professional competence and the quality of produced instructional tools. Utilizing a descriptive qualitative approach with a field study design, the research was conducted at UPTD SD Negeri 33 Bangai. Data were collected through participatory observation, semi-structured interviews, and document analysis of teaching modules and worksheets. The subjects were selected via purposive sampling, and data were analyzed using the interactive model of reduction, display, and conclusion drawing. The results indicate that AI-assisted smart teaching training effectively shifts teachers from passive technology users to active pedagogical designers. Findings reveal a paradigm shift where teachers perceive AI as "augmenting intelligence" that strengthens rather than replaces their professional role. The instructional tools produced post-training showed significant improvements in systematic alignment and the integration of Higher-Order Thinking Skills (HOTS). Grounded in adult learning and experiential learning theories, this practice-based model fosters greater learning autonomy and reflective practice. This study contributes empirical evidence for the primary education context, suggesting that human-centered and pedagogically-driven AI integration is a vital strategy for teacher professional development in the digital era.

Keywords : Artificial Intelligence, Smart Teaching, Teacher Professional Competence, Instructional Tools, Primary Education.

Abstrak

Transformasi digital yang pesat dalam pendidikan telah mendefinisikan ulang peran guru, sehingga diperlukan integrasi Kecerdasan Buatan (AI) untuk meningkatkan efisiensi pedagogis. Studi ini bertujuan untuk menganalisis kebutuhan guru sekolah dasar terkait AI, mendeskripsikan implementasi

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pelatihan pengajaran cerdas berbantuan AI, dan mengevaluasi dampaknya terhadap kompetensi profesional guru serta kualitas alat pembelajaran yang dihasilkan. Menggunakan pendekatan kualitatif deskriptif dengan desain studi lapangan, penelitian ini dilakukan di UPTD SD Negeri 33 Bangai. Data dikumpulkan melalui observasi partisipatif, wawancara semi-terstruktur, dan analisis dokumen modul dan lembar kerja. Subjek dipilih melalui pengambilan sampel bertujuan, dan data dianalisis menggunakan model interaktif reduksi, tampilan, dan penarikan kesimpulan. Hasilnya menunjukkan bahwa pelatihan pengajaran cerdas berbantuan AI secara efektif mengubah guru dari pengguna teknologi pasif menjadi perancang pedagogis aktif. Temuan mengungkapkan pergeseran paradigma di mana guru memandang AI sebagai "peningkat kecerdasan" yang memperkuat, bukan menggantikan, peran profesional mereka. Alat-alat pembelajaran yang dihasilkan pasca pelatihan menunjukkan peningkatan signifikan dalam penyelarasan sistematis dan integrasi Keterampilan Berpikir Tingkat Tinggi (KBTT). Berlandaskan teori pembelajaran orang dewasa dan pembelajaran berbasis pengalaman, model berbasis praktik ini mendorong otonomi belajar yang lebih besar dan praktik reflektif. Studi ini memberikan bukti empiris untuk konteks pendidikan dasar, menunjukkan bahwa integrasi AI yang berpusat pada manusia dan didorong secara pedagogis adalah strategi vital untuk pengembangan profesional guru di era digital.

Kata Kunci : Kecerdasan Buatan, Pengajaran Cerdas, Kompetensi Profesional Guru, Alat Pembelajaran, Pendidikan Dasar.

1. INTRODUCTION

Transformation in education has driven significant changes in the roles and competencies of teachers, particularly within the context of 21st-century learning. Teachers are no longer positioned merely as information providers but as designers of learning experiences capable of balancing pedagogy, technology, and human values. The development of Artificial Intelligence (AI) presents strategic opportunities to support teachers' professional duties, especially in lesson planning, instructional tool development, and more adaptive and efficient assessment (Holmes, Bialik, and Fadel 2022).

However, various studies indicate that the utilization of AI in educational practice still faces serious challenges, primarily regarding low teacher AI literacy, ethical concerns, and the gap between technological potential and field implementation (Zawacki-Richter et al. 2023). In many primary school contexts, teachers still struggle to develop learning tools that align with learning outcomes, orient toward Higher-Order Thinking Skills (HOTS), and remain responsive to diverse student needs. This condition suggests that the presence of advanced technology does not automatically improve learning quality without proper pedagogical intervention.

Theoretical studies on Smart Teaching assert that effective learning in the digital era demands synergy between a teacher's pedagogical intelligence and the use of smart technology as assistive technology (Miao et al. 2023). In this context, AI is understood not as a replacement for the teacher's role, but as a professional assistant that aids in curriculum analysis, formulating learning objectives, mapping materials, designing student worksheets (LKPD), and developing systematic assessments. This approach aligns with the principles of adult learning (andragogy), which emphasizes direct experience, reflection, and relevance to the professional tasks of the participants (Knowles, Holton, and Swanson 2020).

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Despite growing research on AI in education, most studies still focus on higher education, the development of intelligent systems, or laboratory-based conceptual and experimental analysis. Research examining the implementation of practice-based training regarding AI utilization for primary school teachers, specifically in developing contextual learning tools, remains relatively limited. Furthermore, few studies explicitly link the use of AI with a smart teaching approach that places the teacher as the primary actor in pedagogical decision-making (UNESCO 2023).

Based on these conditions, a clear research gap exists: the need for field-based empirical studies examining how AI-assisted smart teaching training can tangibly enhance professional competence, in terms of conceptual understanding, practical skills, and the resulting instructional products. The novelty of this research lies in the integration of teacher needs analysis, hands-on training, and the utilization of AI as a pedagogical assistant within the primary school context—an area that has received less attention in international literature.

Consequently, this research holds high academic and practical urgency, as it not only enriches the study of AI in education but also provides an applicable and contextual intervention model to improve the quality of teacher lesson planning in the era of digital transformation.

a. Research Objectives:

- ✓ To analyze the needs of primary school teachers regarding the use of AI in developing learning tools.
- ✓ To describe the implementation of AI-assisted smart teaching training designed with a hands-on approach.
- ✓ To analyze the impact of the training on improving teachers' understanding of AI in education.
- ✓ To assess the quality of the learning tools (teaching modules, worksheets, and assessments) produced by teachers after the training.
- ✓ To identify the pedagogical implications of using AI as a professional assistant for teachers in lesson planning.

b. Artificial Intelligence in Education

Artificial Intelligence (AI) in education is defined as the utilization of computational systems capable of mimicking human cognitive functions, such as data analysis, providing recommendations, and supporting pedagogical decision-making. In the learning context, AI serves as augmenting intelligence—technology that strengthens the teacher's capacity to design, implement, and evaluate learning rather than replacing them (Holmes et al. 2022). This approach positions AI as a professional tool that supports teacher effectiveness and efficiency. Studies show that AI has great potential in assisting lesson planning, personalizing materials, and developing adaptive assessments. AI can be used to analyze curriculum, align learning objectives with competency achievements, and design student-centered learning activities (Zawacki-Richter et al. 2023). In primary education, this role is crucial as teachers are required to manage heterogeneous classrooms with limited resources.

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c. The Concept of Smart Teaching in 21st-Century Learning

Smart teaching is an instructional approach that integrates a teacher's pedagogical competence, technological utilization, and a deep understanding of student characteristics. This concept emphasizes the teacher's ability to design reflective, adaptive, and data-driven learning to meet 21st-century challenges.

In practice, smart teaching does not focus solely on technology use but on the quality of pedagogical decision-making. Teachers are expected to leverage technology, including AI, to enhance instructional design quality, strengthen higher-order thinking activities, and optimize student engagement. This aligns with the Revised Bloom's Taxonomy, which emphasizes analyzing, evaluating, and creating (Anderson and Krathwohl 2001).

d. Adult Learning Theory (Andragogy)

Teacher training in this study is grounded in the theory of andragogy. Knowles et al. (2020) assert that adult learners have distinct characteristics, including a need for immediate relevance, experience as a primary learning source, and an orientation toward solving real-world problems. Therefore, effective training must be practice-based and contextual.

Regarding AI utilization, the andragogic approach demands hands-on training where teachers directly practice using AI to draft learning tools. This allows for deeper internalization of knowledge and skills compared to purely theoretical training. This is further reinforced by Kolb's Experiential Learning Theory (2014), which emphasizes the cycle of concrete experience, reflective observation, abstract conceptualization, and active experimentation.

e. Previous Research on AI and Teacher Training

Previous research indicates that integrating AI into teacher training can improve lesson planning efficiency and assessment quality. Zawacki-Richter et al. (2023) found through a systematic review that AI potentially supports pedagogical decision-making, though success depends heavily on teacher readiness and training design. UNESCO (2023) emphasizes the need for practice-based research exploring how AI can be integrated ethically and pedagogically into professional development. This indicates that AI-assisted smart teaching training in primary schools still has broad and globally relevant development potential.

2. RESEARCH METHOD

1) Research Design

This study employs a descriptive qualitative approach with a field study design based on community engagement (Nugraha, 2025). This approach was selected to gain a profound understanding of the implementation of Artificial Intelligence (AI)-assisted smart teaching training and its impact on teachers' professional competence in developing instructional tools. Qualitative research allows the researcher to explore teachers' experiences, perceptions, and practices contextually and holistically within their natural environment (Creswell 2018).

The field study design emphasizes the researcher's direct involvement in training activities and teacher mentoring, ensuring that the data obtained is empirical and based on actual practice. This model is relevant for examining instructional innovations and teacher

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professional development oriented toward solving contextual problems (Miles, Huberman, and Saldaña 2014).

b. Population and Research Subjects

The population of this study consists of all primary school teachers at UPTD SD Negeri 33 Bangai. Research subjects were determined using a purposive sampling technique, selecting participants based on their alignment with the research objectives. The selected subjects are active teachers directly involved in the AI-assisted smart teaching training who hold responsibility for drafting learning tools.

The purposive selection of subjects aims to ensure that the data truly reflects the teachers' experiences and practices in utilizing AI as a pedagogical assistant. This technique is common in qualitative research, which prioritizes data depth over statistical generalization (Creswell 2018).

c. Data Collection Techniques and Instruments

Data collection was conducted through three primary techniques: observation, semi-structured interviews, and document studies.

- ✓ Observation: Used to directly observe the training process, teacher engagement, and the practical use of AI in drafting learning tools. Participatory observation was conducted to obtain an authentic picture of the training dynamics.
- ✓ Semi-structured Interviews: Conducted to explore teachers' perceptions, understanding, and experiences regarding AI utilization in learning. This technique allows for in-depth yet flexible data collection tailored to the field context (Miles et al. 2014).
- ✓ Document Studies: Employed to analyze the instructional products generated by the teachers—such as teaching modules, student worksheets (LKPD), and assessment instruments—as empirical evidence of the training outcomes.

Research instruments include observation guides, interview protocols, and document analysis sheets, developed based on the theoretical frameworks of smart teaching, AI in education, and instructional design.

d. Data Analysis Techniques

The data obtained were analyzed using the interactive qualitative data analysis technique proposed by Miles et al. (2014), comprising three main stages: data reduction, data display, and conclusion drawing/verification.

1) Data Reduction: Sorting and focusing on data relevant to the research objectives.
2) Data Display: Presenting data in the form of descriptive narratives to facilitate an understanding of the relationships between findings.
3) Conclusion Drawing: Performed incrementally through continuous verification and reflection on the data.

To ensure data validity (trustworthiness), this study applies triangulation of sources and techniques, comparing results from observations, interviews, and documentation (Creswell 2018).

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The research follows a practice-based training model that integrates the principles of adult learning and experiential learning. The training is structured into several stages: needs analysis, training planning, implementation of hands-on training, reflection, and evaluation of training outcomes (Kolb 2014).

In this model, Artificial Intelligence is positioned as a pedagogical assistant that supports teachers in drafting learning tools systematically and reflectively. This research model enables a comprehensive examination of both the process and the results of the training, as well as its implications for enhancing teachers' professional competence.

3. RESULT AND DISCUSSION

The research findings indicate that Artificial Intelligence (AI)-assisted smart teaching training significantly impacts the enhancement of teachers' professional competence in developing instructional tools. Observations during the training sessions revealed a substantial shift in teacher engagement patterns, moving from passive participation to active exploration of AI as a pedagogical assistant. Teachers did not merely follow examples of AI usage; they began independently crafting prompts and revising AI outputs to align with their specific classroom contexts and student needs. These findings suggest that a practice-based training approach effectively enhances the learning autonomy of teachers as adult learners (Knowles et al. 2020).

Interviews identified a paradigm shift among teachers regarding the utilization of AI in education. Initially, AI was perceived as a complex technology with the potential to replace the teacher's role. However, following the training, teachers came to understand AI as augmenting intelligence that supports pedagogical decision-making, particularly in lesson planning. Teachers noted that AI helps accelerate the analysis of learning outcomes, the formulation of objectives, and the systematic design of activities and assessments. This finding aligns with the view of Holmes et al. (2022), which emphasizes that AI serves to strengthen, rather than replace, the teacher's professional role.

Analysis of the instructional documents produced by the teachers showed an improvement in the quality of instructional design. Teaching modules and student worksheets (LKPD) developed post-training demonstrated better integration between objectives, activities, and assessments. Furthermore, these learning tools began to accommodate elements of High-Order Thinking Skills (HOTS), such as analysis and reflection, as emphasized in the revised Bloom’s Taxonomy (Anderson and Krathwohl 2001). This indicates that AI utilization affects not only teacher efficiency but also the pedagogical quality of lesson planning.

From a smart teaching perspective, these findings show that AI integration encourages teachers to become more reflective in designing instruction. Teachers no longer view instructional tools as mere administrative obligations but as strategic instruments to optimize student learning. AI functions as an alternative source of ideas and structure, while the final decision remains with the teacher as the primary pedagogical actor. This approach underscores

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the importance of technology integration oriented toward instructional design quality rather than mere technological adoption.

The results of this study also reinforce adult learning and experiential learning theories. Training designed around direct practice allowed teachers to learn through concrete experience, reflection, and application within their professional tasks. This cycle is consistent with the experiential learning model, which posits that effective learning occurs when individuals are directly involved in meaningful experiences (Kolb 2014). The direct relevance between training materials and teachers' professional needs enhances motivation and the acceptance of technological innovation (Knowles et al. 2020).

Compared to previous research, these findings expand the study of AI in education, which has historically been dominated by higher education contexts and conceptual studies. This research provides practice-based empirical evidence in primary schools, specifically regarding teacher professional development. This addresses the recommendations of Zawacki-Richter et al. (2023) and UNESCO (2023), which emphasize the need for field research on ethical, contextual, and human-centered AI integration.

Overall, the findings and discussion of this study confirm that AI-assisted smart teaching training is an effective intervention model for improving teacher competence in lesson planning. AI integration that is pedagogically designed, practice-based, and aligned with adult learning principles holds great potential to support the professional transformation of teachers in the digital era. These findings offer an important contribution to the development of teacher training models and the international discourse on AI utilization in primary education.

4. CONCLUSION

This study concludes that Artificial Intelligence (AI)-assisted smart teaching training is effective in enhancing the professional competence of primary school teachers, particularly in the development of instructional tools. AI is proven to function as a pedagogical assistant that helps teachers draft lesson plans more systematically, efficiently, and in alignment with learning outcomes. The research results indicate that a practice-based training approach grounded in adult learning principles fosters an improvement in teachers' understanding, skills, and the quality of their instructional products. Teachers are able to utilize AI reflectively and contextually without losing their primary role as pedagogical decision-makers. Consequently, the integration of AI within a smart teaching framework can be viewed as a relevant and applicable teacher professional development strategy in addressing the challenges of digital transformation in education, especially within the primary school context.

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