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Exploration of Teachers' Perceptions and Challenges in Using Artificial Intelligence in Learning

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Abstract

The rapid development of Artificial Intelligence (AI) in education has created significant opportunities to improve teaching and learning processes; however, teacher readiness and perceptions remain diverse, particularly at the elementary school level. This study aims to explore teachers' perceptions and challenges in using AI in classroom learning. The research employed a qualitative descriptive-exploratory design involving eight elementary school teachers selected through purposive sampling in Magetan Regency. Data were collected through semi-structured interviews and non-participant observation and analyzed using thematic analysis techniques. The findings indicate that teachers generally have positive perceptions of AI, viewing it as a supportive tool to increase efficiency, creativity, and access to learning resources. However, understanding and practical use of AI are still in their infancy, with limited direct integration into classroom practice. The study also identified several challenges, including limited digital competency, lack of institutional training and support, inadequate infrastructure, and concerns about AI accuracy and student dependability. These findings suggest that while AI has strong potential to improve pedagogical practice, its effective implementation depends on improving teacher competency and providing systematic support. This study contributes to the theoretical understanding of teacher-AI interactions in primary education and highlights the need for professional development programs, policy support, and ethical guidance to ensure the responsible and effective integration of AI in education.

Keywords: Artificial Intelligence, Teacher Perception, Primary Education, Digital Competence.

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INTRODUCTION

The digital transformation in 21st-century education is further accelerated by the development of Artificial Intelligence (AI) technology, which offers significant potential in supporting learning processes, such as material personalization, content creation, and automated assessment. AI enables teachers and students to optimize the learning experience through tools that can adapt to individual needs and increase teaching effectiveness. Conceptually, AI in education is understood as technology that mimics human cognitive functions to support learning and teaching processes more adaptively and efficiently (Chen et al., 2020; Rajkumar et al., 2025). In practice, AI is utilized to generate learning

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materials through generative systems capable of compiling syllabi, sample questions, case studies, and simulations tailored to student abilities, thereby helping teachers save time in content design (Chakraborty, 2025). In addition, AI is also used in automated assessment and learning analytics that provide real-time feedback, enabling faster and more continuous evaluation (Ahmad et al., 2022; Celik et al., 2022). For students, AI serves as a learning aid through adaptive platforms, intelligent tutors, and educational chatbots that can personalize learning paths and improve engagement and learning outcomes.

These developments have also driven a shift in the role of teachers from mere transmitters of knowledge to designers of learning experiences, facilitators, mentors, and data-driven decision-makers capable of curating and verifying AI-generated content, while guiding students in the ethical and critical use of AI (Cope et al., 2020; Onesi-Ozigagun et al., 2024). Despite the increasing use of AI in schools, teachers' perceptions of this technology remain mixed; some see AI as an opportunity to improve teaching practices, while others are concerned about challenges such as training requirements, impacts on educational quality, and anxiety about changing their professional roles. Studies show that teachers' digital literacy plays a crucial role in shaping their attitudes and readiness to effectively integrate AI in the classroom, while professional support and ethical understanding are key factors in reducing anxiety and building trust in the technology (Alwaqdani, 2024; Zhang & Cao, 2025; Galindo-Domínguez et al., 2024). Therefore, a thorough understanding of teachers' perceptions is crucial as a basis for designing policies and training programs that optimize the use of AI in education while maintaining their professional well-being.

Teachers' perceptions of learning technology are generally positive, with teachers viewing technology integration as an effort to improve the quality of teaching practices, make the learning process more engaging and interactive, and increase student motivation (Akram et al., 2022). However, teachers' acceptance of technology does not occur automatically; it is influenced by various factors, such as understanding of the technology, experience using it, digital readiness, and concerns about the technology itself. Understanding and experience with technology have been shown to increase teachers' confidence in utilizing digital tools, ultimately contributing to perceived ease of use and usefulness of technology in learning (Antonietti et al., 2022). Furthermore, teachers' digital readiness, encompassing digital competence and self-efficacy, is a crucial factor in shaping teachers' intentions to adopt learning technologies (Macwan & Barot, 2025). Conversely, technological apprehension, such as fear or anxiety in using new tools, can be a barrier that reduces teachers' acceptance of technology (Akram et al., 2022). Therefore, institutional support in the form of adequate training and infrastructure availability is crucial in encouraging effective technology integration into learning practices.

Although research on artificial intelligence (AI) in education continues to grow, most research still focuses on the development aspects of the technology, while in-depth exploration of the experiences and perceptions of teachers as primary users remains relatively limited. A qualitative approach is crucial for comprehensively understanding how teachers perceive the benefits and challenges of using AI in

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real-world learning contexts. Several studies indicate that teachers acknowledge AI's potential to enhance personalized learning and teaching efficiency, but also express various concerns, such as the need for intensive training, the impact on creativity, and the level of trust in the technology's accuracy (Arvin et al., 2023; Wardat et al., 2024). Furthermore, teachers emphasize the importance of continuous professional development and adequate policy support for effective and ethical AI integration (Kim, 2023; Wang et al., 2023).

Therefore, research that explores teachers' experiences and perspectives in depth is crucial for generating contextual and relevant understanding to support AI implementation in educational settings (Yau et al., 2022; Almuhanna, 2024). Based on this description, this study aims to explore teachers' perceptions and challenges in using Artificial Intelligence (AI) in learning, as well as to identify the experiences and obstacles faced by teachers in integrating this technology in elementary school environments.

METHODS

This study used a qualitative approach with a descriptive-exploratory design, aiming to deeply explore teachers' perceptions and challenges in using Artificial Intelligence (AI) in learning (Sugiyono, 2018). This approach was chosen because it provides a comprehensive understanding of the experiences, perspectives, and real-world contexts faced by teachers in integrating AI into educational settings.

The subjects were eight elementary school teachers selected using a purposive sampling technique (Moleong, 2018). Subject criteria included teachers who were active teachers and had experience or knowledge related to the use of AI in learning. The study was conducted in elementary schools in Magetan Regency, selected because they were already familiar with and utilizing digital technology in the learning process.

Data collection was conducted through interviews and observations. Semi-structured interviews were conducted to obtain in-depth information regarding teachers' perceptions of AI, their experiences with AI, perceived benefits, and challenges faced. Meanwhile, observations were conducted non-participatory by directly observing classroom learning activities, particularly regarding the use of technology and teacher-student interactions in the context of AI-based learning.

In this study, the researcher acted as the primary instrument (human instrument) directly involved in the data collection and analysis process. Supporting instruments used included an interview guide to guide the question-and-answer process, an observation sheet to record learning activities, and field notes used to document findings throughout the study. Data analysis was conducted using thematic analysis techniques. The analysis process began with transcribing interview data, followed by thorough reading and understanding of the data (Denzin, 2012). Next, coding was performed to identify key elements of the data, which were then grouped into specific themes. The resulting themes included teachers' perceptions of AI, the benefits of using AI, and the challenges faced in its implementation. The

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final stage was drawing conclusions based on the patterns and relationships between the themes identified.

The validity of the data in this study was maintained through triangulation techniques. Technical triangulation was conducted by comparing data from interviews and observations, while source triangulation involved several teachers as research subjects. Furthermore, the researcher conducted member checks by confirming interview results with respondents to ensure data consistency. Documentation and field notes were also used to support the credibility of the data.

RESULTS

Teachers' Perceptions and Experiences in Using AI in Learning

The research results indicate that teachers' perceptions of the use of Artificial Intelligence (AI) in learning tend to be positive, although their understanding and experience with it are still in their early stages. Based on interviews with eight elementary school teachers, most view AI as a tool that can facilitate the learning process, particularly in developing materials and searching for references. However, teachers' understanding of AI varies, ranging from those who only recognize AI as a "smart application" to those who understand its function as a system that can help personalize learning.

Several teachers expressed that AI makes it easier to design learning. One teacher stated that "AI is very helpful in creating questions and materials, making it faster and more varied" (G3). Another teacher echoed this sentiment, stating that "AI can be used to find more interesting learning ideas" (G5). These findings indicate that AI is perceived as a tool that increases efficiency and creativity in learning.

In terms of user experience, it was found that some teachers have used AI, but with varying intensity. Some teachers use AI simply, such as to search for materials or create questions, while others have not yet used AI directly and only have limited exposure to it. This indicates that the integration of AI into learning is still at an exploratory stage and has not yet become a consistent practice.

Classroom observations corroborate the interview findings, which indicated that direct use of AI in learning remains limited. Teachers prefer general digital technologies, such as presentations or searching for information online, rather than specific uses of AI. Teacher-student interactions are also still dominated by conventional methods supported by simple technology. This indicates that while perceptions of AI tend to be positive, its implementation in learning practices is not yet optimal.

Overall, these findings indicate that teachers are open to the use of AI, but still need to improve their understanding and practical experience to integrate this technology more effectively into learning.

Table 1. Summary of Coding of Teachers' Perceptions and Experiences

Main Categories	Sub-Categories	Interview Findings	Observational Findings	Code
AI Understanding	Basic understanding	AI is understood as a tool or smart application	No specific use of AI was observed in the classroom	G1, G2, G6

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	Developing understanding	AI is understood as a tool to support learning and materials	Technology use is becoming more varied	G3, G5
AI Perceptions	Positive perception	AI helps efficiency, variety in learning, and creativity	Teachers use technology to support learning	G3, G4, G5, G7
	Limited perception	AI is considered interesting but not yet deeply understood	Use is still limited to general technology	G1, G2
User Experience	Direct use	Used to create questions, materials, and search for references	Not always used in direct learning	G3, G5, G7
	Limited use	Used only occasionally or not yet used	No explicit use of AI was found	G1, G2, G6, G8
Learning Practices	AI integration	AI has not been systematically integrated	Learning remains conventional with the assistance of simple technology	All
	Classroom interaction	Teachers still dominate learning	Interactions are still teacher-centered	All

Benefits and Challenges for Teachers in Integrating AI

The research results show that the use of Artificial Intelligence (AI) in learning provides various benefits perceived by teachers, although it also presents a number of significant challenges. Based on interviews, most teachers stated that AI helps improve work efficiency, particularly in compiling learning materials, creating questions, and searching for references. Teachers feel that AI can save time and provide variety in material presentation, making learning more engaging.

One teacher stated that "with AI, I don't have to spend time creating questions because I can help immediately, just adjust them" (G4). Another teacher added that "AI helps provide more creative and less monotonous learning ideas" (G7). This demonstrates that AI plays a role as a tool that supports productivity and innovation in teaching practice.

Furthermore, several teachers also expressed that AI has the potential to help understand student needs by providing more varied and adaptive materials. However, this utilization is still not optimal due to teachers' limited understanding and experience in using this technology to its full potential. Furthermore, this study also identified various challenges faced by teachers in integrating AI into learning. The main challenge is limited knowledge and skills in using AI. Some teachers admitted they still don't understand how AI works or how to utilize it effectively. This was reinforced by a teacher who stated that they were "still confused about using AI, because they haven't received any special training" (G2).

In addition to limited competency, a lack of training and institutional support also poses significant barriers. Teachers feel they haven't received adequate guidance in integrating AI into their learning. Furthermore, limited infrastructure, such as internet access and supporting devices, also impacts the use of AI in the classroom. Another prominent challenge is concerns about the use of AI,

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both in terms of information accuracy and its impact on students. Some teachers worry that the use of AI could lead to student dependency and reduce critical thinking skills. One teacher expressed "fear that students will become too dependent on AI and less able to think independently" (G6). This concern highlights the psychological and pedagogical aspects that need to be considered in the implementation of AI in education.

Overall, these findings indicate that while AI provides significant benefits in supporting learning, teachers still face various challenges related to competency, support, and readiness to integrate this technology. Therefore, systematic efforts are needed to improve teacher capacity and provide adequate support for optimal AI utilization.

Table 2. Summary of Coding Benefits and Challenges

Main Category	Sub-Categories	Interview Findings	Observational Findings	Code
Manfaat AI	Work efficiency	Simplifies the creation of materials and questions, saving time	Teachers use technology to accelerate lesson preparation	G3, G4, G7
	Learning creativity	Provides more varied learning ideas	Learning materials are more diverse, although not yet fully AI-based	G5, G7
	Learning support	Helps with material development and student understanding	Technology is used to support material delivery	G3, G5
Challenge	Competency limitations	Teachers do not yet understand the optimal use of AI	No direct use of AI is observed in the classroom	G1, G2, G6
	Lack of training	No specific training related to AI	Teachers rely on independent experience	G2, G6, G8
	Infrastructure limitations	Device and internet access constraints	Technology use is limited	G1, G8
	AI concerns	Fear of student dependency, doubts about AI accuracy	Teachers remain cautious in using technology	G4, G6
Teacher readiness (implicit))	Not yet optimally ready	Still in the learning and exploration stage	Learning remains conventional	Majority
	Beginning to adapt	Starting to try using simple AI	There are indications of the use of supporting technology	G3, G5, G7

DISCUSSION

The study's findings indicate that teachers have a generally positive perception of the use of Artificial Intelligence (AI) in learning, even though its implementation is still in its early stages. This finding aligns with previous research, which found that teachers generally view technology as a means to improve the quality of learning, make the learning process more engaging, and increase student motivation (Akram et al., 2022). In the context of AI, this positive perception is reflected in teachers' views of AI as a tool to simplify material development and increase work efficiency. This also supports

the findings that AI has the potential to personalize learning and increase teaching effectiveness (Ahmad et al., 2021; Rajkumar et al., 2025).

However, the results of this study also indicate that teachers' understanding and experience in using AI are still limited. This situation reinforces previous findings that digital literacy and experience using technology are important factors in shaping teachers' attitudes and readiness to adopt new technologies (Antonietti et al., 2022; Galindo-Domínguez et al., 2024). Teachers with more experience tend to demonstrate more positive perceptions and higher readiness, while teachers with limited experience are still at the exploration stage. This suggests that the adoption of AI in education depends not only on the availability of technology but also on individual teacher readiness.

In terms of benefits, this study found that AI helps improve teacher work efficiency, particularly in creating materials and questions, and provides variety in learning. These findings are consistent with studies that suggest AI can support the automation of administrative and pedagogical tasks and assist teachers in designing more adaptive learning (Chakraborty, 2025). Furthermore, AI's potential to enhance learning creativity is evident in the technology's ability to provide a variety of innovative learning resources and ideas. Similarly, these findings align with research that suggests a lack of institutional readiness and support are key factors hindering technology adoption in education (Macwan & Barot, 2025; Wang et al., 2023). Furthermore, teachers' concerns about AI accuracy and the potential for student dependency also indicate that ethical and pedagogical aspects are important concerns in AI implementation. This supports the view that AI integration requires not only technical readiness, but also a critical and ethical understanding of its use (Zhai, 2024).

Furthermore, the results of this study confirm that the use of AI has also impacted the changing role of teachers in learning. Teachers no longer act solely as conveyors of information, but also as facilitators and managers of technology-based learning. This finding is consistent with the literature stating that the development of AI is driving a transformation in the role of teachers to become more adaptive, reflective, and data-driven (Celik et al., 2022; Cope et al., 2020). However, this changing role requires adequate support for teachers to adapt optimally.

Overall, this study shows that while AI has great potential to improve the quality of learning, its implementation at the elementary school level still faces various challenges that need to be addressed. This study excels in using a qualitative approach that allows for in-depth exploration of teachers' perceptions, experiences, and challenges. This research is strengthened through triangulation of interviews and observations, resulting in a contextual and comprehensive picture, particularly at the elementary school level, which is still limited in scope. However, this study also has limitations, including the limited number of subjects so that it cannot be generalized, variations in the level of teacher understanding of AI that affect the depth of the findings, and the practice of using AI that is still in its early stages so that it does not fully reflect optimal implementation in the field; therefore, further research is recommended to involve a wider range of subjects and more diverse contexts to obtain more comprehensive results.

CONCLUSIONS

This study confirms that the integration of Artificial Intelligence (AI) into elementary school learning has significant potential to support pedagogical innovation, but its implementation is highly dependent on teacher readiness, including competency, experience, and institutional support. Therefore, strengthening AI literacy, ongoing training, and providing adequate policies and infrastructure are crucial steps to ensure the effective and responsible use of AI in education. Future research is recommended to involve a wider number of subjects, across various educational levels, and examine AI implementation more deeply and longitudinally to gain a more comprehensive understanding of its impact on learning practices.

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R.F.A.: Writing – Original Draft Preparation; Data Analysis; Writing Final Draft

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