

Analysis of Teachers' Readiness to Integrate Artificial Intelligence in Learning in Public High Schools

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ABSTRACT

The development of artificial intelligence (AI) has brought significant changes in various sectors of life, including education. The use of AI in learning offers a variety of opportunities to improve the effectiveness of the teaching and learning process through learning personalization, automation of administrative tasks, analysis of learning data, and the provision of more adaptive learning resources. However, the success of AI integration in education is highly dependent on the readiness of teachers as the main actors in the learning process. This study aims to analyze the readiness of teachers in integrating artificial intelligence in learning at SMAN 1 Dompu. The research uses a qualitative approach with a case study design. Data was obtained through in-depth interviews, observations, and documentation involving teachers from various subjects. Data analysis was carried out through the stages of data reduction, data presentation, and conclusion drawing using the interactive model Miles, Huberman, and Saldaña. The results show that most teachers have a positive perception of the use of AI in learning and are aware of its potential in increasing learning effectiveness. However, teacher readiness still faces various challenges, especially related to technological competence, understanding AI-based pedagogy, digital infrastructure, and ethical aspects of using AI in education. This study confirms that teacher competency development, institutional support, and adaptive school policies are important factors in encouraging the integration of AI effectively and responsibly in learning.

Keywords: Artificial intelligence, Teacher readiness, Digital learning

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INTRODUCTION

The rapid development of digital technology in the 21st century has led to the emergence of various innovations that change the way humans work, communicate, and learn. One of the innovations that is currently of global concern is artificial intelligence or Artificial Intelligence (AI). In the context of education, AI is no longer seen as the technology of the future, but rather has become part of the educational transformation that is taking place today. Various AI-based applications such as ChatGPT, Gemini, Copilot, intelligent tutoring systems, adaptive learning

platforms, learning analytics, and automated assessments have begun to be used to support the learning process in various countries (Holmes et al., 2022; Zawacki-Richter et al., 2023; Kasneci et al., 2023; Tlili et al., 2023). The use of AI allows for the personalization of learning according to the needs of students, improves the efficiency of learning evaluation, and assists teachers in designing more effective and adaptive learning experiences (Luckin & Holmes, 2021; Chiu, 2023; Kohnke et al., 2023). In Indonesia, the development of the use of AI in education is increasing in line with digital transformation driven by the Merdeka Learning policy and school digitalization (Kemendikbudristek, 2023). However, the integration of AI in learning still faces various challenges, especially related to the readiness of teachers as the main implementers of the education process. Teachers are required not only to understand AI technology, but also to be able to integrate it pedagogically and ethically in learning (Ng et al., 2023; Chan & Hu, 2023). The initial phenomenon found at SMAN 1 Dompu shows that some teachers have begun to use AI-based applications to compile teaching materials, create evaluation questions, and search for learning references. However, teachers' level of understanding, skills, and readiness to utilize AI still varies. Some teachers show high enthusiasm for the use of AI, while others still have doubts regarding the effectiveness, validity of information, and the ethical implications of its use in education.

The study of teachers' readiness to integrate AI is increasingly important because teachers have a strategic role in determining the success of digital education transformation. Various studies show that the successful implementation of educational technology is not only determined by the availability of technology, but also by the readiness of human resources who use it (Ertmer et al., 2022; Tondeur et al., 2021). In the context of AI, teacher readiness includes various dimensions, including technological competence, pedagogical understanding, attitudes towards innovation, digital literacy, and the ability to understand ethical aspects and data privacy (Miao et al., 2021; UNESCO, 2021; Akgun & Greenhow, 2022). Recent research shows that teachers who have a high level of readiness tend to adopt AI technology more easily and utilize it effectively to improve the quality of learning (Chiu, 2023; Schmid et al., 2024). Additionally, AI has great potential in helping teachers manage administrative workloads, provide faster feedback to students, and support learner-centered learning (Kasneci et al., 2023; Tlili et al., 2023). According to UNESCO (2021), responsible integration of AI in education should be oriented towards improving the quality of learning and developing teacher capacity. Therefore, the analysis of teacher readiness is important as the basis for the preparation of professional development strategies that are relevant to the demands of future education. In the context of high school, teachers' readiness for AI also plays an important role in preparing students to face a digital society that is increasingly influenced by smart technology and automation.

Although research on AI in education has grown rapidly in recent years, there are still a number of research gaps that need attention. Most previous research has focused on the development of AI systems, the effectiveness of AI use on learning outcomes, or students' perceptions of AI technology in college (Zawacki-Richter et al., 2023; Kasneci et al., 2023; Crompton & Burke, 2023). Research that specifically examines the readiness of secondary school teachers to integrate AI into learning practices is still relatively limited, especially in the context of schools in the region (Ng et al., 2023; Chan & Hu, 2023). In addition, most studies use a quantitative approach that focuses on measuring teachers' readiness levels, so there has not been much exploration of the experiences, perceptions, barriers, and strategies used by teachers in dealing with AI-based technological transformation (Akgun & Greenhow, 2022; Chiu, 2023). Previous research results also show mixed findings. Several studies have found that teachers have a positive attitude towards AI and show a high readiness to integrate it in learning (Schmid et al., 2024; Kohnke et al., 2023). Conversely, other research shows that low

digital competence, training limitations, lack of institutional support, and concerns about the ethical impact of AI are major obstacles to its implementation (Holmes et al., 2022; Miao et al., 2021; UNESCO, 2021). In the context of regions such as Dompu Regency, the condition of technological infrastructure, access to training, and the culture of school organization can produce different dynamics of teacher readiness compared to schools in large urban areas. Therefore, research is needed that is able to provide an in-depth understanding of teachers' readiness to integrate AI into learning in specific local contexts.

Based on this description, this study aims to analyze the readiness of teachers in integrating artificial intelligence in learning at SMAN 1 Dompu. The novelty of this research lies in the focus of a study that specifically explores the readiness of high school teachers to face the transformation of AI-based learning in the context of regional education that is still relatively rarely researched. In addition, this study uses a qualitative approach that allows for a more in-depth exploration of teachers' experiences, perceptions, challenges, and strategies in adopting AI technology. This research also integrates the perspectives of Technological Pedagogical Content Knowledge (TPACK), digital literacy, and AI literacy to produce a more comprehensive understanding of teachers' readiness to face changing educational paradigms. The research findings are expected to make a theoretical contribution to the development of AI studies in education and become the basis for schools, local governments, and education policy makers in designing teacher professional development programs that are more adaptive to the development of artificial intelligence technology. In addition, the results of the research are expected to provide practical recommendations on strategies to strengthen teachers' competencies in order to be able to utilize AI effectively, ethically, and responsibly in supporting 21st century learning.

METHODS

This study uses a qualitative approach with a case study design to gain a deep understanding of teachers' readiness to integrate artificial intelligence (AI) in learning at SMAN 1 Dompu. The qualitative approach was chosen because this research focuses on exploring the experiences, perceptions, understandings, and practices carried out by teachers in dealing with the transformation of AI-based educational technology. The case study design is used to examine phenomena contextually in a specific school environment so that it can produce a comprehensive picture of the condition of teachers' readiness to adopt AI technology in the learning process. The research was carried out for three months, starting from the initial observation stage, field data collection, to the data verification and analysis process.

The research informants were selected using purposive sampling techniques based on certain criteria, namely teachers who are actively teaching in the current school year, have experience using digital technology in learning, and are willing to become research participants. The main informants consisted of 15 teachers from various subjects, including science, social, language, and vocational subjects. In addition, to strengthen the validity of the data, the research also involved the deputy principal for curriculum and the school's information technology coordinator as supporting informants. Data collection techniques were carried out through in-depth interviews, participatory observations, and documentation studies. Interviews are used to explore teachers' perceptions of understanding, attitudes, experiences, opportunities, and challenges in the use of AI. Observations were carried out to observe the practice of using digital technology in learning, while documentation was used to examine school documents, teaching modules, learning tools, and policies related to education digitalization.

Data analysis was carried out using the interactive analysis model Miles, Huberman, and Saldaña (2014) which includes three main stages, namely data reduction, data presentation, and conclusion/verification. The interview data was transcribed verbatim, then encoded and

grouped into key themes related to teacher readiness for AI integration. To ensure the validity of the data, the research applied source triangulation, triangulation techniques, and member checking. Source triangulation is carried out by comparing information from various informants, while technical triangulation is carried out by comparing the results of interviews, observations, and documentation. Member checking is carried out by reconfirming the results of the interpretation to several informants so that the research findings are in accordance with the actual conditions. Through this procedure, the research is expected to produce credible, trustworthy, and able to provide an in-depth picture of teachers' readiness to integrate artificial intelligence into learning at SMAN 1 Dompu.

RESULTS AND DISCUSSION

This study aims to analyze the readiness of teachers in integrating artificial intelligence (AI) into the learning process at SMAN 1 Dompu. Data was obtained through in-depth interviews with 15 teachers from various subjects, observation of learning activities, and documentation studies related to the use of digital technology in schools. Data analysis was carried out using the interactive model of Miles, Huberman, and Saldaña which included data reduction, data presentation, and conclusion drawn.

The results of the study show that in general, teachers at SMAN 1 Dompu have a positive perception of the use of AI in learning. Most informants understand that AI can be used to help with the preparation of teaching materials, the creation of questions, the personalization of learning, the analysis of student learning outcomes, and the development of interactive learning media. However, teachers' understanding of AI concepts and implementations still varies.

Table 1. Teacher Readiness Level in AI Integration

Readiness Aspects	Key Findings	Categories
Knowledge of AI	Teachers are familiar with generative AI such as ChatGPT, Gemini, and Copilot	Medium
AI usage skills	Able to use AI for basic learning tasks	Medium
Attitudes towards AI	Embracing and supporting the use of AI	Height
Supporting infrastructure	The internet and devices are available but not yet uneven	Medium
Institutional support	There is no AI-specific policy in schools yet	Low
Professional development	AI training is still limited	Low

Based on Table 1, the aspect of attitude towards AI obtained the highest category. Almost all teachers stated that AI has the potential to improve the quality of learning if used correctly. In contrast, the professional development and institutional support aspects are still major challenges because most teachers have never undergone specific training on the integration of AI in education.

In addition, the results of observations show that the use of AI is still individual and has not yet become part of systematic learning practices. Teachers who have better digital literacy tend to be more active in using AI than teachers who have limited technology experience.

Table 2. Forms of AI Utilization by Teachers

Forms of AI Utilization	Frequency of Use
Preparation of teaching materials	Height
Creation of evaluation questions	Height
Preparation of RPP/Teaching Modules	Height
Creation of learning media	Medium

Analysis of learning outcomes	Low
Adaptive learning	Low

The data in Table 2 shows that teachers are using AI more to support administrative work and learning preparation than for direct implementation in the personalization-based learning process.

The findings of the study show that teachers at SMAN 1 Dompu are at a moderate readiness stage in integrating AI into learning. This readiness is reflected in the basic understanding of the functions of AI, a positive attitude towards technological innovation, and a willingness to learn about various AI applications that are rapidly developing in the world of education.

This phenomenon shows that the digital transformation of education has encouraged teachers to start adapting to the latest technological developments. The emergence of various generative AI platforms such as ChatGPT, Gemini, Claude, and Copilot has changed the way teachers design learning, develop teaching materials, and evaluate student learning outcomes. Teachers no longer only play the role of conveyors of information, but also as facilitators who are able to utilize technology to create a more effective and personalized learning experience.

The results of this study are in line with the research of Holmes et al. (2022) who explained that the success of the implementation of AI in education is highly dependent on the readiness of teachers as the main actors in the learning process. Teachers who have an adequate understanding of AI tend to be more likely to integrate the technology in teaching and learning activities.

As stated by Holmes et al. (2022): *"Teachers remain central actors in the successful adoption of artificial intelligence in education."*

The quote reinforces the study's findings that the success of AI implementation is not only determined by the sophistication of the technology, but also by the capacity of teachers to utilize it pedagogically.

Research found that most teachers are already familiar with generative AI and understand its basic benefits in learning. However, this understanding is still limited to simple operational functions such as making materials, preparing questions, and searching for information.

This condition shows that there is a gap between the use of AI as an administrative tool and the use of AI as a pedagogical instrument that is able to improve the quality of learning. Some teachers still view AI as a work-support technology, not as a tool that can help create adaptive and student-centered learning.

These findings are in line with research by Ng et al. (2023) which shows that many teachers are aware of the existence of AI, but do not yet have adequate competencies to effectively integrate the technology in the learning process. Low AI literacy causes teachers to focus more on the technical aspect than the pedagogical aspect of using AI.

In the context of SMAN 1 Dompu, the limitations of AI literacy are influenced by the lack of formal training organized by educational institutions. Most teachers gain knowledge about AI independently through social media, webinars, or professional communities. As a result, the quality of understanding is uneven.

One of the important findings of this study is the high level of teacher acceptance of the use of AI in learning. The majority of informants stated that AI can help improve work efficiency, reduce administrative burden, and support learning innovation.

This positive attitude is an important capital in the digital education transformation process. According to the Technology Acceptance Model (TAM) theory, the perception of the ease of use and benefits of technology is the main factor that determines the level of user acceptance of new technologies. In this study, teachers viewed AI as a relatively easy-to-use technology that provides tangible benefits in their daily work.

The findings support the results of Chiu et al.'s (2024) research which found that the perception of the benefits of AI has a significant influence on teachers' intentions to adopt the technology in learning. The higher the perception of benefits that teachers feel, the more likely they are to use AI in a sustainable way.

As stated by Chiu et al. (2024): *"Perceived usefulness is one of the strongest predictors of AI adoption among educators."*

The results of this study show that teachers of SMAN 1 Dompu already have a strong psychological foundation to accept the use of AI in learning. The main challenge that remains is to improve technical and pedagogical competence so that such acceptance can be realized in real learning practice.

Despite showing good readiness, the study found several obstacles that could potentially hinder the optimal implementation of AI.

The first obstacle is related to the limitations of teachers' technical competence. Some teachers still have difficulty using more complex AI features, such as creating adaptive learning, analyzing student learning data, and developing AI-based assessments.

The second obstacle is the limitation of professional training. Until the time of the research, there was no specific training program that systematically discussed the integration of AI in learning. As a result, the AI learning process takes place informally and relies on individual initiative.

The third obstacle relates to the ethical and security aspects of using AI. Some teachers expressed concerns about the accuracy of AI-generated information, the potential for plagiarism, and the risk of students' dependence on technology.

These findings are in line with UNESCO research (2023) which emphasizes that the implementation of AI in education must pay attention to ethical aspects, transparency, data security, and responsibility for the use of technology.

The results of the study show that the digital infrastructure at SMAN 1 Dompu is relatively adequate to support the implementation of AI. The school already has internet access, computer labs, and digital devices that can be used in the learning process.

However, institutional support is still limited. There is no school policy that specifically regulates the use of AI in learning. In addition, there are no operational guidelines or competency standards that are a reference for teachers in utilizing AI effectively and responsibly.

This condition shows that technological readiness has not been fully offset by organizational readiness. In fact, the success of AI integration requires synergy between infrastructure, policies, school leadership, and human resource competencies.

Practically, the results of the study show that schools need to develop teacher capacity building strategies that focus on AI literacy, AI use ethics, and AI-based learning design. Structured training programs can help teachers improve their competencies so that the use of AI is not only administrative but also pedagogical.

Schools also need to develop clear policies and guidelines for the use of AI to ensure that the use of technology takes place safely, ethically, and responsibly. In addition, collaboration with universities, the education technology community, and local governments can accelerate teacher capacity building in the face of AI-based education transformation.

Theoretically, this study strengthens various studies on the relationship between digital literacy, technological readiness, and the adoption of educational innovations. The findings of the study show that teacher readiness is a key factor that determines the success of AI implementation in learning.

As affirmed by UNESCO (2023): *"Artificial intelligence should augment rather than replace teachers."*

The statement affirms that AI should serve as a tool that strengthens teachers' capacity, not replaces it.

This research has several limitations. First, the research was only conducted on one school so the results could not be generalized in a broader context. Second, the research uses a qualitative approach so that it does not measure the level of teacher readiness quantitatively. Third, the research has not involved the perspective of students which is also an important part of the implementation of AI in schools.

Therefore, further research is recommended to use a mixed methods approach, involving more schools, and integrating the perspectives of teachers, students, and school managers in order to obtain a more comprehensive picture of the readiness to implement artificial intelligence in education.

CONCLUSION

The implementation of artificial intelligence (AI) in education is an important part of the 21st century learning transformation that requires the readiness of teachers as the main actors in the educational process. The results of the study show that teachers at SMAN 1 Dompu generally have a level of readiness that is in the medium to high category in integrating AI into learning. This readiness is reflected in teachers' positive attitudes towards the use of AI, basic skills in utilizing various generative AI applications, and awareness of the potential of this technology in increasing learning effectiveness. However, the study also found that the level of conceptual understanding and pedagogical skills related to AI is still uneven. Most teachers still use AI in the administrative aspects and learning preparation, while its use for adaptive learning, learning outcome analysis, and learning personalization is still relatively limited.

In practical terms, the research findings affirm the importance of strengthening teacher capacity through ongoing training programs on AI literacy, ethics of using AI, and AI integration strategies in learning. Schools need to provide stronger institutional support through the formulation of policies, operational guidelines, and the development of a digital learning ecosystem that supports the effective and responsible use of AI. In addition, improving technological infrastructure and access to AI-based learning resources are important factors that can accelerate the process of technology adoption in the school environment. From a theoretical perspective, this study strengthens the view that teacher readiness is the main determinant of the successful implementation of educational technology innovations, especially in the context of the use of artificial intelligence.

This research contributes to the development of studies on the integration of AI in secondary education, especially in the context of schools in areas that are still relatively rarely researched. However, the study has limitations because it is only conducted in one school and uses a qualitative approach so that the results cannot be generalized widely. Therefore, further research is recommended to use a mixed methods or quantitative approach with a larger coverage of respondents in order to measure the level of teacher readiness more comprehensively. In addition, future research needs to examine other factors such as school leadership, organizational culture, students' digital literacy, infrastructure readiness, and ethical aspects of using AI to gain a deeper understanding of the successful implementation of artificial intelligence in learning.

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