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Analysis of Elementary School Teacher Readiness in Integrating AI Technology in the Learning Process

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Abstract

This study aims to analyze the readiness of elementary school teachers to integrate Artificial Intelligence (AI) technology into the learning process. The background of the study stems from the increasingly rapid development of educational technology, which demands teachers' adaptability, particularly in utilizing digital media and AI-based applications. The study used a qualitative descriptive approach, involving teachers at Elementary School 28 Katobengke as subjects. Data were obtained through interviews, observations, and documentation studies, then analyzed thematically. The results showed that teachers have positive attitudes and basic skills in using digital platforms such as Canva, Quizizz, and YouTube. However, their readiness is still hampered by limited infrastructure, differences in adaptability, and suboptimal institutional support. The study concluded that teacher readiness is influenced by three main aspects: technical, pedagogical, and institutional readiness.

Keywords : Teacher Readiness, AI Technology, Elementary Schools, Digital Learning

INTRODUCTION

Education in Indonesia has a long and complex history, influenced by various social, political, and cultural factors. Education in Indonesia is informal, typically transmitted orally. In the 19th century, education evolved into formal education, while at that time, the introduction of learning processes in society was very limited (Mulyasa 2017). The government emphasized that education is a priority for citizens. Education within it has different systems, including elementary, middle, and high school, as well as higher education, which includes formal education and non-formal education, which includes courses and training aimed at improving skills and knowledge. Education faces the following challenges: first, access and quality to address disparities, particularly between regions, urban and rural. Second, a lack of resources; many schools in remote areas lack facilities and have a low-quality teaching staff. Third, a relevant curriculum requires curriculum changes, balanced with ongoing teacher training.

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Education has undergone reforms since the early 2000s to improve the quality of the learning process, including implementing a curriculum focused on character and skills development (Dekdinas, 2021).

Elementary School (SD) education, as explained in the national education system, aims to provide children with the basic knowledge, skills, and attitudes needed to continue on to higher education. Elementary school education was reserved for elite children during the colonial period, while during the independence period after the proclamation of independence in 1945, regulated by Law No. 4 of 1950, compulsory education is a six-year program aimed at developing children's character, moral, ethical, and social values, and basic skills such as reading, writing, and arithmetic. Elementary school education in the development of information and communication technology has an important aspect of progress, namely the development of AI-based tools and applications that include adaptive learning, chatbots, and learning management systems, and requires adequate internet accessibility, one of which opens opportunities for students to utilize online educational resources supported by AI, elementary school is a place where students who are still able to be measured with initial skills. Therefore, the introduction of the use of AI technology in learning must meet the need for adaptive learning, that is, where the material can be adjusted to the needs and abilities of each student (Vasileva, 2020). In addition, it can support various learning styles so that teachers can identify students' learning styles and provide effective learning methods. The introduction of AI-based learning for students and educators will also face challenges and considerations, that teachers must be ready and follow adequate guidance or training to implement technology in learning, so that students have ethics and privacy in using AI responsibly (Muyonga et al, 2004).

Learning using AI in elementary schools requires students to develop skills, one aspect of which is enhancing the learning experience. Therefore, the use of AI has limits that are easy to implement for students. Technologies that support the learning process include adaptive learning based on the Khan Academy platform, which contains a variety of materials presented according to the curriculum. Educational chatbots to facilitate answering questions and completing assignments, such as the Dulingo application in foreign languages, game-based learning applications such as Prodgy Math, which teaches mathematical concepts, Moodle for teachers to manage classes and facilitate student interaction, Gradescope for teachers to assess assignments and exams, and Amazon Alexa to help students find various information.

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Learning can help students improve learning outcomes with AI, but the success of this integration depends heavily on teachers' readiness to use technology. Integrating AI technology is crucial for the successful implementation of new learning methods, which will be seen as encompassing teachers' knowledge, skills, and attitudes towards technology use.

Katobengke 4th State Elementary School is one of the educational institutions in the area, which has a role in producing the next generation in facing global challenges. Looking at the social and economic background of the area, this study is expected to provide insight into how teacher readiness in integrating AI technology can affect the quality of education in the school. With the title **"Analysis of Elementary School Teacher Readiness in Integrating AI Technology in the Learning Process"**

Literature Review

Understanding Teacher Readiness

Teacher readiness to integrate technology, particularly Artificial Intelligence (AI), into the learning process is a condition in which teachers possess the knowledge, skills, and positive attitudes necessary to use this technology effectively in teaching. According to Ertmer (1999), teacher readiness consists of two main aspects: technical readiness and pedagogical readiness. Technical readiness encompasses teachers' ability to use technological devices and applications, while pedagogical readiness relates to teachers' ability to design and implement learning strategies that utilize technology.

The Importance of AI Technology Integration in Learning

The integration of AI technology in learning has many benefits, including: Personalized Learning: AI can analyze student data and provide materials tailored to individual needs, thereby increasing learning effectiveness (Luckin et al., 2016). Interactivity: AI technology can create more interactive learning experiences through tools such as chatbots, game-based learning applications, and simulations (Woolf, 2010). Teaching Efficiency: AI can help teachers manage time and resources, as well as provide students with quick feedback on their progress (Brynjolfsson & McAfee, 2014).

Dimensions of Teacher Readiness to Integrate AI Technology

Teacher readiness can be analyzed through several dimensions, as follows:

1. Technological Knowledge

Knowledge of AI technology is crucial for teachers. According to Koehler and Mishra (2009), teachers need to understand how technology can be used to support learning. This includes knowledge of relevant AI applications, how the technology works, and its impact on the learning process.

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2. Technological Skills

Practical skills in using technology are key to successful integration. Teachers must be able to use AI-based software and tools and integrate them into their lesson plans. According to Inan and Lowther (2010), these skills include the ability to apply technology in appropriate pedagogical contexts.

3. Attitudes Toward Technology

Positive attitudes toward technology can influence teachers' readiness to integrate AI into learning. Teachers who believe that technology can enhance learning tend to be more open to adopting new technologies (Teo, 2009). Conversely, teachers who are skeptical of technology may be reluctant to use it.

4. Relevant Theories

Some educational theories relevant to this study include: Constructivism theory emphasizes that students construct their knowledge through experience and interaction. AI can support this approach by providing an interactive and adaptive learning environment, allowing students to learn at their own pace and style (Piaget, 1973).

The TPACK (Technological Pedagogical Content Knowledge) model explains the importance of integrating content knowledge, pedagogy, and technology. Teachers ready to integrate AI must have a good understanding of these three components and how they interact (Mishra & Koehler, 2006).

5. Diffusion of Innovation Theory

This theory explains how innovations, including new technologies, are accepted and adopted within a system. Factors such as communication, social support, and prior experience can influence teacher readiness to integrate AI into learning (Rogers, 2003).

Factors Influencing Teacher Readiness

Several factors that can influence teacher readiness to integrate AI technology include Training and Professional Development. Appropriate training is crucial to improving teacher readiness. Training programs focused on the use of AI technology in learning can help teachers develop the necessary skills and knowledge (Darling-Hammond et al., 2017).

Access to Technology: The availability of adequate devices and internet connections in schools significantly impacts teachers' ability to use technology. Schools that provide a strong technological infrastructure will facilitate teachers' integration of AI (Hsu et al., 2013). Support from school management and colleagues also plays a crucial role in teacher readiness. An environment that supports innovation and the use of technology will encourage teachers to be more prepared to adopt new technologies (Ertmer & Ottenbreit-Leftwich, 2010).

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Teachers' prior experience using technology in their learning can influence their readiness to use AI technology. Teachers who have positive experiences with technology tend to be more confident in integrating it into their learning (Teo, 2011).

METHOD

This research uses a quantitative approach with a case study method. This approach was chosen to gain in-depth insight into how AI technology can be integrated into the context of learning in Elementary Schools. which was carried out by researchers Lecturers at the Muslim University of Buton, PGSD Study Program with the aim of Identifying the level of teacher readiness in integrating AI technology in learning., To Analyze the factors that influence teacher readiness at Elementary School 28 Katobengke. And To Provide recommendations for teacher professional development in the use of AI technology in the classroom.

RESULTS AND DISCUSSION

This research was conducted at Baubau 28 Public Elementary School, Katobengke Village, Betoambari District. The data generated came from learning observations and interviews with several teachers at Baubau 29 Elementary School. Based on observations conducted by researchers during the learning process and interviews with school residents as sources, the answer was obtained that learning had been implemented using digital technology both from the media and the models applied, but there were several factors that hampered teachers, namely adaptation to technology was still minimal for implementation.

1. Teacher Preparation for Integrating AI Technology into the Learning Process

Observations of several classes, including Grades Three, Four, and Five at Baubau State Elementary School 28, revealed that teachers demonstrated good communication skills and engaged in discussions with students. They engaged in engaging with students, and their language style made the material easy to understand. During the lessons, teachers used simulations such as Canva, WhatsApp, Qiuziz, and projectors. They also created engaging worksheets (LKS) and demonstrated theories through YouTube video projections on an LCD projector.

Following the observation, interviews with teachers at Katobengke State Elementary School 28 revealed that media were prepared before the teacher began independent learning. Teachers

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prepared materials to suit classroom conditions. They also prepared assessments and arranged seating for students to facilitate comprehension. The teaching modules were prepared one week prior to the meeting. The teacher as a resource person explained that he had participated in an AI-based learning webinar and the modules used, so he was not confused when looking for AI technology that supports the learning materials being implemented, he explained that the use of AI technology in classroom learning really requires good teachers to understand the situation of students when learning through technological portal media, not that the teacher is successful in using it, so the resource person concluded that group learning is easier, so that teachers can easily evaluate students not only liking AI technology, but understanding the connection of material in AI technology, for example, students also do simulations by working on questions in the learning media. Meanwhile, the resource person who teaches in the fourth grade, said that, "I think the learning that we integrated in the class is very effective, especially every day we use it, however, what is less supportive is the interactive media used by students such as cellphones is very limited, so 100% of the simulation of the teacher's media uses it, such as interactive PPT so it is quite effective when studying in groups, meaning that representatives of each group simulate students using the teacher's cellphone, and the school also has a policy that students are not allowed to bring cellphones." However, this situation provides teachers with various strategies that are always effective so that students can easily understand the material presented, so that the habit of using various digital technologies makes teachers have skills and there are no difficulties, besides that their young age makes them able to adapt to current digital developments. The second interview was conducted with a fourth-grade teacher, the use of AI technology in the classroom is to prepare media in advance before starting learning with a duration of one to three days, the third-grade students are still in the childish stage, emphasizing the creative learning aspect so that learning is not too serious but combined with playing games, so that students do not get bored quickly with AI technology, according to the source, the lack of SD Negeri 28 Baubau is facilities such as projectors that are used alternately

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with teachers on other class schedules, the class teacher said, "I happened to have attended training using Canva, but I often look for new media from YouTube and TikTok, so it helps me in overcoming this, and some games that I combine in the use of media such as Quiziz and using songs. Teachers have knowledge gained from these habits for learning, but Canva and YouTube are more important. The third interview was conducted with the fifth grade teacher, regarding the preparation of learning that it was complete, had been provided before use, discipline and responsibility had been implemented both in terms of tasks and responsibilities, the teacher explained that there was a difference when using digital and conventional media in the fifth grade because the material was prepared for the exam when moving up to the sixth grade, so it needed the right media.

Barriers to Integrating AI Technology into the Learning Process

Observations revealed that several subjects were effective in explaining realities in their environment, such as natural sciences, including photosynthesis and the environment. Teachers were also teaching and utilizing existing digital technology. Furthermore, infrastructure and facilities at State Elementary School 28 Baubau were inadequate, with only one projector, one computer, and a Wi-Fi connection available. Teachers explained that the learning process using AI technology was very effective when implemented, but the infrastructure was inadequate.

Interviews with non-teaching staff members at the school revealed similar opinions, highlighting the primary factors: inadequate infrastructure and age, which hindered the optimal integration of digital technology. Another teacher explained that elementary school students were not yet required to use mobile phones during learning, except for the teachers' phones. However, not all parents had the opportunity to lend mobile phones during learning, especially for students who required close supervision. Therefore, it is necessary to resolve the obstacles in the form of solutions so that teachers can carry out learning that is integrated with technology well and educators can experience new learning.

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Discussion

A teacher who masters AI technology requires professionals who can direct portal-based media with each learning material. The learning process runs well because of the presence of professional teachers. That teachers must adapt to the learning environment in general in the era of globalization where the era of AI-based system contributions requires teachers to be prepared to introduce AI. Research results (Pipit Novianta, 2024) explain that the presence of AI first helps teachers understand the differences in student character from their experiences, because the learning process is from the surrounding environment. Second, it can improve communication in the learning process, one of which is with game platforms such as Quiziz. Third, the advantage for educators is finding strategies in learning activities to facilitate assessment in the form of field assessments. This can be seen that education also needs technology to increase accessibility, and new innovations according to the curriculum. Educators must be ready to use AI technology to be able to understand the advantages and disadvantages of using it. Research Results (Gleneagle, 2024) Some AI used by teachers can assist in creating materials, and students can complete their assignments, as well as improve student learning outcomes. However, the use of AI technology has risks, namely a lack of critical thinking and weakness in providing solutions based on one's own thinking style.

The learning process in the classroom, as a professional teacher, the main assessment is the development of students in managing innovative knowledge, intelligence with higher memory. In research (Adi Kusumo, 2023) that the use of AI can improve the quality of students in indicators of knowledge and intelligence, involving several AI technologies such as Canva, Quillbolt, Chat GPT, Natural Reader and Movavi Screen Recorder, while specifically at SD 28 Negeri Katobengke teachers implemented learning using AI media from Canva, Quiziz, students' attention in class was very responsive according to the teacher's planned learning objectives. Observations from third, fourth, and fifth grades revealed the most prominent, enjoyable, and innovative communication between students and teachers in finding solutions.

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AI-based learning implemented by teachers is not only seen from the facility perspective and the ability to make students enjoy seeing something new. It also requires a competent teacher with a positive mindset, namely that the purpose of using AI is to remain focused on the needs and well-being of students, providing understanding, as in research (Sulistiyani Nur, 2025), which explains that teachers must have a strong sense of opportunity to find solutions and provide guidance when facing problems in the classroom, such as helping students solve their own problems according to their abilities. Teachers must be competent in implementing ethical AI use, as explained in research (Gandasari Fatimah, 2024), which explains that deviations and problems faced by many students are the highest primary plagiarism in the Chat GPT platform. This is a violation of the provisions for scientific writing. Elementary schools are urgently needed AI pedagogical competence to provide guidance to students to be careful in using AI facilities such as mobile phones.

The competence of a teacher in using AI technology is primarily seen from the implementation of the curriculum used by the school, for SD Negeri 28 Katobengke the curriculum used is the independent curriculum, which directs that teachers are able and understand digital technology into learning, thus requiring teachers to develop media that is interesting enough for students, this is a challenge in the learning environment, in research (Soleha, 2024) there are several challenges to implementing the independent curriculum, namely limited resources that textbooks are in accordance with the curriculum, technological devices, and innovative teaching materials, guidance and implementation training for teachers to implement changes in the regular curriculum to the independent curriculum, low levels of evaluation and inconsistent assessment that only focus on traditional assessments according to the independent curriculum standards only focus on the knowledge domain that ignores the creativity domain, mismatch of assessment instruments, so that the independent curriculum requires teachers to create contextual learning that requires the help of AI technology. Based on research results (Damayanti, 2025) The use of AI technology in the independent curriculum

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through the creation of teaching modules has proven to be very good and easy to create by 26 teacher participants out of 54 people who participated in making modules, AI technology uses the link.tree, chatGPT, and Eduaide platforms. Research conducted by SD Negeri 28 Katobengke shows that the teaching modules used by teachers are still in the process of adaptation stages with the teachers' existing knowledge.

The involvement of teachers in the use of AI technology for students in order to implement technology-integrated learning requires teachers to have the ability and skills in understanding developing technology, in addition to the facilities and infrastructure used in the learning process, so flexible and accurate training is needed for teachers at SD 28 Negeri Katobengke and requires the role of government institutions to solve existing problems.

Conclusion

Based on research conducted at Katobengke 28 Elementary School, it can be concluded that teacher readiness to integrate AI technology into the learning process is still developing. Teachers demonstrated positive attitudes and basic skills in utilizing digital media such as Canva, Quizizz, YouTube, and other AI-based learning applications. This demonstrates an awareness of the importance of technological innovation in supporting effective learning.

However, several major obstacles remain, including limited infrastructure (such as projectors, computers, and internet connections), limited student access to devices, and varying teacher abilities in adapting to technology. Age and experience also influence the level of acceptance and mastery of AI in learning.

In general, this study confirms that the success of AI integration is strongly influenced by three main aspects: technical readiness (mastery of devices and applications), pedagogical readiness (ability to manage technology-based learning), and institutional support (infrastructure, training, and school policies). By strengthening these three aspects, the use of AI in elementary schools has significant potential to improve learning quality, process efficiency, and active student participation in class.

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