





## Teachers' Perceptions of the Utilization of Artificial Intelligence (AI)-Based Learning Media in Elementary Schools


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### Abstract

The perceptions of elementary school teachers are the main focus of this research, particularly regarding the use of Artificial Intelligence (AI) as a learning support medium in the classroom. This research involved two classroom teachers and used a qualitative approach through interviews, observations, and documentation to describe teachers' acceptance, understanding, and assessment of AI utilization. The research findings indicate that AI is primarily used for creating questions, student worksheets, and interactive media such as Wordwall, Canva, and learning videos. The teacher stated that AI helps speed up the process of preparing materials and increases student attention and engagement due to more appealing visual presentations. However, this study also found limitations such as limited technological facilities, a lack of shared devices, and the risk of student dependence if AI is used excessively. Additionally, differences in training experience affect teachers' understanding of AI usage, particularly in their ability to create appropriate prompts. Overall, AI is considered to provide significant benefits in terms of learning efficiency and quality, although it still requires wise management, improved teacher competency, and the provision of adequate supporting facilities for its optimal and sustainable utilization.

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## Introduction

The ever-evolving world of education demands that teachers no longer simply deliver material but encompass a variety of responsibilities that require high professional competence and adaptability. A teacher has various roles, such as teaching, directing or guiding, managing learning, giving instructions or being an initiator, being a facilitator, providing advice and support or motivation, and evaluating their students to develop their interests and talents, broaden their horizons, and build student character (Awiria et al., 2025; Yasin et al., 2023). According to Mukarromah and Andriana (2022), teachers have the ability to conduct learning, understand their students, design the learning process, provide evaluations of student learning outcomes, and develop their own potential. In the role of facilitator, teachers must help students accept and understand the lesson material (Yestiani & Zahwa, 2020). As a facilitator, teachers must also understand and develop learning media to convey information to students (Nurwahyuni & Tabrani, 2025; Nurzannah, 2022).

Today's teachers are not only responsible for delivering material but must also adapt to technological advancements and student needs by using digital tools, interactive multimedia, project- and problem-based learning models, and creative methods like gamification to enhance student motivation and engagement (Sabaruddin et al., 2025; Salimi & Fauziah, 2023). This innovation is crucial to ensure learning remains relevant to the challenges of the digital era, which requires teachers to improve their digital literacy in selecting and managing learning media. As explained by Anggraini et al. (2024), the integration of technology and teacher creativity significantly impacts the quality of learning. In line with this, Mashah et al. (2024), emphasized the importance of developing teachers' digital skills through continuous training and school facility support, although there are still obstacles such as limited resources and a lack of technical assistance. Siregar et al. (2024), also emphasize that digital literacy is key to the successful implementation of Technological Pedagogical Content Knowledge (TPACK), as teachers who are more skilled in technology can integrate media, methods, and materials more effectively to create engaging and contextually relevant learning.

When discussing the realm of technology, Artificial Intelligence emerged in the digital era to solve problems in the learning process, such as differences in students' learning styles and limitations in teacher resources Iryanto (Putra et al., 2024). AI is a technology that enables machines to perform tasks that typically require human intelligence, such as learning, planning, and problem-solving (Fatimah & Octaviani, 2023). Various forms of innovation have been implemented in education, particularly in science subjects at the elementary school level. AI technology not only helps teachers present material more interactively but also gives students the opportunity to participate in personalized and adaptive learning through simulations, games, and direct interaction (Aini et al., 2024; Astutik & Elviana, 2025).

The research findings of Nitasari and Lastuti (2025), indicate that AI-based interactive video media is considered valid, practical, and effective in Indonesian language learning because it is able to increase student participation and literacy skills. Similar findings were also obtained in the research by Saraswati et al. (2024), which revealed that the AI Bing Image Creator media can increase students' interest, motivation, and storytelling abilities, as the visuals generated are able to spark ideas and courage to tell stories in front of the class. Additionally, another

study by Ainiyah et al. (2024), confirms that the utilization of AI in learning contributes to increased teaching effectiveness through personalization, interactive material development, and real-time feedback, although its implementation still faces constraints such as limited teacher training, technological facilities, and potential student dependence if not used wisely.

The concept of teacher perception needs to be further understood as the basis for this research. According to Nisa et al. (2023), perception is the process by which an individual selects, organizes, and interprets various stimuli they receive, resulting in a meaningful understanding or image of their surrounding environment. Ananda (2020), define perception as the process of organizing and interpreting stimuli received through the five senses, which is related to an individual's relationship with their environment, resulting in an interpretation and meaning of the observed object. Meanwhile, perception is how a person sees something (Wardana et al., 2018). Perception has three indicators: absorption or reception of external stimuli or objects received through the five senses, resulting in an image in the brain; understanding or comprehension of the object formed through the process of interpreting that image; and individual evaluation of the object after understanding is formed (Walgito, 2010).

National education policy states that the use of technology should be an integral part of learning in schools. Law Number 20 of 2003 concerning the National Education System, Article 36 paragraph (3), states that curriculum development needs to keep pace with advancements in science and technology to ensure education remains relevant to the needs of the times. Many educational institutions in Indonesia are starting to use AI in independent learning and thru government and private programs. The results of a survey conducted by the Ministry of Education, Culture, Research, and Technology (Kemendikbudristek) show that as digital infrastructure and digital education transformation policies improve, the use of AI technology in the education sector continues to increase (Kemendikbudristek, 2023). This is also supported by initiatives such as Merdeka Belajar and Digital Learning Transformation, which encourage the integration of technology into the curriculum and learning management (Syahria & Darlis, 2025).

However, various previous studies have shown that the implementation of AI in schools still faces several obstacles. In the study by Luon et al. (2025), at St. Arnoldus Janssen Catholic High School in Kupang, several obstacles were revealed, including limited internet access, AI output that is not always relevant to the school's learning context, and the need for curriculum adjustments. This condition confirms that the effectiveness of AI implementation in education is highly influenced by teacher readiness, the availability of technological infrastructure, and ongoing training support. Additionally, research conducted at Madang State Elementary School by Fitri and Iswatiningsih (2025), indicates that the implementation of AI in learning is not yet optimal due to limitations in devices and internet networks, low digital competence of teachers, a lack of specialized training, and the absence of school policies that systematically and sustainably support AI integration.

Based on research by Musdalifa et al. (2024), primary school teachers' perceptions of using AI in mathematics learning show benefits such as personalized learning and classroom management efficiency. However, that research was based on a literature study, so it did not yet reflect the real conditions in the field or the teachers' direct experiences when using AI media, unlike this study which directly explores primary school teachers'

experiences in using AI-based learning media. Furthermore, research by Putri et al. (2025), also examined primary school teachers' perceptions regarding the implementation of AI and coding in the curriculum, but its research object was limited to one teacher and did not examine the practice of using AI-based learning media in the classroom, whereas this study explores the concrete utilization of AI media, including how teachers recognize AI, forms of use in the classroom, and the obstacles they face. Meanwhile, research by Sudirman et al. (2025) used a quantitative approach to analyze PAI teachers' literacy and attitudes toward AI but did not highlight the use of AI media as a learning tool or the technical barriers in primary school environments. This differs from the current study, which focuses on AI-based learning media and teachers' empirical experiences in their application. Thus, this research offers a more specific and useful perspective on how elementary school teachers use AI media.

The urgency of this research lies in the need to understand the readiness and acceptance of elementary school teachers toward the use of AI-based learning media, which are increasingly being introduced into educational practice. Although technological advancements drive innovation in the teaching and learning process, its implementation remains highly dependent on the perception and readiness of teachers as instructional decision-makers. The mismatch between the availability of technology and teachers' ability or willingness to use it can hinder the effectiveness of learning. Therefore, this research is important to conduct in order to provide a factual overview of how teachers interpret, assess, and perceive the benefits and obstacles of using AI-based media in the classroom, so that the results can serve as a basis for developing training programs, school policies, and more targeted technology implementation directions.

Based on the background above, this research aims to answer several key questions regarding the utilization of Artificial Intelligence (AI) in elementary school learning. These questions include:

- 1) what is the form of teachers' acceptance of using AI-based learning media;
- 2) why does teachers' understanding of AI-based media need attention in the implementation of learning;
- 3) how do teachers assess the effectiveness of using AI-based media in supporting the learning process.

In line with this question, this research aims to examine primary school teachers' perceptions of the use of Artificial Intelligence (AI). This includes:

- (1) teachers' acceptance in capturing and responding to various information related to this technology;
- (2) teachers' understanding of the concept and its application in teaching and learning activities;
- (3) as well as teachers' assessment of the effectiveness, benefits, and potential obstacles that may arise in its implementation in the primary school environment.

## **Method**

### **Research Design**

This research uses a qualitative method with a case study approach. According to Waruwu (2023), qualitative research is a research process that utilizes narratives or the use of words to explain and understand the meaning of a particular phenomenon, symptom, or social condition. Qualitative methods involve a variety of techniques, all of which emphasize the analysis of qualitative data. This type of data is descriptive and generally takes the

form of "text" or "images," not numbers. Due to its unstructured nature, this data can provide in-depth insights for research exploring questions like "why" and "how." These characteristics of qualitative data make qualitative methods very suitable for understanding complex human behavior and experiences (Ardic et al., 2025). A case study is an empirical investigation that explores contemporary phenomena in the context of real-life settings, as stated by Yin (Nur'aini, 2020). The descriptive case study method was chosen because it is capable of deeply and accurately describing teachers' perceptions of the use of Artificial Intelligence (AI)-based learning media in elementary schools, allowing the researcher to comprehensively uncover teachers' acceptance, understanding, and assessment aspects through contextual data based on real-world experiences.

### **Participants**

The participants in this study were two classroom teachers, specifically a 4th-grade and a 5th-grade teacher who taught at SDN 07 in Serang City. Participant selection was done using purposive sampling techniques. Purposive sampling is the process of selecting a population sample where the researcher chooses study participants based on their presence in the target population, characteristics, experiences, or other criteria (Stratton, 2024). The participant criteria for this study are teachers who have experience using Artificial Intelligence-based learning media in the classroom. This selection technique was chosen because participants who meet the criteria are considered capable of providing relevant and in-depth information, thus aligning with the research objective of uncovering teachers' perceptions of the utilization of AI media in elementary school learning.

### **Data Collection Techniques**

The data collection techniques used are interviews, observation, and documentation. Interviews are conducted to obtain information directly from respondents regarding the necessary data. Structured interviews are highly standardized, following a predetermined set of questions asked in the same order to all participants (Chand, 2025). Observations were conducted by the researcher visiting the school directly to observe the conditions and activities related to the research focus. Non-participant observation involves the researcher taking a separate role in the context they are studying (Chand, 2025). Meanwhile, documentation is used as an indirect data collection technique, namely by gathering various documents such as photos, notes, archives, reports, or official documents relevant to the research. Document analysis is a qualitative research method that involves the systematic examination and interpretation of documents to gain insights into a specific phenomenon (Chand, 2025).

### **Data Analysis Techniques**

The data analysis used in this study employed the Miles & Huberman (1994) model, which includes four main stages: data collection, data presentation, data condensation, and conclusion drawing and verification. These stages unfold gradually, starting with the collection of data in the form of descriptive narratives, which are then organized and simplified to identify information patterns. Next, the data is presented in various formats to facilitate understanding and decision-making. In the condensation stage, the data is focused, summarized, coded, and developed into categories until a clear structure of findings is obtained. The final stage is drawing tentative

conclusions that will be validated if supported by consistent evidence, resulting in credible findings that align with the research focus. Furthermore, the validity of data in qualitative research is the alignment of the concepts of validity and reliability with the characteristics and paradigm of qualitative research (Husnullail et al., 2024). To ensure the validity of the data obtained, examination techniques based on specific criteria are required. These four criteria include: credibility, transferability, dependability, and confirmability. This testing is conducted to ensure the data is suitable for use as a basis for scientific research, as stated by Hwain (Husnullail et al., 2024).

## Results

The analyzed results of the interviews and documentation provide a comprehensive overview of how teachers view the implementation of Artificial Intelligence (AI)-based learning media in elementary schools. This analysis not only serves as a basis for understanding teachers' experiences and perceptions but also provides a foundation for formulating research problem statements that remain aligned with the study's objectives and focus. Based on field findings, it is known that although 19 teachers have participated in training on the use of AI technology, its utilization in learning is still uneven. Only high-level class teachers are starting to implement it. There are two teachers, one for 4th grade and one for 5th grade, who actively utilize AI as a learning tool, representing approximately 10.53% of the total participants. This condition confirms the gap between training and field practice, making teachers' understanding of AI usage an important aspect to explore further. Considering the overall context, the researcher formulated the research problem, which includes: 1) what is the form of teachers' acceptance of the use of AI-based learning media; 2) why teachers' understanding of AI-based media needs attention in the implementation of learning; 3) how do teachers assess the effectiveness of using AI-based media in supporting the learning process.

### Teachers' Acceptance of Using AI-Based Learning Aids

Based on the results of interviews conducted with 4th-grade teachers, the teachers participated in AI usage training programs organized by the government. The teachers stated that when they first tried to implement it, they still felt unfamiliar because AI technology was still relatively new to them. However, after several trials of its use, interest arose in developing the utilization of this technology in learning. Next, interviews were also conducted with a 5th-grade teacher who stated that they initially experienced confusion and difficulty adapting to the use of AI. However, after attending several training sessions, the teacher began to understand the ease provided by this technology in supporting the learning process. The 5th-grade teacher revealed,

*"Initially, I attended the Google Gemini Academy 2024 Dissemination Program training organized by the government, which was also at the suggestion of the principal who nominated me. Since then, I've become even more interested and feel that the existence of AI can help me in my role as a teacher."*

The observation results in class 4 showed that during learning, the teacher used video learning media sourced from YouTube, displayed on a Smart TV, to explain fractions. After the video screening, the teacher provided further explanation to the students. However, at the time of observation, no other learning media were seen being used that would prove the presence of AI in the classroom. Meanwhile, the results of observations and interviews

in class 5 indicate that teachers actively participate in professional development through training and regular meetings organized by the principal. The teacher also presented evidence in the form of a certificate of participation in the Google Gemini Academy 2024 Dissemination Program, organized by the government in collaboration with Google and REFO. During the interview session, the teacher explained their initial experience with AI technology in a sequential manner without long pauses, accompanied by enthusiastic expressions such as smiles and changes in intonation, especially when describing what they considered interesting parts. The observation results are supported by documentation of the teacher conducting a routine meeting about AI usage, as well as certificates of program participation (see Figure 1 and Figure 2).



Figure 1. Certificate for 5th Grade Teacher as a Resource Person



Figure 2. Certificate for 4th Grade Teacher as Participant

### Teachers' Understanding of the Use of AI-Based Learning Aids

Based on the interview results with the 4th-grade teacher, the teacher stated that they had only recently begun to learn about the use of AI in teaching and were still learning how to use some simple AI tools. Therefore, the teacher's understanding of using AI media was not yet fully mastered. The teacher revealed,

*"I'm also just starting to get to know AI, especially in learning, and I'm still learning how to use some simple AI tools like AI Canva or Google Gemini to help create teaching materials and questions."*

Unlike the 5th-grade teacher who stated that after attending the training and conducting several experiments, they were initially confused because the results they obtained differed from the examples created by other users. However, through repeated practice, the teacher began to understand the methods and strategies for crafting the right prompts, allowing them to tailor the results to meet specific needs.

The observation results indicate that teachers still manually prepare lesson plans, following the format from the Teacher and Education Personnel platform and adjusting them to the city-level learning achievements. During the observation of 4th-grade learning activities on fractions, the teacher used YouTube videos as an introduction before providing additional explanations. The teacher then used a touchscreen Smart TV for group exercise, although they still seemed to be getting used to operating the digital pen and eraser features on the device. Observations were also made on 5th-grade teachers, and it was found that AI was used limitedly for creating questions and student worksheets, while direct application of AI in teaching was not yet evident. The teacher also showed the use of Wordwall and Canva media as learning support through screenshot evidence (see Figure 3).



Figure 3. Creating Interactive Learning Media Using Canva

Additionally, two teachers were observed to have different levels of experience regarding AI usage training, particularly in the "Effective Prompts" material, where the 4th-grade teachers participated in the training as attendees, while the 5th-grade teachers served as resource persons for their colleagues. This finding illustrates the variation in teachers' skills and experience in implementing AI in school settings. The observation results are supported by documentation of the use of interactive learning media such as Canva, Wordwall, and the use of AI as a supplement to learning media (see Figure 4, Figure 5, and Figure 6).



Figure 4. Interactive Learning Media Creation Using Wordwall



Figure 5. Application of Gemini AI as a Means of Creating Learning Media

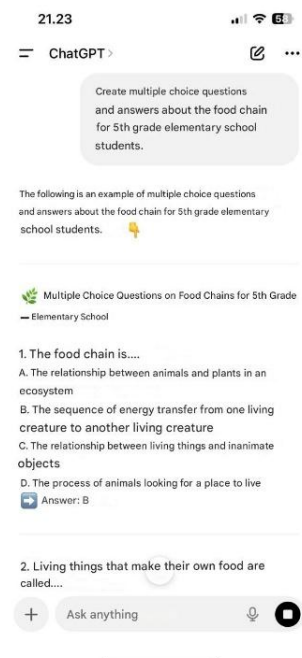


Figure 6. Application of ChatGPT as a Tool for Creating Learning Media

## Teachers' Assessment of the Use of AI-Based Learning Aids

Teacher assessment of the effectiveness of AI as a learning aid refers to several indicators commonly used in teaching practice, such as student engagement, material comprehension, learning motivation, deficiencies in material delivery, and the suitability of the media with learning objectives. The 4th-grade teacher explained that the use of AI is considered capable of improving students' understanding because its presentation is more engaging and can provide direct examples. Additionally, AI is also believed to increase students' learning motivation by offering a more interactive learning experience compared to just listening to the teacher's explanations. This is supported by the statement of the 5th-grade teacher, who said that AI is very helpful in preparing questions and student worksheets because the process is faster and more practical. After entering specific commands, teachers can obtain results that are then customized according to their needs. A 5th-grade teacher said,

*"AI is very helpful for me in creating questions and student worksheets. The process is faster and more practical; I don't have to think too long because I just enter the command, and the results can be adjusted later. Hopefully, with the help of AI, it will be easier for children to find information and use it wisely."*

The observation results from teaching in class 4 show that during learning using Smart TV-based interactive media, students demonstrated active engagement. They paid attention to the teacher's explanation, responded to questions, and participated in the practice exercises displayed on the screen. While the teacher was still getting used to certain features, such as the eraser function, some students helped point out where those features were located. Most students were also able to answer the questions correctly. Observations of school facilities show that the availability of technological devices is still limited. Laptops are used on a rotating basis because not all teachers have personal devices, and there is only one Smart TV, so it must be used on a rotating basis between classes. Both teachers believe that AI has the potential to support the learning process through engaging visual presentations, which helps students understand the material faster and stay more motivated during lessons. However, the 5th-grade teacher cautioned that excessive use of AI could lead to dependence and decrease students' reading interest. Additionally, teachers hope that the future use of AI can be equipped with security features such as age filters, as well as improvements in teacher skills and technological facilities, including devices and networks, so that technology-based learning can run more effectively. The observation results are supported by documentation of learning activities that show the students' enthusiastic attitude during learning using interactive media.

## Discussion

### Teachers' Acceptance of Using AI-Based Learning Aids

The results of a study on teachers' acceptance of Artificial Intelligence (AI)-based learning media integration show that, in general, teachers exhibit a positive attitude toward the use of this technology in the educational process, especially in elementary schools, where AI offers pedagogical benefits such as personalized learning, instant feedback, and a reduction in administrative workload. Empirical findings from an international study by Cabero-Almenara et al. (2024), reveal that high acceptance rates are achieved when teachers perceive AI as offering real benefits, such as efficiency in lesson planning or assessment (performance-expectancy) and ease of use (effort-

expectancy), and when their pedagogical beliefs lean toward constructivism; in this case, teachers not only intend to use AI but also actively apply it in their teaching practice (usage behavior). However, this acceptance is heavily influenced by perceptions of ease of use, teacher readiness, and technology anxiety arising from a lack of understanding and training (Rafida et al., 2024). Pons (2023), in an OECD report, emphasizes that optimal acceptance is only possible if algorithmic transparency, data protection, and pedagogical control remain in the hands of teachers, thereby building strong trust in AI. Meanwhile, a systematic review by Tan et al. (2025), in *Computers & Education: Artificial Intelligence*, found that the main factor determining acceptance is the availability of relevant professional development, as increased digital competence directly boosts teachers' confidence and readiness to integrate AI in the classroom. These three findings confirm that teacher acceptance does not solely depend on the benefits of technology, but also on institutional support, professional readiness, and clarity regarding the ethical aspects accompanying the implementation of AI in elementary schools.

### **Teachers' Understanding of Using AI Media**

Teachers' understanding of Artificial Intelligence (AI)-based learning media is crucial in elementary schools, as digital literacy, including a deep understanding of AI, forms the foundation for the successful integration of technology pedagogically and ethically. This directly impacts the willingness and effectiveness of implementation of AI in daily learning. International research by Viberg et al. (2025), Teachers' understanding of Artificial Intelligence (AI)-based learning media is crucial in elementary schools, as digital literacy, including a deep understanding of AI, forms the foundation for the successful integration of technology pedagogically and ethically. This directly impacts the willingness and effectiveness of implementation of AI in daily learning. International research by Holmes & Tuomi (2022), in their study on the State of the Art and Practice in AI in Education, highlight that excessive expectations regarding AI often stem from misconceptions about the capabilities of AI systems, which, without adequate understanding, can lead teachers to become overly reliant on technology or reject it due to fear of the "black box" of algorithms. Furthermore, Tzafilkou et al. (2023), found that many primary and secondary school teachers scored low in digital competence, particularly in the aspects of teaching delivery, student support, and educational innovation, indicating professional unpreparedness to effectively integrate digital technologies such as AI. Therefore, strengthening teachers' digital understanding and competence is not only about adding technological knowledge, but also a strategic step to support the digital transformation of learning, expand pedagogical creativity, ensure instructional adaptation, and maintain ethics and inclusivity in improving the quality of learning in elementary schools.

### **Teachers' Assessment of AI Media Usage**

Based on research, the application of Artificial Intelligence (AI) in school learning significantly improves the effectiveness of the teaching and learning process through adaptive personalization, allowing students to learn at their own pace and ability, thus reducing understanding gaps and helping teachers identify areas requiring targeted intervention. AI also eases the administrative burden on teachers by automating task grading, attendance, and progress tracking, allowing for greater focus on pedagogical aspects and direct interaction. Some schools report increased student motivation through more interactive and engaging learning materials, such as gamification or

simulations that integrate game elements to create a fun learning experience, encourage active participation, and develop skills like problem-solving, cooperation, and perseverance through rewards such as points, levels, or badges (Rahardian et al., 2024). Teachers assess the effectiveness of AI-based learning media in elementary schools based on its ability to support practical tasks without sacrificing pedagogical aspects and the quality of human interaction, where their level of trust in AI is strongly linked to their digital knowledge and competence. A study by Viberg et al. (2025), showed that teachers who understand AI concepts tend to view this technology as a safe, beneficial, and effective tool for improving the quality of learning, especially when AI accelerates the analysis of learning outcomes, provides adaptive feedback, and assists with learning differentiation. Research by Oh & Ahn (2024) on elementary school teachers in Korea confirmed that the effectiveness of AI is highly valued when technology supports administrative tasks, material creation, automated assessment, and personalization according to individual student needs. However, teachers emphasized the limitations of AI in handling social-emotional aspects such as empathy, learning motivation, and character guidance, thus AI is seen as optimal as a supporting tool that complements, rather than replaces, the pedagogical role of teachers. In this context, the effectiveness of AI is evaluated not only by its sophistication, but also by the extent to which the technology strengthens educational interactions, improves efficiency, and maintains the essential human touch in elementary school learning.

## Conclusion

Based on the research findings, it can be concluded that teachers' perceptions of the use of AI-based learning media in elementary schools are generally positive, with their interest and willingness increasing. AI adoption is supported through hands-on experience, guidance, and training programs. At the beginning of the reception, the teacher admitted that they were still having difficulty adapting. However, after repeated adjustments in daily application, teachers began to feel the ease brought by technology. Regarding the level of understanding, teachers' understanding of AI varies depending on their experience, how often they use the technology, and the training they have received. The ability to create instructions (prompts) and utilize AI in preparing teaching materials, exam questions, or visual content develops with practice, although direct application in the classroom is still not widespread. On the other hand, teacher evaluations show that AI offers significant benefits in boosting student motivation, deepening their understanding, and simplifying administrative tasks, despite obstacles such as device availability, internet connectivity, lack of training, and security issues. In general, the application of AI in elementary schools has the potential to improve the quality of education if supported by adequate teacher skills, good technological facilities, and appropriate school policies.

## Recommendations

Some important suggestions were made based on the findings, which showed that teachers see the use of artificial intelligence-based learning media in primary schools. The main recommendation is that Artificial Intelligence technology developers should improve the quality of their algorithms to reduce bias and ensure information is distributed correctly, and to strengthen privacy controls and transparency to address teachers' concerns about the collection and storage of student data. Teachers believe that in the context of elementary school learning, the use

of AI-based media must be balanced with students' ability to critically evaluate content created by AI, so that technology becomes not only an aid but also a means of improving students' digital literacy. They also believe that AI-based learning media has great potential to help students connect abstract concepts with real-life examples.

## Statements and Declarations

**Acknowledgments/Notes:** Not applicable.

**AI Usage Statement:** During the preparation of this article, the authors used ChatGPT to provide language editing and proofreading support. After using ChatGPT, the authors reviewed and edited the content as needed and took full responsibility for the content of the publication.

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