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Teacher's Perceptions and Institutional Preparedness For Implementing AI in Learning Assessment at The Elementary School Level

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Abstract
The digital transformation in education encourages the integration of Artificial Intelligence as a supportive tool in various instructional processes, including student assessment. This study aims to explore the perceptions of primary school teachers and the readiness of schools in implementing AI for learning assessment. A descriptive qualitative approach was employed, supported by descriptive quantitative data analysis. Data were collected from 15 elementary school teachers at Bogor Regency through questionnaires and semi-structured interviews, focusing on three key aspects: teachers' knowledge of AI, their attitudes toward its use, and the readiness of school infrastructure. The findings indicate that the majority of teachers (73%) expressed positive attitudes toward AI implementation, with 60% demonstrating basic knowledge of AI concepts. However, only 40% reported that their schools were adequately equipped with the necessary infrastructure to support such technological integration. Further qualitative analysis reveals that while positive attitudes are a promising starting point, they must be supported by intensive training programs and clear policy frameworks to ensure the contextual and sustainable use of AI in assessment practices.
Keywords: *artificial intelligence, learning assessment, teacher perception, elementary school*

Abstrak
Transformasi digital dalam pendidikan mendorong integrasi Kecerdasan Buatan sebagai alat pendukung dalam berbagai proses pembelajaran, termasuk penilaian siswa. Penelitian ini bertujuan untuk mengeksplorasi persepsi guru sekolah dasar dan kesiapan sekolah dalam menerapkan AI untuk penilaian pembelajaran. Pendekatan kualitatif deskriptif digunakan, didukung oleh analisis data kuantitatif deskriptif. Data dikumpulkan dari 15 guru sekolah dasar di Kabupaten Bogor melalui kuesioner dan wawancara semi-terstruktur, dengan fokus pada tiga aspek utama: pengetahuan guru tentang AI, sikap mereka terhadap penggunaannya, dan kesiapan infrastruktur sekolah. Temuan menunjukkan bahwa mayoritas guru (73%) menyatakan sikap positif terhadap implementasi AI, dengan 60% menunjukkan pengetahuan dasar tentang konsep AI. Namun, hanya 40% yang melaporkan bahwa sekolah mereka dilengkapi dengan infrastruktur yang diperlukan untuk mendukung integrasi teknologi tersebut. Analisis kualitatif lebih lanjut mengungkapkan bahwa meskipun sikap positif merupakan titik awal yang menjanjikan, sikap tersebut harus didukung oleh program pelatihan intensif dan kerangka kebijakan yang jelas untuk memastikan penggunaan AI yang kontekstual dan berkelanjutan dalam praktik penilaian.
Kata Kunci *: kecerdasan buatan, penilaian pembelajaran, persepsi guru, sekolah dasar*

Introduction

The development of digital technology has brought significant changes across various aspects of life, including the field of education. One technology that is increasingly being discussed and piloted in classrooms is Artificial Intelligence (AI). AI is a branch of computer science that focuses on the development of systems capable of performing human cognitive functions, such as thinking, decision-making, problem-solving, and learning from experience (S Russell, 2016). In the context of education, AI is increasingly utilized to support personalized learning, academic administrative management, student learning analytics, and the implementation of automated and objective assessments (Zawacki-Richter et al., 2019). The integration of AI into education is not intended to replace teachers' roles, but rather to serve as a tool that enhances the efficiency and effectiveness of the learning process. Dissanayake & Chandeepa (2021) assert that AI holds significant potential to improve learning quality through its adaptive capabilities, allowing materials and task difficulty levels to be tailored to each student's abilities. Furthermore, Yim & Su (2024) argue that AI supports automatic assessment systems capable of analyzing student responses, whether in the form of multiple-choice questions or essays, by utilizing natural language processing (NLP) and providing instant feedback. Consequently, AI can reduce teachers' administrative workload and allow them to concentrate more on pedagogical aspects. In the context of primary education, the use of AI offers opportunities to enhance the efficiency, effectiveness, and objectivity of learning assessments, which have traditionally posed challenges for elementary school teachers (Mardiana, 2020; Moroianu et al., 2023; Ridwan et al., 2022; Zawacki-Richter et al., 2019). AI applications can extend to various aspects of education, one of the most prominent being the assessment process.

Learning assessment constitutes a crucial element of the teaching and learning process, serving as a tool to measure students' competency achievements. It plays a pivotal role as an indicator of student learning success, a source of feedback for teachers, and a foundation for making subsequent instructional decisions. At the primary education level, assessments must adopt a holistic approach, evaluating not only cognitive domains but also affective and psychomotor aspects (Mulyasa, 2021). One of the approaches promoted in the Merdeka Curriculum is authentic assessment, which emphasizes higher-order thinking skills, creativity, and the ability to apply knowledge in real-world contexts. Although the concept of authentic assessment has been

integrated into curriculum policies, many teachers still encounter challenges in its implementation, particularly due to time constraints, heavy workloads, and difficulties in developing appropriate assessment instruments (F Miao, 2021; Mardiana, 2020). In this regard, the application of AI can serve as a solution to automate certain aspects of the assessment process, such as grading assignments, analyzing learning outcomes, and reporting student competency achievements through auto-grading systems, pattern recognition of student answers, and adaptive assessments tailored to individual student capabilities (Holmes, 2019). These systems can rapidly and accurately assess student responses, whether in the form of multiple-choice, short answers, or essays. Technologies such as NLP and machine learning enable these systems to understand the context of student responses and provide fair and consistent evaluations (Lu & Cutumisu, 2021). Moreover, AI-based assessments allow teachers to identify learning patterns, detect common errors, and deliver targeted instructional interventions.

Aligned with this, the adoption of new technologies such as AI in education, particularly at the primary level, is not solely determined by the availability of the technology itself but heavily depends on human resources—specifically teachers—and institutional readiness (Salma, 2021). Teachers' perceptions of AI play a crucial role in influencing the acceptance and implementation of this technology in educational practices. According to the Technology Acceptance Model (TAM) developed by FD Davis (1989), technology acceptance is influenced by two main factors: perceived usefulness and perceived ease of use. When teachers perceive that technologies such as AI can assist their work and are easy to use, they are more likely to adopt them. Furthermore, school readiness for AI integration encompasses not only the availability of hardware and internet access but also organizational readiness, policy support, and an innovative culture within the school environment (OECD, 2021). Schools with a strong vision for digitalization are generally more prepared to integrate AI into their learning systems. Nevertheless, in Indonesia, most primary schools, especially those located in 3T (underdeveloped, frontier, and outermost) areas, still face significant challenges in accessing and utilizing technology (Ridwan et al., 2022).

In Indonesia, discourse surrounding the use of AI in education remains largely centered on secondary and tertiary levels, while its application at the primary level has received relatively little attention. Yet, primary education forms the crucial foundation for shaping students' character and fundamental competencies. Therefore, it is essential

to investigate how elementary school teachers perceive AI and to what extent they are prepared to implement it for learning assessments. This study is particularly important because AI implementation holds the potential to serve as a solution through systems such as auto-grading, student answer pattern recognition, and adaptive assessments tailored to individual students' needs (Holmes, 2019). This means that the successful implementation of AI for learning assessment at the primary school level strongly depends on the synergy between internal factors (teachers' perceptions, skills, and readiness) and external factors (school support, government policies, and technological infrastructure).

The novelty of this study lies in its focus on the underexplored context of AI implementation in primary education in Indonesia, particularly in relation to teachers' perceptions and institutional readiness for AI-based assessment. While previous studies have predominantly addressed AI in secondary or higher education, this research provides empirical insights into the foundational level of schooling, where digital transformation is still in its early stages. Moreover, the study contributes to the discourse on AI literacy by highlighting the specific needs, challenges, and opportunities faced by elementary educators in integrating AI into authentic assessment practices.

Method

This study employed a qualitative descriptive approach, aiming to provide an in-depth portrayal of teachers' perceptions and school readiness in implementing AI for learning assessment at the elementary school level. This approach was selected as it allows the researcher to explore the meanings, experiences, and subjective views of teachers within their contextual settings. To support the validity of the descriptions and strengthen the analysis, limited quantitative descriptive elements were also incorporated, particularly in the form of percentages and visual data representations based on teacher perception questionnaires.

The research subjects consisted of elementary school teachers teaching both lower and upper grades at several schools located in the Bogor Regency area, specifically in Klapanunggal Village, Rumpin Village, and Gunung Sindur Village. A total of 15 teachers were purposively selected as the main respondents, based on the following criteria: (1) having at least three years of teaching experience, (2) having participated in

ICT-based training or Merdeka Curriculum training, and (3) willing to participate in interviews.

The researcher utilized two primary instruments: a closed- and open-ended questionnaire regarding teachers' perceptions and readiness towards AI usage, and a semi-structured interview guide designed to explore further teachers' views, expectations, and challenges in implementing AI for assessment purposes. The questionnaire measured three main aspects of teacher readiness: knowledge of AI (focusing on familiarity and basic understanding), attitudes towards AI (related to interest, confidence, and general perspectives), and infrastructural readiness (referring to the accessibility of devices, internet network convenience, and school support). Quantitative descriptive analysis using percentages and bar graph visualizations was conducted on the questionnaire data. Meanwhile, interview data were analyzed through thematic analysis, involving stages of data reduction, categorization, and thematic conclusion drawing based on the respondents' narratives.

Result and Discussion

study identified elementary school teachers' perceptions and levels of readiness regarding the implementation of Artificial Intelligence (AI) in learning assessments. Data were collected from 15 teachers using questionnaires and semi-structured interviews, with a focus on three main aspects: (1) knowledge of AI, (2) attitudes toward the implementation of AI, and (3) school infrastructure readiness. The findings presented below are derived from both descriptive quantitative analysis and thematic qualitative interpretation.

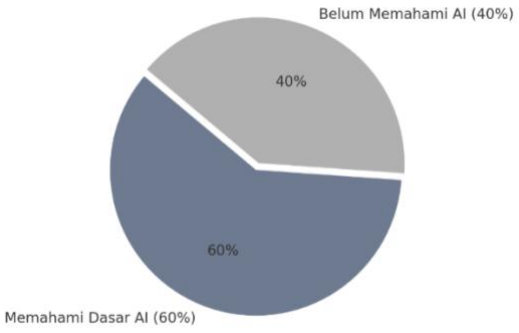

Image 1. Teachers' Perceptions of Their Understanding of AI

1. Teachers' Knowledge of AI

Out of 15 respondents, 9 teachers (60%) reported having a basic understanding of AI, including its general definition, underlying working principles, and examples of its application in educational contexts. These teachers were generally those who had participated in ICT training sessions, Merdeka Curriculum workshops, or had been exposed to technology-related information through online media. They acknowledged the potential of AI to enhance educational processes, particularly in facilitating formative assessment and analyzing student learning outcomes. However, 6 teachers (40%) indicated that they lacked a specific understanding of AI, perceiving it merely as a futuristic concept with no immediate relevance to teaching practices in primary education. Several respondents even equated AI with common digital tools such as PowerPoint or YouTube, revealing prevalent misconceptions that highlight the need for targeted training and continuous professional development in this area.

2. Teachers' Attitudes Toward the Implementation of AI

The majority of teachers expressed positive and open attitudes toward the integration of AI in education. A total of 11 teachers (73%) reported welcoming the presence of AI technology, particularly for its potential to enhance teachers' work efficiency—especially in the area of assessment. These teachers viewed AI as a promising solution to administrative challenges, such as grading daily assignments, tracking student progress, and generating academic reports. They also recognized AI's potential to support personalized, data-driven learning experiences.

However, 4 teachers (27%) expressed concerns about the application of AI in educational settings. These concerns were based on several factors: first, the possibility that AI might replace the humanistic element essential to holistic and contextual assessment; second, the teachers' limited digital literacy, which led to anxiety over their ability to operate unfamiliar technologies; and third, the lack of clear regulations or school policies to guide the systematic integration of AI into teaching and assessment practices.

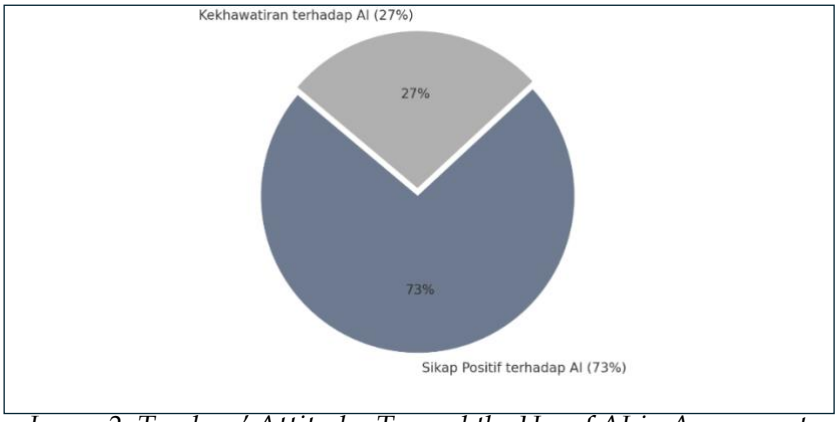

Image 2. Teachers' Attitudes Toward the Use of AI in Assessment

From the figure above, it can be concluded that although a minority of teachers demonstrated some resistance, overall attitudes toward AI were sufficiently supportive to facilitate the advancement of school digital transformation initiatives.

3. School Infrastructure Readiness

Findings in this area indicate that infrastructure remains a major challenge in the implementation of AI in primary school settings. Only 6 out of 15 teachers (40%) reported that their schools possessed adequate infrastructure, including access to computers, stable internet connections, and technical support from school IT personnel. These schools were generally located in urban areas and had already initiated school digitalization programs.

In contrast, 9 teachers (60%) stated that their schools lacked the necessary infrastructure to support AI integration. The most frequently cited issues included insufficient access to digital devices for both teachers and students, limited internet bandwidth, and the absence of AI-based systems or software in classroom activities. These findings suggest that AI implementation in primary education remains uneven and highlights the need for systemic support from both local and national governments. To further illustrate teachers' perceptions regarding infrastructure readiness, the following chart provides a visual summary.

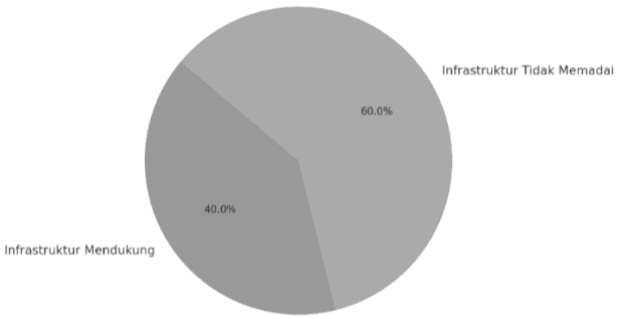

Image 3. Distribution of Teachers' Perceptions on Infrastructure Readiness

One of the most critical barriers to the implementation of Artificial Intelligence (AI) in primary schools is the unequal distribution of technological infrastructure. The chart above illustrates that only a minority of teachers perceived their schools as having the fundamental technological readiness necessary to adopt AI systems in educational practices.

4. Qualitative Findings from Teacher Interviews

From the in-depth interviews, several thematic findings were obtained that enriched the quantitative data, which can be broadly outlined in the table below.

Tabel 1. Teacher Interview

Interview Aspect	Questions Asked	Respondents' Answers
Perceptions of AI Benefits	What benefits do you experience from using AI technology in learning assessment?	AI is very helpful, for example in analyzing students' weaknesses and providing fast and targeted feedback.
	How does AI help you in giving feedback to students?	With AI, I can give more specific comments and directly address the aspects students need to improve.
	Do you feel AI makes your assessment work more efficient? Please explain.	Yes, because AI speeds up the grading process and allows me to focus on other aspects of learning.
Ethical and Pedagogical Concerns	Do you have concerns about the use of AI in the assessment process? If yes, explain.	Yes, I am concerned that AI reduces direct interaction between teacher and students. A good assessment should include a humanistic approach.
	In your opinion, can AI fully replace the teacher's role in assessing students?	No. Teachers are still essential because only humans can assess students' expressions, empathy, and social context.
	What is your opinion about the impact of AI on teacher-student	I feel that AI risks lowering the emotional quality of the teacher-

Interview Aspect	Questions Asked	Respondents' Answers
	social interaction?	student relationship if used excessively.
Need for Training	What are your expectations regarding training or support for using AI from the government or relevant institutions?	I hope there will be specific training from the Education Office that is technical, pedagogical, and practical so that we can use AI effectively.
	What kind of training do you need to be able to utilize AI in learning?	I need training that discusses real applications of AI in the classroom, including case studies and live simulations.
	In your opinion, who should be responsible for providing AI training for teachers?	The Education Office and school principals should actively facilitate this training so that all teachers can participate.

From the table above, it can be seen that teachers who have used AI-based applications (such as Grammarly, Google Classroom, or online automated assessment systems) stated that this technology significantly helps their work. They believe AI can assist in quickly analyzing students' weaknesses and providing targeted feedback. However, these advantages are accompanied by ethical and pedagogical concerns, where several teachers expressed worries that AI may reduce teacher-student interaction. They believe that assessment should include a humanistic approach, which machines cannot fully achieve, such as interpreting student expressions or understanding social and cultural contexts.

In line with this, interview findings showed that nearly all teachers expressed the need for specialized training to understand and use AI effectively. They hoped for tiered training from the Education Office that is not only technical but also pedagogical and practical. Ultimately, the study's overall findings indicate that elementary school teachers in Bogor Regency are beginning to show personal readiness in adopting AI technology, especially in terms of positive attitudes and basic knowledge.

The results of this study indicate that the application of Artificial Intelligence (AI)

in learning assessment at the elementary school level is generally perceived positively by the majority of teachers, particularly regarding their attitudes and the potential benefits of AI in improving educators' work efficiency. These findings are consistent with the study by Viberg & Grönlund (2018), which emphasized that teachers' attitudes are among the critical indicators for the successful adoption of technology in educational settings. When teachers perceive technology as useful (*perceived usefulness*), acceptance and participation rates are likely to increase, as explained in the Technology Acceptance Model (TAM) framework (FD Davis, 1989).

Regarding teachers' knowledge of AI, the data reveal that 60% of teachers reported having a basic understanding of AI, indicating that a significant proportion (40%) still lack sufficient knowledge. This finding highlights that AI literacy at the elementary education level remains limited and is heavily influenced by teachers' training backgrounds and access to technological information. These results align with the study by Rahmawati and Nugroho (2020), which found that most elementary school teachers are still in the early stages of understanding advanced technologies such as AI and require structured training to integrate these technologies into classroom practice. Limited understanding may lead to misconceptions about AI's role, such as the belief that AI poses a threat or is unsuitable for young learners. However, according to Holmes (2019), the role of AI in education is augmentative rather than substitutive, aiming to enhance data-driven assessments within student-centered learning environments.

Another prominent finding in this study is the high percentage of teachers (73%) who demonstrated a positive attitude towards the implementation of AI. This indicates that teachers are generally open to adopting technologies they believe will provide tangible benefits in the assessment process, particularly regarding time efficiency, result accuracy, and automated reporting. Nevertheless, a small portion of teachers expressed reservations, mainly due to technical unfamiliarity or ethical concerns related to the potential dehumanization of education. This attitude underscores the need for support not only in the form of technical training but also in pedagogical framing that explains how AI can be utilized while upholding humanistic principles in education. The prevailing positive attitude represents an asset that policymakers should capitalize on by developing comprehensive and sustainable training programs.

Furthermore, infrastructural readiness emerged as the primary challenge for AI implementation in elementary schools. Only 40% of teachers reported that their schools

possessed adequate technological devices and support systems. This finding points to a significant gap between individual teacher readiness and institutional readiness. It is an important insight that suggests digital transformation in primary education cannot be effectively achieved without substantial investments in infrastructure and technology-based school management systems. This finding reinforces the OECD (2021) report, which emphasizes that successful digital transformation in primary education requires a supportive ecosystem that includes hardware availability, network infrastructure, regulatory frameworks, and institutional policies promoting a culture of innovation. Without such an ecosystem, AI adoption risks stagnation and may remain merely a discourse without practical realization.

Conclusion

This study has identified key insights into elementary school teachers' perceptions and institutional readiness regarding the implementation of Artificial Intelligence (AI) in learning assessment. The findings reveal that the majority of teachers exhibit a positive attitude toward the integration of AI, particularly in enhancing the efficiency, objectivity, and scalability of assessment practices. This favorable disposition represents a foundational asset for advancing digital transformation in primary education.

Despite this promising outlook, the study also highlights significant disparities in teachers' AI-related knowledge. While some educators demonstrate a basic understanding of AI and its pedagogical applications, others remain unfamiliar with its core concepts, indicating a pressing need for structured and continuous professional development. Furthermore, infrastructural readiness emerged as a critical barrier, with many schools—especially those in under-resourced areas—lacking adequate digital facilities, internet connectivity, and technical support.

To address these challenges, the study underscores the essential requirement for a systemic and collaborative approach. This includes the provision of comprehensive training programs that are not only technically robust but also pedagogically grounded, as well as the development of institutional policies that promote innovation and digital inclusion. Moreover, investments in infrastructure must prioritize *cost-effectiveness* and *scalability* to ensure equitable access across diverse educational contexts. In light of these findings, it is recommended that policymakers, educational institutions,

and technology developers work in synergy to establish a supportive ecosystem for AI integration. Such an ecosystem should encompass teacher capacity building, infrastructure enhancement, and policy alignment to foster sustainable and contextually relevant digital transformation in Indonesia's primary education sector.

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