

Research Article

Transforming learning or creating dependency? Teachers' perspectives and barriers to AI integration in education

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The emergence of artificial intelligence (AI) in education offers significant potential to enhance personalized learning, feedback, and instructional strategies. However, its effectiveness depends on educators' practices and students' capabilities, especially in rural contexts where the digital divide presents challenges. This qualitative study explores teachers' perceptions of AI integration in education, collecting data from focus group discussions with 127 teachers. AI is viewed as a powerful resource for providing tailored information, enhancing learning depth, and offering immediate assistance to students. However, teachers also highlight the potential for over-dependence on AI, particularly among students with low motivation and literacy levels. In rural, additional challenges include regulations banning smartphone use, which restricts access to AI tools, and weak student motivation due to issues such as misaligned subject placements and assessment criteria that prioritize passing grades over demonstrating actual competencies. The research identifies several significant barriers to AI implementation, including these motivational challenges, limited technological infrastructure, insufficient teacher readiness, and a lack of critical thinking development. Moreover, issues such as low AI literacy and concerns about the ethical implications of AI-generated content are also raised. To effectively integrate AI, the study suggests addressing these barriers through targeted initiatives such as enhancing student motivation, improving digital literacy, and fostering teacher creativity. The findings emphasize the need for a careful and supportive approach to AI integration, ensuring it serves as a tool to enhance, rather than hinder, educational outcomes.

Keywords: Artificial intelligence; Digital divide; Rural areas; Student motivation; Teachers' perceptions

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1. Introduction

Artificial intelligence (AI) has emerged as a transformative force in education, reshaping traditional pedagogical frameworks and redefining the roles of teachers and learners. Chassignol et al. (2018) describe AI both as a field of study and a theoretical framework. As a field of study, AI focuses on solving cognitive problems associated with human intelligence, such as learning,

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decision-making, and pattern recognition. As a theoretical construct, it guides the creation of systems capable of human-like tasks, including speech recognition and language translation. These dual perspectives underscore AI's potential not only to solve practical problems but also to redefine educational theories and practices.

Building on this foundation, other scholars have provided complementary insights. Markauskaite et al. (2022) emphasizes AI's ability to approximate human reasoning, enhancing decision-making and adaptive learning in educational contexts. Kim (2024) and X. Huang (2021) extends this understanding by highlighting AI's role in developing systems that help teachers and students cultivate knowledge and flexible skills. These contributions collectively illustrate AI's revolutionary potential in education, while also prompting questions about how these systems influence the epistemological foundations of teaching and learning.

The application of AI in education is exemplified by a range of tools that have become integral to contemporary teaching and learning. Canva, a graphic design platform launched in 2013, empowers educators to create engaging visual content that enhances lesson delivery (Kohnke, 2021). AI chatbots like ChatGPT-launched in 2022 by OpenAI and Bard-also introduced in 2022, provide personalized support for tasks such as text generation, language translation, and tutoring (Alqahtani et al., 2023; Obaidoon & Wei, 2024). Socratic, an AI-powered platform acquired by Google in 2018, helps students grasp complex concepts through conversational interfaces (Bhise et al., 2022; Lameris & Arnab, 2021). These tools, while expanding accessibility and personalizing learning pathways, also invite critical reflection on whether their widespread adoption risks commodifying education or diminishing creative autonomy.

The benefits of AI for both students and educators are profound but require careful consideration. For students, AI facilitates personalized learning, offering immediate feedback and tailored support. Tools like ChatGPT enhance engagement and motivation by providing detailed explanations and step-by-step solutions (Adigüzel et al., 2023; Sevnarayan, 2024). Similarly, Zhu et al. (2023) highlight AI's ability to promote critical thinking and intrinsic motivation. For educators, AI streamlines administrative tasks such as grading and lesson planning, freeing up time for more meaningful student interactions (Ahmad et al., 2022; Onesio-Ozigagun et al., 2024). Furthermore, AI tools enable the creation of adaptive instructional materials that cater to diverse learner needs (Kavitha & Joshith, 2024; Sundari et al., 2024).

Despite its benefits, AI integration in education raises significant concerns that question its reliability, fairness, and ethical implications. AI systems, such as ChatGPT, can produce biased or inaccurate information, undermining their credibility as educational tools (Al-kfairy et al., 2024; Kamalov et al., 2023). Issues such as plagiarism, lack of originality, and cybersecurity vulnerabilities further complicate AI's role in fostering authentic learning. The reliance on AI for assignments also challenges academic integrity, as distinguishing between human- and AI-generated work remains difficult (Farrokhnia et al., 2024; Gustilo et al., 2024). These challenges highlight the tension between the efficiencies AI offers and the fundamental values of education, such as critical thinking, creativity, and ethical responsibility.

Ethical challenges extend beyond practical concerns to broader issues surrounding data privacy, equity, and the nature of knowledge itself. AI systems collect vast amounts of data, necessitating robust safeguards to protect user privacy and prevent misuse (Mittelstadt, 2019; Nguyen et al., 2023). Furthermore, over-reliance on AI tools risks stifling students' critical thinking and problem-solving skills. As Appleby (2023) notes, perceptions of AI in education are polarized, with some viewing tools like ChatGPT as cheating and others considering them valuable resources. These divergent views underscore the need for a balanced approach to AI integration – one that maximizes its benefits while preserving the foundational principles of education.

The effectiveness of AI as an educational tool is heavily reliant on the pedagogical practices adopted by educators (Kim, 2024) and the learners' own capacities (Bates et al., 2020). The integration of AI technologies in education is not merely a matter of adopting new tools; it requires a fundamental rethinking of pedagogical approaches. Ouyang & Jiao (2021) discusses the three

paradigms in AI in education—AI-directed, AI-supported, and AI-empowered—showcasing different ways AI addresses educational challenges by evolving the role of learners from passive recipients of AI-driven instruction to collaborators working alongside AI, and ultimately to autonomous learners taking full agency in their educational journey with the aid of AI tools. This progression highlights how AI can increasingly support and empower learners, shifting from directing learning to enabling learner-driven exploration and critical thinking. Furthermore, the role of AI in creating adaptive learning environments is crucial, as it allows for the customization of educational experiences to meet individual learner needs, thereby fostering a more effective learning process (Gligorea et al., 2023).

In the specific context of rural madrasah aliyah or Islamic senior high school (an educational institution under the Ministry of Religious Affairs of the Republic of Indonesia), the digital divide presents significant challenges that hinder access to essential learning resources and technology (Lembani et al., 2020; Onitsuka et al., 2018). This gap not only restricts students' engagement with advanced educational tools but also limits their exposure to AI-enhanced learning experiences. Students in rural madrasah frequently face substantial barriers in accessing digital resources, exacerbating educational inequalities. This situation is further complicated by a lack of professional development opportunities for teachers, who may lack the necessary skills to effectively integrate AI into their instructional practices (Alwaqdani, 2024). Wang et al. (2023) emphasize the critical role of teacher preparedness in the successful implementation of AI technologies in educational settings, noting that without adequate training, the potential benefits of AI may remain unrealized.

In addition to curriculum development, the attitudes and perceptions of educators towards AI integration play a crucial role in its successful implementation. The teachers' perceptions significantly influence their willingness to adopt AI technologies in their teaching practices (Ma & Lei, 2024). Enhancing educators' understanding of AI's potential benefits and addressing their concerns can facilitate a more effective integration of AI in educational settings. Given the challenges associated with AI integration in education, particularly in rural contexts, this study focuses on examining educators' perspectives on the adoption of AI in a rural area. Exploring these views is essential to uncovering the expectations, barriers, and opportunities that influence the effective implementation of AI technologies. By addressing a notable gap in the existing literature, this research aims to provide insights into how educators perceive AI's role in enhancing learning outcomes and mitigating the digital divide in rural Madrasah Aliyah, offering a foundation for informed strategies to promote equitable technology adoption. The study seeks to answer the following research questions:

RQ 1) What are educators' perceptions of the integration of AI technologies in a rural area?

RQ 2) How do educators foresee the potential impacts and challenges of AI integration in a rural area?

2. Method

In investigating teachers' perceptions of AI integration in education, a qualitative research methodology is employed, specifically focusing on a phenomenological approach. This methodology is adept at uncovering the lived experiences of educators, thereby allowing researchers to gain insights into their perceptions, concerns, and expectations regarding AI in the classroom (Creswell & Poth, 2016). By centering the voices of teachers, the study aims to illuminate the multifaceted nature of their experiences, which can significantly inform educational practices and policies in the context of emerging technologies.

We conducted a Focus Group Discussion [FGD] with teachers from Madrasah Aliyah. The FGD took place in a single session lasting 2 to 2.5 hours. A total of 127 teachers from five districts in South Kalimantan, Indonesia, participated in this FGD, with details as follows: 21 teachers from Kotabaru Regency, 28 teachers from Tanah Bumbu Regency, 36 teachers from Hulu Sungai Tengah Regency, 22 teachers from Tapin Regency, and 20 teachers from Barito Kuala Regency. The FGD commenced with a presentation by the research team on the integration of AI in education,

emphasizing its potential benefits for both students and teachers. Participants were subsequently invited to share their knowledge and experiences with AI, including any prior implementation efforts. The discussion was structured around four key questions: (1) teachers' perceptions of AI in education, (2) predictions regarding AI integration, (3) potential challenges to effective integration, and (4) proposed solutions to address these challenges. Participants were encouraged to share their views on each question, with efforts made to ensure everyone had the opportunity to contribute. The format allowed for open dialogue, with participants raising their hands to speak, while the research team facilitated to maintain a structured and equitable discussion.

To analyze the data, thematic analysis was employed, following the six-phase approach outlined by Braun and Clarke (2013). This method allowed the researcher to identify and interpret recurring themes within the qualitative responses. The analysis process includes familiarization with the data, generating initial codes, searching for themes, reviewing themes, defining and labeling themes, and creating the report. It begins with indexing and memoing to capture the "big picture" of the data, enabling researchers to identify emergent themes and refine their understanding of key narratives across cases. This foundational stage supports the systematic application of analytic codes, focusing on one research question or theme at a time to enhance reliability and validity. In subsequent phases, researchers ensure theoretical validity by constructing explanations grounded in the data. They validate relationships by revisiting respondent-level and cross-case memos, applying analytic codes, and examining how well the emerging stories align with the full dataset. This rigorous process ensures that findings are credible, data-driven, and provide a nuanced understanding of participants' perceptions and attitudes (Deterding & Waters, 2021).

To establish the validity and trustworthiness of the research findings, several strategies were implemented. Triangulation was employed to compare the qualitative data with existing literature on AI in education, which helped corroborate the results and enhance the study's credibility. Informed consent was prioritized; potential participants received an information sheet detailing the study's specifics, including who is involved, the nature of the study, and instructions on how to opt out. Additionally, member checking was conducted, allowing participants to review the findings to ensure that their perspectives were accurately represented.

3. Results and Discussion

3.1. Teachers' Perceptions of the Integration of AI

Understanding teacher perceptions of AI integration in education is crucial because teachers are key mediators of technology in the classroom. Their attitudes toward AI directly influence its adoption and effectiveness, impacting student engagement and learning outcomes. Positive perceptions can lead to successful implementation, while negative views may result in resistance, hindering the potential benefits of AI. Additionally, recognizing teachers' concerns helps identify barriers to integration and informs the development of supportive professional training, ultimately fostering a more innovative and effective educational environment. Table 1 summarizes the key themes from the Focus Group Discussions regarding teachers' perceptions of the integration of AI in education.

The integration of AI in education, particularly in a rural area, is recognized by educators as a transformative tool, especially in enhancing knowledge delivery. Tools like ChatGPT are highly praised for their ability to provide tailored responses, synthesize complex information, and facilitate brainstorming across various disciplines. Teachers highlight its potential to deepen understanding and motivate students to learn. Unlike traditional search engines that deliver raw data, ChatGPT offers synthesized information, making it an efficient and versatile resource. Similarly, DALL-E is valued for generating illustrations that meet specific requirements, which is seen as a significant asset for creative and visual learning. However, applications such as Canva are regarded merely as standard editing tools, while others like DeepL or QuillBot are limited to linguistic refinement. Notably, all AI tools used by participants are free versions as Madrasahs

Table 1
Teachers' Perceptions of AI Integration

Categories and codes	Sample excerpt
AI in Knowledge Delivery Information provision	<p>"This is a tremendous leap forward. Chat GPT can directly provide responses tailored to user requests, making it a significant advancement."</p> <p>"I once asked ChatGPT about theology, and it could provide answers. It also answered questions about science and could even translate into multiple languages. This makes obtaining information for learning significantly easier."</p> <p>"Unlike Google, which provides raw data, ChatGPT delivers processed information tailored to our requests. And this is just the free version – imagine the capabilities of the paid one. But they say it's very expensive."</p> <p>"With ChatGPT, analysis and synthesis can also be performed. We provide a question, and it can be answered in detail. This can enhance students' motivation to learn. As for DALL-E, we can request it to create illustrations. This is truly impressive."</p>
Knowledge depth	<p>"AI enables brainstorming. We can discuss ideas with AI, allowing us to deepen our understanding."</p> <p>"In terms of knowledge transfer, the teacher's role can be replaced by Chat GPT. Teachers must therefore strengthen their skills in character building and the psychomotor aspects of students."</p> <p>"If the teacher's role is solely to deliver information, they are outperformed by AI. Teachers must enhance their ability to guide and mentor students."</p>
Replacing knowledge transfer	<p>"I think students with strong motivation and curiosity will be highly spoiled by Chat GPT."</p> <p>"AI can create engaging and adventurous learning experiences. There are various types of AI offering diverse tools to support learning."</p> <p>"Chat GPT can be a very strong support for learning. It seems like Chat GPT knows everything. It can even create illustrations."</p> <p>"AI provides instant feedback. Students particularly appreciate receiving immediate responses when they are highly motivated to learn."</p>
AI as Learning Support Motivation and engagement	
Immediate learning assistance	
Challenges on Critical Thinking and Ethics	
Verification necessity	<p>"However, they still need to remain critical and verify the results (AI-provided information)."</p> <p>"There is often informational bias. For instance, ChatGPT sometimes fabricates nonexistent connections. I once tested it by linking two fictional historical figures, and ChatGPT created a narrative as if it were true. This is a significant issue."</p> <p>"Indeed, the goal of our learning is still to answer questions, right? Rarely do outcomes take the form of projects or creations because assessment is difficult. If it's just about answering questions, especially at the LOTS level, it's very easy for students to ask for AI help."</p> <p>"Imagine taking a picture of a math problem – ChatGPT can instantly solve it step by step. It's concerning that students might use AI for all their assignments, including daily quizzes."</p> <p>"Excessive use of AI can hinder students' cognitive development. They may become overly dependent on AI, struggling when it's unavailable. This is a serious risk."</p>
Students rely on AI	

where this study conducted, do not allocate budgets for AI technologies. A minority of participants reported accessing paid versions through shared credentials purchased from online marketplaces, highlighting a technology divide within the community.

A central concern is the potential for AI to supplement, and sometimes replace, traditional teaching methods. Teachers recognize that AI's ability to deliver content may surpass their own, prompting a shift toward a focus on character building and psychomotor skill development—areas that AI cannot replicate. This transition emphasizes the need for educators to mentor students, fostering emotional intelligence and ethical reasoning, which are beyond AI's capabilities.

Teachers also express mixed feelings about AI's role in the classroom. While AI's capacity to create engaging environments and offer instant feedback is valued, concerns arise over its potential to foster dependency. Highly motivated students may benefit from AI to explore advanced concepts, but less motivated learners might misuse AI as a shortcut, diminishing critical thinking and cognitive development.

Ethical considerations, particularly the accuracy and bias of AI-generated information, are highlighted as key challenges. Teachers stress the importance of teaching students digital literacy to critically evaluate AI outputs and avoid overreliance on technology. Without such skills, students risk becoming misinformed, which could hinder their academic growth. Lastly, teachers express concerns about their preparedness to adapt to AI integration. The absence of professional development programs, coupled with a lack of institutional support and funding for AI tools, leaves many educators struggling to keep pace with technological advancements. This gap underscores the urgent need for targeted training and investment to ensure equitable and effective AI integration in rural Madrasahs.

3.2. Teachers' Predictions on AI Integration

Understanding teachers' predictions and analyses regarding the potential use of AI in madrasah aliyah is crucial, as it offers valuable insights into their expectations and concerns about integrating this technology. Given that these institutions have not yet adopted AI, educators' perspectives can inform future planning, guide professional development initiatives, and shape policies that facilitate effective AI integration. In Table 2, we present teachers' predictions regarding the integration of AI in current learning environments.

Teachers predict that the integration of AI will yield both opportunities and challenges, heavily influenced by students' readiness and systemic conditions. A key concern is the dependence on students' intrinsic motivation and character development. Teachers foresee that without foundational improvements in these areas, AI risks amplifying existing issues like low engagement and weak literacy. They highlight a potential tendency among less motivated students to misuse AI as a shortcut, which could hinder cognitive growth and deepen dependency, emphasizing the need for early interventions to promote curiosity and independent learning.

The structural and cultural context poses additional challenges. Teachers anticipate that systemic issues, such as low literacy levels and the entrenched exam-focused culture, could limit AI's impact. They predict that without reforms in curriculum and pedagogy, AI may further marginalize critical thinking and meaningful engagement with content. In particular, the misuse of AI to bypass critical analysis and problem-solving underscores the urgency of fostering digital literacy and revising assessment strategies to align with AI-driven learning.

From a pedagogical perspective, teachers foresee a redefinition of their roles, shifting from traditional content delivery to mentorship and fostering ethical reasoning. They acknowledge AI's potential to enhance learning through adaptive tools and instant feedback but emphasize that these advancements require significant teacher upskilling. Concerns about inadequate access to professional development, especially in rural contexts, compound anxieties about being replaced by AI, particularly for educators relying on conventional methods.

Ethical and regulatory concerns are also prominent in teachers' predictions. They warn of risks related to learning integrity, intellectual property, and data privacy. Without clear guidelines, AI

Table 2
Teachers' Predictions on AI Integration

Categories and codes	Sample excerpt
Students and Learning Motivation	
Low student motivation	"I am not sure AI will have a positive impact. This is not due to the AI itself, but rather the very low motivation of students to learn." "AI is merely a tool. Its utility depends on the user. If students lack curiosity and intrinsic motivation, they are more likely to use AI as a shortcut. Our main issue is weak motivation to learn, exacerbated by curriculum demands." "Perhaps students will become dependent on AI, viewing it as a quick solution for everything." "This issue requires early anticipation and root cause identification. If students feel overly facilitated by AI, they may become overly dependent, as the saying goes: 'Easy times create weak generations.'" "For lazy students, daily exercises and other tasks might be done by AI. In my experience, more students are lazy than diligent." "If teachers are not creative and assessments remain simple question-answer tasks, lazy students will simply rely on AI. Evaluation must focus on authentic assessments like project-based learning and performance-based outcomes."
Potential dependency on AI	
Laziness in learning	
Quality of Student Literacy	
Weak literacy	"Student literacy is weak, particularly digital literacy. Curiosity is not nurtured, and students grow complacent due to the lack of exams, as they automatically move up a grade." "Our literacy levels rank among the lowest globally – 60th out of 61 countries. We read far less than our neighboring countries, such as Singapore. Students may even rely on AI to summarize reading materials, further weakening literacy."
Utilization of AI in Learning	
Technology dependency	"AI is a tool whose effectiveness depends on the user. With the current characteristics of our students, I believe its integration will be challenging."
AI as a learning tool	"Technological advancements like AI are inevitable. Students will naturally explore and learn about AI and its capabilities independently."
Character Development in Students	
Need for character improvement	"We need to focus on improving students' character first. Otherwise, introducing AI would be like giving a smartphone to a child – leading to irresponsibility, addiction, and overuse."
Teacher Preparedness for AI	
Knowledge gap among teachers	"Perhaps teachers will be the ones falling behind in adapting to AI."
Fear of replacement	"Teachers may fear being replaced by AI, especially if they teach using traditional methods. Integrating AI requires significant improvements in teacher quality. Teaching is more than just transferring theoretical knowledge."
Negative Impacts of AI	
Potential negative effects	"Currently, we are not ready. The negative effects of AI might outweigh the positives. Students with weak literacy skills struggle to validate AI-generated information. Many use AI for exams, resulting in over-reliance and reduced motivation to learn." "We don't really know where the data comes from or how it's being used. When students use AI like ChatGPT, I worry about privacy – what if their questions or information are stored and misused?" "AI outputs are impressive, but who owns the material? If the tool is trained on internet data, isn't there a risk that it's copying or plagiarizing content? We need to teach students to be aware of these issues."

could undermine authentic learning experiences, enabling students to bypass critical engagement in assessments. Teachers question the transparency of AI tools' privacy agreements and raise concerns about the ethical use of datasets, some of which may include plagiarized or unauthorized material.

3.2.1. Barriers to AI implementation

Analyzing the challenges associated with integrating AI in education is essential, as it enables educators and policymakers to identify and address the specific barriers that impede effective implementation. These challenges frequently stem from existing learning conditions, including outdated infrastructure, resistance to change among educators, and insufficient training. Moreover, traditional pedagogical practices may not align with the capabilities and potential of AI technologies, further complicating integration efforts. We requested that teachers analyze the factors that hinder the effectiveness of AI integration in learning, and the results are presented in Table 3.

The challenges of integrating AI in rural are multifaceted, spanning systemic issues, pedagogical limitations, infrastructure deficits, and student readiness. A critical systemic barrier is low student motivation, driven by a lack of accountability measures such as exams, which fosters complacency. Teachers also highlight the absence of immersive, language-rich environments, especially in subjects like language learning, limiting AI's potential to enhance practical skills. This misalignment between traditional teaching methods and AI's capabilities reduces its effectiveness.

Curricular and pedagogical challenges further complicate AI adoption. The curriculum's density and repetitiveness discourage critical thinking, while many educators lack expertise in fostering higher-order thinking skills [HOTS]. Consequently, instructional approaches remain focused on rote memorization rather than leveraging AI's strengths in analysis, synthesis, and problem-solving. These gaps prevent the technology from being used as a transformative tool for deeper learning.

Teacher readiness and infrastructure deficits compound the problem. Excessive administrative burdens leave teachers with little time or capacity to innovate and incorporate AI into their teaching. Additionally, restrictive policies on device use, such as smartphone bans, obstruct students' access to essential AI tools. While these policies aim to prevent misuse, they also hinder the development of digital literacy and 21st-century competencies.

Student readiness, particularly in digital and AI literacy, represents a significant barrier. Weak foundational skills in navigating digital tools render many students unprepared to engage effectively with AI. Teachers also express concern about dependency, where students might misuse AI as a shortcut, undermining cognitive development and effort. Addressing these issues requires targeted interventions to build both technical skills and intrinsic motivation.

Lastly, institutional shortcomings in evaluation and support systems exacerbate these challenges. Current assessment mechanisms, such as ANBK and AKMI, lack the depth needed to provide meaningful insights or support for addressing learning gaps. The absence of comprehensive literacy improvement programs further limits progress, leaving both students and educators underprepared for AI integration.

3.2.2. Proposed Approaches to Facilitate AI Integration

Understanding proposed approaches to facilitate AI integration in learning environments from the teachers' perspective is essential, as teachers play a critical role in the practical implementation of these technologies. Their insights can inform the development of strategies that address specific classroom realities, including training needs and resource limitations. Engaging teachers in this process fosters a sense of ownership and collaboration, ultimately leading to more effective integration of AI and improved educational outcomes for students. After analyzing the factors that hinder the effectiveness of AI integration, we also asked teachers to discuss various approaches and solutions to mitigate the impact of these barriers, which are outlined in Table 4.

Table 3
Barriers to AI Implementation

Categories and codes	Sample excerpt
Learning Conditions	
Low learning motivation	"Currently, the state shows the lowest motivation to learn. The absence of exams makes students feel they will automatically pass."
Limited language environment	"As a language teacher, learning is focused on text comprehension and grammar. We lack a language-rich environment for practice."
Dense and circular curriculum	"The curriculum is circular. Many topics are taught across different education levels without any deepening of the material."
Understanding and Application of HOI	
Insufficient understanding of HOTS	"I believe many teachers still do not understand HOTS well. Learning outcomes in the lesson plans still focus on 'students can understand and explain...'"
Low evaluation standards	"Evaluations are still at a level where students simply understand the material. AI can solve this easily."
Readiness and Infrastructure	
Administrative burden on teachers	"Teachers are overwhelmed with administrative tasks, making it hard to create their own materials."
Smartphone usage ban	"Many Madrasahs still prohibit students from bringing smartphones because of the risk of negative use."
Student Literacy	
Low AI Literacy	"Digital an AI literacy must be significantly improved before integrating AI into learning. Otherwise, there will be more negatives."
Dependency on AI	"If students are lazy, AI will become a shortcut."
Evaluation and Support	
Insufficient evaluation Support from ANBK and AKMI	"ANBK and AKMI are just screenings, and the results do not reach teachers. There's no analysis of the shortcomings of the madrasah or follow-up support. If it's just training for a few teachers, this is ineffective. Moreover, learning is still focused on textbooks and worksheets that cannot be guaranteed to align with the characteristics of the madrasah."
Absence of literacy improvement programs	"The literacy program is not visible in Madrasahs. We do not know what is meant by increasing literacy."

Table 4
Proposed Approaches to Facilitate AI Integration

<i>Categories and codes</i>	<i>Sample excerpt</i>
Student Preparation and Learning	
Understanding AI as a support tool	"AI should be understood as a learning support tool. What needs to be prepared are the learners, the ones using the tool."
Enhancing learning motivation	"Motivation must be addressed first. Our students are currently at their lowest motivation."
Identifying interests and talents	"The root of motivation lies in identifying interests and providing appropriate support."
Learning Approaches	
Project-based learning	"Learning is still limited to theory transfer. There is rarely project-based learning."
Curriculum personalization	"There are many things that need to be addressed, from the system of identifying interests to a personalized curriculum."
Innovation and Creativity	
Integration of AI and gamification	"AI and gamification seem to be a perfect match for increasing student interest."
Teacher creativity development	"There is a lack of creativity from teachers. There are no creative and challenging learning experiences."
Digital Technology Usage	
Openness to digital use	"Madrasahs need to open up to the use of digital devices. If continuously prohibited, students will become more uncontrolled."

The proposed strategies reflect a comprehensive understanding of the challenges and opportunities of AI integration. A key priority is preparing students to use AI responsibly, focusing on developing critical skills and intrinsic motivation. Teachers emphasize aligning educational activities with students' interests and talents to enhance engagement, highlighting the need for a learner-centered approach. Teachers also advocate for transformative instructional practices, proposing project-based learning and personalized curricula to foster active participation and adaptability. These recommendations underscore a shift from rigid, theory-heavy methods to more dynamic and flexible models that maximize AI's potential for customization.

Innovation and creativity are seen as essential, with AI and gamification identified as tools to increase engagement. However, teachers highlight a need for professional development to address gaps in their creativity and enhance their ability to design effective AI-integrated learning experiences. Finally, the teachers critique restrictive policies on device usage, arguing for structured, guided use to balance technological benefits with ethical considerations. This approach seeks to promote digital literacy and responsible AI utilization, ensuring technology serves as a facilitator for meaningful learning.

4. Discussion

This paper aimed to explore teachers' perceptions of AI integration in education within a rural province. Teachers hold nuanced views on the integration of AI in education, recognizing both its transformative potential and its challenges. They regard AI as a tool for personalized and adaptive learning, enabling tailored information delivery and fostering deeper engagement (Altinay et al., 2024). For instance, tools like ChatGPT allow educators to provide detailed explanations and synthesize complex information, which can stimulate student motivation and enrich learning experiences (Murtaza et al., 2022). However, the effectiveness of these tools is contingent upon students' intrinsic motivation, which teachers identify as critically low, potentially hindering meaningful interaction with AI technologies (Dai et al., 2020).

While AI's capabilities to supplement traditional knowledge delivery are broadly acknowledged, concerns persist about its potential to diminish the teacher's role. Many educators worry that AI, especially in tasks emphasizing lower-order thinking skills [LOTS], might supplant their authority in content delivery, reducing their role to mere facilitators (Gentile et al., 2023). This apprehension underscores the need for a pedagogical shift toward fostering higher-order thinking skills and holistic student development (Lu et al., 2024), including character building and psychomotor skills—areas where AI cannot replicate the nuances of human interaction (Selwyn, 2019).

Teachers also emphasize the ethical challenges associated with AI use, particularly its potential to propagate misinformation or plagiarism, given its reliance on vast, unverified internet data (Currie, 2023). Without digital literacy and critical thinking skills, students risk misusing AI for academic shortcuts, compromising the integrity of their learning processes (Ayanwale et al., 2024). Educators stress the importance of teaching students to question AI-generated outputs critically and to validate their accuracy and relevance (Yu, 2024). This dual focus on ethical use and information evaluation highlights the shared responsibility of educators and institutions to cultivate informed and discerning users of AI.

Several institutional and policy-level barriers hinder AI integration in rural madrasah. Policies prohibiting digital device usage, while intended to minimize distractions, inadvertently restrict access to AI and other educational technologies (Nikolopoulou, 2020). This approach deprives students of opportunities to develop essential digital literacy skills and limits educators' ability to incorporate AI into their teaching. Additionally, the implementation of the Kurikulum Merdeka creates administrative burdens that prioritize procedural compliance over educational innovation, exacerbating superficial learning practices and reducing engagement with AI tools (Zhai et al., 2024). Teachers report that students often use AI for rote task completion, bypassing deeper

cognitive engagement, which undermines the educational potential of these tools (Lieberman, 2024; Williams, 2023). This dependency also reflects gaps in foundational digital literacy, with students struggling to navigate issues like plagiarism and the credibility of AI-generated content (Samala et al., 2024).

To address these challenges, professional development and targeted teacher training are essential to equip educators with the skills to integrate AI effectively and ethically (Luckin et al., 2022). Programs should focus on enhancing teacher competency in using AI for pedagogical innovation and fostering creativity in lesson design. Simultaneously, motivation programs tailored to students' interests and talents can enhance engagement and combat complacency (Xia et al., 2022).

Adopting project-based learning and personalized curricula offers promising pathways for leveraging AI's potential. These approaches encourage active learning and critical thinking, while also allowing for differentiated instruction tailored to students' strengths and interests (Alamri et al., 2020; Williams et al., 2023). Furthermore, integrating gamification elements and promoting the controlled use of digital devices can make learning more interactive and engaging, ensuring that AI serves as a facilitator rather than a crutch (Hong et al., 2024).

Finally, fostering digital and AI literacy through systematic curriculum integration is imperative (Almatrafi et al., 2024; Walter, 2024). Schools must go beyond basic technical skills, embedding ethical considerations and critical evaluation of digital content into their teaching practices (Ng et al., 2021). Strengthening guidance and counseling services, supported by AI-based assessments, can also help identify students' interests and align their educational pathways with future career aspirations (Cross & Cross, 2021).

5. Conclusion

The analysis of the data reveals both the opportunities and challenges of integrating Artificial Intelligence into rural Madrasah Aliyah. Teachers perceive AI as a transformative tool for knowledge delivery, particularly with applications like ChatGPT and DALL-E that facilitate tailored responses and creative outputs. These tools are seen as invaluable in motivating students and deepening their understanding of complex subjects. However, the data also highlights significant barriers, such as low student motivation, weak literacy skills, and limited teacher understanding of higher-order thinking skills. Additionally, infrastructural challenges—like restricted access to smartphones—hinder the effective use of AI. Teachers emphasize the necessity of project-based learning and personalized curricula to align with students' interests and promote authentic engagement, which are currently underdeveloped in this educational context.

The findings also underscore the implications of the digital divide in rural areas. Limited funding for AI tools, inadequate digital literacy, and the lack of professional development for teachers exacerbate disparities in educational access and quality. Furthermore, concerns over AI dependency, ethical use, and verification of AI-generated information point to the urgent need for structured guidance and literacy programs. Addressing these challenges requires systemic reforms, including investments in infrastructure, professional training, and curricular innovation. This study has several limitations that warrant further exploration. Firstly, it does not fully address the impact of external factors such as funding shortfalls for education, inadequate infrastructure (including limited access to high-speed internet), and the lack of specialized trainers for teachers, all of which significantly influence AI integration in rural Madrasah Aliyah. The digital divide, particularly in terms of access to paid AI tools and reliable internet, is a critical issue that exacerbates inequalities in educational opportunities. Future research should explore the long-term effects of AI integration, focusing on its impact on equity, teacher roles, and student outcomes while considering external factors like funding, internet accessibility, and community attitudes toward technology.

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