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Who programs the teacher? Rethinking bias and inclusion in AI-powered Indonesian classrooms

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ABSTRACT

Despite the growing use of artificial intelligence (AI) in education, research often emphasizes its efficiency while overlooking its ethical implications, particularly with respect to algorithmic bias and teacher agency. This study aims at examining how junior high school teachers in Lumajang Regency, East Java, Indonesia perceive the bias and inclusivity of AI systems, and their pedagogical agencies when using AI tools in Indonesian EFL classroom settings. A qualitative approach was employed, involving questionnaire responses from 20 teachers and semi-structured interviews with 12 selected participants. The data revealed that while teachers appreciate AI for streamlining lesson planning and content generation, they are also aware of the limitations in its cultural and linguistic representation in AI-generated content. Many participants actively modify AI-generated materials to reflect their students' local contexts better. However, only a small proportion reported receiving AI training in educational settings, highlighting a significant gap in institutional support. This study is limited by its localized sample and the reliance on self-reported data, which may affect generalizability. Nonetheless, the findings underscore the need for targeted professional development that includes not only technical training but also ethical and cultural competencies. Practically, this research informs policy on teacher preparation for AI integration. Socially, it contributes to more equitable digital education practices by centering the teacher's role in mediating AI use. Future studies should expand geographically and include student perspectives to develop a more comprehensive understanding of AI's impact on education.

Keywords: AI in education; algorithmic bias; inclusivity; teacher agency

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INTRODUCTION

In recent years, artificial intelligence (AI) has rapidly transformed educational systems worldwide, providing powerful tools to support instruction, assessment, and administrative efficiency. From adaptive learning platforms to automated grading systems, AI is increasingly embedded in the day-to-day activities of classrooms and is often perceived as a promising solution to long-standing challenges in education, such as large class sizes, limited instructional resources, and the demand for personalised learning (Dakakni & Safa, 2023). In Indonesia, the integration of AI in education has gained

momentum, largely influenced by digital transformation policies and the post-pandemic acceleration of blended and online learning modalities (Subiyantoro, 2024). This rapid adoption reflects not only a global trend but also the government's commitment to preparing students and teachers for the demands of the twenty-first century.

However, the discourse surrounding AI in education is far from one-dimensional. While AI is widely promoted as a neutral and efficient tool for improving educational outcomes, a growing body of scholarship challenges this assumption by revealing the presence of algorithmic bias embedded in these systems (Mhlanga, 2022). Such biases can inadvertently perpetuate inequities, marginalise learners from diverse cultural and linguistic backgrounds, and reduce teachers' pedagogical agency. In other words, the promise of AI as an innovative driver of educational reform coexists with critical risks that may undermine inclusivity and professional autonomy. This paradox raises an urgent question for educators and policymakers: to what extent does AI support teachers in exercising their professional judgment, and to what extent does it constrain or even "program" them to follow algorithmic pathways?

Globally, studies have investigated the promises and perils of AI in education. Mabuan (2024) highlights English language teachers' perspectives on the use of ChatGPT in ELT, including the potential use of ChatGPT in ELT. Delcker et al. (2025) found that teachers express concerns about fairness and quality when using AI-based feedback systems, questioning whether these systems truly align with students' learning needs. Nguyen et al. (2023) argue that while AI offers opportunities for innovation, ethical considerations such as transparency, accountability, and bias mitigation are often overlooked in its implementation. Similarly, Madaio et al. (2022) reveal that many AI systems encode implicit assumptions about learning, which subtly shape and constrain classroom practices. These studies illustrate the global awareness of AI's ethical dilemmas, but also highlight that much of the current debate remains technology-driven rather than teacher-centred. Research by Shams et al. (2023) offers a systematic review of AI adoption among educators and calls for increased teacher training on algorithmic literacy. Kim and Kim (2022) reveal that most STEM teachers positively experienced AI as a source for superior scaffolding.

Within the Indonesian context, however, studies examining the use of AI in classrooms remain relatively sparse and largely focus on its utility rather than its risks. Rahardja (2022) finds that many teachers use AI-based tools without understanding how algorithmic decisions are made, raising concerns about transparency and bias. Zaman (2019) reports that teachers using machine translation tools often encounter outputs that reinforce gender and cultural stereotypes. Miftah (2022) notes that AI applications in rural schools may exacerbate digital inequality and learner exclusion. More broadly, research from Asia also shows that localised cultural contexts are often missing in AI tools trained on predominantly Western datasets, raising issues of epistemic injustice (Sahebi & Formosa, 2025).

Despite the growing literature on AI in education, there has been a specific gap persists in the area of algorithmic bias and its implications for inclusive pedagogical practices. In addition, this gap remains requiring further exploration regarding AI's application in multilingual and multicultural education. Prior studies have addressed ethical AI design and digital equity at a macro-policy level, few have examined how teachers, particularly in multilingual and multicultural educational contexts like Indonesia, experience, interpret, and navigate algorithmic bias within the classroom. The majority of existing research is either technology-centric or learner-focused, leaving the teacher's role in mediating AI-driven pedagogies underexplored (Liu et al., 2022). This neglect is problematic because teachers are not passive recipients of technology; they actively adapt, resist, or reshape AI-generated materials to align with local cultural, linguistic, and ethical contexts. Understanding teachers' perspectives is thus crucial to evaluating whether AI systems are genuinely empowering educators or instead subtly "programming" them to follow algorithmic outputs without sufficient critical agency.

This study seeks to fill that gap by shifting the analytical lens toward the teacher. It explores how Indonesian teachers experience algorithmic bias in AI-powered tools and how such experiences influence their instructional choices, professional autonomy, and commitment to inclusive education. The title "Who Programs the Teacher?" reflects a critical inquiry into whether the increasing reliance

on algorithmically guided tools is constraining teachers' judgment and embedding hidden forms of discrimination into the learning process. In doing so, this research contributes a nuanced understanding of the socio-technical dynamics between teachers and AI systems in the Global South.

The novelty of this study lies in its integration of algorithmic bias, teacher agency, and inclusivity within Indonesia's culturally diverse educational landscape. By centring teachers' voices and examining how they navigate AI tools in their classrooms, this research reveals the complex interplay between technology and pedagogy. These insights are essential for guiding ethical AI development, shaping policies that support equitable learning environments, and strengthening digital pedagogical competencies among educators.

Accordingly, this study has four key objectives: first, to investigate Indonesian teachers' awareness of and exposure to algorithmic bias in AI-based educational tools; second, to examine how these biases influence teachers' pedagogical agency and their efforts to create inclusive learning environments; third, to identify the challenges and ethical dilemmas teachers encounter in integrating AI into their instructional practices; and fourth, to provide recommendations for the design of inclusive, transparent, and culturally responsive AI systems that support equitable education in diverse contexts. These objectives aim to advance the understanding of the socio-technical dynamics of AI integration in education and inform both policy and practice.

LITERATURE REVIEW

Artificial intelligence in education (AIED)

Artificial intelligence in education (AIED) refers to the integration of machine learning, natural language processing, and predictive algorithms into educational tools, systems, and environments (Wang et al., 2024). These systems are often used to personalise learning pathways, automate assessment, recommend content, and support administrative tasks (Ouyang et al., 2023). Incorporating AI in education can provide teachers with targeted interventions to promote teaching-learning practices. This, additionally, allows teachers to more efficiently foster inclusive learning environments.

In the Indonesian context, AI has become increasingly prominent in digital platforms used by both teachers and students, especially in the aftermath of the COVID-19 pandemic, which accelerated the adoption of online and blended learning (Fauziddin et al., 2025). While these technologies offer significant potential to enhance efficiency and improve learning outcomes, they also pose critical challenges regarding the neutrality of algorithms. Some scholars caution that AI systems may unintentionally constrain pedagogical innovation rather than fully supporting it (Iyer, 2025). This tension highlights the need for a critical perspective when examining AI's role in education.

Furthermore, the introduction of AI has reshaped traditional teacher–student dynamics, where decision-making authority is sometimes shifted from educators to algorithmic systems. While this can improve efficiency, it also risks diminishing teachers' professional judgment if AI-generated recommendations are followed uncritically. Therefore, ongoing research is needed to determine whether AI in education empowers teachers as facilitators of learning or gradually replaces their autonomy with automated guidance.

Algorithmic bias and educational equity

Algorithmic bias refers to systematic and replicable errors in AI systems that result in unfair or skewed outcomes, disproportionately disadvantaging marginalised groups (Kordzadeh & Ghasemaghaei, 2022). Bias can be embedded in the training data, in the assumptions of the algorithm designers, or in the unintended consequences of AI deployment in real-world educational settings (Baker & Hawn, 2022). In academic contexts, algorithmic bias may manifest in content curation, predictive grading, automated feedback, or language assessment, often privileging dominant cultural norms and linguistic practices (Cheuk, 2021).

This issue has profound implications for equity, particularly in multilingual and multicultural contexts like Indonesia. Arora (2024) highlights that AI systems trained on predominantly Western-

centric data frequently marginalise non-Western epistemologies and cultural practices. This marginalisation can undermine efforts to promote inclusion and fairness in education, reinforcing inequalities rather than addressing them. Therefore, addressing algorithmic bias is essential to ensure that AI contributes meaningfully to inclusive and equitable learning opportunities.

Beyond cultural and linguistic exclusion, algorithmic bias also influences students' perceptions of fairness and trust in educational technologies. When students encounter AI-generated outputs that do not reflect their lived experiences, they may feel alienated from the learning process. In the long term, this undermines the credibility of AI as a learning tool and risks widening existing educational disparities. Thus, algorithmic fairness is not only a technical issue but also a social imperative that directly affects learners' engagement and participation.

Teacher agency and autonomy in AI-mediated classrooms

The integration of AI into classrooms has intensified tensions between algorithmic recommendations and teachers' professional autonomy. Educators are increasingly expected to interpret or follow system-generated decisions without fully understanding their underlying mechanisms (Liu et al., 2023). This dynamic risks reducing teachers to passive implementers of technology, thereby constraining their agency and ethical decision-making in pedagogy (Franco D'Souza et al., 2024).

Without adequate training and critical digital literacy, teachers may inadvertently reproduce algorithmic bias, perpetuating exclusionary practices (Chaka, 2022). However, when teachers are equipped with both technical expertise and ethical competencies, they can critically evaluate AI recommendations, adapt content to reflect local realities, and preserve their central role as pedagogical leaders. This reinforces the importance of recognising teachers as active agents in shaping AI's integration into classroom practices.

Moreover, teacher agency in AI-mediated classrooms should be viewed as a continuum rather than a binary condition. In some cases, teachers use AI outputs as supplementary resources that stimulate creativity, while in others, AI-generated content heavily influences lesson planning. This variability underscores the need for professional development that not only enhances teachers' technical proficiency but also empowers them to critically negotiate the role of AI in their instructional decision-making.

Recent studies on AI, bias, and inclusion in education

International research has increasingly examined the ethical, cultural, and pedagogical dimensions of AI in education (Schiff, 2022). Holstein and Doroudi (2022) found that educators often lack awareness of AI bias, which can lead to uncritical adoption of technologies that disadvantage certain learners. Similarly, Cheuk (2021) found that bias in AI-driven language learning systems undermined assessment fairness for students from non-dominant linguistic groups. Meanwhile, Miragoli (2024) warned of epistemic injustice when AI fails to represent diverse learning contexts.

In Indonesia, related studies remain relatively limited. Nurhayati et al. (2025) identified digital inequalities in rural communities due to insufficient adaptation of AI tools, while Shah (2024) documented gender bias in AI-assisted feedback systems. These findings highlight pressing ethical and practical concerns but tend to overlook teachers' lived experiences in navigating such challenges. This study addresses this gap by foregrounding Indonesian educators' perspectives on algorithmic bias, inclusivity, and agency in AI-mediated classrooms.

Additionally, there is limited evidence on how teachers critically respond to AI bias in practice. Some educators have reported adjusting or rewriting AI-generated outputs to make them more culturally relevant, while others have used these outputs as discussion points to raise students' critical awareness. These examples illustrate that teachers are not passive recipients of AI technology but active mediators who balance its benefits with contextual limitations. This perspective strengthens the argument that teacher voices must be central in discussions about AI's role in education.

METHOD

This research employed a qualitative approach to explore junior high school teachers' perceptions of integrating artificial intelligence (AI) in the classroom, with a focus on inclusivity, bias, and pedagogical utility. The study was conducted in Lumajang Regency, East Java, Indonesia, a region selected due to its growing interest in digital education and its mix of rural and urban schools.

The participants included 20 junior high school teachers from different schools completing a structured questionnaire. This study used purposive sampling to select the participants. From this pool, 12 teachers were purposively selected for semi-structured interviews. All these participants were purposively selected based on their prior experience using AI-based educational tools such as ChatGPT, Grammarly, Gemini or similar platforms. Purposive sampling was employed to ensure a diversity of teaching backgrounds, school locations, and subjects taught. This approach aims at obtaining rich, context-specific data rather than generalize across populations, in line with qualitative research principles (Lim, 2024).

The data collection process involved two stages. First, a 15-item Likert-scale questionnaire was distributed electronically via Google Forms. The questionnaire items were adapted from validated instruments on AI ethics and educational equity (Kamali et al., 2024). This covered domains such as algorithmic bias awareness, AI usefulness, cultural inclusivity, and training availability. Second, 12 teachers were selected for semi-structured interviews, conducted via in-person meetings or Zoom, depending on availability and connectivity. Each interview lasted approximately 30 to 45 minutes and was audio-recorded with participant consent.

Data analysis was conducted through analysing questionnaire descriptively, including frequencies, percentages, and mean scores, to identify general trends and patterns. Further, the data from the interviews were analysed using thematic analysis, following Braun and Clarke's (2006) six-step procedures, involving familiarising data, generating initial codes, generating initial themes, reviewing themes, theme transcription, and interpretation. Triangulation between questionnaire and interview findings was used to validate results and ensure credibility. This, additionally provided a deeper understanding of how AI was perceived and experienced in the localised educational setting of Lumajang, offering valuable insight into the challenges and opportunities of ethical and inclusive AI integration in Indonesian EFL classrooms.

FINDINGS

The analysis of both the questionnaire data (Figure 1) and the interview responses reveals a multifaceted understanding of teachers' experiences and perceptions regarding the integration of AI tools in Indonesian classrooms. The research findings confirm the initial hypothesis that AI tools are being increasingly incorporated into daily pedagogical practices, with 82% of respondents indicating either "Agree" or "Strongly Agree" that AI assists them in lesson planning and material generation (Figure 1). Interview narratives reinforce this quantitative result, with teachers describing the use of AI for drafting lesson plans, generating example texts, and creating interactive activities (e.g., Respondents 1, 2, and 4). This convergence between quantitative and qualitative data underscores AI's perceived value as a time-saving and creative support tool in the classroom.

Despite the widespread use, significant concerns emerged regarding AI bias and the limited cultural-linguistic representation in AI-generated content. According to the questionnaire, only 29% of teachers agreed that AI adequately represents students' cultural and linguistic diversity, while 48% indicated neutrality, and 23% disagreed or strongly disagreed (Figure 1). Interview responses echoed these concerns, with teachers reporting that AI outputs often default to Western-centric examples and lack relevance to local Indonesian contexts. Respondents from various disciplines, such as English, History, and Bahasa Indonesia (e.g., R3, R5, R6, and R9), emphasized difficulties in finding culturally appropriate materials, highlighting the disconnect between AI's training data and the rich cultural diversity of Indonesian classrooms. This finding challenges previous research by Balahur et al., (2022), which argued that AI tools are universally applicable and unbiased. Instead, our results show that algorithmic bias remains a critical barrier to equitable AI integration in education.

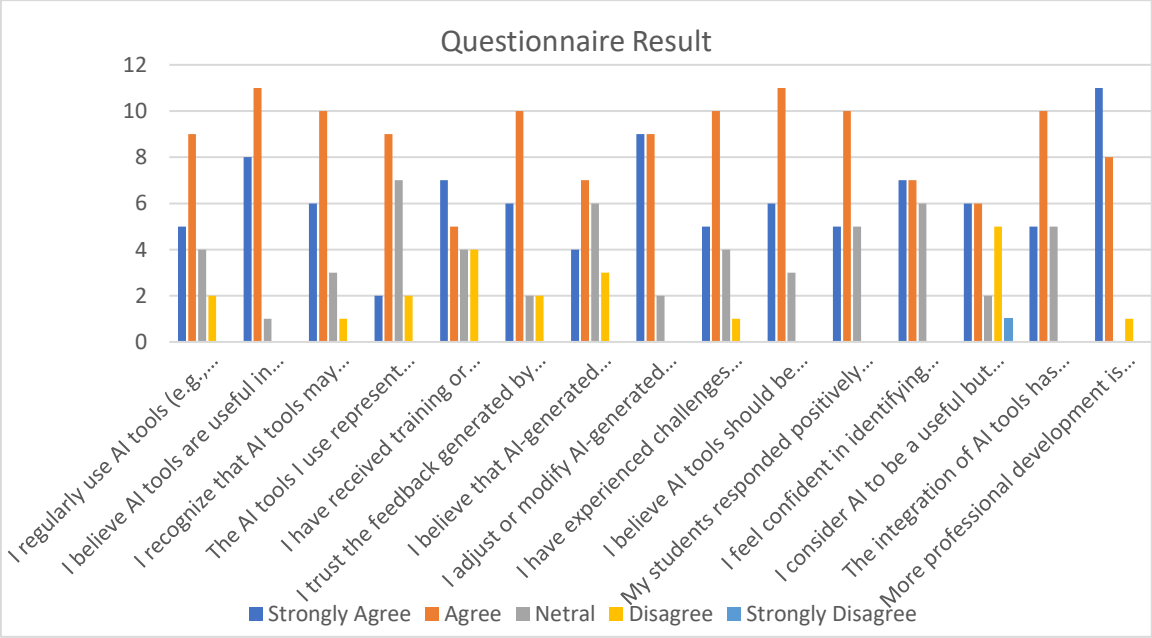
Teachers' proactive responses to AI bias reflect an adaptive and critically engaged approach. Questionnaire data indicate that 75% of teachers agreed or strongly agreed that they adjust AI-generated materials to align with their students' contexts (Figure 1). This behavior is reinforced by interview narratives, in which teachers described rewriting AI outputs, facilitating discussions about bias, and using AI-generated content as a springboard for critical reflection (e.g., R4, R5, R7, and R12). This finding diverges from study conducted by Fischer et al., (2020), which suggested that teachers often accepted AI outputs passively due to limited time or digital literacy. Our results highlight a pedagogical shift, positioning teachers as active curators and ethical mediators who critically evaluate AI content to support inclusive learning.

Challenges related to training and systemic support emerged as significant barriers to effective AI use. Questionnaire data reveal that only 22% of teachers reported receiving formal training on AI tools, while 41% indicated relying on self-taught methods or informal peer support, and 37% reported no training at all (Figure 1). Interview data further underscore this challenge, with teachers (e.g., R1, R2, R6) noting the lack of structured professional development opportunities. Additionally, teachers cited infrastructural issues such as limited internet connectivity and inconsistent device access as significant impediments to AI integration. Unlike Kamali et al.'s (2024) study, which emphasized the need for technical training alone, our findings demonstrate that comprehensive training, including cultural responsiveness and ethical considerations, is necessary for equitable and contextually relevant AI integration.

Despite these challenges, a strong sense of cautious optimism about AI's potential was evident among teachers. According to the questionnaire, 68% of respondents expressed agreement or strong agreement that AI holds promise for transforming learning experiences and supporting innovation (Figure 1). Interviews echoed this optimism, with teachers describing how AI could evolve to be more inclusive, culturally relevant, and adaptable to diverse student needs. Teachers also described a professional transformation from traditional content delivery to roles as facilitators, curators, and ethical stewards who help students critically navigate AI outputs (e.g., R1, R5, R7, and R12). This professional evolution aligns with, but also deepens, Shankar et al.'s (2025) findings by highlighting teachers' expanded responsibilities in ensuring that AI integration promotes educational equity and authenticity.

Figure 1

Result from Questionnaire



In summary, the findings reveal that while AI tools are increasingly adopted and appreciated for their efficiency and creative potential, substantial challenges remain, particularly regarding cultural sensitivity, inclusivity, and training gaps. Teachers are not passive consumers of AI outputs but are actively engaged in critically evaluating and adapting them to align with their students' needs. These findings emphasize the urgent need for comprehensive, context-sensitive training that equips teachers with both technical skills and the critical pedagogical competencies required to harness AI's potential while addressing its biases. By supporting teachers in this expanded role, AI can more effectively contribute to transformative and equitable learning experiences across diverse Indonesian classrooms.

DISCUSSION

Despite the growing practices and literature on AI, a gap persists in understanding algorithmic bias and its implications in multilingual and multicultural contexts. Prior studies have dealt with ethical AI design and digital equity at macro-policy levels, leaving the micro-level experiences of teachers underexplored (Liu et al., 2022). In addition, these findings highlight analytical lens on EFL teachers in Lumajang on how they experience, interpret, and navigate AI-powered tools. Through interviews with 18 EFL teachers, this study uncovered recurring tensions between algorithmic outputs and culturally responsive pedagogy.

This study aims at exploring teachers' perceptions and experiences of using AI tools within junior high school teachers. These have dealt with exploring their pedagogic usefulness, biases, cultural-linguistic representation, and adequacy of training support. The findings indicate that although educators mostly agree on the usefulness of AI tools in supporting lesson planning and creativity, significant concerns remain with respect to cultural representation, inclusiveness, and adequacy of training. This discussion provides an interpretation of these findings in the framework of contemporary theory and research, emphasizing the importance of the data and placing it within the larger context of educational technology research.

Furthermore, the promising potential of AI in promoting pedagogical practices remains notable challenges and ethical dilemmas. In this case, teachers may express concerns about algorithms bias. This bias is regarding to equitable access and representation in diverse classrooms like those in Indonesia. Further, ethical AI integration should provide teachers with guidelines for responsible use. In addition, teachers should override AI recommendations if they struggle with pedagogical issues in their classroom practices. In short, teachers should be included in professional development programs dealing with technical training on AI's use to enable them for responsible use.

The finding that ≥ 80% of teachers report using AI tools regularly and valuing their efficiency aligns with understanding the extent to which AI is integrated into daily pedagogical practice. This finding is consistent with prior research by Chen et al.(2020), who emphasized AI's potential to automate administrative tasks and scaffold learning, thereby supporting teachers in routine planning and content creation. However, while the adoption rate is high, it reveals that teachers remain critically engaged with AI outputs, adjusting and modifying them to ensure relevance and appropriateness. This challenges the notion of teachers as passive technology users—a notion suggested by earlier studies such as Fischer et al (2020) and instead supports a view of teachers as active agents shaping the integration of AI within their pedagogical contexts.

A central interpretation of this study is that AI-generated content often lacks sufficient cultural-linguistic representation, leading to concerns about inclusivity and relevance. This aligns with theories of algorithmic bias in AI, as discussed by Ofosu-Asare (2024), who argued that AI systems trained on predominantly Western datasets can perpetuate cultural biases and marginalize non-Western contexts. The fact that only 30% of teachers perceived AI content as culturally inclusive suggests that existing AI models do not adequately reflect Indonesia's linguistic and cultural diversity. This finding highlights the need to develop AI tools that incorporate local contexts, a point also emphasized by Arumugam et al. (2023), who advocate for inclusive AI design that reflects diverse languages and cultures. The scientific significance here is that while AI offers technological promise, its deployment in education requires alignment with sociocultural realities to avoid reinforcing existing inequalities.

The proactive stance of teachers in critically evaluating and modifying AI-generated content also offers an important contribution to educational AI research. Teachers' willingness to adapt AI output demonstrates their evolving role as critical pedagogues rather than mere consumers of technology. This aligns with Vygotsky's sociocultural theory (1978), which emphasizes the role of teachers as mediators of learning and culture. The findings thus illustrate how teachers are bridging the gap between AI-generated outputs and local classroom needs, an interpretation that builds upon but extends earlier research that often-positioned teachers as passive recipients of technology rather than active evaluators and curators.

Regarding training and professional development, the finding that only 20% of teachers received formal training while the majority were self-taught highlights a systemic gap in AI education support. This result both supports and expands on Lee's (2022) study, which found that technical training is essential but insufficient on its own. These indicate that teachers also need training that addresses pedagogical and ethical considerations to effectively navigate issues of bias and cultural representation. This finding reinforces calls from scholars such as Holmes IV et al.(2021), who argue that comprehensive AI education must integrate both technical proficiency and critical digital literacy to empower teachers as informed and ethical AI users.

Finally, the cautious optimism among teachers regarding the potential of AI tools to enhance learning aligns with broader educational technology literature that recognizes AI's transformative potential when appropriately contextualized (Alam & Mohanty, 2023). Yet, our findings suggest that without addressing issues of bias, cultural relevance, and training, the transformative promise of AI may remain unrealized or may even exacerbate existing inequities. This interpretation is particularly important in the context of Indonesia's diverse and multilingual education system, where equitable access to culturally relevant education is both a policy priority and a pedagogical imperative.

This study sheds light on the dual reality of AI integration in education: while AI tools offer genuine potential to enrich pedagogy and streamline instructional tasks, they also risk perpetuating cultural bias and reinforcing existing inequities, especially when built upon datasets lacking in diversity (Cau et al., 2024). In addition, these findings suggest that AI systems do not outright replace teachers, but they can reroute this program. This rerouting happens when teachers rely on AI-generated recommendations, potentially narrowing pedagogical choices. What makes these findings important is the emphasis on the need for a more inclusive and critically aware approach, one that sees teachers not just as users of technology but as active agents who help shape how it affects their students.
Future research should prioritize the development of AI systems that reflect diverse cultural and linguistic contexts, alongside robust, context-sensitive professional development programs that empower teachers to navigate both the opportunities and ethical challenges of AI integration in the classroom. In short, AI system has the potential to reroute or influence teachers' decision-making and empower teachers' professional practices.

CONCLUSION

This study aimed to investigate Indonesian junior high school teachers' perceptions of AI use in educational settings, specifically focusing on algorithmic bias, fairness, and inclusivity. The research revealed that while teachers acknowledge the significant benefits of AI in streamlining administrative and instructional tasks, they exhibit a limited awareness of embedded algorithmic biases and broader ethical implications. Despite this awareness gap, teachers proactively develop individual strategies to mitigate perceived biases, such as adapting content manually or engaging students in critical discussions about AI outputs.

The findings underscore a critical need for enhanced understanding and systemic support regarding ethical AI implementation in Indonesian education. The observed biases, particularly the Eurocentric and culturally irrelevant examples, highlight a significant contribution to the literature by demonstrating how global AI models can misrepresent specific local contexts, such as Indonesian idioms, cultural references, religious diversity, and regional languages. This extends beyond general discussions of bias to pinpoint culturally specific challenges in AI adoption within diverse educational

settings. Furthermore, the study reveals a notable reliance on self-taught methods and minimal formal training among teachers, indicating a substantial gap in professional development. This pervasive lack of structured support not only hinders teachers' ability to effectively manage AI's ethical complexities but also risk deepening digital inequalities by potentially excluding students with diverse needs.

The implications of these findings are multifaceted. Practically, there is an urgent need for policymakers and developers to design culturally sensitive, inclusive, and ethically aligned educational technologies. This includes investing in targeted professional development programs that equip teachers with critical AI literacy, focusing on identifying and mitigating algorithmic bias within local contexts. Theoretically, this research contributes to the emerging discourse on AI ethics in education by providing empirical evidence from a non-Western context, thereby challenging the generalizability of some existing theories on AI adoption and teacher readiness that might not fully account for cultural and systemic nuances.

A primary limitation of this study is its geographical focus on East Java and the reliance on self-reported data. Future research should expand to diverse regions across Indonesia to provide a more holistic view of national perceptions and experiences. Additionally, exploring student perspectives on AI-generated content and bias would offer a crucial complementary dimension to this research. Further investigation into specific AI tools and their varying degrees of bias across different subjects could also yield valuable insights. Ultimately, this study provides a foundational understanding of the ethical landscape of AI in Indonesian classrooms, urging a collaborative effort among educators, policymakers, and developers to ensure that AI serves as an equitable and inclusive tool for all learners.

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