ETHICAL AND MANAGERIAL CHALLENGES OF ARTIFICIAL INTELLIGENCE INTEGRATION IN INDONESIAN EDUCATION: A CRITICAL REVIEW

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Abstract. *This study explores the ethical and practical challenges surrounding the use of Artificial Intelligence in Indonesian education, with particular attention to management and policy contexts that are often overlooked. Rather than treating AI as a neutral innovation, the study focuses on identifying key moral concerns and operational barriers before considering value-based responses. A critical review of policy documents and peer-reviewed literature published between 2020 and 2025 was conducted using sources indexed in Scopus, Google Scholar, and ERIC. The study adopts a qualitative, descriptive design supported by thematic and textual analysis. The findings suggest that while AI has the potential to support personalized learning and administrative efficiency, its adoption remains limited due to persistent ethical concerns. These include risks to academic integrity, data privacy, and algorithmic fairness. Such challenges are intensified by weak digital infrastructure and low digital literacy, particularly in rural areas. Moreover, the absence of clear national strategies and accountability frameworks further complicates implementation. The study argues that AI integration in Indonesian education requires ethically informed, long-term management that prioritizes governance, capacity building, and inclusive decision-making to ensure AI supports equity rather than deepening existing disparities.*

Keywords: *Artificial Intelligence; Educational Management; Ethics in Education; Indonesia*

1. INTRODUCTION

1.1 Background

Artificial intelligence has increasingly transformed from the periphery of educational technology to an active agent in the organization, management, and experience of education. It has ceased to be something that quietly stays in the background. AI now plays a role in curriculum design, assessment, and institutional decision-making. At many universities around the globe, AI is being portrayed as a means to improve efficiency and competitiveness often linked to broader innovation agendas (Abbasi et al 2025). While this narrative is desirable, what it does leave open is whether educational systems are ready for such a change ethically and institutionally. In unsophisticated governance contexts, it is hard to miss the mismatch between technological capability and educational worth.

With the arrival of AI-powered tools in schools, educators must address the gap between the policies enacted and the realities of teaching. Teachers sometimes feel the need to be better equipped with AI-assisted products without proper training, ethical guidance, or the chance to make their own teaching decisions. It is then not surprising that the situation has led to some unwillingness to adopt the technology, resistance, or inconsistent adoption. When the speed of adoption is given priority over the time for reflective practice and contextual readiness, AI is seen as a source of ambiguity rather than assistance (Abedi, 2024). The above-mentioned factors lead to the conclusion that the integration of AI into the system is not a purely technical matter but rather a change in social and institutional factors that is closely linked to professional identity, authority, and trust. In Indonesia, the situation is further complicated by the country's

cultural, religious, and institutional diversity. For instance, studies of Islamic higher education institutions reveal that AI adoption is often justified by moral and theological considerations that are not necessarily aligned with the modern Western technology narrative (Achruh et al., 2024). These justifications demonstrate the limitations of universal AI frameworks and underscore the need for ethical, locally rooted managerial perspectives.

The emergence of generative AI has brought about a new round of complications. Large language models, for instance, create a dilemma between human thinking and automation. They introduce the possibility of new learner and content generation forms, but at the same time make the already raised issues of academic integrity and epistemic authority even more critical. Informally, teachers now find themselves in a zone where it is not always easy to distinguish between helping and cheating (Adeshola & Adepoju, 2024).

The ambiguities in question inevitably shift teachers' positions. The AI systems are gradually becoming the main support for teachers rather than replacing them, thus participating alongside teachers in instructional processes. Such a scenario raises questions about pedagogical agency, professional identity, and the institutional reliance on automated judgment, particularly in systems already facing heavy workloads and rapid digital change (Chan & Tsi, 2023).

Apart from teaching, AI has completely changed the way student data is collected and the way it is dealt with. A learning analytics system now controls and mediates assessment, progression, and intervention, often with little transparency or human oversight. Although such systems are promoted under the name of hybrid intelligence, their ethical implications are predominantly determined by the governance structures that regulate consent, data use, and interpretability (Cukurova, 2025).

The academic world worldwide is slowly but surely realizing that AI is challenging traditional concepts of originality and trust. The coming of post-plagiarism thinking is an uncomfortable admission that the old regulatory models find it difficult to cope with AI-mediated authorship. Nonetheless, the journey to these new paradigms is still a long one and will be uneven, particularly in systems where there is no institutional readiness and no ethical consensus (Eaton, 2025).

Managerial pressures weigh down educational leaders more than ever before. They have the responsibility to ensure that AI-driven innovation aligns with sustainability and accountability, a task that calls for more than just technical proficiency. AI management without proper guidance is likely to lead to managerial practices that prioritize optimization at the expense of equity and care (Elbanna & Armstrong, 2024).

In Indonesian education, the integration of AI seems more of an ethical and managerial dilemma than a straightforward technological advancement. The issues of infrastructural inequality, ethical uncertainty, and governance are so intertwined that they require careful, context-sensitive analysis. Positioning AI as a socio-technical system embedded within educational power structures is a vital starting point for understanding the challenges this research addresses.

1.2 Problem Statement

The Indonesian scenario, notwithstanding the increasing interest in AI in education, underscores the reality that the gap between aspirations and the actual state of institutions remains. Most of the literature available gives a detailed description of AI functionalities, but it insufficiently discusses the preparedness of educational systems to cope with AI. Research comparing Indonesia with other developing countries with similar conditions indicates that the regulatory structures meant to keep AI initiatives in check are often outpaced by these initiatives, leading to fragmented adoption and limited coherence (Mustopa et al., 2024). The problem, therefore, is not the unavailability of AI tools but the lack of a proper framework for their responsible use. Global narratives that depict AI integration as mostly inevitable or neutral

in its impact further this problem. Such views invariably ignore the influence of local cultures, governance traditions, and socio-economic inequalities on AI outcomes. The literature review on Indonesia shows that ethical and operational issues may arise, but only briefly, without any follow-up on the implications of AI for the redistribution of power, access, and accountability in education (Rakuasa et al., 2024). In this respect, ethics is treated as an afterthought rather than being considered a core principle of design.

At the level of institutions, the lack of clear and cohesive policies further adds to the difficulties in adoption. Even though universities are progressively issuing AI-related regulations, these papers often do not have any legally binding norms, are not ethically clear, or do not correlate with the laws of the country (McDonald et al., 2025). In Indonesia, this uncertainty causes teachers and administrators to use AI in a trial-and-error manner, which in turn exposes them to possible ethical blunders and damage to their reputation. The fast-paced adoption of generative AI has created a scenario where the question of learning integrity and trust has become more pronounced. Studies on the usage of AI tools by the students and academics imply that there are unresolved conflicts between the two extreme positions of learning support system and intellectual dependency, especially when the guidance from the institution is vague or completely absent (Memarian & Doleck, 2023). Consequently, teachers are left in most cases to confront the ethical issues by themselves without any common rules or support from the system.

The combination of these factors highlights a crucial issue: the adoption of AI in Indonesian education is moving forward without a strong ethical and managerial base. In the absence of proper governance, context-specific frameworks, and building capabilities in the institutions, AI might aggravate the existing inequalities rather than lessen them. This is a scenario that needs a critical and more profound AI adoption rethinking that puts ethical accountability and management responsibility ahead of technological optimism.

1.3 Research Significance

By placing ethics and management at the centre of analysis, this study contributes to scholarship that questions technology-first approaches to AI in education. While many reviews catalogue applications and trends, fewer examine how governance structures and managerial decisions shape ethical outcomes. Recent systematic reviews of generative AI suggest that ethical risks are widely recognised but rarely translated into concrete institutional strategies (Nguyen & Truong, 2025). This gap between awareness and action remains underexplored.

The study is particularly relevant for Indonesia, where educational reform unfolds across institutions with uneven resources and regulatory clarity. By situating ethical concerns within Indonesia's socio-cultural context, the research responds to calls for more grounded analyses. Work on curriculum change in Indonesian and Islamic education shows that technology adoption is deeply intertwined with values, beliefs, and social expectations that cannot be separated from management practices (Liriwati, 2023). Rather than relying on generic ethical checklists, this study highlights how locally rooted values should inform AI governance and leadership.

From a policy and leadership perspective, the study offers insights into more coherent institutional responses. Evidence from neighbouring Southeast Asian contexts indicates that trust in AI depends less on technical skill and more on perceived governance and ethical safeguards (Razak et al., 2025). By emphasising managerial accountability, strategic planning, and inclusive decision-making, this research speaks directly to policymakers and educational leaders grappling with AI-related reforms.

More broadly, the study contributes to debates on human-centred educational innovation. Research on ethical AI and learning analytics consistently points to transparency, participation, and interpretability as foundational principles rather than optional features (Topali et al., 2025). Framing AI integration through this lens reinforces the study's significance in advocating for

educational futures where technological advancement supports equity, rights, and dignity within the Indonesian education system.

2. LITERATURE REVIEW

The growing body of research on artificial intelligence in education marks a shift from early, exploratory discussions toward a deeper understanding of its potential to transform educational systems. Initially, AI was seen as a tool for improving efficiency. However, as the literature has evolved, it's increasingly viewed as an active force that can reshape everything from curriculum design to institutional governance, even educational values themselves. The range of AI applications, from intelligent tutoring systems to generative tools, has blurred the lines between teaching, administration, and decision-making (Samala et al., 2025). AI is no longer just an innovation sitting on the sidelines; it's becoming a structural component of how education works.

Generative AI, in particular, has captured the attention of researchers, especially for its ability to influence learning practices and knowledge production. Tools like ChatGPT are seen as valuable for supporting writing, offering feedback, and deepening conceptual understanding. Yet, they also challenge the traditional norms of academic authorship and assessment (Rahman & Watanobe, 2023). This duality—AI as both a tool for enhancing autonomy and a potential threat to academic rigor—underscores the tension many educators face in adapting to these new technologies.

Beyond the practical implications, epistemological concerns are at the forefront of the debate. AI-mediated knowledge isn't neutral; it fundamentally alters how students understand authority, reasoning, and justification in academic work (Malfatti, 2025). This perspective pushes us to rethink AI as more than just a technical intervention. It's a participant in the process of meaning-making within educational contexts.

Ethical issues are also central to the discourse. Scholars have raised alarms about AI's opacity, biases, and the responsibility we have for the decisions it makes in education. Ethical analyses of tools like ChatGPT emphasize that without critical oversight, AI could perpetuate inequalities or distort educational outcomes (Zhou et al., 2024). These concerns have sparked calls for embedding ethical principles directly into AI's design and governance from the outset, not tacking them on as an afterthought.

At the K–12 level, there's been some pushback against the overhyped expectations of AI. While tools like adaptive learning systems and learning analytics hold promise, their success largely depends on how well they're mediated by teachers and supported by infrastructure (Yim & Su, 2025). The assumption that AI automatically leads to better outcomes is increasingly being questioned, particularly in environments where teachers face heavy workloads and limited resources.

Teacher education, too, has become a focal point in the literature. Educators are caught between seeing AI as a professional resource and a disruptive force, particularly when they lack institutional support or ethical clarity (Whalen & Mouza, 2023). This tension highlights the managerial challenges of AI adoption. How leadership decisions are made at the institutional level plays a significant role in shaping educators' ability to engage meaningfully with AI technologies.

In vocational education, AI's potential to enhance workforce readiness and support sustainable development goals is frequently discussed. However, for AI to reach its full potential, implementation must be accompanied by inclusive planning and long-term governance strategies (Prasetya et al., 2025). Without these, AI risks widening the gap between well-resourced institutions and those left behind. Despite the progress in the field, the literature reveals persistent gaps between technological potential and real-world application, especially in developing countries. In particular, limited infrastructure and digital literacy present significant

barriers to the ethical and effective use of AI tools in schools (Yusuf, 2025). These issues are often recognized, but they remain inadequately integrated into the broader ethical and managerial frameworks necessary for sustainable AI use.

The intersection of AI, data practices, and institutional accountability also deserves attention. Learning analytics, for example, has introduced new power dynamics between institutions and students, especially when data governance mechanisms lack transparency and participation (Topali et al., 2025). These concerns situate AI ethics within wider discussions about surveillance, consent, and governance in education.

While global and regional studies have grown in number, research specific to Indonesia remains fragmented. Existing reviews of the Indonesian context often identify challenges such as regulatory uncertainty, cultural adaptation, and inconsistent policy implementation, but they rarely integrate ethical and managerial frameworks into a cohesive analysis (Rakuasa et al., 2024). This fragmentation limits the ability of the existing literature to offer deep insights into how AI is being integrated into Indonesian education.

Moreover, comparative research suggests that AI adoption in different countries is shaped more by institutional leadership and governance coherence than by the technology itself. In Indonesia, students' experiences with AI are influenced by how well their institutions define responsibility, ethical boundaries, and support systems (Mustopa et al., 2024). These findings suggest that management practices often underexplored in the literature are crucial to the success of AI integration.

Taken as a whole, the literature shows a clear gap between the growing body of work on AI applications and the critical, contextual examination of how ethical and managerial principles are put into practice. Few studies have synthesized ethical theory, institutional governance, and the unique realities of Indonesia's educational system. This research aims to fill that gap by focusing on the importance of management accountability, ethical responsibility, and a nuanced understanding of local contexts in AI adoption, offering a more holistic and context-sensitive approach to AI in education.

3. RESEARCH METHODS

3.1 Research Design

This study takes a qualitative approach to explore the ethical and managerial challenges that arise from integrating artificial intelligence into Indonesian education. A qualitative design makes sense here because the focus is on understanding values, governance, and how these issues are shaped by the local context things that can't easily be reduced to numbers or causal relationships. Previous qualitative work in educational technology has shown that ethical and managerial concerns around AI aren't just abstract concepts; they are deeply influenced by the cultures and institutions they're embedded in, which makes them unsuitable for purely quantitative research (Lai & Bower, 2019). In this way, the study aims to dive deeper into the complexities of these issues through a critical lens, prioritizing nuanced understanding over broad generalizations.

More specifically, this study uses a critical literature review approach, which isn't just about gathering data from existing studies. It's about questioning assumptions, exposing power dynamics, and highlighting contradictions in the literature. Unlike systematic reviews that focus on synthesizing and summarizing, critical reviews aim to challenge the status quo and uncover what's been overlooked or ignored. This fits well with the current call in AI education research to rethink how we synthesize findings, especially in contexts where ethical and governance structures are still being figured out (Nguyen & Truong, 2025). Ultimately, this design lets the study engage with AI as a socio-technical issue, not just a shiny new tool.

3.2 Data Collection

For this study, data was gathered from peer-reviewed articles and policy-driven academic literature published between 2020 and 2025. This period was chosen because it coincides with the rapid rise of AI adoption in education, particularly after breakthroughs in generative technologies and learning analytics. The sources were identified through careful searches in databases like Scopus, Google Scholar, and ERIC, ensuring that the research was balanced between global and Indonesia-focused perspectives. The literature was selected based on its relevance to the study's focus on ethics, institutional management, governance, and educational equity (Rahimi & Oh, 2024).

Rather than following a rigid methodological framework, the selection was based on the conceptual depth of the studies. Only those that directly addressed AI in educational settings and provided insights into ethical risks, managerial practices, or policy implications were included. Studies that were purely technical and didn't have educational or governance relevance were left out. This kind of purposive selection, common in qualitative research, values depth and contribution over representativeness (Kassab et al., 2020). Since the study doesn't involve human participants, ethical approval wasn't required, but transparency in the selection and interpretation process was maintained to ensure ethical rigor.

3.3 Data Analysis

The collected literature was analyzed using thematic analysis, supported by qualitative textual interpretation. Thematic analysis enabled the identification of recurring ethical concerns, managerial challenges, and contextual constraints across diverse educational settings. This process involved iterative reading, coding, and categorization of texts to surface dominant themes and marginal perspectives. Such an approach is widely recognized as effective for synthesizing qualitative insights in educational research where meaning and interpretation are central (Topali et al., 2025).

To enhance analytical rigor, themes were examined in relation to institutional governance, infrastructural conditions, and socio-cultural factors specific to Indonesia. Rather than relying on frequency counts, the analysis focused on how arguments were constructed and how ethical responsibilities were framed within managerial discourse. This interpretive strategy aligns with human-centered perspectives on AI research, which stress the importance of contextual accountability and reflexivity over procedural objectivity (Shaheen, 2024). No statistical software was employed, as the analysis prioritized conceptual synthesis and critical reasoning.

Through this methodological framework, the study aims to generate a nuanced understanding of AI integration that captures ethical complexity and managerial responsibility. By combining a critical review design with thematic qualitative analysis, the methodology supports the study's broader objective of contributing context-sensitive insights into responsible AI governance in Indonesian education.

4. RESULTS AND DISCUSSION

4.1 Findings

The analysis highlighted a striking paradox in the integration of artificial intelligence in Indonesian education: while AI's potential is widely recognized, there's a persistent hesitation when it comes to ethical considerations. On one hand, AI is seen as a tool that can personalize learning, automate administrative tasks, and expand access to resources. Yet, these advantages haven't been enough to drive widespread adoption. In many schools, AI is still only being tested in pilot projects, rather than being integrated into day-to-day practices (Hidayah, 2025). This suggests that having the technology isn't enough; the system itself needs to be ready to implement it. A key finding relates to concerns about academic integrity. AI tools, especially generative ones, were often seen as disrupting traditional assessment methods by blurring the

lines between student effort and machine-generated help. Studies examining student interactions with AI systems pointed to a growing reliance on these tools, which raised questions about whether students were still engaging critically with their work, or simply relying on automated outputs (Nugroho, Putro, & Syamsi, 2023). What's particularly concerning here is that these problems aren't just technical; they are deeply connected to the lack of clear institutional guidance and shared ethical standards.

Data privacy and algorithmic transparency also emerged as critical themes. The literature suggested that the AI systems used in education often work in ways that are opaque to both institutions and users. Without clear processes for informed consent or accountability, institutions struggle to manage these risks properly. AI-driven platforms, for instance, frequently operate without a robust data governance framework, which only adds to the uncertainty around their use in schools (Singh et al., 2025). This highlights the managerial side of AI ethics, where the responsibility for data management is often vague or spread too thinly across different actors.

Infrastructural inequality also played a big role in amplifying ethical and managerial risks. Studies focused on rural and under-resourced schools showed that uneven access to digital tools and AI technologies only made existing educational disparities worse. Far from being the great equalizer it's often touted as, AI risks deepening these divides, especially when access to technology is so uneven (Ramlowat & Pattanayak, 2019). This finding aligns with broader concerns about the role of technology in reinforcing inequalities within education systems.

On the learner side, perceptions of AI were shaped not just by how easy the tools were to use, but by trust and how institutions framed these tools. Post-use surveys of students revealed a mixed reaction: while students appreciated the efficiency AI offered, they also expressed uncertainty about its ethical implications and long-term effects on their learning (Nugroho et al., 2025). This shows that ethical concerns aren't just something imposed by institutions they are internalized by the learners themselves. To summarize these findings, Table 1 outlines the core themes and implications drawn from the literature.

Table 1. Key Findings on Ethical and Managerial Challenges of AI Integration

Theme	Core Issues Identified	Implications
Ethical Integrity	Academic honesty, authorship ambiguity	Assessment redesign required
Data Governance	Privacy risks, algorithmic opacity	Need for accountability frameworks
Infrastructure	Digital divide, access inequality	Risk of widening educational gaps
Institutional Management	Policy fragmentation, unclear responsibility	Weak governance capacity
Learner Perception	Trust, dependency concerns	Need for ethical literacy

4.1 Discussion

The findings strongly suggest that ethical concerns are far from peripheral in the AI integration process. In fact, these issues seem to be central to how AI is being adopted within Indonesian education. Institutions aren't necessarily resisting AI, but rather struggling with how to reconcile technological innovation with core educational values. This aligns with broader arguments that AI adoption is more of a governance challenge than a technical or pedagogical one. Without strong leadership and a clear strategy, AI initiatives in schools tend to remain fragmented, more symbolic than substantive (Hidayah, 2025). When compared to international research, the Indonesian case shows both similarities and differences. On the one hand,

concerns about academic integrity and student dependency echo what's seen in other countries. However, Indonesia's struggles are compounded by infrastructural gaps and regulatory uncertainties, making it more difficult to implement AI effectively. This divergence helps explain why, despite widespread awareness of AI's potential, its adoption in Indonesia has been slower and more cautious (Singh et al., 2025).

The mixed attitudes of Indonesian students toward AI also offer an interesting contrast to findings from better-resourced countries, where AI adoption is often met with greater enthusiasm. Indonesian students seem to be more reflective, weighing the benefits of efficiency against potential ethical concerns (Nugroho et al., 2025). This could be linked to cultural expectations around education and the moral responsibilities of learning, which may differ from those in more utilitarian or outcome-driven educational systems. Another significant finding relates to digital inequality. Previous research often treats infrastructure as a technical issue, but this study shows that infrastructure gaps carry serious ethical implications. Where access to technology is uneven, AI doesn't level the playing field it exacerbates existing inequalities (Ramlowat & Pattanayak, 2019). This highlights the importance of ensuring that AI integration is not just technologically feasible but also socially equitable. While these findings contribute to the ongoing debate about AI in education, there are limitations.

As a literature-based qualitative review, this study relies on the scope and framing of existing research, which can introduce biases. Additionally, since the study didn't involve original fieldwork, it misses out on capturing real-world practices and informal governance mechanisms that are often at play in schools. Future research, particularly empirical studies that engage with teachers, policymakers, and students directly, could provide deeper insights into how these challenges play out in practice. The findings suggest that ethical concerns are not peripheral obstacles but central determinants shaping how AI is integrated into Indonesian education. Rather than resisting AI outright, institutions appear constrained by uncertainty over how to align technological innovation with educational values. This reinforces arguments that AI adoption must be understood as a governance challenge rather than a purely pedagogical or technical one. Managerial studies of educational administration emphasize that without strategic leadership, AI initiatives remain fragmented and symbolic (Hidayah, 2025).

When compared with prior international research, the Indonesian case exhibits both convergence and divergence. Similar to global findings, concerns over academic integrity and learner dependency recur across contexts. However, unlike studies conducted in well-resourced systems where ethical frameworks are gradually institutionalized, Indonesian institutions face compounded challenges due to infrastructural constraints and regulatory ambiguity. This divergence helps explain why AI adoption remains cautious despite widespread awareness of its benefits (Singh et al., 2025). The prominence of student ambivalence toward AI aligns with previous research highlighting the importance of institutional framing in shaping learner attitudes. While some global studies report high levels of AI acceptance among students, Indonesian learners demonstrate a more reflective stance, balancing perceived utility with ethical unease (Nugroho et al., 2025). This difference may be attributed to cultural expectations regarding educational responsibility and the moral role of learning, particularly in value-oriented educational traditions.

The findings also extend earlier discussions on digital inequality by demonstrating how ethical risks are unevenly distributed across educational contexts. Whereas prior literature often treats infrastructure as a technical prerequisite, this study shows that infrastructural gaps carry ethical consequences by limiting who can benefit from AI and under what conditions (Ramlowat & Pattanayak, 2019). As such, equity emerges as both an ethical and managerial concern. Despite these contributions, the study is subject to several limitations. As a qualitative literature-based review, the findings are shaped by the scope and framing of existing studies, which may reflect publication biases or uneven research attention across educational levels. Additionally,

the reliance on secondary data limits the ability to capture real-time institutional practices or informal governance mechanisms. Future research incorporating empirical fieldwork could provide deeper insight into how ethical and managerial challenges are negotiated in practice.

CONCLUSION

This study explored the ethical and managerial challenges of AI integration in Indonesian education through a critical qualitative review. It found that while AI offers tangible benefits, such as personalized learning and administrative efficiency, its adoption remains slow and fraught with ethical concerns. Issues such as academic integrity, data privacy, and algorithmic transparency were found to be central to the hesitation surrounding AI adoption. The study also highlighted how infrastructural inequality exacerbates these challenges, particularly in rural areas, and how the lack of coherent governance structures limits the effective use of AI tools.

Rather than being isolated concerns, these issues point to a broader problem: AI is being integrated without a sufficiently robust ethical and managerial framework. This reinforces the need for ethical governance, institutional leadership, and inclusive decision-making in AI adoption. AI's role in education shouldn't be seen as a short-term technological shift, but as a long-term process that requires careful management and ethical reflection.

Looking ahead, more empirical research is needed to capture how these challenges play out in real-world educational settings. Longitudinal studies that track the evolution of ethical perceptions and institutional capacities will be crucial for developing adaptive governance frameworks that can respond to the emerging complexities of AI in education.

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