



MORAL GOVERNANCE OF ARTIFICIAL INTELLIGENCE: HOW ISLAMIC BOARDING SCHOOLS INTEGRATE AI WITHOUT REPLACING RELIGIOUS AUTHORITY

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Abstract:

This study examines how Islamic boarding schools govern generative artificial intelligence while preserving religious authority and educational identity. Using qualitative multiple-case study of eight pesantren in Madura, Indonesia, data were collected through interviews, observation, and document analysis. Findings show AI is governed as a instrument serving educational purposes rather than as an autonomous authority. Four mechanisms emerged: governing educational purpose before technology, redistributing epistemic work without transferring authority, moral leadership through epistemic stewardship, and institutional resilience through adaptive innovation. The study develops the Moral Governance of Artificial Intelligence framework linking AI governance with moral responsibility, epistemic legitimacy, and educational leadership.

Keywords: *Artificial Intelligence; Islamic Boarding Schools; Educational Leadership; Epistemic Stewardship; Moral Governance.*

INTRODUCTION

The emergence of generative artificial intelligence (AI) represents not merely another wave of technological innovation but a profound transformation in the epistemic foundations of education. Unlike previous generations of educational technologies that primarily facilitated access to information, large language models (LLMs) are increasingly capable of generating explanations, arguments, lesson plans, assessments, and scholarly texts that closely resemble human intellectual work (Dwivedi et al., 2023; Kasneci et al., 2023; Tlili et al., 2023). As a result, AI is no longer positioned solely as an instructional tool but has begun to function as an active participant in the production, interpretation, and circulation of educational knowledge. This development fundamentally alters the relationship between technology, teachers, learners, and knowledge itself, raising questions that extend well beyond pedagogical effectiveness or technological adoption (Holmes et al., 2019; UNESCO, 2023). Rather than asking simply how AI can improve teaching and learning, educational researchers are

increasingly confronted with a more fundamental challenge: how should educational institutions respond when machines become capable of producing knowledge that appears authoritative, persuasive, and pedagogically valuable? This question marks a significant epistemic shift because it relocates the central concern of AI in education from technological capability to the governance of educational knowledge and authority.

The unprecedented capabilities of generative AI have stimulated an extraordinary expansion of research across education, educational technology, and digital pedagogy. Early studies predominantly emphasised the transformative potential of large language models to enhance instructional design, personalise learning experiences, support formative assessment, facilitate academic writing, and improve access to educational resources (Dwivedi et al., 2023; Kasneci et al., 2023; Rudolph et al., 2023; Tlili et al., 2023). Consequently, much of the emerging scholarship has concentrated on issues of AI adoption, digital literacy, pedagogical innovation, academic integrity, and students' and teachers' readiness to engage with AI-enabled learning environments (Cotton et al., 2023; UNESCO, 2023; Zawacki-Richter et al., 2019). Parallel to these developments, another body of literature has shifted attention towards responsible AI, trustworthy AI, explainable AI, and human-centred AI, arguing that meaningful human oversight, transparency, accountability, and ethical safeguards must remain central to educational decision-making (Floridi & Cowls, 2019; Holmes et al., 2019; OECD, 2023; UNESCO, 2021). Collectively, these studies have significantly advanced understanding of how AI can be effectively and responsibly integrated into educational practice. Nevertheless, the dominant trajectory of current scholarship continues to conceptualise AI primarily as a technological innovation whose educational value depends on appropriate adoption, ethical regulation, or human supervision. Comparatively less attention has been devoted to understanding how educational institutions themselves determine the epistemic status of AI-generated knowledge and the institutional conditions under which such knowledge becomes educationally legitimate.

Despite these important advances, the rapid expansion of research on AI in education has also exposed a significant conceptual imbalance. Existing scholarship has devoted considerable attention to improving the technical performance, pedagogical effectiveness, ethical deployment, and regulatory governance of AI systems, yet comparatively little attention has been paid to the epistemic processes through which AI-generated outputs acquire educational legitimacy. This omission is theoretically important because educational institutions do not merely facilitate learning; they function as communities that define what counts as valid knowledge, who is authorised to interpret it, and under what conditions knowledge becomes worthy of teaching and transmission (Biesta, 2021; Muller & Young, 2019; Young, 2008). While AI may generate responses that appear coherent, accurate, and academically persuasive, informational plausibility is not equivalent to epistemic legitimacy. Knowledge becomes educationally meaningful only after it is interpreted, evaluated, and authorised within institutional communities that possess recognised intellectual and moral authority (Biesta, 2021; Floridi & Cowls, 2019; Selwyn, 2019). Consequently, the central challenge posed by generative AI is not simply whether machines can produce knowledge-like outputs, but how educational institutions distinguish between algorithmically generated information and knowledge that is considered educationally legitimate. It is precisely this institutional process of legitimising AI-generated knowledge that remains insufficiently theorised within

contemporary research on artificial intelligence in education.

The absence of a robust explanation of epistemic legitimacy is particularly consequential for value-based educational institutions, where the authority of knowledge extends beyond empirical accuracy or technical competence. Across diverse educational traditions, knowledge is not accepted solely because it is factually correct or algorithmically generated; rather, it derives legitimacy through historically developed practices of interpretation, professional judgement, ethical responsibility, and institutional trust (Bernstein, 2000; Biesta, 2021; Young, 2008). Educational authority therefore rests upon socially recognised processes through which communities evaluate not only the validity of knowledge claims but also their moral appropriateness and educational significance. Recent debates on AI governance have rightly emphasised principles such as transparency, accountability, fairness, and human oversight (Floridi & Cowls, 2019; OECD, 2023; UNESCO, 2021). Nevertheless, these governance frameworks remain predominantly regulatory and technological in orientation, offering limited explanation of how educational institutions themselves exercise moral judgement in determining whether AI-generated knowledge should be accepted, adapted, modified, or rejected within specific pedagogical and cultural contexts. Consequently, understanding AI integration requires moving beyond questions of technological governance towards an examination of how educational institutions govern knowledge itself through institutional authority, moral reasoning, and epistemic responsibility.

This unresolved question becomes particularly salient in Islamic boarding schools (*pesantren*), where educational authority is deeply embedded in long-standing epistemological traditions rather than technological expertise alone. As one of the oldest and most influential institutions of Islamic learning in Southeast Asia, *pesantren* organise educational life around principles of *sanad* (scholarly chains of transmission), *talaqqi* (direct teacher–student learning), *ijazah* (authorised transmission of knowledge), and the moral authority of the *kyai*, through which knowledge is simultaneously transmitted, interpreted, and ethically embodied (Azra, 2012; Dhofier, 2011; Lukens-Bull, 2005). Within this tradition, the legitimacy of knowledge is inseparable from the legitimacy of those who transmit and interpret it. Consequently, educational authority is constructed not merely through cognitive competence but through recognised scholarly lineage, moral integrity, and communal trust. These characteristics distinguish *pesantren* from many contemporary educational institutions and position them as a theoretically significant setting for examining how emerging technologies encounter deeply institutionalised systems of epistemic authority. Rather than representing a culturally exceptional case, *pesantren* offer a critical empirical context for understanding a broader global challenge: how value-based educational institutions negotiate technological innovation while preserving the moral and institutional foundations upon which educational legitimacy depends.

Although a growing body of scholarship has begun to examine the use of artificial intelligence within religious education and faith-based institutions, existing studies have largely framed AI as an issue of technological acceptance, digital competence, instructional innovation, or ethical regulation. Such perspectives have generated valuable insights into the opportunities and challenges of AI adoption but provide only limited explanation of how religious educational institutions preserve the legitimacy of human authority when algorithmic systems increasingly participate in knowledge production. This limitation is particularly significant in educational traditions where knowledge is

inseparable from moral formation, interpretive responsibility, and institutional trust. In such contexts, the central educational question is not whether AI can generate accurate or useful information, but how its outputs are subjected to processes of interpretation, validation, and moral evaluation before being recognised as educationally legitimate. We argue that these processes cannot be adequately understood through existing frameworks of AI governance alone because they involve institutional mechanisms that mediate the relationship between algorithmic capability and educational authority. To capture this overlooked dimension, this article conceptualises these institutional processes as epistemic mediation—the continuous practices through which educational communities interpret, verify, contextualise, and morally authorise AI-generated knowledge before it enters teaching, learning, and religious deliberation. Understanding this process is essential for explaining how educational institutions integrate generative AI while preserving the human authority upon which educational trust ultimately depends.

Against this background, this study shifts the analytical focus from the adoption of artificial intelligence to the institutional production of epistemic legitimacy within value-based education. Rather than asking whether generative AI should be incorporated into educational practice, we examine how educational institutions determine when, under what conditions, and through which institutional processes AI-generated knowledge becomes educationally legitimate without displacing human authority. Drawing on qualitative evidence from Islamic boarding schools (*pesantren*) in Madura, Indonesia, this article investigates how religious educational communities negotiate the relationship between technological innovation and long-established traditions of knowledge validation. We argue that *pesantren* neither reject generative AI as a threat to religious learning nor accept it as an autonomous source of educational authority. Instead, they govern its use through institutional processes that combine moral leadership, epistemic mediation, scholarly validation, and communal responsibility. We conceptualise this broader institutional framework as Moral Governance of Artificial Intelligence, referring to the normative and organisational processes through which educational institutions regulate not only the use of AI technologies but also the legitimacy of the knowledge they produce. By foregrounding institutional authority rather than technological capability, this framework repositions AI governance as a fundamentally educational and moral practice rather than merely a technical or regulatory concern.

This article makes three interrelated contributions to contemporary scholarship on artificial intelligence in education. First, it extends existing debates on AI governance by arguing that governance within educational institutions cannot be reduced to questions of technological regulation, algorithmic accountability, or ethical compliance alone. Instead, educational governance must also be understood as a process through which institutions produce, negotiate, and legitimise knowledge in accordance with their moral commitments and educational purposes. Second, the article introduces the concept of Moral Governance of Artificial Intelligence as a theoretical framework for explaining how educational institutions preserve human authority while integrating generative AI into teaching and learning. By identifying moral leadership, epistemic mediation, scholarly validation, and communal responsibility as the principal institutional mechanisms through which AI-generated knowledge acquires legitimacy, the study offers a conceptual vocabulary that moves beyond existing frameworks of responsible AI and human-

centred AI. Third, by positioning Indonesian pesantren as a critical theoretical case rather than merely a local educational context (Flyvbjerg, 2006), the article demonstrates how educational institutions grounded in strong moral and epistemological traditions provide broader insights into one of the defining educational questions of the AI era: not whether artificial intelligence can generate knowledge, but how human communities determine which knowledge deserves to be trusted, transmitted, and taught. By shifting scholarly attention from technological capability to the institutional production of epistemic legitimacy, this article ultimately repositions artificial intelligence as an object of moral governance, thereby offering a new theoretical lens for understanding the future relationship between artificial intelligence, educational authority, and value-based education.

RESEARCH METHOD

This study employed a qualitative multiple-case study design to investigate how Islamic boarding schools (pesantren) govern the integration, use, and legitimacy of generative artificial intelligence (AI) in educational contexts. A qualitative approach was considered appropriate because the study sought to understand institutional meanings, leadership practices, decision-making processes, epistemic judgments, and ethical considerations underlying the governance of AI rather than to measure technological adoption quantitatively. The multiple-case design enabled the researchers to examine AI governance across different pesantren settings while identifying both context-specific practices and recurring institutional patterns. Consistent with the logic of case study research, each pesantren was treated as a bounded institutional case, while cross-case comparison was used to develop a more comprehensive explanation of how religious authority, educational responsibility, and institutional mechanisms interact in governing AI-generated knowledge and its use in learning (Yin, 2018). The study was also oriented toward theory building, with empirical findings progressively connected to theoretical interpretations to formulate an empirically grounded framework of Moral Governance of Artificial Intelligence (MGAI).

The research was conducted in eight pesantren located across Bangkalan, Sampang, Pamekasan, and Sumenep, Madura, Indonesia. Case selection followed a purposive logic designed to capture variation in institutional characteristics, educational structures, and levels of digital and AI development. This variation was important for examining whether particular governance practices were embedded in specific institutional contexts or represented broader patterns across pesantren. Participants were recruited through purposive theoretical sampling, prioritising individuals who possessed direct experience of educational leadership, institutional decision-making, religious authority, pedagogical practice, or AI-supported learning (Eisenhardt & Graebner, 2007; Patton, 2015). Six stakeholder groups were represented: kyai, pesantren administrators, heads of educational institutions, teachers (ustadz/ustadzah), students (santri), and parents (wali santri). The study involved 48 core participants, with eight participants representing each stakeholder group. The diversity of participants enabled the study to capture complementary perspectives concerning moral leadership, institutional policy, curriculum management, classroom practice, everyday AI use, epistemic trust, and communal accountability. Sampling adequacy was assessed using the principle of information power, whereby the sufficiency of participants was determined by the relevance, specificity, and richness of the information generated in relation to the study aim rather than by

statistical representativeness (Malterud et al., 2016).

Data were collected between March and December 2024 using three complementary techniques: semi-structured interviews, participant observation, and document analysis. Semi-structured interviews explored participants' experiences and perceptions concerning generative AI, educational authority, institutional decision-making, verification of AI-generated information, pedagogical practices, and ethical responsibilities. Each interview lasted approximately 60–90 minutes, was conducted with participants' consent, audio-recorded, transcribed verbatim, and translated when necessary to maintain analytical consistency. Participant observation was conducted in relevant educational and institutional settings, including classroom activities, pesantren programmes, and institutional meetings, to examine how AI-related governance was enacted in everyday practice rather than relying solely on participants' reported accounts. Document analysis complemented the interview and observational data by examining institutional policies, curricula, regulations, meeting records, educational guidelines, and other organisational documents relevant to AI use and governance. The integration of these three sources facilitated methodological triangulation, allowing participants' narratives to be compared with observed practices and documentary evidence. Accordingly, interviews provided access to meanings and interpretations, observation revealed enacted practices, and documents provided evidence of the formalisation and institutionalisation of governance mechanisms (Yin, 2018).

Data analysis followed an abductive, iterative, and cross-case analytical strategy, involving continuous movement between empirical evidence and theoretical interpretation (Timmermans & Tavory, 2012). Analysis commenced concurrently with data collection through repeated reading of transcripts and field notes, analytic memoing, initial coding, and progressive refinement of emerging categories. The coding procedure was informed by the Gioia methodology, comprising three analytical levels: first-order coding to preserve participants' terms, meanings, and experiences; second-order coding to identify theoretically informed relationships and interpretive themes; and aggregate dimensions to integrate related themes into higher-order conceptual constructs (Gioia et al., 2013). Constant comparison was conducted within and across the eight cases, as well as across interviews, observations, and documents, to identify convergence, divergence, and contextual variation. Emerging interpretations were repeatedly examined against the empirical evidence to strengthen analytical coherence and avoid premature theoretical closure. This process resulted in the identification of four interconnected governance mechanisms—Moral Leadership, Epistemic Mediation, Scholarly Validation, and Communal Responsibility—which subsequently formed the conceptual dimensions of the proposed Moral Governance of Artificial Intelligence (MGAI) framework. Research credibility was strengthened through source and method triangulation, iterative comparison across cases, and systematic alignment between empirical codes, interpretive themes, and theoretical constructs. Institutional access was obtained from the participating pesantren, and all participants participated voluntarily after receiving information about the study's purpose, procedures, confidentiality, and right to withdraw. To preserve anonymity, participants were identified using role-based pseudonyms rather than personal names or directly identifiable institutional positions.

RESULTS AND DISCUSSION

Governing Educational Purpose Before Technology

The analysis of interview, observation, documentary, and triangulation data consistently indicates that the participating pesantren did not begin AI governance by discussing technological capabilities or institutional regulations. Instead, they first evaluated whether generative artificial intelligence was compatible with the educational purposes, religious commitments, and pedagogical traditions of the institution. Across the eight participating pesantren, AI was consistently understood as a *wasilah* (instrumental means) whose legitimacy depended upon its contribution to learning, moral formation, and Islamic scholarship rather than upon its computational sophistication. This orientation emerged consistently across all categories of participants, suggesting that educational purpose constituted the primary criterion through which AI was introduced into institutional practice.

Interview evidence strongly supports this finding. A senior kyai explained that AI should not be interpreted as a threat to Islamic education but rather as one stage in the historical development of educational tools:

“AI is part of the advancement of knowledge. In Islam, we are taught to derive wisdom from any source, provided it does not conflict with Sharia. Therefore, I do not view AI as a threat. The issue lies not in the technology itself, but in how humans use it.” (Senior kyai, Interview)

The same participant further emphasised that the pesantren had historically adapted to successive technological developments, including printing technology, computers, digital libraries, and the internet, and regarded AI as a continuation of this adaptive process rather than as a radical educational rupture.

However, acceptance of AI was never unconditional. When asked whether AI could replace educational authority, the same kyai clearly distinguished between technological assistance and educational legitimacy:

“If AI is used to speed up administration, help find book references, translate Arabic, help prepare learning materials, that is very good. But if AI is used as a substitute for teachers, a substitute for deliberation, or even a replacement for the *talaqqi* process for ulama, I do not agree.” (Senior kyai, Interview)

This distinction appeared consistently throughout the interview data. Participants generally welcomed AI when it supported educational activities, but rejected any form of technological substitution that diminished the pedagogical roles of teachers, kyai, or the traditional processes of scholarly transmission.

The interviews further demonstrated that educational purpose preceded decisions regarding technological implementation. Rather than introducing AI immediately into all learning activities, institutions first strengthened students' digital literacy and ethical awareness before allowing access to AI applications. As one kyai explained:

“We first introduce digital literacy to the *santri* (Islamic boarding school students). Only after they understand internet usage ethics are AI-based applications introduced—though all of this takes place under the guidance of their *ustadz* (religious teachers).” (Senior kyai, Interview)

When asked why teacher supervision remained necessary, the participant explained:

“This is because AI is sometimes right and sometimes wrong. If *santri* (Islamic boarding school students) lack a strong foundation in religious knowledge, they might mistakenly accept every answer provided by AI as

correct.” (Senior kyai, Interview)

These accounts demonstrate that AI was introduced only after institutional actors had established pedagogical conditions capable of ensuring responsible use. Educational preparation therefore preceded technological implementation.

Interview data also indicate that the preservation of classical Islamic learning remained a central consideration during AI integration. Although AI facilitated information retrieval and language assistance, participants consistently insisted that these functions should complement rather than replace engagement with kitab kuning. As one kyai stated:

“AI helps speed up the search for references... However, they are still required to consult the original texts afterward. We do not want santri (Islamic boarding school students) to lose the ability to read these texts.” (Senior kyai, Interview)

Similarly, when discussing the traditional sorogan method, the participant firmly rejected the possibility that AI could replace direct scholarly transmission:

“Sorogan is not merely about reading religious texts. It involves the blessing of the sanad (chain of transmission), the correction of one's recitation, the shaping of character, and the observance of proper etiquette toward the teacher. None of this can be accomplished by a machine.” (Senior kyai, Interview)

These statements illustrate that educational value was defined not simply in terms of information acquisition but through the cultivation of scholarly discipline, moral formation, and interpersonal learning relationships.

Observation data corroborated these interview findings. Classroom observations consistently showed that AI-generated information was reviewed by teachers before being incorporated into learning activities. AI-assisted instruction occurred alongside conventional pedagogical practices such as teacher explanation, discussion, and engagement with classical texts rather than replacing them. Teachers remained responsible for correcting inaccurate AI-generated responses and contextualising digital information within established religious and pedagogical frameworks. These observations indicate that AI functioned as an auxiliary instructional resource while educational authority continued to reside with teachers and kyai.

Documentary evidence likewise confirmed that institutional policies explicitly framed technology as subordinate to educational objectives. The Pedoman Pengembangan Pesantren emphasises that institutional modernisation should strengthen education, preserve tradition, and improve services while clearly defining technology as a *wasilah* rather than an end in itself. Teacher training reports demonstrate that AI was introduced through structured programmes focusing on instructional improvement, digital media, assessment, and responsible educational practice. Meeting records further indicate that AI policies were formulated through institutional deliberation (*musyawarah*), ensuring that technological decisions remained aligned with the educational philosophy of the pesantren.

Cross-case comparison revealed remarkable consistency despite differences in institutional size and technological capacity. Some pesantren implemented AI more extensively than others, yet all participating institutions shared the same normative orientation: AI was accepted only when it strengthened educational quality without compromising *adab*, scholarly verification, and teacher authority. Thus, variation occurred primarily in the degree of technological implementation rather than in the moral principles

governing its adoption.

Finally, the triangulation matrix demonstrated strong convergence across all sources of evidence. Interview data consistently identified AI as an educational instrument; observation data showed teachers validating AI-generated information before classroom use; and documentary evidence embedded this principle within institutional policies and development guidelines. Together, these three sources confirm that AI governance in the participating pesantren begins with educational purpose rather than technological implementation.

Analytical Proposition 1

The empirical evidence consistently demonstrates that the participating pesantren establish the legitimacy of generative artificial intelligence by first evaluating its alignment with educational purposes, Islamic moral values, and institutional identity before determining its technological implementation. Educational purpose therefore functions as the primary governance mechanism through which AI acquires institutional legitimacy, providing the empirical foundation for the theoretical argument developed in discussion.

Human Verification and the Preservation of Religious Authority

While participants recognised the practical benefits of generative artificial intelligence for supporting learning activities, the empirical evidence consistently demonstrated that AI-generated information was never treated as self-validating knowledge. Across the participating pesantren, educational actors distinguished between the production of information and the validation of knowledge. AI was acknowledged as capable of accelerating access to information, references, translations, and instructional materials, yet responsibility for determining the accuracy, appropriateness, and religious legitimacy of that information remained firmly with kyai and teachers. This pattern indicates that the introduction of AI altered the distribution of educational tasks without changing the institutional location of epistemic authority.

Interview data illustrate this distinction clearly. A senior kyai acknowledged that AI could support a range of educational activities, including locating references, translating Arabic texts, and assisting teachers in preparing learning materials. Nevertheless, he drew a clear boundary regarding the authority of AI within religious education:

“If AI is used to expedite administrative tasks, assist in locating textual references, translate Arabic, or help prepare learning materials, that is excellent. However, if AI is positioned as a substitute for the teacher, for scholarly consultation, or even for the talaqqi process with religious scholars, I do not agree.” (Senior Kyai, Interview)

This statement reflects a consistent institutional understanding that technological assistance does not imply the transfer of educational authority. Participants accepted AI as a resource for supporting educational work but rejected its use as a substitute for scholarly judgement or pedagogical interaction.

The interview further revealed that institutional leaders regarded teacher supervision as indispensable because AI-generated responses could not always be assumed to be accurate. Explaining why students were not allowed to use AI independently, one kyai stated:

"Because AI is sometimes right and sometimes wrong. If santri (Islamic boarding school students) lack a strong foundation in religious knowledge, they might accept every AI answer as correct—even though, in fiqh (Islamic

jurisprudence) alone, there are often multiple scholarly opinions. AI frequently provides just a single answer without explaining the differences of opinion (khilafiyah)." (Senior Kyai, Interview)

This evidence demonstrates that participants recognised the limitations of AI-generated knowledge, particularly in areas requiring contextual interpretation and awareness of scholarly diversity. Rather than relying directly on AI outputs, teachers were expected to evaluate, contextualise, and explain information before it entered classroom learning.

The same orientation appeared in participants' descriptions of learning classical Islamic texts. AI was considered useful for accelerating the identification of references and supporting language comprehension, yet these functions were consistently presented as preparatory rather than substitutive. As one kyai explained:

"AI helps accelerate the process of finding references. In the past, santri had to open numerous texts; now, they can search for specific terms using Maktabah Syamilah. AI also assists in explaining Arabic vocabulary. However, they are still required to consult the original texts afterward. We do not want the santri to lose the ability to read the actual texts." (Senior Kyai, Interview)

The emphasis on returning to the original texts indicates that AI-assisted retrieval was regarded as an aid to learning rather than a replacement for engagement with primary sources. Access to information was therefore distinguished from the educational processes through which knowledge is understood and internalised.

Participants expressed the same position when discussing sorogan, one of the core pedagogical traditions within pesantren. When asked whether AI might eventually replace this instructional method, the response was unequivocal:

"Sorogan is not merely about reading religious texts. It involves the blessing of the sanad (chain of transmission), the correction of one's recitation, the shaping of character, and the observance of proper etiquette toward the teacher. None of this can be accomplished by a machine." (Senior Kyai, Interview)

This statement highlights that participants understood religious learning as encompassing dimensions that extend beyond information transfer. Correction of recitation, moral cultivation, interpersonal guidance, and continuity of scholarly transmission remained inseparable from direct interaction between teachers and students.

Observation data reinforced these interview findings. Across classroom observations, AI-generated materials were not presented directly to students without prior examination. Teachers routinely reviewed AI-generated content, compared it with recognised learning resources, and corrected inaccuracies before incorporating it into classroom discussions. During learning activities, students continued to rely on teacher explanation, discussion, and direct engagement with kitab kuning, while AI functioned primarily as a supplementary learning aid. These observed practices indicate that educational authority continued to reside with teachers despite the growing availability of AI-assisted information.

Documentary evidence further supports this institutional pattern. AI implementation guidelines, teacher training materials, and institutional development documents consistently emphasised responsible AI use, verification of digital information, and the continued role of teachers in evaluating learning materials before classroom application. Institutional documents did not position AI as an independent source of educational knowledge but rather as one

component within broader pedagogical processes governed by teachers and institutional policies.

Cross-case comparison showed substantial consistency across the participating pesantren. Although institutions differed in their technological infrastructure and the extent of AI utilisation, all maintained the principle that AI-generated information required human validation before becoming part of educational practice. Differences among institutions therefore related primarily to implementation strategies rather than to the underlying distribution of educational authority. In every case, AI supported educational work, whereas teachers and kyai remained responsible for determining the validity, relevance, and pedagogical appropriateness of knowledge.

The triangulation matrix further strengthens this conclusion. Interview evidence consistently emphasised that AI should function as an educational aid rather than an authoritative source of knowledge. Observation data demonstrated that teachers routinely verified AI-generated information before classroom use, while documentary evidence institutionalised this practice through pedagogical guidelines and AI implementation policies. The convergence of these three sources indicates a stable institutional pattern in which technological innovation redistributes educational tasks without altering the location of epistemic authority.

Analytical Proposition 2

The empirical evidence indicates that the integration of generative artificial intelligence within the participating pesantren redistributes educational work by expanding access to information and supporting instructional preparation, while preserving epistemic authority within teachers, kyai, and established traditions of scholarly verification. Consequently, AI changes how educational work is performed without changing who determines the legitimacy of educational knowledge.

Collective Moral Leadership in Governing Artificial Intelligence

The empirical evidence indicates that decisions concerning the adoption and regulation of generative artificial intelligence were not treated as individual technological choices but as collective institutional responsibilities. Across the participating pesantren, AI governance was embedded within established leadership structures involving kyai, senior teachers, school principals, and institutional administrators. Rather than introducing AI through isolated administrative decisions, educational leaders adopted a gradual and deliberative approach in which technological innovation was evaluated through institutional consultation (*musyawarah*), consideration of educational objectives, and assessment of potential benefits and risks. This governance pattern demonstrates that AI integration was embedded within existing institutional leadership practices rather than being managed as a purely technical initiative.

Interview evidence clearly illustrates this collective decision-making process. When asked how technological innovation was introduced within the pesantren, one senior kyai explained that institutional decisions were never taken individually but were developed through consultation involving multiple educational stakeholders:

"We must not rush. All policies are discussed through consultation. We invite ustadz, madrasah principals, administrators, and even alumni who are knowledgeable about technology. If the benefits are substantial and the risks

manageable, we begin implementing them gradually." (Senior Kyai, Interview)

This statement demonstrates that technological governance was understood as a collective educational responsibility rather than a managerial decision based solely on technological considerations. The inclusion of religious scholars, teachers, institutional managers, and alumni with technological expertise reflects an institutional commitment to balancing educational values with technological innovation.

The interview data further indicate that leadership decisions were guided by explicit evaluative criteria rather than by technological enthusiasm. Explaining the principles underlying institutional decision-making, the same participant stated:

"There are three factors. First, the benefits. Second, the potential harm. Third, its alignment with pesantren values. If the benefits outweigh the drawbacks, we adopt it. If the potential harm is significant, we limit it." (Senior Kyai, Interview)

This evidence suggests that institutional leaders systematically evaluated AI according to educational benefit, potential harm, and compatibility with the moral identity of the pesantren. Technological capability alone was therefore insufficient to justify institutional adoption.

Leadership also extended beyond policy formulation into the supervision of educational practice. Interview participants explained that students were introduced to AI only after acquiring adequate digital literacy and ethical awareness, and that AI-assisted learning remained under teacher supervision. The gradual introduction of AI reflected an institutional strategy of ensuring that technological competence developed alongside educational responsibility rather than independently of it.

Observation data reinforced these findings. During classroom activities and institutional meetings, educational leaders continued to monitor the implementation of AI-supported learning while maintaining existing structures of teacher supervision. Teachers remained responsible for determining when AI could appropriately support classroom activities, while school leaders ensured that technological initiatives remained aligned with institutional educational programmes. Observations also indicated that discussions concerning AI frequently occurred within routine academic coordination meetings rather than separate technology committees, suggesting that AI governance had been incorporated into the broader educational management of the pesantren.

Documentary evidence further confirms the institutionalisation of this governance model. Development plans, meeting minutes, AI implementation guidelines, and institutional policy documents consistently demonstrate that technological innovation was introduced through formal organisational procedures. Institutional records describe teacher capacity-building programmes, AI literacy workshops, curriculum discussions, and collaborative policy development involving multiple educational actors. Rather than encouraging unrestricted experimentation, these documents emphasise phased implementation, institutional supervision, and continuous evaluation of AI-assisted educational practices.

Cross-case comparison reveals a notable degree of consistency across the participating pesantren. Although individual institutions differed in organisational scale and technological readiness, all adopted similar leadership approaches characterised by consultation, gradual implementation, and institutional oversight. None of the participating institutions delegated AI

governance solely to technical personnel or information technology units. Instead, educational leaders remained directly involved in evaluating technological developments, determining implementation priorities, and ensuring that AI use remained compatible with institutional educational objectives. This consistency suggests that leadership responsibility extended beyond administrative management to encompass the broader governance of educational change.

The triangulation matrix provides additional support for this interpretation. Interview evidence demonstrates that kyai and institutional leaders viewed AI adoption as a matter requiring collective deliberation and careful judgement. Observation data confirm that leadership involvement continued throughout classroom implementation and institutional supervision, while documentary evidence records AI governance within formal planning documents, development strategies, and organisational procedures. The convergence of these independent data sources indicates that AI governance in the participating pesantren was characterised by collective institutional leadership rather than individual technological decision-making.

Taken together, these findings indicate that leadership within the participating pesantren functioned not merely as organisational administration but as an institutional mechanism for governing technological change through educational deliberation, collective responsibility, and continuous supervision. Decisions concerning AI were consistently embedded within established leadership structures, ensuring that technological innovation remained accountable to institutional values and educational priorities.

Analytical Proposition 3

The empirical evidence demonstrates that the governance of generative artificial intelligence within the participating pesantren is exercised through collective institutional leadership characterised by consultation, phased implementation, and continuous educational supervision. AI governance therefore emerges as an organisational responsibility embedded within established leadership structures rather than as a purely technical or administrative process.

Adaptive Innovation While Preserving Educational Tradition

The empirical evidence demonstrates that the participating pesantren responded to the emergence of generative artificial intelligence through a process of adaptive innovation rather than institutional disruption. Instead of perceiving AI as a force requiring either complete acceptance or outright rejection, educational leaders consistently integrated technological innovation into existing pedagogical structures while maintaining the core principles of Islamic education. Across interviews, classroom observations, institutional documents, and triangulated evidence, adaptation was characterised by gradual implementation, continuous supervision, and the preservation of long-established educational traditions. Consequently, institutional change occurred through the incorporation of new technological resources into established educational practices rather than through the replacement of those practices.

Interview data consistently indicate that adaptation was regarded as an educational necessity rather than a departure from tradition. Participants explained that pesantren had historically adapted to successive technological developments, including printed books, computers, digital libraries, and

internet-based learning resources. Generative AI was therefore interpreted as another stage within this broader trajectory of educational development. As one senior kyai observed:

"AI is part of the advancement of knowledge. In Islam, we are taught to derive wisdom from any source, provided it does not conflict with Sharia. Therefore, I do not view AI as a threat. The issue lies not in the technology itself, but in how humans use it." (Senior Kyai, Interview)

This perspective demonstrates that institutional adaptation was framed as a continuation of the pesantren tradition of engaging constructively with new forms of knowledge while maintaining religious and moral boundaries.

Participants also emphasised that technological adaptation should occur gradually and be accompanied by educational preparation. Rather than immediately encouraging unrestricted AI use, institutions prioritised strengthening students' digital literacy and ethical awareness before introducing AI-supported learning. One kyai explained:

"We first introduce digital literacy to the santri. Only after they understand internet usage ethics are AI-based applications introduced... yet all of this remains under the guidance of the ustadz." (Senior Kyai, Interview)

This statement illustrates that technological innovation was embedded within a staged educational process. AI was introduced only after students had acquired the knowledge and ethical dispositions considered necessary for responsible engagement with digital technologies.

Interview evidence further demonstrates that adaptation was understood as improving educational effectiveness without diminishing the central role of traditional learning practices. Participants described AI as supporting the search for references, facilitating Arabic language comprehension, assisting lesson preparation, and improving administrative efficiency. However, these practical advantages were consistently presented as complementary to, rather than replacements for, established pedagogical activities. As one participant explained:

"AI helps speed up the search for references... However, they are still required to consult the original texts afterwards. We do not want *santri* to lose the ability to read the texts." (Senior Kyai, Interview)

Similarly, participants reaffirmed that core instructional traditions such as sorogan and talaqqi remained indispensable because they cultivate dimensions of learning that cannot be replicated through digital technologies, including the transmission of sanad, correction of recitation, moral discipline, and adab toward teachers.

Observation data corroborate these interview findings. Classroom activities showed that AI-assisted learning was incorporated into existing instructional routines without replacing teacher explanation, collective discussion, or engagement with kitab kuning. Teachers used AI-generated materials selectively, verified their accuracy before classroom use, and integrated them into conventional pedagogical practices. Students continued to participate in face-to-face learning, guided reading of classical texts, and direct interaction with teachers while using AI as a supplementary educational resource. These observations indicate that institutional adaptation occurred through pedagogical integration rather than pedagogical substitution.

Documentary evidence provides further support for this interpretation. Institutional development plans, AI implementation guidelines, teacher training materials, and policy documents consistently describe technological innovation

as part of broader efforts to strengthen educational quality while preserving the distinctive identity of the pesantren. Rather than presenting AI as an independent institutional objective, these documents integrate technological development within existing programmes of curriculum improvement, teacher professional development, digital literacy, and educational service enhancement. Importantly, institutional guidelines repeatedly define technology as a *wasilah* for achieving educational goals rather than as an end in itself.

Comparison across the eight participating pesantren reveals considerable institutional consistency despite differences in organisational resources and technological readiness. Some institutions possessed more advanced digital infrastructure and implemented AI across a wider range of educational activities, whereas others adopted a more limited approach. Nevertheless, all participating institutions shared the same adaptive strategy: technological innovation was accepted only when it reinforced educational objectives, respected institutional values, and preserved the centrality of teachers, *kyai*, and classical Islamic scholarship. Consequently, institutional variation occurred primarily in the pace and scope of implementation rather than in the underlying philosophy guiding educational change.

The triangulation matrix further confirms this pattern. Interview evidence portrays AI as a useful educational innovation introduced within clear moral and pedagogical boundaries. Observation data demonstrate that AI-assisted learning remains integrated with traditional instructional practices rather than replacing them. Documentary evidence institutionalises this orientation by embedding technological innovation within educational planning and institutional development strategies. The convergence of these three sources therefore indicates that adaptation within the participating pesantren is characterised by the simultaneous preservation of educational tradition and responsible technological innovation.

Taken together, these findings suggest that the participating pesantren neither resisted technological change nor embraced technological transformation uncritically. Instead, they developed an adaptive model of institutional change in which innovation remained accountable to educational purposes, religious values, and established pedagogical traditions. Through this process, technological development strengthened rather than displaced the distinctive educational identity of the institution.

Analytical Proposition 4

The empirical evidence demonstrates that the participating pesantren respond to generative artificial intelligence through adaptive innovation that integrates new technological resources into established educational traditions while preserving the moral, pedagogical, and institutional foundations of Islamic education. Institutional adaptation therefore occurs through the continuous alignment of innovation with enduring educational values rather than through the replacement of educational traditions.

DISCUSSION

Governing Educational Purpose Before Governing Technology: A Moral Logic of AI Integration

The findings demonstrate that the governance of generative artificial intelligence (AI) in pesantren begins with the determination of educational purpose rather than with the regulation of technology itself. Across the

participating institutions, AI was understood as a *wasilah*, or instrumental means, whose legitimacy depended on its capacity to support rather than replace teachers, *kyai*, classical Islamic scholarship, and the moral objectives of education. Interview, observation, and documentary evidence consistently showed that AI-generated information was subjected to teacher verification, contextual interpretation, and ethical evaluation before being incorporated into learning activities. This pattern indicates that technological adoption was subordinated to educational values rather than educational values being adjusted to accommodate technological innovation. The finding therefore extends conventional AI governance approaches, which predominantly emphasise accountability, transparency, privacy, fairness, and institutional compliance (UNESCO, 2021), by demonstrating that governance in educational institutions begins at a more fundamental level: determining what technology is educationally and morally intended to accomplish. In this respect, the finding strongly confirms Biesta's (2009, 2015, 2020) argument that the fundamental question of education is not simply what works efficiently but what education is for. However, the present study extends Biesta's position by showing that educational purpose does not merely orient pedagogy; it also functions as a mechanism for governing technological legitimacy.

The centrality of *adab* further explains why the *pesantren* approach differs from technologically deterministic models of educational transformation. Within Islamic educational philosophy, knowledge cannot be separated from moral formation, proper conduct, and recognition of legitimate authority (Al-Attas, 1980, 1993, 1995). The findings show that this epistemological principle remains operative in AI-mediated learning: technological innovation was neither rejected nor accepted uncritically but interpreted through the normative framework of *adab*, scholarly authority, and educational responsibility. Consequently, AI became legitimate only when its use strengthened moral formation, intellectual discipline, and responsible judgement. This finding broadens contemporary AI governance by introducing what may be termed moral governance of educational purpose, in which the central concern is not only whether AI is used responsibly but also whether its use serves the institution's educational identity and moral mission. Theoretically, this challenges the assumption that governance begins after technology has been implemented. Instead, the *pesantren* cases indicate that governance precedes implementation because institutions first establish the moral boundaries within which technological innovation may legitimately operate. Accordingly, the first proposition of the Moral Governance of Artificial Intelligence (MGAI) framework is: Educational institutions preserve educational authority by governing the moral purposes for which artificial intelligence is employed before governing the technological practices through which it is implemented.

AI Does Not Replace Authority; It Redistributes Epistemic Work

The second major finding indicates that generative AI does not necessarily diminish religious or educational authority; rather, it redistributes epistemic work among students, teachers, and *kyai* while preserving institutional responsibility for determining the legitimacy of knowledge. Students used AI to generate explanations, translations, summaries, and preliminary references, while teachers remained responsible for verification, correction, contextualisation, and pedagogical interpretation. *Kyai*, in turn, retained responsibility for determining whether AI-assisted interpretations were

compatible with Islamic teachings and the educational philosophy of the pesantren. Observation data further demonstrated that AI-assisted learning remained embedded within bandongan, sorogan, classroom dialogue, and teacher explanation. These practices indicate that AI assumed a greater role in information generation but did not acquire the authority to determine what constitutes legitimate religious knowledge. This finding challenges binary representations of AI as either replacing teachers or merely augmenting existing teaching. Instead, it identifies a third process: the redistribution of epistemic work without the transfer of epistemic authority. In this process, routine informational tasks may be delegated to AI, whereas validation, interpretation, contextual judgement, and ethical deliberation remain institutional and human responsibilities.

The finding is consistent with Abbott's (1988) theory of professional jurisdiction, which suggests that professional authority is maintained not simply through control over information but through jurisdiction over the interpretation and application of specialised knowledge. In the pesantren context, AI can accelerate access to information, but it does not possess jurisdiction over the interpretation of religious knowledge because such authority remains embedded in teachers, kyai, sanad, talaqqi, and established scholarly traditions. The finding also extends the concept of epistemic cultures associated with Knorr-Cetina (1999) by demonstrating that AI-generated information acquires legitimacy only through socially organised processes of verification, comparison with turath, explanation, discussion, and scholarly consultation. Thus, information produced by AI does not automatically become knowledge; it becomes educationally legitimate through institutional epistemic practices. This distinction is particularly important because it demonstrates that increased technological capacity can make human epistemic judgement more, rather than less, significant. The second proposition of the MGAI framework therefore states: Artificial intelligence redistributes epistemic work without redistributing epistemic authority; educational legitimacy continues to depend upon human processes of interpretation, validation, and moral judgement. The contribution of this proposition is to shift the central question of AI in education from whether AI replaces teachers toward which forms of epistemic work can be automated and which remain fundamentally dependent on human educational communities.

Moral Leadership as Epistemic Stewardship: Preserving Religious Authority in the Age of Artificial Intelligence

The third finding demonstrates that the continuing role of kyai in AI-mediated education is best understood not merely as administrative or instructional leadership but as epistemic stewardship. Decisions concerning AI integration were not treated as purely technical matters but were deliberated collectively by kyai, senior teachers, and institutional administrators in relation to educational ethics, curriculum, character formation, and religious responsibility. Institutional documents and observations likewise indicated that teacher supervision, scholarly verification, and ethical responsibility remained central conditions for AI-assisted learning. This pattern extends conventional educational leadership perspectives that commonly conceptualise leaders as instructional managers (Hallinger, 2011), transformational leaders (Leithwood & Jantzi, 2005), or distributed leaders (Spillane, 2005). While these theories explain how leaders coordinate organisational change and improve educational effectiveness, they provide comparatively limited explanation of how leaders

preserve epistemic legitimacy when knowledge itself becomes increasingly mediated by AI. The present study therefore identifies an additional leadership function: leaders must determine not only how educational organisations respond to technological change but also how institutional communities distinguish information from trustworthy knowledge and legitimate knowledge from morally inappropriate interpretation.

Epistemic stewardship is exercised through the preservation and activation of classical Islamic educational principles, particularly sanad, talaqqi, adab, and musyawarah. The findings show that these traditions were not treated as barriers to technological innovation but as institutional mechanisms for evaluating and governing innovation. AI-generated responses were required to pass through processes of scholarly verification, teacher interpretation, collective deliberation, and, where necessary, consultation with kyai. In this respect, the findings confirm Al-Attas' (1980, 1995) conception of adab as recognition of the hierarchy of knowledge, authority, and moral responsibility, while simultaneously extending Biesta's (2015) normative conception of educational leadership into AI-mediated environments. The distinctive contribution of the present study is that kyai operate simultaneously as moral leaders, educational leaders, and epistemic stewards whose authority lies not in monopolising information but in maintaining the institutional conditions through which information becomes trustworthy knowledge. This stewardship also strengthens institutional resilience because technological disruption becomes an opportunity to reinforce scholarly verification, ethical deliberation, and collective interpretation rather than a force that automatically weakens traditional authority. Accordingly, the third proposition of MGAI is: Moral leadership preserves educational authority by functioning as epistemic stewardship, governing the institutional processes through which AI-generated information is evaluated, validated, and transformed into legitimate educational knowledge.

Preserving Tradition Through Adaptive Innovation: Institutional Resilience in AI-Mediated Islamic Education

The fourth finding reveals that AI integration did not weaken the traditional educational identity of the participating pesantren; instead, it stimulated a process of selective and adaptive innovation. The institutions incorporated AI for information retrieval, translation, lesson preparation, and administrative efficiency while preserving the centrality of kitab kuning, bandongan, sorogan, sanad, talaqqi, and adab. This pattern demonstrates that innovation occurred through adaptation rather than substitution. Rather than allowing technological capabilities to redefine educational practice, institutional actors continually interpreted AI according to existing pedagogical, epistemic, and moral commitments. The finding therefore challenges technologically deterministic assumptions that technological advancement inevitably displaces traditional educational practices. It also contributes to theories of institutional resilience by showing that resilience does not simply mean resisting external disruption; rather, it involves preserving institutional identity while selectively incorporating new technological possibilities. Three mutually reinforcing mechanisms were evident: the preservation of kyai and teacher authority over knowledge interpretation, the continuity of traditional pedagogical practices within AI-assisted learning, and the reinforcement of adab, scholarly discipline, and communal responsibility as conditions for responsible technology use.

The central role of adab demonstrates that adaptive innovation in pesantren is fundamentally a process of institutional interpretation rather than technological adoption alone. Consistent with Al-Attas' (1980, 1995) conception of adab, participants distinguished between the efficient acquisition of information and the formation of morally responsible persons. AI was therefore considered legitimate only insofar as it remained compatible with the institution's educational mission, moral commitments, and scholarly traditions. This finding extends contemporary approaches to educational innovation by proposing that successful technological innovation should be evaluated not by the speed, scale, or intensity of adoption but by its compatibility with institutional identity. In this sense, tradition and innovation are not oppositional forces; tradition becomes a living normative framework through which technological change is interpreted and directed. The fourth proposition of the MGAI framework therefore states: Institutional resilience in AI-mediated education is achieved through adaptive innovation, whereby technological change is incorporated through, rather than at the expense of, enduring moral traditions, epistemic authority, and educational identity. Collectively, the four subthemes demonstrate that sustainable AI governance in pesantren is not achieved by restricting technology or maximising technological efficiency, but by governing its purposes, preserving human epistemic authority, strengthening moral leadership, and adapting innovation through enduring educational traditions.

CONCLUSION

This study concludes that the integration of generative artificial intelligence (AI) into pesantren does not inevitably erode religious authority, displace teachers, or weaken institutional identity; rather, AI is governed through a moral–epistemic logic in which educational purpose, human authority, and institutional values precede technological adoption. Drawing on a qualitative multi-case study of eight Islamic boarding schools in Madura, Indonesia, the findings demonstrate four interconnected mechanisms of AI governance. First, governing educational purpose establishes that AI is legitimate only when it serves the moral, pedagogical, and religious objectives of education. Second, redistributing epistemic work shows that AI may perform informational and routine cognitive tasks without acquiring authority to determine the legitimacy of knowledge, which remains vested in teachers and kyai through verification, interpretation, and moral judgement. Third, epistemic stewardship demonstrates that kyai and educational leaders preserve institutional epistemic integrity by governing the processes through which AI-generated information is transformed into trustworthy educational knowledge. Fourth, adaptive innovation explains how pesantren incorporate technological change through, rather than at the expense of, adab, sanad, talaqqi, classical scholarship, and established pedagogical traditions. These findings culminate in the Moral Governance of Artificial Intelligence (MGAI) framework, proposed as a middle-range theory explaining how educational institutions sustain legitimacy amid AI-driven transformation through the integration of moral purpose, epistemic authority, epistemic stewardship, and institutional resilience. Theoretically, MGAI extends conventional AI governance beyond technical regulation and accountability toward a moral–epistemic paradigm; practically, it indicates that sustainable AI governance requires institutions to strengthen ethical reasoning, human judgement, teacher authority, epistemic trust, and educational purpose. Although limited to eight pesantren in Madura and primarily focused on

institutional governance rather than long-term student outcomes, the framework offers analytically transferable propositions for comparative and longitudinal research across diverse educational, cultural, and religious contexts.

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