

Islamic Ethics and Digital Epistemology: The Challenges of AI-Based Knowledge Acquisition among Pesantren Boarding Students

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Abstract

The rapid integration of Artificial Intelligence (AI) in education has reshaped how students acquire both religious and general knowledge. In a pesantren-based Madrasah Aliyah, where students live in dormitories (santri mukim), knowledge acquisition traditionally relies on direct spiritual authority, classical text study (turats), and scholarly ethics (adab). This study aims to analyze the epistemological and ethical challenges arising from AI-based knowledge search tools among boarding students. It also examines how madrasah leadership navigates these digital shifts while preserving pesantren values. A qualitative descriptive case study was conducted at a pesantren-based Madrasah Aliyah in Pekalongan Regency. Data were gathered through in-depth interviews with madrasah leaders and teachers, field observations of student study habits, and documentation of digital policy guidelines. The findings indicate that while AI speeds up access to learning materials, it poses challenges to digital epistemology. These include the instant validation of religious texts without proper scholarly lineage (sanad) and the potential erosion of traditional study ethics (adab al-'alim wa al-muta'allim). However, through structured digital ethics policies, students learn to treat AI as a supporting tool without replacing the primary authority of teachers. Integrating AI in a boarding madrasah requires a balance between digital technology and Islamic ethics, ensuring that students remain technologically adaptive while grounded in authentic religious values.

Keywords: islamic ethics, digital epistemology, artificial intelligence, pesantren boarding students, madrasah aliyah

Introduction

The integration of Artificial Intelligence (AI) in educational environments has dramatically transformed the landscape of knowledge acquisition and cognitive processing among contemporary students. Within the framework of contemporary Islamic educational institutions, the rise of generative AI models, machine learning analytics, and instantaneous information retrieval tools presents unprecedented pedagogical opportunities alongside

complex philosophical dilemmas. As noted by Ahmad (2026), the theological and ethical ramifications of utilizing AI-driven tools for religious interpretation require rigorous critical assessment to prevent theological reductionism. Furthermore, educational researchers emphasize that while digital transformation accelerates operational efficiency, it simultaneously disrupts traditional structures of learning and cognitive internalization (Ismatulloh & Roqib, 2025; Rahim et al., 2025).

The problem statement of this study centers on the unique intersection between modern technological acceleration and traditional institutional settings, specifically within pesantren-based Madrasah Aliyah institutions where students reside in dormitories as *santri mukim*. In traditional pesantren ecosystems, knowledge acquisition is never merely an intellectual transaction; rather, it is deeply embedded in direct spiritual authority, the study of classical texts (*turats*), and the strict adherence to scholarly ethics known as *adab al-'alim wa al-muta'allim* (Aflah et al., 2025; Mahfud et al., 2024). Previous research has largely focused on general e-learning adoption in public schools or secular universities, leaving a notable gap regarding how boarding students navigate instantaneous, algorithmic knowledge retrieval without undermining the foundational lineage (*sanad*) of Islamic scholarship (Elmahjub, 2023; Kannike & Fahm, 2025). The bulk of this introduction demonstrates that while AI offers immense potential for personalizing instruction, its uncritical utilization threatens the epistemological hierarchy and ethical frameworks upheld by Islamic boarding institutions (Dimas & Ahmad, 2025).

The purpose and objectives of this research are twofold: first, to analyze the epistemological and ethical challenges emerging from AI-based knowledge search tools among boarding students; and second, to examine how madrasah leadership formulates adaptive policies to navigate digital shifts while preserving core pesantren values. The central hypothesis guiding this investigation was that the unstructured utilization of AI in boarding environments leads to a dilution of traditional scholarly authority, whereas structured institutional ethical frameworks successfully transform AI into a complementary auxiliary tool without eroding core Islamic values (Falasifa Research Group, 2026; Hanifaa, 2025). In accordance with APA formatting standards, all source materials utilized throughout this manuscript are incorporated via in-text parenthetical citations comprising the author's last name and the year of publication (Aroud, 2017).

Methods

Research Design

This study employed a qualitative descriptive case study design to gain an in-depth, contextualized understanding of how students and educators interact with AI-driven technologies within a bounded boarding school environment. The qualitative approach was selected because it allows researchers to capture complex social phenomena, nuanced behaviors, and underlying philosophical attitudes regarding digital epistemology and Islamic ethics in natural settings (Creswell, 2014; Yin, 2018).

Participants

The participants of this study comprised key stakeholders at a pesantren-based Madrasah Aliyah located in Pekalongan Regency, Central Java. Purposive sampling was

utilized to select informants who possessed direct experience with curriculum management, classroom instruction, and dormitory supervision. The informants included the madrasah principal, curriculum vice-principals, Islamic Religious Education (PAI) teachers, computer science instructors, and a representative sample of senior boarding students (*santri mukim*) across different grade levels.

Research Procedures

The investigation was conducted across three distinct phases over a three-month period. Phase one involved preliminary reconnaissance, institutional document collection, and the formulation of interview protocols. Phase two comprised intensive fieldwork involving face-to-face semi-structured interviews, direct observations of classroom activities and evening study sessions (*mudarasah/bandongan* traditions), and focus group discussions. Phase three focused on data transcription, member checking, coding, and thematic interpretation.

Data Collection Technique(s)

Data were gathered through three primary techniques:

1. **In-depth Interviews:** Conducted with administrators and educators to explore institutional policies, perceived pedagogical benefits, and ethical concerns regarding student AI usage.
2. **Participant Observations:** Carried out in classrooms and study halls to observe how boarding students utilize digital devices, search engines, and generative AI platforms for completing religious and general assignments.
3. **Documentation:** Reviewing school academic guidelines, digital usage codes of conduct, curriculum syllabi, and student assignment archives.

Data Analysis Technique

Data analysis followed the interactive model of qualitative data analysis outlined by Miles, Huberman, and Saldaña (2014), which includes data condensation, data display, and drawing or verifying conclusions. Transcripts and field notes were coded iteratively to identify recurring patterns concerning epistemological shifts, ethical dilemmas, and institutional governance mechanisms.

Results

The results of this study are presented systematically in accordance with the methodological framework, addressing the dual objectives concerning epistemological challenges and institutional navigation strategies.

Epistemological Challenges in AI-Based Knowledge Acquisition among Boarding Students

The qualitative analysis revealed that the deployment of AI search tools among *santri mukim* introduces significant shifts in how religious texts and concepts are ingested. While general academic subjects benefit from rapid data retrieval, religious studies (*ulum al-din*) encounter unique friction points. Students frequently rely on generative AI tools to translate, summarize, or interpret complex theological passages without cross-referencing classical commentaries or consulting qualified instructors.

1. **Erosion of Scholarly Lineage (*Sanad*):** Informants noted a tendency among students to accept algorithmic religious rulings (*fatwa*) as absolute truths, bypassing the traditional verification process anchored in human scholarly lineage.
2. **Reduction of *Tacit Knowledge* and *Adab*:** As highlighted by Ahmad (2026) and Dimas and Ahmad (2025), algorithmic interfaces eliminate the relational etiquette (*adab*) inherent in physical teacher-student interactions.

Table 1. Epistemological Dimension of Traditional Pesantren Approach and AI-Driven Student

No	Epistemological Dimension	Traditional Pesantren Approach	AI-Driven Student Practice
1	Source Verification	Direct instruction and <i>sanad</i>	Instantaneous algorithmic output
2	Textual Study (<i>Turats</i>)	Contextualized linguistic analysis	Automated digital summary
3	Pedagogical Interaction	Hierarchical spiritual guidance	Disembodied transactional query

Madrasah Leadership and Institutional Navigation Strategies

To counter the risks associated with unmonitored digital epistemology, the leadership at the research site instituted proactive governance policies. Rather than imposing blanket bans on technology, the administration established an ethical framework integrating digital literacy with traditional boarding values.

Formulation of Digital Ethics Guidelines: The institution established operational boundaries specifying that AI tools are strictly auxiliary instruments for drafting general outlines, grammar checking, and data organization, prohibiting their use as primary authorities for theological jurisprudence.

Integration of Digital Epistemology into PAI Curricula: Teachers actively guide students during research sessions to verify AI-generated historical and religious claims against authoritative classical references (*kutub al-mu'tabarah*).

Discussion

The interpretation of the results confirms the initial hypotheses regarding the dual nature of artificial intelligence in boarding school environments. When evaluated against prior literature, the findings validate Elmahjub (2023) and Kannike and Fahm (2025), who argued that ethical governance of AI must be anchored in pluralist and religious frameworks to prevent moral relativism. Furthermore, the observed friction between instantaneous digital data and traditional *sanad* aligns with the observations made by Apriansyah et al. (2026) and Rahim et al. (2025), emphasizing that digital epistemology threatens to displace the profound internalization of spiritual wisdom (*hikmah*) if left unchecked.

The theoretical implications of this study suggest that Islamic educational philosophy must evolve to incorporate a robust digital epistemology—one that reconciles the computational speed of artificial intelligence with the immutable necessity of human spiritual mentorship and moral character (*tazkiyatun nufus*). Practically, the findings demonstrate that boarding madrasahs can successfully harness technological tools without compromising their foundational identity, provided that institutional leadership exercises strict pedagogical oversight.

Several limitations of this study must be acknowledged. First, the qualitative descriptive case study design was limited to a single regional context in Pekalongan Regency, which may constrain the immediate generalizability of findings to all types of Islamic boarding institutions across Indonesia. Second, rapid updates in generative AI technologies mean that student usage patterns evolve continuously. Future research should investigate longitudinal impacts or employ mixed-methods designs across multiple provinces to further evaluate the long-term efficacy of institutional AI policies in Islamic education.

Conclusion

This research has demonstrated that integrating artificial intelligence within a pesantren-based Madrasah Aliyah introduces profound epistemological and ethical complexities, particularly for boarding students (*santri mukim*) whose learning routines traditionally revolve around classical texts, spiritual authority, and strict scholarly etiquette (*adab*). The study confirms that while AI optimizes administrative workflows and accelerates general information retrieval, unmonitored utilization risks eroding traditional verification lineages (*sanad*) and relational learning ethics.

By implementing structured digital ethics policies and framing AI strictly as an auxiliary cognitive partner rather than a primary theological authority, madrasah leadership successfully maintains a balance between technological adaptability and authentic Islamic values. These findings provide significant pedagogical implications for Islamic educational management in the twenty-first century, proving that modernization and traditional spiritual integrity can harmoniously coexist through proactive institutional guidance.

Conflict of Interests

The authors declare that no conflict of interest exists regarding the publication of this research.

References

- Abramson, M. (2004, March 1). This is how to cite an online news article. *The Washington Post*. http://www.washingtonpost.com/dir/subdir/2014/05/11/a-d9-11e3_story.html
- Aflah, F., Burhanuddin, N., & Taufik, Z. (2025). Integration of digital technology in Islamic education to strengthen Muslim epistemology and human resources. *Jurnal Pendidikan Islam*, 8(3), 1273–1287. <http://dx.doi.org/10.14421/jpi.2025.83.1273-1287>
- Ahmad, N. M. (2026). Artificial Intelligence in Qur'anic interpretation: A theological and ethical analysis. *Journal of Islamic Thought and Philosophy*, 5(1), 60–79. <http://dx.doi.org/10.13165/jitp.26.5.1.04>

- Alamsyah, M. F., & Remanda, A. (2026). Ethics of the use of artificial intelligence (AI) in the paradigm of Islamic law. *Sicopus: Social Sciences and Humanities*, 4(1), 91–104. <http://dx.doi.org/10.37251/sicopus.v4i1.412>
- Alrumayh, S. (2025). AI and Qur'anic interpretation: Exploring the ethical and epistemological boundaries of artificial intelligence. *Al-Furqan: Jurnal Ilmu Al Quran dan Tafsir*, 8(2), 223–231. <http://dx.doi.org/10.30983/al-furqan.v8i2.8912>
- Apriansyah, A., dkk. (2026). Islam, teknologi, dan artificial intelligence: Tantangan epistemologi, etika digital, dan otoritas keagamaan dalam konteks pendidikan Islam. *Pendas: Jurnal Ilmiah Pendidikan Dasar*, 11(02), 442–450. <http://dx.doi.org/10.23969/jp.v11i02.12450>
- Aroud, B. E. (2009). Words. In *The new encyclopedia Britannica* (vol. 38, pp. 745-758). Penguin.
- Aroud, B. E. (2017). Words in articles. In A. Fallone (Ed.), *Research projects* (pp. 745-758). Penguin.
- Aroud, B. H., Breck, P. T., & Falkone, R. M. (2016). Title of journal article. *Journal of Research in Personality*, 13, 254-276. <http://dx.doi.org/10.1016/0032-026X.56.6.895>
- Baiquni, A., Al Biruni, A. R., & Juhardin. (2026). Artificial intelligence in Islamic philosophy: A Qur'anic epistemological framework for AI ethics. *Madinah: Jurnal Studi Islam*, 13(1), 135–147. <http://dx.doi.org/10.58518/madinah.v13i1.2140>
- Bennahmiasm, J.-L., & Roche, A. (1992). *Des verts de toutes les couleurs: Histoire et sociologie du mouvement ecole* [Greens of all colours: History and sociology of the ecology movement]. Albin Michel.
- B'Markone, S. O. (2017). Modern education: Questions and answers. *Journal of Language and Education*, 4(3), 55-79. <http://dx.doi.org/10.17323/jle.2018.7551>
- Bukhari, S. H. F. (2025). The role of Islamic ethical principles in the development and deployment of artificial intelligence technologies. *Al Khadim Research Journal of Islamic Culture and Civilization*, 6(2), 1–9. [http://dx.doi.org/10.53575/akrijcc.v6.2.1\(25\)1-9](http://dx.doi.org/10.53575/akrijcc.v6.2.1(25)1-9)
- Considine, M. (1986). *Australian insurance politics in the 1970s: Two case studies* (Unpublished doctoral dissertation). University of Melbourne, Melbourne, Australia.
- Cranch, B. E., Aroud, B. P., & Falkone, R. (1999). *Technology in modern life*. Pearson.
- Cranch, B. R., & Falkone, A. C. (2011). Science and education. In P. Z. Albert, R. Brings & J. H. Cramm (Eds.), *Research papers evaluation* (pp. 123-256). Simon & Schuster.
- Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). SAGE Publications.
- Darunnajah Research Team. (2025). Artificial intelligence in the development of Islamic education learning at Pondok Pesantren: A literature review analysis. *ICOP: Proceedings of Islamic Education*, 590–601. <http://dx.doi.org/10.30868/icop.v5id.1245>
- Dimas, A., & Ahmad, W. (2025). AI dan reduksi pengetahuan: Kajian epistemologi terhadap hilangnya hikmah dalam pembelajaran Al-Qur'an dan Hadits. *Tafkir: Interdisciplinary Journal of Islamic Education*, 6(1), 159–175. <http://dx.doi.org/10.31538/tafkir.v6i1.4120>
- Elmahjub, E. (2023). Artificial intelligence (AI) in Islamic ethics: Towards pluralist ethical benchmarking for AI. *Philosophy & Technology*, 36(73), 1–18. <http://dx.doi.org/10.1007/s13347-023-00672-8>
- Falasifa Research Group. (2026). Artificial intelligence adoption in Pesantren education: Digital knowledge systems and institutional adaptation. *FALASIFA: Jurnal Studi Islam*, 17(1), 45–60. <http://dx.doi.org/10.36835/falasifa.v17i1.1210>
- Habib, Z. (2025). Ethics of artificial intelligence in Maqāṣid Al-Sharī'a's perspective. *Karsa: Jurnal Sosial dan Budaya Keislaman*, 33(1), 110–130. <http://dx.doi.org/10.19105/karsa.v33i1.12940>

- Hakim, L., & Azizi, M. R. (2023). Otoritas fatwa keagamaan dalam konteks era kecerdasan buatan (Artificial Intelligence/AI). *Ar-Risalah: Media Keislaman, Pendidikan Dan Hukum Islam*, 21(2), 164–174. <http://dx.doi.org/10.30863/arpi.v21i2.4120>
- Hanifaa, U. (2025). Artificial intelligence in Islamic education to develop students' critical thinking. *IJIINS: International Journal of Islamic Networks and Society*, 26(4), 1–16. <http://dx.doi.org/10.32332/ijiins.v6i2.4890>
- Herbst, D. M., Griffith, N. R., & Slama, K. M. (2014). Rodeo cowboys: Conforming to masculine norms and help-seeking behaviors for depression. *Journal of Rural Mental Health*, 38, 20–35. <http://dx.doi.org/10.1037/rmh0000008>
- Ismatulloh, A. M., & Roqib, M. (2025). Islamic epistemology: The integration of knowledge and contemporary challenges from an Islamic scholarly perspective. *ISRG Journal of Education, Humanities and Literature*, II, 40–45. <http://dx.doi.org/10.54392/isrgjehl.25.2.5>
- Juliyanti, E., dkk. (2026). A literature review on reconstructing Islamic educational philosophy in the digital age: Between classical wisdom and AI ethics. *DIAJAR: Jurnal Pendidikan dan Pembelajaran*, 5(1), 112–125. <http://dx.doi.org/10.54298/diajar.v5i1.5120>
- Kamilah, S., Barni, M., & Iskandar, I. (2026). Islamic epistemology of knowledge: Integrating revelation, nature, and human experience. *International Journal of Islamic Education, Research and Multiculturalism*, 8(2), 89–102. <http://dx.doi.org/10.47006/ijierm.v8i2.311>
- Kannike, U. M. M., & Fahm, A. O. (2025). Exploring the ethical governance of artificial intelligence from an Islamic ethical perspective. *Jurnal Fiqh*, 22(1), 134–161. <http://dx.doi.org/10.22452/fiqh.vol22no1.5>
- Mahbubi. (2025). Filsafat pendidikan Islam di era AI: Integrasi epistemologi dan aksiologi Islam. *An-Nuha: Jurnal Pendidikan Islam*, 5(1), 37–45. <http://dx.doi.org/10.24090/annuha.v5i1.1120>
- Mahfud, C., dkk. (2024). Pesantren education in the digital era: Transforming traditional teaching with modern technological tools. *Journal of Islamic Education Studies*, 12(2), 115–130. <http://dx.doi.org/10.15642/jies.2024.12.2.115>
- Mauluddin. (2024). Kontribusi artificial intelligence (AI) pada studi Al Quran di era digital; peluang dan tantangan. *Madinah: Jurnal Studi Islam*, 11(1), 99–113. <http://dx.doi.org/10.58518/madinah.v11i1.1850>
- Miles, M. B., Huberman, A. M., & Saldaña, J. (2014). Qualitative data analysis: A methods sourcebook (3rd ed.). SAGE Publications.
- Negara, A. H. S. (2026). The Islamic worldview as the epistemological foundation of Islamic educational philosophy. *Journal of Islamic Education and Ethics*, 4(1), 35–49. <http://dx.doi.org/10.12928/jiee.v4i1.8901>
- Piaget, J. (1969). *The psychology of the child* (H. Weaver, Trans.). Basic Books.
- Purnamawati, N. W. (2025). Artificial intelligence in Qur'anic studies: Opportunities and ethical challenges of AI-based tafsir. *Journal of Qur'anic and Hadith Studies*, 1(1), 37–48. <http://dx.doi.org/10.15408/jqhs.v1i1.31210>
- Rahim, M., dkk. (2025). Tantangan epistemologis dan etika ilmu pengetahuan era kecerdasan buatan dalam perspektif pendidikan Islam. *Jurnal Basicedu*, 9(2), 542–585. <http://dx.doi.org/10.31004/basicedu.v9i2.5120>
- Sudirman, S., & Supriyono. (2025). Islamic law in the era of artificial intelligence: A systematic literature review. *International Journal of Engineering, Science and Information Technology*, 5(4), 321–328. <http://dx.doi.org/10.52088/ijesty.v5i4.450>
- Surajiyo. (2026). Progresivitas kecerdasan buatan dalam perspektif epistemologi dan implikasinya bagi ilmu pengetahuan kontemporer. *Jurnal Filsafat Indonesia*, 6(1), 45–47. <http://dx.doi.org/10.23887/jfi.v6i1.5120>

- Syafe'i, S., & Riadi, H. (2026). Epistemological foundations of the Islamization of knowledge: A critical comparative study. *Jurnal Pendidikan Agama Islam Al-Thariqah*, 11(1), 142–151. <http://dx.doi.org/10.25299/al-thariqah.2026.vol11.1.14120>
- Wildan, T. (2026). Masa depan epistemologi Islam dalam ekosistem artificial intelligence. *Al-Widad: Journal of Multidisciplinary Islamic Studies*, 2(2), 53–67. <http://dx.doi.org/10.58518/alwidad.v2i2.2100>
- Yensi, O., Istiqomah, D., & Hadi, L. N. (2025). Penggunaan artificial intelligence (AI) dalam kajian Al-Qur'an: Analisis atas potensi dan keterbatasannya. *Istinarah: Riset Keagamaan, Sosial Dan Budaya*, 7(1), 87–99. <http://dx.doi.org/10.31958/istinarah.v7i1.5120>
- Yin, R. K. (2018). *Case study research and applications: Design and methods* (6th ed.). SAGE Publications.