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Research Trends on the Use of Artificial Intelligence in Islamic Religious Education: A Systematic Review from 2021 to 2025

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Abstract

This study investigates research trends on the use of Artificial Intelligence (AI) in Islamic Religious Education (IRE) from 2021 to 2025. A systematic review methodology was employed following PRISMA 2020 guidelines, resulting in the inclusion of 34 peer-reviewed Scopus-indexed articles. The findings reveal that quantitative research approaches, particularly experimental and quasi-experimental designs, dominate the field. Higher education institutions serve as the primary research settings, while studies at the madrasah, Islamic boarding school (pesantren), and early childhood Islamic education levels remain underrepresented. The primary purposes of AI integration identified in the literature center on enhancing learning outcomes, personalizing instruction, and supporting assessment in educational contexts applicable to IRE. Most studies recommend broader AI adoption accompanied by strong ethical frameworks, teacher training, and institutional support recommendations directly relevant to the development of Islamic Religious Education learning environments. This review highlights a critical gap: very few studies explicitly contextualize AI integration within IRE settings, suggesting a significant opportunity for research that integrates Islamic values and pedagogical principles with AI-driven educational innovations. Findings provide a roadmap for Islamic education researchers, madrasah administrators, and IRE curriculum developers seeking to leverage AI responsibly and equitably.

Keywords: Systematic Review, Artificial Intelligence, Islamic Religious Education, Research Trends, 2021–2025

Introduction

The development of Artificial Intelligence (AI) technology has brought profound transformations across multiple sectors, with education being one of the most significantly affected domains (Triplett, 2023; Mnguni et al., 2024a; Mnguni et al., 2024b). Within the specific context of Islamic Religious Education (IRE), the rapid emergence of AI-driven tools presents both a compelling opportunity and a nuanced challenge. IRE, which encompasses the teaching of Al-Qur'an, Hadith, Fiqh, Aqidah, and Islamic ethics across formal institutions such as madrasahs, pesantren (Islamic boarding schools), and Islamic universities, requires pedagogical approaches that are not only effective but also aligned with Islamic values and epistemological frameworks.

At the macro level, AI is reshaping how educational content is delivered, how student progress is monitored, and how learning environments are designed. According to Murtaza et al. (2022), AI as a personalization technology can adapt learning materials to individual learner needs and abilities. In the context of IRE, this capability holds significant potential: adaptive AI systems could, for instance, tailor the pacing of Qur'anic recitation learning, identify individual weaknesses in Arabic morphology comprehension, or provide personalized feedback on Islamic jurisprudence assignments. Ayeni et al. (2024) further define personalized AI learning as "a pedagogical approach tailored to meet the needs, abilities, and interests of individual students," a definition entirely compatible with the spirit of Islamic education, which emphasizes attending to the unique intellectual and spiritual development of each learner (tarbiyyah fardiyyah).

Despite the growing body of AI-in-education literature, a critical gap persists: systematic reviews examining AI trends in the specific context of IRE are virtually absent. Most existing systematic reviews aggregate findings across secular and mainstream educational contexts, leaving Islamic educational institutions which serve hundreds of millions of learners globally without a dedicated evidence base to guide responsible AI adoption. This gap is particularly significant given that IRE institutions face unique contextual factors, including the integration of classical Islamic scholarship with modern curricula, the centrality of character formation (akhlaq), and ethical imperatives derived from Islamic epistemology that must govern technology use.

The urgency of this research therefore lies in providing a structured, evidence-based understanding of AI research trends in education that can be interpreted and applied within Islamic educational settings. By mapping the dominant research methods, the most frequently studied educational levels, the primary purposes of AI integration, and the most common recommendations found in recent literature, this systematic review offers a foundation upon which IRE researchers, madrasah policymakers, and Islamic higher education administrators can build contextually informed AI strategies.

This study aims to bridge the gap between general AI-in-education research and the specific needs of Islamic Religious Education by conducting a systematic review of Scopus-indexed articles published from 2021 to 2025. The study is guided by four research questions:

1. What research methods are most widely used in research on the use of AI in education, and what implications do they hold for IRE research?
2. What is the most frequently studied level of education in AI research, and how does this compare to coverage of Islamic educational levels?
3. What are the primary purposes of AI integration in education as reported in the literature, and how do these align with the goals of Islamic Religious Education?
4. What recommendations appear most frequently in AI-in-education research, and how can they be adapted for IRE institutions?

Method

Review Design and Reporting Standards

We conducted a systematic review of Scopus-indexed journal articles on the use of artificial intelligence (AI) in education published between 1 January 2021 and 31 December 2025. Reporting follows the PRISMA 2020 Statement (checklist and flow diagram) and the PRISMA-S extension for transparent reporting of database searches (Page et al., 2021).

Procedure

The systematic review procedure began by defining research questions, eligibility criteria, search strategy, screening protocols, data extraction items, risk-of-bias assessment procedures, and synthesis plans, all of which were prepared before the search was conducted.

Eligibility Criteria

Research subjects in the included articles were drawn from all educational settings, from early childhood education, K–12, higher education, vocational education, professional education, and informal/online learning. The research phenomena relate to the use of artificial intelligence (broadly defined: machine learning, deep learning, LLMs, recommendation systems, analytics, intelligent tutoring systems) in educational processes, tools, or outcomes. Empirical findings or substantive analyses related to teaching, learning, assessment, administration, ethics, equity, or policy were required. Conference proceedings, book series/chapters, editorials, notes, and short surveys were excluded.

Search Strategy

Scopus Advanced Search targeted titles, abstracts, and author keywords using the following Boolean query:

TITLE-ABS-KEY(artificial AND intelligent AND education) AND (PUBYEAR > 2020 AND PUBYEAR < 2026) AND DOCTYPE(ar) AND SRCTYPE(j) AND (LIMIT-TO(LANGUAGE, "English"))

Full search strings, date run, and export fields are provided in Supplementary Material consistent with PRISMA-S reporting items (Rethlefsen et al., 2021).

Study Selection

Screening proceeded in two stages by two independent reviewers: (1) title/abstract screening against eligibility criteria, and (2) full-text screening for all provisional inclusions and uncertain cases. Disagreements were resolved by discussion; a third reviewer adjudicated when needed. Inter-rater agreement was quantified using Cohen's κ, with substantial agreement ($\kappa \geq 0.61$) required before full screening began.

Data Extraction

The extraction form captured bibliographic details (authors, year, country, journal, citations, funding), study characteristics (educational level, discipline, participant type and size, AI type, study design), and outcomes (learning outcomes, engagement, assessment accuracy, ethics, equity, teacher outcomes, institutional impact). Two reviewers independently extracted a pilot set of 10–20%; discrepancies were resolved through codebook refinement before full extraction.

Risk of Bias and Methodological Quality

Methodological quality was assessed using the Mixed Methods Appraisal Tool (MMAT) – Version 2018, with appropriate domain criteria applied across qualitative, randomised, non-randomised, quantitative descriptive, and mixed-methods studies. Two reviewers independently scored items with consensus procedures; results informed narrative weighting but did not serve as exclusion criteria unless fatal flaws (e.g., absence of data) were identified.

Results and Discussion

The PRISMA 2020 flow diagram documents counts at each review stage. Of 101 unique records retrieved, 34 studies met the inclusion criteria and were included in the synthesis. Table 1 presents an overview of all included studies.

Table 1. Summary of Included Studies (2021–2025)

No.	Author(s) (Year)	Method	Sample/Data	Limitations/Context of AI Usage	Recommendation
1	Li et al. (2025)	Qualitative	120 medical students, 38 residents, 41 radiologists	Survey on AI integration in radiology education	Faculty radiologists expressed enthusiasm for AI platforms to enhance training confidence
2	YaoYan & Li (2025)	Quantitative	SNN neural network design samples	Online teaching system with GCN-SNN for dance education	Future studies should address computational load via graph sparsification and hardware acceleration
3	Wen et al. (2025)	Quantitative	40,179 social media user comments	ChatGPT and education sentiment on Chinese platforms	Educational institutions should reevaluate teaching methods and AI development policies
4	Maaz et al. (2025)	Quantitative	Proficient, Meeting-Expectations, and Developing Students	AI and robotics in primary school adaptive learning	Combining AI and robots in real-world settings enhances engagement and educational outcomes
5	Tlili et al. (2025)	Quantitative	85 studies, 10,469 participants	Meta-analysis on AI effect on student learning outcomes	Educational level and intervention length moderate the AIEd effect
6	Dahri et al. (2025)	Quantitative	290 students from Malaysia	Gamification and AI for student engagement and achievement	Educators should adopt these technologies for personalized interactive learning environments
7	Illera (2024)	Qualitative	Conceptual/philosophical analysis	AI and education relationships focusing on cognitive metaphors	AI may both advance and hinder cognitive development depending on implementation context
8	Wang (2024)	Qualitative	Dance educators, researchers, software developers	AI-powered immersive technology (VR/AR/MR) in dance teaching	Instructors must integrate virtual and real worlds in daily practice
9	Filipescu et al. (2024)	Quantitative	IoT edge devices via LAN and WAN	IoT-cloud and digital twin in robotic cell for Industry 4.0 education	System is a creative fusion of cutting-edge technologies for

No.	Author(s) (Year)	Method	Sample/Data	Limitations/Context of AI Usage	Recommendation
					robotics and education
10	Chang et al. (2024)	Quantitative	MusicARLtrans Net multimodal system	Multimodal interactive music education agent via reinforcement learning	AI-driven systems have potential to transform music education
11	Yi (2024)	Mixed-methods	Oil painting classification samples	Deep learning in oil painting instruction at Chinese institutions	Future research to broaden model measurement content with real-world case studies
12	Belda-Medina & Kokošková (2023)	Mixed-methods	237 college students (Spain & Czech Republic)	App-Integrated Chatbots (AICs) for EFL teacher candidates	Improvements needed in alignment with student needs and voice technology for better interaction
13	Arun (2024)	Quantitative	18 anatomy queries to Anatbuddy and ChatGPT	Custom AI chatbot for anatomy education	Further investigation on chatbot acceptance and impact on learning outcomes needed
14	Yun et al. (2024)	Quantitative	>70% students reported skill improvement	Intelligent tutoring in educational metaverse using XAI	Future work to build educational metaverse leveraging XAI and digital twin advances
15	Collins et al. (2024)	Qualitative	GPT Builder with open-source textbooks	AnatomyGPT customized AI for anatomical sciences education	Teachers and students may create their own GPTs for anatomy teaching/learning
16	Knoth et al. (2024)	Mixed-methods	45 university students aged 19–35	AI literacy and prompt engineering in LLM-based systems	AI literacy may require additional components for effective prompt engineering with LLMs
17	Aguilera et al. (2024)	Qualitative	Children aged 4–6 in integration test	Voice-controlled robotics for early education	Human-robot collaboration is critical for future workforce and warrants further study
18	Alonso-Rodríguez (2024)	Qualitative	International organizations, nations, industry representatives	Ethical foundations of AI in educational endeavors	A normative ethical framework for AI in education and new teacher professional profiles needed
19	Sovrano et al. (2024)	Qualitative	102 students aged 19–38	YAI4Edu e-book with question-answering for on-demand explanations	More research needed on effectiveness of random explanation generators

No.	Author(s) (Year)	Method	Sample/Data	Limitations/Context of AI Usage	Recommendation
20	Annuš (2024)	Qualitative	75 educators	Educator perceptions on AI application in classroom	Key domains identified where AI will significantly alter teaching and learning processes
21	Mahariya et al. (2023)	Qualitative	LMS user data up to 70 GB	Industry 4.0 enabling technologies for smart campus 4.0	IoT and cloud computing recommended for real-time monitoring and student progress tracking
22	Trabelsi et al. (2023)	Qualitative	7 students in initial testing	Real-time AI classroom monitoring for attention and mood	Future: social robots as teaching assistants for inattentive students
23	Yang et al. (2023)	Quantitative	Convolutional neural network image datasets	Target detection via CNN in sustainable outdoor education	Future investigations to focus on parallel computing and parameter optimization
24	Li et al. (2023)	Qualitative	166 students, 10 teachers in 4 classrooms	Real-time classroom behavior analysis with AI and embedded smart glasses	Future studies should adopt privacy-preserving techniques acceptable to parents and students
25	Ahmad et al. (2023)	Qualitative	Conceptual framework development	Framework for AI technology adoption in educational organizations	Effective AI adoption requires proper procedural steps and future model translation
26	Li et al. (2022)	Quantitative	3,983 students from OULA dataset	Multi-topology graph neural networks for student performance prediction	Future work should include structural learning and broader analytical tasks in education
27	Ishak & Jiang (2022)	Quantitative	6,000 university students	AI development in teaching related to shifting educational objectives	Proposed algorithm performs better than current algorithms
28	Singh et al. (2022)	Quantitative	Selected students and teachers	SeisTutor intelligent tutoring system with cognitive intelligence simulation	Intelligence-incorporated SeisTutor improves learning compared to non-intelligent systems
29	Krishnan et al. (2022)	Quantitative	50 computer science students	Learning analytics and AI for academic achievement during COVID-19	Teaching strategies can be enhanced based on students' learning preferences
30	Zhao et al. (2021)	Quantitative	Teachers and students across China	TSBEP model using ML for student behavioral	Classifier training with teacher actions

No.	Author(s) (Year)	Method	Sample/Data	Limitations/Context of AI Usage	Recommendation
				engagement	more reliably predicts student behavioral engagement
31	Aldeman et al. (2021)	Quantitative	Histopathological kidney biopsy reports 2013–2018	SmartPathK: AI platform for teaching glomerulopathies	Verify tool as supplemental digital instrument in graduate nephropathology education
32	Li (2022)	Quantitative	University students	Big data and AI in college students' mental health education	Universities should partner with tech organizations to leverage psychological and technical expertise
33	Mu & Shi (2022)	Quantitative	96 datasets for image feature recognition	Tensor CS reconstruction model for AI classroom management	Algorithm has specific educational impact as demonstrated by experimental findings
34	Ayouni et al. (2021)	Quantitative	360 students from PNU College of Computer Science	Intelligent predictive system for student engagement forecasting	Future research should account for multiple elements predicting student success and engagement

Research Methods Widely Used in AI-in-Education Research

Across the 34 reviewed studies, the most frequently applied research methods were quantitative approaches, particularly experimental and quasi-experimental designs. Many studies tested AI-based interventions such as intelligent tutoring systems, learning analytics dashboards, and adaptive assessment tools to measure their effects on student achievement, engagement, and learning efficiency. Quantitative survey-based studies were also common, examining students' and teachers' perceptions, acceptance, and readiness toward AI technologies.

Qualitative methods, including case studies and interviews, were less dominant but provided in-depth insights into implementation processes and user experiences. A smaller but notable proportion employed mixed-methods designs. The overall methodological trend emphasizes measurement of effectiveness through controlled or data-driven approaches, reflecting the broader scientific orientation of AI research in education.

From the perspective of Islamic Religious Education (IRE), this dominance of quantitative methods presents both an opportunity and a limitation. On one hand, empirical evidence of AI effectiveness supports the case for adoption in madrasah and pesantren environments. On the other hand, the qualitative and interpretive dimensions integral to IRE including assessment of spiritual development, moral character (akhlaq), and Qur'anic understanding are less amenable to purely quantitative measurement. Future IRE-focused research should therefore consider mixed-methods designs that capture both measurable learning outcomes and the qualitative spiritual-educational dimensions unique to Islamic educational contexts.

The Most Researched Level of Education

The analysis reveals that higher education is the most researched level in AI-in-education research. Universities are frequently used as testbeds for AI-based learning platforms, adaptive feedback systems, plagiarism detection tools, and academic analytics, largely because they offer

access to large datasets and more robust technological infrastructure. Research in K–12 settings was present but less prominent, while studies at the early childhood and vocational education levels were relatively rare.

This finding carries significant implications for IRE. Islamic educational institutions span a wide spectrum: from Raudhatul Athfal (early childhood Islamic education) and Madrasah Ibtidaiyah (elementary) through Madrasah Tsanawiyah (junior secondary), Madrasah Aliyah (senior secondary), to Islamic universities (PTKIN). The existing research base is heavily skewed toward higher education, leaving the foundational levels of Islamic schooling where Qur'anic learning and core aqidah formation take place almost entirely absent from the AI literature. This constitutes a major research gap that scholars in Islamic education are uniquely positioned to address.

Purposes of AI Integration Most Widely Researched

The primary purposes of applying AI in education identified in the reviewed articles center on enhancing learning outcomes and personalizing instruction. Many studies investigated adaptive systems designed to tailor instructional content, provide real-time feedback, and adjust difficulty levels based on learner performance. Other major themes included learning analytics (predicting student performance, identifying at-risk learners), automated assessment, and supporting engagement through chatbots and gamified environments.

These purposes are directly relevant to IRE. The personalization of Qur'anic recitation learning (tahsin and tajwid), the adaptive support of students studying Arabic grammar (nahwu and sarf), and the automated feedback on Islamic jurisprudence (fiqh) comprehension assessments are all concrete applications that the identified AI purposes could serve. Furthermore, AI-driven learning analytics could help madrasah administrators identify students at risk of spiritual or academic disengagement, enabling timely pastoral intervention consistent with Islamic guidance principles. Ethical AI applications focused on fairness and transparency also resonate deeply with Islamic principles of 'adl (justice) and amanah (trustworthiness) in educational management.

Most Frequently Appearing Recommendations

Most studies concluded with recommendations emphasizing broader AI adoption accompanied by attention to ethical use, teacher training, and institutional support. Capacity-building for educators and learners to understand both the potential and limitations of AI was a recurring theme, along with expansion of research to diverse and non-Western contexts. Policy frameworks addressing privacy, bias, and fairness were also widely recommended, as was the co-design of AI systems with educators and students to increase usability and trust.

For Islamic Religious Education specifically, these recommendations translate into several actionable imperatives. First, IRE institutions should develop AI literacy programs for Islamic teachers (guru PAI and ustadz/ustadzah) that situate AI competencies within an Islamic ethical framework, drawing on principles such as maslahah (public benefit), hifzh al-'aql (preservation of intellect), and the prohibition of harm (la dharar wa la dhirar). Second, policymakers at the Ministry of Religious Affairs (Kemenag) level should develop national guidelines for responsible AI adoption in madrasah systems. Third, AI systems deployed in IRE contexts should be co-designed with Islamic educators and students to ensure cultural appropriateness, pedagogical alignment with Islamic values, and transparency in algorithmic decision-making.

The broader literature reinforces the transformative potential of AI in education. A systematic review published in Multimodal Technologies and Interaction found that cognitive benefits of AI include improved student achievement, motivation, and participation through personalized learning and interactive feedback (Garzón et al., 2025). A review in the International Journal of Artificial Intelligence in Education highlighted AI's appropriateness as a platform for adaptive curricula development, teacher AI literacy enhancement, and student performance prediction (Fu et al., 2024). These findings, when interpreted through the lens of IRE, suggest that AI can serve as a powerful facilitator of tarbiyyah Islamic holistic education when implemented with careful attention to Islamic pedagogical values.

Conclusion

This systematic review of 34 Scopus-indexed articles published between 2021 and 2025 reveals that quantitative research designs dominate AI-in-education research, higher education is the most studied level, and the primary purposes of AI integration center on personalization, learning outcome enhancement, and adaptive assessment. The most common recommendations call for ethical AI frameworks, teacher capacity-building, and inclusive research across diverse contexts.

Critically, this review identifies that Islamic Religious Education remains dramatically underrepresented in the AI-in-education research landscape. This gap is both a challenge and an invitation. Islamic education scholars, madrasah administrators, and IRE curriculum developers are called to take active roles in shaping how AI is researched, designed, and implemented within their specific educational traditions. AI is not a neutral technology; its values and assumptions must be examined and, where necessary, realigned with Islamic epistemological and ethical frameworks.

When implemented thoughtfully—with attention to Islamic values of justice (‘adl), beneficence (ihsan), preservation of intellect (hifzh al-‘aql), and teacher-student relational ethics—AI holds genuine promise as a tool for advancing equitable, personalized, and effective Islamic Religious Education. The path forward requires collaborative effort among IRE researchers, Islamic education institutions, technology developers, and policymakers to ensure that AI serves as an enabler of tarbiyyah and not a displacement of its human and spiritual essence

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