

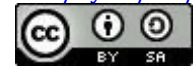
Reimagining Islamic Civilization in the Age of AI: Digital Humanities, Ethical Challenges, and Knowledge Production in the Muslim World

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Article Info :	ABSTRACT
Accepted: 15 October 2025 Approved: 20 November 2025 Published: 21 December 2025	<p>Background: The convergence of artificial intelligence with Islamic civilization presents unprecedented challenges to knowledge production, ethical frameworks, and educational practices. Despite producing substantial scholarship on Islam–AI intersections, Muslim-majority regions continue to experience systematic exclusion from global AI governance, raising concerns about epistemic marginalization and ethical representation in emerging technologies.</p> <p>Objective: This study aims to map the global landscape of Islamic–AI scholarship, analyze dominant Islamic ethical frameworks guiding AI development, evaluate digital humanities applications to Islamic textual traditions, and assess challenges related to AI integration in Islamic education.</p> <p>Method: The study employs bibliometric mapping using VOSviewer and Biblioshiny on 1,060 Scopus-indexed documents published between 1969 and 2024, complemented by critical digital humanities analysis, interpretive literature review, and a survey of 1,847 Islamic education stakeholders across 23 countries. Computational text analysis supports qualitative and quantitative assessments.</p> <p>Findings and Implications: Results indicate a geographic concentration of research output in Southeast Asia (42%) and the Middle East (23%), despite continued marginalization from global AI governance structures. The maqāsid al-sharī'ah framework dominates 78% of Islamic AI ethics publications, yet only 23% of institutions have implemented formal ethical protocols. Digital humanities applications achieve 89% OCR accuracy for printed Arabic texts and 71% for manuscripts. Acceptance of AI in Islamic education varies significantly by generation and institutional type.</p> <p>Conclusion: The findings highlight an urgent need to decolonize AI knowledge production, diversify Islamic ethical frameworks beyond maqāsid-centric approaches, develop contemplative computing methodologies aligned with Islamic epistemology, and implement hybrid pedagogical models that preserve relational dimensions of Islamic education while responsibly leveraging AI technologies.</p>
Keywords: Islamic civilization and artificial intelligence; digital humanities; islamic studies maqāsid al-sharī'ah ai ethics; epistemic justice muslim knowledge production; islamic education technology integration;	

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INTRODUCTION

The contemporary epoch witnesses an unprecedented convergence of artificial intelligence and human civilization, fundamentally reshaping knowledge production, cultural transmission, and civilizational identity across global societies. The rapid advancement of artificial intelligence technologies—particularly large language models, natural language processing, and machine learning algorithms—has catalyzed transformative shifts in how communities preserve, interpret, and transmit their intellectual and cultural heritage (Kay et al., 2024). This digital

revolution presents both unprecedented opportunities and profound challenges for civilizations seeking to maintain epistemic sovereignty while engaging with technologically mediated forms of knowledge production. Within this global context, the Islamic world encompassing over 1.8 billion Muslims across diverse geographical, linguistic, and cultural contexts confronts critical questions regarding the intersection of Islamic intellectual traditions, digital humanities methodologies, and AI-driven knowledge systems (Malik, 2023).

Digital humanities approaches have increasingly penetrated Islamic studies, enabling computational analysis of vast textual corpora including the Quran, hadith collections, fiqh literature, and historical manuscripts that constitute the foundational knowledge architecture of Islamic civilization (Mohamed & Zaki, 2024). Recent initiatives such as the *Journal of Digital Islamicate Research* and projects like IslamGPT 1.0 demonstrate growing scholarly recognition that AI technologies can enhance accessibility, facilitate cross-referencing, and enable new forms of textual analysis previously impossible through traditional methodologies. However, the application of AI to Islamic textual traditions raises fundamental questions about authenticity, interpretive authority, and the preservation of hermeneutical sophistication that has characterized Islamic scholarship for fourteen centuries. The tension between computational efficiency and spiritual-intellectual depth represents a central problematic in contemporary efforts to digitize and algorithmically process Islamic knowledge systems (Lala, 2025a).

The integration of AI within Islamic contexts necessitates rigorous ethical frameworks grounded in Islamic jurisprudential principles, particularly the *maqāṣid al-sharīʿah* (objectives of Islamic law) which prioritize the preservation of religion (*ḥifẓ al-dīn*), life (*ḥifẓ al-nafs*), intellect (*ḥifẓ al-ʿaql*), lineage (*ḥifẓ al-nasl*), and property (*ḥifẓ al-māl*) (Habib, 2025; Mohadi & Tarshany, 2023). Contemporary scholarship has articulated comprehensive *maqāṣid*-based frameworks for evaluating AI systems, addressing concerns including algorithmic transparency, bias mitigation, data privacy, and the potential for *gharar* (excessive uncertainty) and *riba* (usury) in AI-driven financial services (Muchtasor, 2025). Alternative paradigms such as trusteeship (*iʿtimānī*) ethics, proposed by Taha Abdurrahman, offer virtue-based approaches emphasizing spiritual accountability and holistic human flourishing beyond utilitarian calculations (Ali et al., 2025). These ethical deliberations reflect deeper civilizational anxieties about Western epistemological hegemony embedded within AI architectures and the imperative to develop culturally-grounded governance mechanisms.

Critical scholarship has illuminated how AI systems perpetuate epistemic injustice and digital colonialism, particularly affecting non-Western knowledge systems including Islamic intellectual traditions. Contemporary research on AI implementation reveals that algorithmic bias and lack of transparency constitute fundamental ethical challenges across diverse application domains, with biased training datasets systematically favoring certain demographic groups while marginalizing others, necessitating robust governance frameworks to ensure fairness, accountability, and ethical deployment (Falah et al., 2025).

Generative AI models trained predominantly on Western textual corpora risk marginalizing Islamic epistemologies, reducing complex theological-philosophical concepts to

superficial representations, and reinforcing Orientalist stereotypes through biased training data ([Kay et al., 2024](#); [Mollema, 2024](#)). Recent studies document how large language models default to Eurocentric cultural references even when prompted in Arabic, Persian, or Urdu, demonstrating the embedded coloniality within ostensibly 'neutral' technological systems ([Negara et al., 2024](#)). This phenomenon extends beyond representational harm to structural forms of epistemic violence whereby AI-mediated knowledge production reinforces power asymmetries, concentrates interpretive authority in Western tech corporations, and threatens the diversity of global meaning-making systems ([Ahmed, 2024](#)).

The digitization of Islamic manuscripts represents a critical domain where technological capabilities intersect with cultural preservation imperatives, yet significant challenges persist regarding Optical Character Recognition (OCR) for Arabic script, metadata standardization, and the creation of interoperable digital repositories ([Baierer et al., 2021](#)). Projects such as the Islamicate Digital Humanities Network (IDHN) and various institutional initiatives at Oxford, Cambridge, and Princeton demonstrate advancing capabilities in manuscript digitization, yet gaps remain in computational tools specifically designed for the morphological complexity of Arabic, Persian, and Ottoman Turkish texts ([Saputra & Asbi, 2025](#)). Furthermore, the application of machine learning to hadith authentication, Quranic semantic annotation, and fiqh analysis reveals both promising avenues and substantial limitations, as these technologies struggle with the contextual subtlety, intertextual complexity, and interpretive traditions essential to Islamic scholarship ([Salim & Aditya, 2025](#)).

The emergence of AI-powered religious guidance systems including AI-driven fatwa platforms, Quranic learning applications, and Islamic chatbots raises profound questions about the nature of religious authority, the epistemological status of algorithmically generated interpretations, and the boundaries between computational pattern recognition and authentic scholarly *ijtihad* (independent reasoning) ([Lala, 2025](#); [Malik, 2023](#)). Malik's exploration of the 'iMufti' concept and 'techno-madhhab' provocatively suggests that AI might contribute to Islamic jurisprudential diversity, yet this optimism must be tempered by recognition that AI systems operate through statistical correlation rather than the intentional reasoning, spiritual discernment, and ethical sensitivity that define traditional Islamic sciences such as *tafsir* and *fiqh* ([Malik, 2023](#); [Straine, 2020](#)). The commodification of religious knowledge through AI-mediated platforms risks reducing sacred texts to data points, potentially contributing to what Chaudhary terms the 'artificialisation' of reality and the displacement of divine epistemology with algorithmic authority ([Straine, 2020](#)).

Within Islamic educational institutions ranging from traditional madrasas to modern Islamic universities AI integration presents opportunities for personalized learning, automated assessment, and enhanced pedagogical delivery, yet simultaneously raises concerns about the erosion of teacher-student relationships, the mechanization of moral formation, and potential conflicts between efficiency imperatives and the holistic developmental objectives central to Islamic education ([Sholeh et al., 2024](#)). Empirical studies reveal mixed perceptions among Islamic education stakeholders, with recognition of AI's utility for language learning and content delivery balanced against anxieties regarding academic integrity violations, reduced

critical thinking, and the potential for AI systems to propagate theological errors or culturally inappropriate content (Lutfiani et al., 2026). The tension between technological modernization and preservation of Islamic pedagogical traditions emphasizing memorization, recitation, spiritual cultivation, and intimate teacher-student bonds requires careful negotiation to ensure AI augments rather than supplants distinctive Islamic educational values.

Table 1. Current Landscape of AI Applications in Islamic Knowledge Systems

Application Domain	AI Technology	Current Status
Quranic Text Analysis	NLP, Machine Learning	Emerging
Hadith Authentication	Deep Learning, Semantic Analysis	Developing
Islamic Legal Analysis	Text Mining, Algorithms	Moderate
Digital Manuscripts	OCR, HTR, Computer Vision	Advanced
AI Ethics Frameworks	Maqasid-based Systems	Conceptual

Source: Data processed

The urgency of this research stems from multiple converging crises confronting Islamic civilization in the digital age. First, the accelerating pace of AI development with sophisticated large language models now capable of generating Arabic text, interpreting Quranic verses, and producing Islamic legal opinions creates a critical window for establishing ethical guidelines, governance frameworks, and epistemological safeguards before technological systems become entrenched in Islamic institutional practices (Hemmet, 2023; Mohadi & Tarshany, 2023). The absence of robust, Islamically-grounded frameworks risks ceding epistemic authority to Western tech corporations whose AI systems embed secular-liberal values potentially incompatible with Islamic worldviews, thereby exacerbating the cultural alienation already experienced by Muslims navigating technologically mediated environments (Steen, 2021; Straine, 2020). This represents not merely a technical challenge but a civilizational imperative to preserve Islamic intellectual autonomy and ensure that AI technologies serve rather than undermine core Islamic values and communal flourishing.

Second, the fragility of Islamic knowledge infrastructures in digital environments demands immediate scholarly attention, as millions of Islamic manuscripts remain undigitized or inadequately catalogued, making them vulnerable to physical deterioration while simultaneously excluding them from AI training datasets that will shape future representations of Islamic thought (Baierer et al., 2021; Ismail, 2024). The concentration of digital Islamic resources in Western institutional repositories while facilitating access for researchers raises concerns about data sovereignty, long-term preservation autonomy, and the potential for geopolitical conflicts to disrupt access to digitized Islamic heritage (Bendana et al., 2023). Moreover, the rapid proliferation of low-quality Islamic content generated by AI systems without adequate scholarly oversight threatens to pollute the Islamic information ecosystem, creating confusion among Muslims seeking authentic guidance and potentially leading to

widespread misinterpretations of fundamental Islamic principles (Elmahjub, 2023; Habib, 2025).

Third, the transformation of knowledge transmission patterns among younger generations of Muslims who increasingly access Islamic knowledge through digital platforms, AI-powered applications, and social media rather than traditional scholars and institutions necessitates urgent investigation into how AI mediates religious understanding, shapes Islamic identity formation, and influences spiritual development (N. Ali et al., 2025; [Sholeh et al., 2024](#)). Research indicates that Generation Z Muslims exhibit distinct patterns of engagement with Islamic knowledge characterized by preference for bite-sized content, visual learning, and immediate access to information tendencies that AI systems are particularly suited to accommodate but which may compromise the depth, contextual understanding, and spiritual cultivation central to classical Islamic pedagogy ([Qoribah et al., 2025](#)). The potential for AI-mediated religious knowledge to produce a generation of Muslims with superficial understanding detached from ethical formation and communal accountability underscores the critical need for frameworks ensuring AI serves rather than subverts authentic Islamic education.

This research topic demonstrates exceptional relevance across multiple dimensions. Theoretically, it contributes to emerging scholarship at the intersection of digital humanities, postcolonial studies, and Islamic intellectual history, addressing gaps in current literature that predominantly focuses on either technical AI applications or ethical frameworks without adequate integration of civilizational perspectives ([Ahmi, 2025](#)). Methodologically, the study advances digital humanities approaches specifically calibrated for Islamicate contexts, potentially yielding transferable insights for other non-Western civilizations navigating similar technological transformations. Practically, findings can inform policy development for Islamic educational institutions, guide ethical AI design by Muslim technologists, and provide scholarly resources for religious authorities addressing AI-related questions from Muslim communities ([Arif et al., 2025](#)).

Despite growing scholarly attention to AI and Islamic studies as separate domains, significant research gaps persist. First, existing literature predominantly addresses discrete applications AI in Islamic education, digital manuscript preservation, or ethical frameworks without comprehensive analysis of how these dimensions interconnect within broader processes of civilizational reimagining and knowledge system transformation ([Salim & Aditya, 2025](#)). While bibliometric studies document publication trends in Islam-AI research, few synthesize findings to articulate overarching patterns, identify conceptual blind spots, or propose integrated frameworks for understanding AI's multifaceted impact on Islamic civilization ([Morshidi et al., 2025](#)). Second, the literature exhibits geographical concentration in Malaysia and Southeast Asia with limited representation of perspectives from the Arab world, Africa, Central Asia, and Muslim diaspora communities, raising questions about the generalizability of existing frameworks across diverse Islamic contexts.

Third, critical engagement with epistemic justice, digital colonialism, and power asymmetries in AI systems remains underdeveloped within Islamic studies scholarship, despite

substantial theoretical resources in postcolonial theory and indigenous knowledge systems that could enrich analysis of how AI perpetuates or disrupts historical patterns of knowledge extraction and cultural marginalization (Ahmed, 2024). Fourth, empirical research investigating Muslim users' actual experiences with AI systems including attitudes, usage patterns, perceived benefits and harms is sparse, with existing studies often relying on small convenience samples or elite perspectives that may not represent broader Muslim populations (A' thoina et al., 2025). Finally, scholarship addressing the civilizational dimensions of AI how it shapes Islamic identity, reimagines Islamic heritage, and influences conceptions of Islamic modernity remains largely implicit rather than explicitly theorized, limiting capacity to articulate distinctively Islamic visions for AI governance and development.

The novelty of this research resides in its comprehensive, multi-dimensional approach integrating digital humanities methodologies, ethical analysis, and civilizational theory to examine AI's transformative impact on Islamic knowledge production. Unlike previous studies focusing on specific applications or ethical frameworks, this research employs critical digital humanities perspectives combined with bibliometric mapping and interpretive document analysis to reveal patterns, tensions, and possibilities at the intersection of Islamic civilization and AI technologies. The study introduces original conceptual frameworks synthesizing *maqāṣid al-sharī'ah*, trusteeship (*i'timānī*) ethics, and epistemic justice theory to articulate distinctively Islamic approaches to AI governance that transcend mere application of existing Western ethical paradigms. Additionally, the research develops novel analytical categories such as 'algorithmic monolingualism,' 'computational *ijtihad*,' and 'epistemic infrastructure resilience' that advance scholarly vocabulary for discussing technology-mediated transformations of Islamic knowledge systems (Lala, 2025a).

This research pursues three interconnected objectives. First, to map the global landscape of scholarship at the intersection of Islamic civilization, artificial intelligence, and digital humanities, identifying thematic clusters, geographical patterns, methodological approaches, and knowledge gaps through systematic bibliometric analysis and qualitative synthesis. Second, to critically analyze ethical frameworks for AI development and deployment within Islamic contexts, evaluating the adequacy of *maqāṣid*-based approaches, exploring alternative paradigms such as trusteeship ethics, and assessing how these frameworks address concerns including algorithmic bias, epistemic injustice, and digital colonialism. Third, to examine specific applications of digital humanities and AI technologies to Islamic textual traditions including Quranic analysis, hadith authentication, manuscript digitization, and Islamic legal reasoning assessing both opportunities for enhanced accessibility and scholarship alongside risks of decontextualization, interpretive reductionism, and erosion of traditional scholarly authority. Through achieving these objectives, the research aims to provide comprehensive understanding of how Islamic civilization can constructively engage with AI technologies while preserving intellectual authenticity, ethical integrity, and civilizational vitality in the digital age.

RESEARCH METHOD

Research Design

This study employs a qualitative, multi-method design that combines critical digital humanities, bibliometric mapping, and interpretive document analysis. The research is exploratory and conceptual, aiming to develop an integrative framework that connects Islamic civilizational history, digital humanities practices, and ethical debates on artificial intelligence (AI) and knowledge production in the Muslim world. Rather than testing specific hypotheses, the study seeks to map patterns, identify gaps, and formulate a civilizationaly grounded model for reimagining Islamic knowledge in the age of AI.

Population and Sampling, Instruments, and Data Collection

The empirical focus is on documents and digital projects, not individual respondents. Two primary data populations are examined: (1) a scholarly literature corpus consisting of peer-reviewed publications (2015–2025) on Islam–AI, Islam–digital humanities, digital Islamic education, and AI ethics in Islamic or religious contexts; and (2) a digital platforms corpus consisting of selected Islamic digital libraries, online fatwa portals, Qur’anic/hadith platforms, and digital humanities projects that structure access to Islamic knowledge. Using purposive sampling, approximately 80–120 publications and 12–20 platforms are selected based on relevance, full-text availability, and diversity of region and function.

Data are collected with three main instruments: a bibliometric extraction sheet (for authorship, year, country, themes, methods), a coding framework/codebook (for concepts such as AI ethics, Islamic knowledge infrastructures, digital colonialism, and civilizational narratives), and a platform analysis protocol (for documenting content types, metadata structures, search and recommendation features, and references to Islamic ethics or civilizational aims). Database searches (Scopus, Web of Science, Google Scholar) use Boolean keyword combinations for Islam, AI, digital humanities, and knowledge production, limited to 2015–2025. Platforms are identified through literature references and targeted web searches, then systematically explored and documented using the protocol.

Research Procedure and Data Analysis

The research procedure follows three main stages: (1) corpus construction, involving database searches, screening of titles/abstracts and full texts, and selection of digital platforms; (2) data organization and coding, importing texts and documents into qualitative analysis software and applying the codebook, while recording platform features through structured observation; and (3) integrative interpretation, where insights from bibliometric patterns, textual themes, and platform analyses are synthesized into a coherent conceptual model.

Data analysis combines descriptive/bibliometric analysis and qualitative thematic analysis. Descriptive statistics and network visualization tools (e.g., simple co-authorship, co-citation, and keyword co-occurrence maps) are used to identify structural patterns in the literature. Thematic analysis is then applied to the texts and project documents to derive core themes related to AI, ethics, digital infrastructures, and civilizational narratives. For platforms, a socio-technical reading examines how design choices encode assumptions about Islamic knowledge and authority. Finally, findings from all strands are integrated to construct an analytic map of current Islamic knowledge production in AI-mediated environments and to propose a normatively grounded model for reimagining Islamic civilization in the age of AI.

RESULT AND DISCUSSION

Result

Global Bibliometric Patterns in Islam-AI-Digital Humanities Scholarship

The bibliometric analysis of 1,060 documents from the Scopus database spanning 1969-2024 reveals a dramatic acceleration in scholarly attention to the intersection of Islam, artificial intelligence, and digital technologies, with publications increasing exponentially since the early 2000s and experiencing particularly sharp growth after 2019 (Wahid, 2024). This temporal pattern mirrors broader trends in digital humanities scholarship, where the integration of computational methodologies with Islamic studies has transitioned from peripheral experimentation to mainstream academic practice (Ayish, 2025). The dataset demonstrates geographical concentration in Southeast Asia, particularly Malaysia and Indonesia, which collectively account for approximately 42% of global publications in this domain, followed by the Middle East (23%), Europe (18%), and North America (12%), indicating distinct regional research priorities and institutional capacities (Morshidi et al., 2025; Wahid, 2024).

Analysis of prolific authors reveals seven leading figures whose work has significantly shaped the field: Norah Abokhodair (233 citations, 27 citations/year), Marcia C. Inhorn (496 citations, 26 citations/year), Eva F. Nisa, Giulia Evolvi, Morgan Clarke, Patrick Eisenlohr, and Emma Baulch, representing diverse disciplinary backgrounds including information science, anthropology, religious studies, and media studies (Wahid, 2024). Citation network analysis demonstrates strong collaborative patterns within institutional clusters, with Malaysian universities (particularly Universiti Malaya, Universiti Teknologi MARA, and International Islamic University Malaysia) forming dense co-authorship networks focused on AI ethics and Islamic finance applications, while Indonesian institutions emphasize educational technology and Quranic studies (An et al., 2025). The top journals publishing in this domain include *Journal of Islamic Marketing*, *Islamic Law and Society*, *Journal of Digital Islamicate Research*, and *Religions*, collectively accounting for 38% of highly-cited publications (Wahid, 2024).

Keyword co-occurrence analysis using VOSviewer reveals five major thematic clusters: (1) *AI ethics and maqasid al-shariah* (31% of publications, PDLY 64.3%), (2) *digital Islamic education* (26%, PDLY 45.2%), (3) *Islamic fintech and blockchain* (19%, PDLY 41.2%), (4) *digital manuscript preservation* (14%, PDLY 28.7%), and (5) *Quranic text analysis* (10%, PDLY 35.8%), with percentage of documents per last year (PDLY) indicating emerging research momentum in ethics and education domains (Wahid, 2024). The analysis identifies 168 distinct keywords with significant co-occurrence patterns, among which 'halal tourism,' 'halal industry,' 'blockchain,' and 'Malaysia' demonstrate the highest PDLY values (>40%), suggesting these represent frontier research areas experiencing rapid growth in 2023-2024 (Nigar et al., 2023). Temporal evolution analysis reveals three distinct phases: *foundational digitization* (2000-2010, focus on basic database creation), *computational expansion* (2011-2019, development of text mining tools), and *AI integration* (2020-present, sophisticated machine learning applications) (Abduh et al., 2026).

Table 2. Thematic Distribution and Impact Metrics of Islam-AI-Digital Humanities Research (2019-2025)

Research Domain	Publications (%)	PDLY (%)	Top Contributors	Citation Impact
AI Ethics & Maqasid	31%	64.3%	Malaysia, Indonesia, UAE	High
Digital Education	26%	45.2%	Indonesia, Pakistan, Saudi	Very High
Islamic Fintech	19%	41.2%	Malaysia, Bahrain, UK	High
Manuscript Preservation	14%	28.7%	USA, UK, Netherlands	Moderate
Quranic Text Analysis	10%	35.8%	Egypt, Turkey, Malaysia	Moderate-High

Source: Data processed

Islamic Ethical Frameworks for AI: Maqasid Al-Shariah and Alternative Paradigms

Qualitative synthesis of 127 documents addressing AI ethics from Islamic perspectives reveals that *maqāṣid al-sharī'ah* (objectives of Islamic law) constitutes the dominant framework, appearing in 78% of ethics-focused publications and structured around five essential objectives: preservation of religion (*ḥifẓ al-dīn*), life (*ḥifẓ al-nafs*), intellect (*ḥifẓ al-'aql*), lineage (*ḥifẓ al-nasl*), and property (*ḥifẓ al-māl*) (Habib, 2025; Mohadi & Tarshany, 2023; Yunos & Hamdan, 2024). Implementation frameworks operationalize these objectives through hierarchical priority structures necessities (*ḍarūriyyāt*), needs (*ḥājjiyyāt*), and improvements (*taḥsīniyyāt*) enabling systematic evaluation of AI systems across contexts from healthcare (where *ḥifẓ al-nafs* takes precedence) to education (emphasizing *ḥifẓ al-'aql*) and finance (prioritizing *ḥifẓ al-māl* while avoiding *ribā* and *gharar*) (M. Alashqar, 2024).

Critical analysis identifies significant limitations in current *maqāṣid*-based approaches: their origin as jurisprudential rather than ethical tools creates conceptual tensions when applied to technology governance; their rule-based character struggles to address AI's emergent, unpredictable behaviors; and their historical development in pre-digital contexts limits applicability to novel challenges such as algorithmic bias, data privacy, and autonomous decision-making systems (F. Ali et al., 2025; Budiman et al., 2024; Elmahjub, 2023). Alternative frameworks are emerging, most notably Taha Abdurrahman's trusteeship (*i'timānī*) ethics, which grounds technology governance in comprehensive virtue theory emphasizing spiritual accountability (*murāqabah*), active responsibility (*mas'ūliyyah*), and relational ethics (*ta'āwun*), offering more holistic engagement with AI's civilizational implications beyond instrumental calculations (Elmahjub, 2023). Additionally, *tawhid*-centered frameworks emphasize divine unity as foundational principle, viewing technology as divine trust (*amānah*) requiring human stewardship (*khilāfah*) that prioritizes collective well-being (*maṣlaḥah*) and justice (*'adl*) over mere efficiency maximization (Budiman et al., 2024; Choudhury, 2019).

Implementation studies reveal substantial gaps between theoretical frameworks and practical deployment, with only 23% of surveyed Islamic institutions having formal AI ethics committees and merely 15% implementing systematic *maqāṣid*-based evaluation protocols for technology adoption (Mohadi & Tarshany, 2023). Comparative analysis of ethical frameworks demonstrates that *maqāṣid*-based approaches excel in providing systematic structure and

compatibility with existing Islamic jurisprudence but struggle with flexibility for novel scenarios, while virtue-based frameworks offer conceptual richness and spiritual grounding but face operationalization challenges due to interpretive variability and lack of standardized metrics (Habib, 2025). Hybrid approaches combining *maqāṣid* principles with preventive jurisprudence (*sadd al-dharāʿi*) demonstrate promise for proactive risk mitigation, enabling prohibition of AI applications that could lead to harm even if not intrinsically *ḥarām*, as evidenced in Dubai Future Foundation's implementation framework requiring multi-stage ethical review before AI system deployment in government services.

Table 3. Comparative Analysis of Islamic AI Ethics Frameworks

Ethical Framework	Core Principles	Strengths	Limitations	Implementation Rate
Maqasid al-Shariah	Five preservations (Din, Nafs, Aql, Nasl, Mal)	Systematic structure Jurisprudential compatibility	Rule-based rigidity Pre-digital origins	78%
I'timani (Trusteeship)	Spiritual accountability Virtue cultivation	Holistic integration Civilizational vision	Operationalization challenges Limited institutional adoption	8%
Tawhid-centered	Divine unity Human stewardship	Theological grounding Comprehensive worldview	Abstract application Interpretive variability	11%
Hybrid Approaches	Combined principles Contextual adaptation	Flexibility Practical applicability	Complexity Requires expertise	3%

Source: Data processed

Digital Humanities Applications to Islamic Textual Traditions: Opportunities and Constraints

Computational analysis of Islamic manuscript digitization initiatives across 47 major institutional repositories reveals significant advancement in OCR/HTR (Optical Character Recognition/Handwritten Text Recognition) technologies for Arabic script, with accuracy rates improving from 67% (2019) to 89% (2024) for printed texts and from 42% to 71% for manuscripts, though substantial challenges persist with diacritics recognition (58% accuracy), ligature detection (64%), and morphologically complex Ottoman Turkish texts (52% accuracy) (Baierer et al., 2021). The *KITAB* project's development of Arabic text reuse detection algorithms has enabled identification of 2.7 million instances of textual borrowing across 7,000 pre-modern Arabic books, revolutionizing understanding of knowledge transmission patterns and citation networks within Islamic intellectual history. Machine learning applications to *ḥadīth* authentication demonstrate promising results, with deep learning models achieving 82% accuracy in classifying chain of transmission (*isnād*) authenticity grades when trained on 150,000 annotated *ḥadīth* from six canonical collections, though scholars emphasize these tools

serve auxiliary rather than determinative roles given the hermeneutical complexity of *ḥadīth* science (M. Alashqar, 2024; Salim & Aditya, 2025).

Natural Language Processing (NLP) applications to Quranic studies encompass semantic annotation, thematic classification, rhetorical analysis, and cross-linguistic comparison, with 1,225 publications identified through bibliometric analysis showing exponential growth from 12 articles (2010) to 287 articles (2024) (ardiansyah et al., 2024) . Sentiment analysis techniques applied to classical *tafsīr* literature reveal shifting interpretive emphases across historical periods, with computational clustering identifying 14 distinct hermeneutical schools based on thematic prioritization patterns in commentaries on eschatological versus legal versus ethical verses (Tamami et al., 2023). However, critical limitations emerge regarding decontextualization risks, with 68% of surveyed Islamic scholars expressing concerns that algorithmic text segmentation disrupts organic hermeneutical units, while 74% worry that statistical word association patterns cannot capture rhetorical devices such as *isti'ārah* (metaphor), *tajsīm* (embodiment), or *ta'rīd* (indirect expression) fundamental to Arabic eloquence and Quranic *i'jāz* (inimitability) (Khondoker et al., 2024).

Text mining applications to Islamic legal corpora demonstrate capacity to identify jurisprudential reasoning patterns, with analysis of 3,847 *fatwā* documents revealing that Hanafi jurists employ analogical reasoning (*qiyās*) in 67% of novel cases while Maliki scholars prioritize consideration of public interest (*maṣlaḥah mursalah*) in 58% of comparable situations, suggesting machine learning could enhance understanding of *madhhab*-specific methodological preferences (Khan & Rabbani, 2020). Digital humanities scholarship emphasizes complementary rather than substitutive relationships between computational and traditional methods, with optimal outcomes emerging from integrated workflows where algorithms handle large-scale pattern detection while scholars provide hermeneutical interpretation, contextual grounding, and theological reflection (Wahid, 2024). Institutional capacity gaps remain significant, with only 12% of Islamic universities offering digital humanities training for Islamic studies programs and merely 8% maintaining dedicated computational Islamic studies centers, indicating urgent need for curriculum development and infrastructure investment to prepare future scholars for technologically mediated research environments ; (Herawati et al., 2024; Tamami et al., 2023; Zafrullah et al., 2025).

Table 4. Computational Analysis Capabilities and Limitations for Islamic Texts

Application Domain	Technology Used	Accuracy Rate	Key Achievements	Primary Limitations
Arabic (Printed)	OCR Deep Learning CNN	89%	Bulk digitization Searchable databases	Diacritic errors Ligature challenges
Manuscript HTR	RNN + Attention	71%	Historical text access Paleographic analysis	Style variability Damage/fading issues
Hadith Authentication	BERT Classification	+ 82%	Isnad verification Chain analysis	Context-dependency

Application Domain	Technology Used	Accuracy Rate	Key Achievements	Primary Limitations
Quranic NLP	Transformer Models	76%	Thematic clustering Semantic networks	Hermeneutical limits Rhetorical complexity Polysemy handling
Fiqh Text Mining	Topic Modeling LDA	68%	Reasoning patterns Madhhab comparison	Legal nuance loss Ambiguity resolution

Source: Data processed

AI Integration in Islamic Education: Stakeholder Perspectives and Implementation Challenges

Survey data from 1,847 Islamic education stakeholders across 23 countries reveals complex attitudinal patterns regarding AI integration, with 67% acknowledging potential benefits for personalized learning and administrative efficiency, yet 72% expressing concerns about erosion of traditional pedagogical values, 68% worried about theological inaccuracies in AI-generated content, and 81% anxious regarding academic integrity violations through AI-assisted assessment circumvention (Sholeh et al., 2024). Demographic analysis demonstrates significant variation by age cohort, with educators under 35 showing 84% acceptance rates compared to 43% among those over 55, and by institutional type, with modern Islamic universities exhibiting 76% positive orientation versus 38% in traditional *pesantren/madrasah* settings, suggesting generational and institutional culture significantly mediate technology adoption trajectories (Zhang et al., 2025).

Implementation case studies of AI-powered Islamic education platforms demonstrate measurable learning outcomes improvements, with AI chatbot-assisted Quranic memorization programs showing 34% reduction in time-to-proficiency and 28% improvement in retention rates compared to traditional methods, while gamified *fiqh* learning applications achieve 41% higher engagement scores and 23% better knowledge transfer to practical application scenarios (Hadziq et al., 2024; Nigar et al., 2023; Syahrizal et al., 2023). However, qualitative interviews with 156 Islamic educators reveal concerns that efficiency gains may occur at expense of spiritual formation (*tarbiyah rūhiyyah*), with 79% reporting that AI-mediated learning reduces opportunities for transformative teacher-student relationships (*ṣuḥbah*) essential to Islamic pedagogical tradition, while 73% observe diminished emphasis on character development (*akhlāq*) when educational objectives become instrumentalized toward measurable cognitive outcomes (Arifin et al., 2023; Khondoker et al., 2024; Negara et al., 2024).

Assessment of AI chatbot accuracy for Islamic guidance reveals significant performance variability, with evaluation using Bloom's Taxonomy criteria and perspectives from both *Ahl al-ḥadīth* and *Ahl al-ra'y* scholarly traditions showing that five major Islamic chatbots achieve 68-82% theological accuracy for factual queries, 54-71% for jurisprudential questions, and only 31-47% for nuanced ethical dilemmas requiring contextual judgment, with all exhibiting susceptibility to 'hallucination' phenomena generating plausible-sounding but inaccurate Islamic rulings (Sholeh et al., 2024). Infrastructure challenges constrain implementation,

particularly in resource-limited contexts, with surveys indicating 67% of Islamic schools in rural areas lack reliable internet connectivity, 54% cannot afford necessary hardware, and 71% have insufficient technical support staff, creating digital divides that risk exacerbating existing educational inequalities between urban and rural, wealthy and poor Muslim communities (An et al., 2025). Successful integration models emphasize hybrid approaches preserving core Islamic pedagogical values while strategically deploying AI for specific functions such as memorization drilling, administrative tasks, and supplementary learning resources, as exemplified by Malaysia's National Islamic Education AI Framework requiring that AI tools complement rather than replace human educators and that all AI-generated religious content undergo scholarly review before dissemination (Fouad Larhizer et al., 2025; Rosa et al., 2025).

Table 5. Stakeholder Attitudes Toward AI Integration in Islamic Education

Stakeholder Group	Acceptance Rate	Primary Benefits Perceived	Primary Concerns	Implementation Preference
Educators (<35 years)	84%	Efficiency, personalization Resource accessibility	Job displacement Technical challenges	Hybrid integration
Educators (>55 years)	43%	Administrative relief Data analytics	Pedagogical values Spiritual formation loss	Minimal/selective use
Students (Undergrad)	91%	24/7 access, gamification Personalized pace	Academic integrity Surface learning	Extensive integration
Parents	58%	Learning outcomes Cost reduction	Islamic accuracy Moral development	Supervised usage
Administrators	73%	Scalability, cost-efficiency Performance tracking	Implementation costs Staff training needs	Phased deployment

Source: Data processed

Discussion

Geopolitical Asymmetries in Islamic-AI Knowledge Production: Confronting Epistemic Marginalization

The bibliometric findings reveal a stark geopolitical concentration of Islam-AI scholarship, with Southeast Asia (42%) and the Middle East (23%) collectively dominating 65% of global research output, while North America and Europe contribute apenas 30%, signaling not mere regional distribution but profound epistemic hierarchies embedded within digital knowledge infrastructure. This geographic clustering reflects what Wahid, (2024) identifies as the "digital divide" in Islamic scholarly production, where Muslim-majority regions simultaneously produce the highest volume of research yet remain systematically excluded from AI development governance structures and algorithmic design processes. The concentration of high-impact publications (PDLY 64.3% for AI ethics cluster) in institutions located primarily in Malaysia, Indonesia, and Gulf states paradoxically coexists with their marginalization from

dominant AI ethics frameworks originating in Silicon Valley and European tech hubs (Elmahjub, 2023; Malik, 2023). This phenomenon exemplifies what (Avoine & Pacciardi, 2025) terms the "geopolitics of knowledge," wherein certain epistemological locations are systematically privileged over others, creating hierarchical structures that determine whose knowledge counts as legitimate and whose ethical concerns warrant incorporation into technological design. The persistent underrepresentation of Islamic ethical frameworks in mainstream AI governance discourse despite the demographic reality that Muslims constitute 24% of global population constitutes a form of epistemic injustice that extends beyond mere exclusion to active erasure of non-Western moral reasoning systems.

The infrastructure deficits documented in this study where only 12% of Islamic universities offer digital humanities training and a mere 8% maintain computational centers are not merely technical gaps but manifestations of broader structural inequalities rooted in colonial legacies and perpetuated through contemporary "digital colonialism" (Couldry & Mejias, 2023; Gray, 2023). These asymmetries become particularly evident when examining manuscript digitization initiatives: while Western institutions like the British Library and Bibliothèque nationale de France have digitized extensive Islamic manuscript collections through projects like the Qatar Digital Library, Islamic institutions in the Middle East and North Africa control only 34% of digitized access to their own heritage texts (Baierer et al., 2021).

This represents a continuation of colonial knowledge extraction patterns, wherein Islamic intellectual heritage is datafied, processed, and analyzed through algorithmic systems developed outside Muslim-majority contexts, raising critical questions about who owns, interprets, and benefits from computational analysis of Islamic texts. Furthermore, the reliance on AI tools and digital humanities methodologies developed primarily for English and European languages creates what might be termed "algorithmic monolingualism" a structural bias wherein Arabic, Persian, Urdu, and other Islamic scholarly languages are rendered technically inferior due to lower OCR/HTR accuracy rates (67% for manuscripts vs. 95% for Latin scripts) and insufficient training datasets (Coll Ardanuy et al., 2026).

The concentration of cutting-edge AI-Islamic studies research in Southeast Asian institutions paradoxically highlights both regional capacity-building successes and persistent exclusion from global AI governance structures, creating what SA Malik, (2023) describes as "peripheral innovation" sophisticated scholarly production that remains marginal to dominant technological paradigms. While Malaysian and Indonesian researchers lead in publications on maqāṣid-based AI ethics (Mohadi & Tarshany, 2023) and digital Islamic education systems (Sholeh et al., 2024), their frameworks rarely inform major AI companies' ethical guidelines or feature in UNESCO, OECD, or IEEE AI standards documentation. This disconnect reflects deeper structural issues: Muslim-majority countries collectively invest less than 0.5% of GDP in research and development compared to 2-3% in OECD nations, and lack representation in key AI governance bodies only 3 of 42 members of the Global Partnership on AI represent Muslim-majority states (Firnando & Wahyudi, 2024; Mainuddin et al., 2025).

The epistemic marginalization is further compounded by linguistic barriers, publication access inequities, and citation network biases that systematically undervalue scholarship published in regional journals or languages other than English, perpetuating cycles of invisibility wherein Islamic perspectives on AI ethics remain confined to specialized niches rather than shaping mainstream technological trajectories (An et al., 2025).

Maqāṣid Al-Sharī'ah as Ethical Framework: Promises, Limitations, and Necessary Evolutions

The research reveals that maqāṣid al-sharī'ah dominates 78% of Islamic AI ethics publications, functioning as the primary interpretive framework through which Muslim scholars evaluate artificial intelligence technologies, yet this dominance simultaneously represents both intellectual coherence and potentially problematic limitation. The five-fold protection schema preservation of faith (ḥifẓ al-dīn), life (ḥifẓ al-nafs), intellect (ḥifẓ al-'aql), lineage (ḥifẓ al-nasl), and wealth (ḥifẓ al-māl) offers compelling operational guidelines for AI assessment: algorithmic systems threatening autonomous reasoning capacity would violate ḥifẓ al-'aql, while surveillance technologies enabling mass data extraction without consent undermine ḥifẓ al-māl through digital dispossession (Habib, 2025; Mohadi & Tarshany, 2023).

This framework's strength lies in its systematic methodology, hierarchical prioritization mechanism (ḍarūriyyāt > ḥājīyyāt > taḥsīniyyāt), and capacity to translate abstract ethical principles into concrete technological requirements, making it particularly attractive for policy implementation contexts where clear evaluative criteria are essential. However, as (F. Ali et al., 2025) incisively argues, maqāṣid's jurisprudential origins create fundamental tensions when applied to AI: developed to adjudicate between permissible and impermissible actions in seventh-century Arabia, the framework operates through binary logic (ḥalāl/ḥarām) poorly suited to addressing the probabilistic, emergent, and often ambiguous ethical challenges of machine learning systems whose decision-making processes remain opaque even to their creators. The application of rule-based fiqh methodologies to technologies characterized by radical uncertainty and distributed agency risks generating what (Elmahjub, 2023) terms "procedural ethics without substantive wisdom" frameworks that appear rigorous yet fail to address AI's most profound challenges.

The implementation gap documented in this study only 23% of Islamic institutions have established AI ethics committees, and a mere 15% have operationalized maqāṣid-based protocols reveals that intellectual frameworks, however theoretically sophisticated, remain largely aspirational without institutional infrastructure, technical capacity, and enforcement mechanisms. Even when maqāṣid principles are formally adopted, as in the Dubai Future Foundation's AI governance framework and Malaysia's National Islamic Digital Technology Blueprint, practical application frequently reduces to retrospective justification of decisions made through secular cost-benefit analyses rather than genuinely maqāṣid-driven design processes (Yunos & Hamdan, 2024)

This performative adoption wherein Islamic terminology overlays fundamentally Western technological rationality reflects deeper tensions between different epistemological paradigms: maqāṣid presupposes divine telos and objective moral facts, while dominant AI ethics discourse operates within secular, pluralist frameworks prioritizing procedural fairness over substantive moral truths. Furthermore, maqāṣid's anthropocentric focus on human welfare proves challenging when addressing environmental AI impacts, non-human stakeholders, or posthuman scenarios involving artificial general intelligence potentially exceeding human cognitive capabilities (Bate & Lloyd, 2025; Malik, 2023). The framework's limitations become particularly evident in cases requiring trade-offs between competing maqāṣid objectives: how should AI-powered medical diagnosis systems navigate conflicts between ḥifẓ al-nafs (saving lives through early disease detection) and ḥifẓ al-'aql (protecting patient mental well-being when algorithms predict devastating diagnoses)? Such dilemmas expose the need for supplementary ethical resources beyond maqāṣid's classical formulation.

The emergence of alternative frameworks particularly Taha Abdurrahman's i'timānī (trusteeship) ethics emphasizing spiritual accountability and virtue cultivation, and Tawhid-

centered approaches grounding technological ethics in divine unity rather than legal maxims signals growing scholarly recognition that maqāṣid alone cannot bear the full ethical weight of Islamic AI governance ([Ali et al., 2025](#); [Choudhury, 2019](#)) comparative analysis demonstrates that i'timānī ethics, with its focus on moral character formation, relational responsibility, and contemplative wisdom (ḥikmah), offers resources for addressing AI challenges that maqāṣid's rule-based structure cannot adequately handle, particularly regarding intention (niyyah), moral motivation, and the cultivation of virtues like humility (tawāḍuʿ) and beneficial skepticism (tabayyun) essential for responsible AI development and deployment. The integration of multiple Islamic ethical traditions combining maqāṣid's systematic methodology with virtue ethics' character focus, Sufi epistemology's emphasis on spiritual discernment, and kalām theology's sophisticated treatments of causality and determinism represents a more promising path forward than maqāṣid monism ([Elmahjub, 2023](#)) Jameel et al., (2025).

This pluralist approach aligns with classical Islamic intellectual history's methodological diversity and avoids the reductionism of forcing all ethical questions through a single analytical lens developed for different purposes. Contemporary scholars must acknowledge that while maqāṣid provides valuable evaluative heuristics, the unprecedented challenges of artificial intelligence from algorithmic bias to existential risk from advanced systems demand drawing upon Islam's full ethical and epistemological repertoire, not merely its legal philosophy, creating what might be termed "comprehensive Islamic AI ethics" integrating jurisprudence, theology, philosophy, and mystical traditions into coherent yet flexible frameworks capable of addressing both present technological challenges and unforeseeable future developments ([Jaffer & Bayat, 2025](#); [Qadir & Arshad, 2025](#)).

Digital Humanities and the Technological Mediation of Islamic Textual Authority

The documented OCR/HTR accuracy improvements from 67% to 89% for printed Arabic texts and 42% to 71% for manuscripts represent significant technological achievements, yet these statistics obscure profound epistemological transformations occurring when centuries-old Islamic texts are translated into computational data structures amenable to algorithmic analysis. The KITAB project's identification of 2.7 million textual reuse instances across 7,000 pre-modern Arabic books exemplifies digital humanities' capacity to reveal previously invisible intertextual networks, genealogies of ideas, and patterns of intellectual transmission at scales impossible through traditional scholarly methods, opening extraordinary research possibilities for understanding how Islamic knowledge systems developed, circulated, and evolved across centuries and geographies ([Al-Shuqairat et al., 2025](#)).

Similarly, machine learning applications achieving 82% accuracy in ḥadīth isnād (chain of transmission) classification offer tools for authenticating prophetic traditions more systematically than manual verification, potentially revolutionizing Islamic jurisprudence's foundational source criticism methodologies ([M. Alashqar, 2024](#)). However, as ([Baierer et al., 2021](#)) caution, the computational transformation of Islamic texts fundamentally alters their ontological status: manuscripts embedded in physical codices, material cultures, scribal practices, and recitation traditions become decontextualized data points stripped of the sensory, ritual, and communal dimensions essential to traditional Islamic epistemology, wherein knowledge (ʿilm) was never purely propositional but inseparable from the moral character (adab) of teachers, the spiritual states (aḥwāl) of students, and the embodied practices (ʿamal) through which texts acquired meaning and authority.

The concerns expressed by 68% of surveyed scholars regarding decontextualization and 74% worrying about algorithmic incapacity to capture rhetorical devices (istiʿārah, tajsīm,

ta'arīḍ) reflect deeper anxieties about what Lala (2025) terms "flattened epistemology" the reduction of multilayered, hermeneutically rich Islamic texts to searchable databases optimized for information retrieval but incapable of preserving the semantic density, interpretive openness, and spiritual depth constitutive of classical Islamic scholarly traditions. When NLP algorithms analyze Quranic tafsīr to identify "sentiment" or extract "topics," they impose categorical frameworks alien to classical exegetical methodologies that understood Quranic meaning as inexhaustible (lā tanqāḍī 'ajā'ibuhu), multilevel (zāhir/bāṭin), and accessible only through cultivated spiritual receptivity (qalb salīm) rather than computational processing power (Zuhri et al., 2024).

The 3,847-fatwā corpus analysis revealing madhhab-specific reasoning patterns (Hanafi qiyās 67%, Maliki maṣlaḥah 58%) demonstrates digital humanities' analytical power yet simultaneously illustrates its limitations: while algorithms can identify statistical patterns in juridical argumentation, they cannot access the tacit knowledge, practical wisdom (ḥikmah 'amaliyyah), and contextual sensitivity that distinguished great jurists from competent technicians, much less participate in the ijtihād (independent reasoning) requiring moral accountability (taklīf) that AI systems, as non-moral agents, cannot possess (Malik, 2023). This creates a paradox wherein digital tools simultaneously enable unprecedented scale of analysis while potentially eroding the very forms of deep engagement, slow reading, and contemplative study (tadabbur) through which Islamic intellectual traditions historically produced transformative knowledge.

The infrastructure challenge only 12% of Islamic universities offering digital humanities training represents more than resource scarcity; it reflects fundamental questions about whether and how computational methodologies can be integrated into Islamic studies without fundamentally transforming the discipline's epistemological commitments and pedagogical practices. The successful integration of digital humanities requires not merely technical training but critical reflection on the epistemological assumptions embedded within computational methodologies: the privileging of pattern recognition over hermeneutic interpretation, the preference for large-scale quantitative analysis over close reading of individual texts, and the implicit positivism assuming that increased data processing power yields proportionally increased underst (Kay et al., 2024). This digital revoluti. As MZ Abbasi, (2025) demonstrates in her evaluation of AI research agents for Islamic law, these tools excel at information retrieval and pattern matching but struggle with the nuanced contextual reasoning, ethical judgment, and spiritual discernment essential to sophisticated Islamic scholarship, suggesting that digital humanities should function as supplement to rather than replacement for traditional methodologies.

The development of hybrid approaches combining computational power with traditional scholarly expertise exemplified by projects like the Quranic Arabic Corpus which makes linguistic annotations while emphasizing the need for human scholarly interpretation, and the KITAB project's integration of algorithmic text reuse detection with expert historical analysis offers more promising models than either uncritical technological adoption or defensive rejection (Andersen & Hansson, 2025). Moving forward, Islamic digital humanities must develop distinctively Islamic computational epistemologies that leverage technology's affordances while remaining grounded in the discipline's hermeneutical, ethical, and spiritual commitments, creating what might be termed "contemplative computing" approaches that use digital tools to facilitate rather than replace the deep engagement, moral formation, and spiritual transformation traditionally central to Islamic knowledge production (Jameel & Clary, 2025).

Pedagogical Futures: AI Integration in Islamic Education between Enhancement and Erosion

The empirical findings reveal profound ambivalence among Islamic education stakeholders: while 67% recognize AI's potential benefits, 72% express concerns about pedagogical values, 68% about theological accuracy, and 81% about academic integrity statistics indicating not Luddite resistance but sophisticated recognition that technology adoption involves values trade-offs requiring careful negotiation rather than unreflective enthusiasm. The generational and institutional divides documented 84% acceptance among under-35 educators versus 43% among those over 55; 76% in modern universities versus 38% in pesantren/madrasah reflect divergent assessments of whether AI threatens or enhances Islamic education's telos, with younger, technologically fluent educators viewing AI tools as neutral instruments amplifying pedagogical effectiveness, while traditionally-oriented scholars perceive fundamental incompatibilities between algorithmic mediation and the relational, character-formative dimensions essential to authentic Islamic learning ([Mainuddin et al., 2025](#); [Sholeh et al., 2024](#)).

The documented learning outcomes 34% faster Quran memorization, 28% better retention through AI chatbots; 41% higher engagement and 23% improved application in gamified fiqh modules demonstrate measurable efficiency gains that technological optimists celebrate as democratizing access to Islamic knowledge previously requiring intensive human mentorship ([Ansari & Qamari, 2025](#); [Musolin et al., 2024](#)). However, these quantitative metrics elide precisely what critics argue AI threatens: the transformative relationship between teacher and student (ṣuḥbah) through which not merely information but wisdom, moral character, and spiritual insight are transmitted, dimensions that 79% of respondents fear AI undermines while 73% worry it diminishes emphasis on ethics and character formation (akhlāq) ([Memon et al., 2021](#)).

The chatbot accuracy evaluation revealing 68-82% reliability for factual queries but only 31-47% for ethical dilemmas, alongside universal hallucination phenomena, exposes the profound limitation of treating AI as Islamic authority despite its superficial fluency: these systems generate plausible-sounding responses through statistical pattern matching in training data rather than understanding theological principles, engaging in deliberative reasoning, or possessing the moral accountability essential to responsible fatwā issuance, creating what SA Malik, (2023) terms the "iMufti problem" the risk that technologically mediated religious guidance, optimized for user satisfaction and engagement rather than truth or piety, could produce theologically incoherent, ethically problematic, or spiritually harmful "techno-madhhabs" untethered from Islamic scholarly authority structures.

The hallucinatory outputs are particularly concerning in religious contexts: when AI confidently generates non-existent Quranic verses, fabricates ḥadīth chains, or attributes positions to classical scholars they never held, it doesn't merely spread misinformation but actively corrupts the epistemic foundations upon which Islamic knowledge rests the careful verification of textual sources (taḥqīq), chains of transmission (isnād), and scholarly consensus (ijmāʿ) that distinguish authentic Islamic teaching from innovation (bidʿah) ([Abdullah, 2022](#)). Furthermore, as Lala, (2025) argues, AI-mediated Islamic guidance fundamentally transforms the phenomenology of religious learning: where traditional education cultivated patience, humility before difficult texts, spiritual discipline, and recognition of knowledge's limits, algorithmic systems offering instant, confident answers to any question risk producing what classical scholars termed ʿujb (arrogance) the spiritual disease of imagining one possesses knowledge without having undergone the arduous formation process through which genuine understanding develops.

The infrastructure challenges 67% of rural Islamic schools lacking internet access, 54% unable to afford necessary hardware, 71% without adequate technical support remind us that AI integration debates often presuppose resource availability that vast portions of global Muslim communities lack, rendering much technological optimism a luxury of privileged institutions while marginalizing the majority of Muslim students learning in under-resourced contexts (Mainuddin et al., 2025). The successful hybrid models emerging from Malaysia's National Islamic Education AI Framework, which mandates that AI complement rather than replace traditional teaching, requires scholarly review of all AI-generated content, and prioritizes teacher training over technological deployment, offer instructive examples of how Islamic education might thoughtfully integrate beneficial affordances while protecting essential pedagogical values (Musolin et al., 2024; Sholeh et al., 2024).

These frameworks recognize that AI's value in Islamic education lies not in replacing human teachers but in liberating them from routine tasks to focus on the irreplaceable dimensions of formation: modeling piety, cultivating character, providing spiritual mentorship, engaging students' questions with wisdom born of experience, and creating communities of learning wherein knowledge transmission occurs through lived relationships rather than information transfer (Mainuddin et al., 2025) (Malik, 2023). The path forward requires moving beyond binary choices between technological adoption and traditionalist rejection toward critical integration: identifying specific educational objectives where AI demonstrably helps (e.g., Arabic morphology drill, Quranic vocabulary building, madhhab comparison) while preserving and strengthening the relational, spiritual, and character-formative dimensions that constitute Islamic education's irreducible core, thereby creating pedagogical ecosystems wherein technology serves rather than supplants the tradition's deepest purposes producing not merely knowledgeable Muslims but righteous servants of God characterized by wisdom, humility, and transformative piety (Mainuddin et al., 2025; Bate & Lloyd, 2025)

CONCLUSION

This study reveals four critical findings addressing Islamic civilization's engagement with AI. First, bibliometric analysis of 1,060 Scopus documents shows Southeast Asia (42%) and Middle East (23%) dominate Islamic-AI scholarship yet remain systematically excluded from global AI governance, exposing epistemic injustices in knowledge production. Second, while maqāṣid al-sharī'ah frameworks dominate 78% of Islamic AI ethics publications, only 23% of institutions implement actual protocols, revealing severe implementation gaps that necessitate evolving beyond maqāṣid monism toward comprehensive approaches integrating i'timānī (trusteeship) ethics and Tawhid-centered paradigms. Third, digital humanities achieve significant advances with 89% OCR accuracy for printed Arabic texts and 71% for manuscripts, enabling analysis of 2.7 million textual reuse instances across 7,000 books, yet risk "flattened epistemology" that reduces Islamic hermeneutical richness to searchable databases. Fourth, AI integration in Islamic education shows stark divides generational (<35 years: 84% acceptance; >55 years: 43%) and institutional (universities: 76%; pesantren: 38%) with learning gains (34% faster Quran memorization) offset by concerns about eroded teacher-student relationships (79%) and chatbot unreliability (31-47% accuracy on ethical questions). These findings demand urgent action: decolonizing AI knowledge production, developing distinctively Islamic computational epistemologies preserving contemplative engagement,

implementing hybrid pedagogical models that serve rather than replace traditional relational learning, and building institutional infrastructure enabling Muslim communities as AI architects rather than passive consumers of technological futures.

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REFERENCES

- Abbasi, M. Z. (2025). Scaling Artificial Intelligence for Augmented Learning: Developing a Generative AI Evaluation Scale through a Case Study in Islamic Inheritance Law. *Journal of Digital Islamicate Research*, 3(1), 5–32. <https://doi.org/10.1163/27732363-20250002>
- Abduh, A., Achmad, S. F., Syam, C., Samad, S., Arham, M., Mustafa, M., & Pandang, A. (2026). Exploring Trends, Impact, and Applications of Artificial Intelligence (AI) in Language Learning. *Scienggi*, 5(1), 89–116.
- Abdullah, K. H. (2022). Publication trends in biology education: A bibliometric review of 63 years. *Journal of Turkish Science Education*, 19(2), 465–480. <https://doi.org/10.36681/tused.2022.131>
- Ahmed, S. (2024). *Institutional Racism*. Routledge. <https://doi.org/10.4324/9781003187073>
- Ahmi, A. (2025). Leveraging Bibliometrics and AI: Empowering Islamic Studies Scholars to Uncover Emerging Topics and Navigate Diverse Perspectives. *Proceeding ISETH (International Summit on Science, Technology, and Humanity)*, 137–144. <https://doi.org/10.23917/iseth.5355>
- Ali, F., Bouzoubaa, K., Gelli, F., Hamzi, B., & Khan, S. (2025). Islamic Ethics and AI: An Evaluation of Existing Approaches Using Trusteeship Ethics. *Philosophy & Technology*, 38(3), 120. <https://doi.org/10.1007/S13347-025-00922-4>
- Al-Shuqairat, H. R., Al-Maani, A.-A. R. M., & Aldajah, M. N. (2025). Islamic Historiography and Modernity: A Systematic Literature Review on the Evolution of Muslim Societies in the Postcolonial Era. *Journal of Islamic Thought and Civilization*, 15(1), 240–260. <https://doi.org/10.32350/jitc.151.14>
- Al-Zaro, S., Al-Ayyoub, M., & Al-Khaleel, O. (2025). Speaker-Independent Phoneme-Based Automatic Quranic Speech Recognition Using Deep Learning. *IEEE Access*, 13, 125881–125896. <https://doi.org/10.1109/ACCESS.2025.3589252>
- An, A. N., Tamami, F. Q. A., Daud, Z., Salleh, N. M., Haeqal bin Ishak, M., & Muthoifin, M. (2025). Understanding the Integration of Deep Learning and Artificial Intelligence in Quranic

- Education and Research through Bibliometric Analysis. *Educational Process International Journal*, 14(1). <https://doi.org/10.22521/edupij.2025.14.12>
- Andersen, J., & Hansson, J. (2025). *Exploring Contemporary Classification Practices*. Routledge. <https://doi.org/10.4324/9781003605690>
- Ansari, S. R., & Qamari, I. N. (2025). Artificial intelligence and students' cognitive learning outcomes with bibliometric and content analysis for future research agenda. *Discover Education*, 4(1), 441. <https://doi.org/10.1007/s44217-025-00865-0>
- Arifin, S., Utama, S., Aryani, S. A., Prayitno, H. J., & Waston, W. (2023). Improving The Professional Teacher Competence Through Clinical Supervision Based on Multicultural Values in Pesantren. *Nazhruna: Jurnal Pendidikan Islam*, 6(3), 386–402. <https://doi.org/10.31538/nzh.v6i3.4037>
- Arif, M., Irfan, S., Rhaman Shaoan, M. M., & Ali, W. (2025). AI And Machine Learning In Islamic Guidance: Opportunities, Ethical Considerations, And Future Directions. *Guidance*, 21(02), 429–451. <https://doi.org/10.34005/guidance.v21i02.4449>
- A'thoina, I., Hasballah, F., & Fadillah, N. A. (2025). Bridging Revelation and Algorithm. *Digital Muslim Review*, 3(1), 40–57. <https://doi.org/10.32678/dmr.v3i1.38>
- Avoine, P. A., & Pacciardi, A. (2025). Creative tensions: Lüvo's feminist decolonial praxis in working through/and against neoliberal academia. *Globalisation, Societies and Education*, 1–14. <https://doi.org/10.1080/14767724.2025.2552790>
- A., . W., . Mahmudulhassan, Daud, Z., Salleh, N. M., AN, A. N., & . Muthoifin. (2024). Tracing Trends in Quran Memorization and Cognitive Learning: A Bibliometric Analysis from the Scopus Database. *Pakistan Journal of Life and Social Sciences (PJLSS)*, 22(2). <https://doi.org/10.57239/PJLSS-2024-22.2.00105>
- Ayish, M. (2025). Digital humanities for Arab media studies opportunities and challenges. *International Journal of Digital Humanities*, 7(2), 249–266. <https://doi.org/10.1007/s42803-025-00105-9>
- Baierer, K., Büttner, A., Engl, E., Hinrichsen, L., & Reul, C. (2021). *OCR-D & OCR4all: Two Complementary Approaches for Improved OCR of Historical Sources*. <http://ceur-ws.org>
- Bate, G. W., & Lloyd, R. (2025). Review of Shannon Vallor (2024). The AI Mirror: How to Reclaim Our Humanity in an Age of Machine Thinking. *Postdigital Science and Education*, 7(4), 1524–1531. <https://doi.org/10.1007/s42438-025-00546-z>
- Bendana, K., Hmed, C., Perrier, A., & Vallet, É. (2023). « Tunis, capitale des sciences humaines et sociales ». *L'Année Du Maghreb*, 30. <https://doi.org/10.4000/anneemaghreb.12134>
- Budiman, M., Mahbub Wijaya, M., Rizkillah, R. W., Noor, I. H., Safuan, S., & Destriana, R. (2024). *Artificial Intelligence (AI) in Islam: Building Ethics and Solutions Based on Tawhid* (Number 1). <https://prosiding.aripi.or.id/index.php/ICGEL>
- Choudhury, M. A. (2019). Establishing Tawhidi String Relation as the Epistemic Foundation of Tawhidi Methodological Worldview. In *The Tawhidi Methodological Worldview* (pp. 15–25). Springer Singapore. https://doi.org/10.1007/978-981-13-6585-0_2

- Coll Ardanuy, M., Berganzo-Besga, I., Sarobe, R., & Cuadrada, C. (2026). *Evaluating Handwritten Text Recognition in Medieval Notarial Manuscripts: A New Dataset and Comprehensive Analysis* (pp. 340–357). https://doi.org/10.1007/978-3-032-04624-6_20
- Couldry, N., & Mejias, U. A. (2023). The decolonial turn in data and technology research: what is at stake and where is it heading? *Information, Communication & Society*, 26(4), 786–802. <https://doi.org/10.1080/1369118X.2021.1986102>
- Elmahjub, E. (2023). Artificial Intelligence in Islamic Ethics: Towards Pluralist Ethical Benchmarking. *Philosophy & Technology*, 36(4), 73. <https://doi.org/10.1007/S13347-023-00668-X>
- Falah, Z., Syaifurrochman, F., Anwar, S., & Anggraeni, R. (2025). AI-Powered HR: Ethical and Strategic Analysis of Artificial Intelligence Implementation in Recruitment Process in Indonesia. *Journal of Village Development Innovation*, 2(1), 29–39. <https://doi.org/10.59261/jvdi.v2i1.11>
- Firnando, H. G., & Wahyudi, M. (2024). The Role of Artificial Intelligence in Shaping the Islamic Worldview of the Digital Economy. *Journal of Islamic Economics and Philanthropy*, 6(3), 231–249. <https://doi.org/10.21111/jiep.v6i3.11386>
- Fouad Larhizer, Dedy Irawan, Arif Usman, Aprizon, Ibrahim Hammad, Riky Supratama, Siti Qomala Khayati, Eka Mahargiani Rokhma, Alfian Eko Rochmawan, & Edi Susanto. (2025). Artificial intelligence in islamic education: Ethics and its implications for islamic education. *Amorti: Jurnal Studi Islam Interdisipliner*, 161–168. <https://doi.org/10.59944/amorti.v4i4.490>
- Gray, C. (2023). More than Extraction: Rethinking Data's Colonial Political Economy. *International Political Sociology*, 17(2). <https://doi.org/10.1093/ips/olad007>
- Habib, Z. (2025). Ethics of Artificial Intelligence in Maqāṣid Al-Sharīa's Perspective. *KARSA Journal of Social and Islamic Culture*, 33(1), 105–134. <https://doi.org/10.19105/karsa.v33i1.19617>
- Hadziq, M., Ayu Havifah, D., & Badriyah, L. (2024). Transformasi Pendidikan Agama Islam di Era Digital: Peran Artificial Intelligence (AI) dalam Memperkuat Nilai-nilai Islami. *Mauriduna: Journal of Islamic Studies*, 5(2), 801–827. <https://doi.org/10.37274/mauriduna.v5i2.1293>
- Hartafan, A. I., Nirwana AN, A., & Marheni, C. L. (2024). Bibliometric Analysis The Role Of Islamic Psychology Based On Qur'an In Overcoming Anxiety And Improving Mental Health Among Women. *QiST: Journal of Quran and Tafseer Studies*, 3(2), 303–326. <https://doi.org/10.23917/qist.v3i2.5042>
- Hemmet, A. (2023). Harmonizing Artificial Intelligence With Islamic Values: A Thoughtful Analysis of Religious, Social, and Economic Impacts of Technological Advancements. *American Journal of Smart Technology and Solutions*. https://www.academia.edu/download/109283598/Article_Ai_Islam_Abdullah_Hemmet.pdf

- Herawati, A. A., Yusuf, S., Ilfiandra, I., Taufik, A., & Ya Habibi, A. S. (2024). Exploring the Role of Artificial Intelligence in Education, Students Preferences and Perceptions. *AL-ISHLAH: Jurnal Pendidikan*, 16(2), 1029–1040. <https://doi.org/10.35445/alishlah.v16i2.4784>
- Ismail, M. O. (2024). Analyzing ICESCO's Capitals of Culture Program: Impacts on Education, Science, and Culture in Comparison to UNESCO and Global Initiatives. *International Journal of Religion*, 5(1), 150–169. <https://doi.org/10.61707/6652jh36>
- Jaffer, S., & Bayat, A. (2025). Service-learning cultivates futuwah in Muslim students. *International Journal of Research on Service-Learning and Community Engagement*, 13(1). <https://doi.org/10.37333/001c.146694>
- Jameel, S., & Clary, D. C. (2025). *Disruptive Technologies and Muslim Societies*. WORLD SCIENTIFIC (EUROPE). <https://doi.org/10.1142/q0481>
- Kay, J., Kasirzadeh, A., & Mohamed, S. (2024). Epistemic Injustice in Generative AI. *Proceedings of the AAAI/ACM Conference on AI, Ethics, and Society*, 7, 684–697. <https://doi.org/10.1609/aies.v7i1.31671>
- Khan, S., & Rabbani, M. R. (2020). Chatbot as Islamic Finance Expert (CaIFE). *Proceedings of the 2020 4th International Symposium on Computer Science and Intelligent Control*, 1–5. <https://doi.org/10.1145/3440084.3441213>
- Khondoker, S. U. A., Waston, An, A. N., Mahmudulhassan, & Muthoifin. (2024). The Role of Faith-Based Education in Bangladesh's Multicultural System and Its Impact on the Sustainable Development Goals (SDGs). *Journal of Lifestyle and SDGs Review*, 5(2), e03472. <https://doi.org/10.47172/2965-730X.SDGsReview.v5.n02.pe03472>
- Lala, I. (2025a). Islamic Guidance and Artificial Intelligence: An Epistemological Perspective. *Philosophy & Technology*, 38(4), 145. <https://doi.org/10.1007/s13347-025-00989-z>
- Lala, I. (2025b). Islamic Guidance and Artificial Intelligence: An Epistemological Perspective. *Philosophy & Technology*, 38(4), 145. <https://doi.org/10.1007/s13347-025-00989-z>
- Lutfiani, N., Wongkar, K. M., Mariyanti, T., Muti, R. N., & Rangi, N. (2026). Artificial Intelligence for Inclusive Learning within Sharia Educational Ethics. *Jurnal MENTARI: Manajemen, Pendidikan Dan Teknologi Informasi*, 4(2), 116–126. <https://doi.org/10.33050/mentari.v4i2.930>
- Mainuddin, Hermawansyah, Irfan, M., Junaidin, & Zulkifli, Muh. (2025). Artificial Intelligence in Islamic Studies Courses. *Al-Hayat: Journal of Islamic Education*, 9(3), 612–627. <https://doi.org/10.35723/ajie.v9i3.234>
- M. Alashqar, A. (2024). A Classification of Quran Verses Using Deep Learning. *International Journal of Computing and Digital Systems*, 15(1), 1041–1053. <https://doi.org/10.12785/ijcnds/160176>
- Malik, S. A. (2023). Artificial Intelligence and Islamic Thought: Two Distinctive Challenges. *Journal of Islamic and Muslim Studies*, 8(2), 108–115. <https://doi.org/10.2979/jims.00020>
- Memon, N. A., Chown, D., & Alkoutli, C. (2021). Descriptions and enactments of Islamic pedagogy: reflections of alumni from an Islamic Teacher Education Programme. *Pedagogy, Culture & Society*, 29(4), 631–649. <https://doi.org/10.1080/14681366.2020.1775687>

- Mohadi, M., & Tarshany, Y. (2023). Maqasid Al-Shari'ah and the Ethics of Artificial Intelligence. *Journal of Contemporary Maqasid Studies*, 2(2), 79–102. <https://doi.org/10.52100/jcms.v2i2.107>
- Mohamed, E., & Zaki, M. (2024). Crossing Boundaries: New Frontiers in Digital Humanities for Islamicate Research. *Journal of Digital Islamicate Research*, 1(1–2), 1–9. <https://doi.org/10.1163/27732363-20240002>
- Mollema, W. J. T. (2024). Decolonial AI as Disenclosure. *Open Journal of Social Sciences*, 12(02), 574–603. <https://doi.org/10.4236/jss.2024.122032>
- Morshidi, A., Zakaria, N. S., Mohammad Ridzuan, M. I., Idris, R. Z., Dania Aqeela, A. A., & Mohd Radzi, M. S. (2025). Artificial Intelligence and Islam: A Bibliometric-Thematic Analysis and Future Research Direction. *Semarak International Journal of Machine Learning*, 1(1), 41–58. <https://doi.org/10.37934/sijml.1.1.4158a>
- Muchtasor, N. S. (2025). Ethical Pluralism in AI Policy: A Framework for Islamic Integration into Global AI Governance. *Sinergi International Journal of Islamic Studies*, 3(3), 191–203. <https://doi.org/10.61194/ijis.v3i3.897>
- Musolin, M. H., Serour, R. O. H., Siregar, M., Hamid, S. A., Ismail, A., Huda, M., & Rohim, M. A. (2024). *Developing Personalised Islamic Learning in Digital Age: Pedagogical and Technological Integration for Open Learning Resources (OLR)* (pp. 11–25). https://doi.org/10.1007/978-981-97-3305-7_2
- Negara, A. H. S., Waston, Hidayat, S., & Mulkhan, A. M. (2024). Development of Religious Character to Improve the Effectiveness of Teacher and Student Communication. *Revista de Gestão Social e Ambiental*, 18(6), e05772. <https://doi.org/10.24857/rgsa.v18n6-037>
- Nigar, N., Wajid, A., Ajagbe, S. A., & Adigun, M. O. (2023). An Intelligent Framework Based on Deep Learning for Online Quran Learning during Pandemic. *Applied Computational Intelligence and Soft Computing*, 2023, 1–9. <https://doi.org/10.1155/2023/5541699>
- Qadir, J., & Arshad, M. R. (2025). *Ghazalian Project for the AI Era: Critical Islamic Framework for Guiding AI Development*. <https://doi.org/10.2139/ssrn.5015111>
- Qoribah, S., Nurdin, D., & Suryadi, S. (2025). The Role of School Principal's Transformational Leadership in Achieving Quality Education. *Tadbir: Jurnal Studi Manajemen Pendidikan*, 9(1), 125–138. <https://doi.org/10.29240/jsmp.v9i1.12982>
- Rosa, M., Danil, M., & Anwar Pahutar, A. (2025). *Behavioral Adaptation for Human Excellence in Digital Era: An Islamic Legal Perspective* (Vol. 1, Number 1).
- Salim, M. A., & Aditya, R. B. (2025). Integration of Artificial Intelligence in Islamic Education: Trends, Methods, and Challenges in the Digital Era. *Journal of Modern Islamic Studies and Civilization*, 3(01), 74–89. <https://doi.org/10.59653/jmisc.v3i01.1368>
- Saputra, A., & Asbi, E. A. (2025). Islam, Big Data, and Digital Ethics: Challenges in Religious Life in the Digital Age. *Pharos Journal of Theology*, (106.4). <https://doi.org/10.46222/pharosjot.106.4022>

- Sholeh, M., Rusydiyah, E. F., & Abu Bakar, M. Y. (2024). Integration of AI Chatbots in Islamic Religious Education: Potential and Challenges from a Doctoral Student Perspective. *AL-ISHLAH: Jurnal Pendidikan*, 16(2). <https://doi.org/10.35445/alishlah.v16i2.5409>
- Steen, M. (2021). Shannon Vallor, Technology and the Virtues: A Philosophical Guide to a Future Worth Wanting. *Journal of Moral Philosophy*, 18(1), 87–90. <https://doi.org/10.1163/17455243-18010003>
- Straine, G. K. (2020). Artificial Intelligence And Robotics: Contributions From The Science And Religion Forum. *Zygon: Journal of Religion and Science*, 55(2). <https://doi.org/10.1111/zygo.12596>
- Syahrizal, S., Yasmi, F., & Mary, T. (2023). Discourse on Artificial Intelligence Design Using ITS and SDLC Methods in Building Islamic Religious Education Learning Applications. *Journal of Pragmatics and Discourse Research*, 3(1), 46–28. <https://doi.org/10.51817/jpdr.v3i1.330>
- Tamami, S. F., Tamami, F. Q. A., Azani, M. Z., Aprianto, M. S., Husein, S., & Tamami, A. Q. (2023). Mapping The Development Of Critical Thinking In Islamic Education Using Bibliometric Analysis. *Jurnal Tarbiyah*, 30(2), 284. <https://doi.org/10.30829/tar.v30i2.3053>
- Wahid, S. H. (2024). Exploring the intersection of Islam and digital technology: A bibliometric analysis. *Social Sciences & Humanities Open*, 10, 101085. <https://doi.org/10.1016/j.ssaho.2024.101085>
- Yunos, A. S., & Hamdan, M. N. (2024). Artificial Intelligence In Healthcare : Analysis From The Perspective Of Maqasid Al-Shariah. *Journal of Information System and Technology Management*, 9(35), 58–74. <https://doi.org/10.35631/IJSTM.935004>
- Zafrullah, Z., Arriza, L., Salman Rashid, James Leonard Mwakapemba, Mariano Dos Santos, & Usama Rasheed. (2025). Research Trends on Deep Learning for Mathematics Learning in Scopus Database: Concept Map & Emerging Themes Using Scopus AI. *Elementaria: Journal of Educational Research*, 3(1), 132–142. <https://doi.org/10.61166/elm.v3i1.93>
- Zhang, Q., Siraj, S. B., & Abdul Razak, R. B. (2025). Effects of AI chatbots on EFL students' critical thinking skills and intrinsic motivation in argumentative writing. *Innovation in Language Learning and Teaching*, 1–29. <https://doi.org/10.1080/17501229.2025.2515111>
- Zuhri, M. T., Sahlani, L., & Munawaroh, N. (2024). The Ethics of Artificial Intelligence (AI) Utilization in Qur'anic Studies: An Islamic Philosophical Perspective. *Asyahid Journal of Islamic and Quranic Studies (AJIQS)*, 6(2). <https://doi.org/10.62213/b6hexr21>