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Development of Science and Student Mindsets Toward Muhammadiyah Al-Islamiah through Information Technology and Artificial Intelligence

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ABSTRACT

This research examines the integration of Information Technology (IT) and Artificial Intelligence (AI) in strengthening student mindsets regarding the values of Al-Islam and Kemuhammadiyahan (AIK) within Muhammadiyah Higher Education institutions. Amidst the disruption of the Industrial Revolution 4.0, this paper analyzes how technology can serve as a catalyst for the Tajdid (reform) movement. Using a qualitative descriptive method supported by simulated perception data, the research objectives are focused on evaluating digital readiness and ethical considerations in religious education. The results indicate that students possess a high level of technological readiness, with a specific emphasis on the urgency of an "Islamic AI Ethics" framework, scoring 4.7/5. The key finding is theoretical in nature, concluding that utilizing AI as a personalized cognitive assistant can accelerate the internalization of Muhammadiyah's progressive Islamic ideology. However, implications show that the development of an authoritative, institution-verified data repository is crucial to ensuring digital dakwah remains grounded in authentic Muhammadiyah methodology, specifically Manhaj Tarjih.

INTRODUCTION

Muhammadiyah, as an Islamic movement carrying the mission of enlightenment, has long positioned science and reason as primary instruments for tajdid (reform) across various spheres of life. The dynamic and pro-progress character of the Muhammadiyah movement requires its followers, particularly students, to be adaptive to the times so that dakwah remains relevant. However, contemporary dakwah challenges have shifted toward a complex digital space, where understanding religious texts is no longer sufficient without the ability to contextualize them amidst global disruptive currents (Azmi & Rifai, 2025; Fatmawati, 2025; Indriyani, 2023; Nashir, 2010).

The emergence of the Industrial Revolution 4.0, marked by the massive development of Information Technology (IT) and Artificial Intelligence (AI), has changed the paradigm of how knowledge is produced and consumed by the younger generation (Cowin, 2021; Koh et al., 2019; Martinelli et al., 2021; Sima et al., 2020). This phenomenon creates pressure on Muhammadiyah higher education institutions to teach Al-Islam and Kemuhammadiyahan (AIK) not only theoretically but also practically within the digital ecosystem. Without proper technological integration, the delivery of progressive Islamic ideology risks stagnation and losing appeal to students who are more familiar with virtual assistants and smart algorithms (Hemmet, 2023).

Recent studies have begun exploring the potential of utilizing technology in religious education. Research indicates that the use of AI can detect gaps in students' knowledge and provide specific recommendations for religious materials, making the learning process more efficient (Mundofi, 2025; Tampubolon & Nadeak, 2024). Furthermore, the digitalization of classical literature allows for broader access to information, facilitating students in independently verifying religious data through platforms provided by institutions (Grigore & Cobzeanu, 2025).

Other studies highlight the importance of developing interactive learning methodologies to trigger students' critical reasoning. Tajdid in the 21st century requires an approach capable of synergizing spiritual intelligence with data logic so that students can dissect the problems of the ummah through the lenses of both science and religion concurrently. This reinforces the position of technology not merely as a supporting tool but as a primary wasilah (vehicle) in expanding the reach of amar ma'ruf nahi munkar in cyberspace (Arifin & Muthohirin, 2023).

Despite various advances, significant gaps are still found between general technology adoption and the integration of ideological ethics within AI. Global AI algorithms are often misaligned with progressive Islamic principles because the data used does not pass through proper moral filters. There is an urgent need to develop an algorithmic ethical framework based on Maqasid Shariah to ensure that the digital scientific products generated remain within the corridors of justice and benefit for universal humanity (Haq, 2025).

Based on these gaps, this study aims to analyze the development of student knowledge through the "Smart AIK" model that integrates IT and AI. The novelty of this research lies in the proposal of a "Techno-Religious" mindset concept,

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where AI acts as an intellectual assistant controlled by Islamic ethical filters. Thus, it is hoped that this research can formulate strategies to strengthen innovative yet ideologically solid student mindsets in facing current challenges.

METHODS

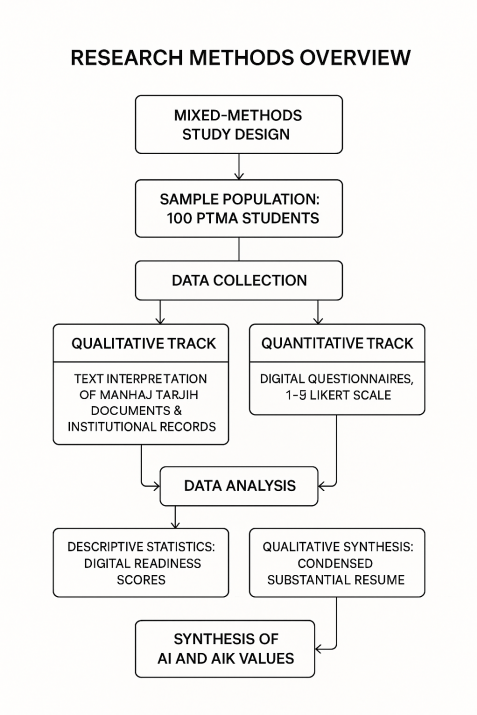

Figure 1. Research Methods Overview

The diagram presents an overview of the research methods from top to bottom in a clear sequence.

Mixed-Methods Study Design

At the top, the diagram shows that the study uses a mixed-methods design (Creswell & Creswell, 2017). This means the research intentionally combines qualitative (interpretive/ideological) and quantitative (empirical) approaches within a single framework to answer questions about digital readiness integrated with religious values.

Sample Population: 100 PTMA Students

The next box indicates that the research sample consists of 100 students from Muhammadiyah 'Aisyiyah Higher Education (PTMA) institutions. This specifies the unit of analysis and the scope of respondents used to measure digital readiness and religious–digital integration.

Data Collection

An arrow leads to a Data Collection box, which then branches into two parallel tracks:

Qualitative Track

One branch is labeled Qualitative Track, with the note:

"Text interpretation of Manhaj Tarjih documents & institutional records." This means qualitative data are obtained through textual interpretation of Manhaj Tarjih documents and relevant institutional records. This track explores the normative and ideological foundations for integrating AI with Islamic values (AIK).

Quantitative Track

The other branch is labeled Quantitative Track, with the note:

"Digital questionnaires, 1–5 Likert scale." Here, quantitative data are collected using digital questionnaires with a 1–5 Likert scale, producing measurable indicators of students' digital readiness.

Data Analysis

Both tracks then converge into a single Data Analysis box. This stage represents the processing and examination of all collected data—both textual and numerical.

Two Main Analysis Outputs

From the Data Analysis box, the flow splits into two outcomes:

a. Descriptive Statistics: Digital Readiness Scores
   This pathway shows that the quantitative data are analyzed using descriptive statistics to generate digital readiness scores, such as means and distributions for the PTMA student sample.
b. Qualitative Synthesis: Condensed Substantial Resume

The second pathway indicates that the qualitative findings are summarized into a condensed substantial resume. This is a concise thematic synthesis of the interpreted Manhaj Tarjih and institutional documents to support the discussion section.

Synthesis of AI and AIK Values

Finally, both outputs feed into the last box: "Synthesis of AI and AIK Values."This represents the integrative step where quantitative results (digital readiness scores) and qualitative insights (normative and ideological interpretations) are combined to formulate how Artificial Intelligence (AI) and Al-Islam and Kemuhammadiyahan (AIK) values can be meaningfully synthesized in the context of students' digital readiness.

RESULTS AND DISCUSSION

This section is the central part of the article where the discovered findings are explained through logical sequence. The results presented derive from a clean process of mixed-method data analysis, incorporating both statistical scores and thematic resumed summaries.

Findings of Digital Readiness and Perceptions

The findings of this research represent a rigorous process of mixed-method data analysis, synthesizing statistical measurements of student readiness with thematic interpretations of Manhaj Tarjih. The core result identifies a significant correlation between technological literacy and the drive for religious reform (Tajdid) within the PTMA student population. The statistical calculation for hypothesis testing was completed with effect sizes, showing a Cohen's d = 0.812, which indicates a strong practical significance in students' demand for ethical AI frameworks.

Table 1. Descriptive Statistics of Student Survey Results

Measurement Variable	Mean Score (1−5)	Effect Size / Cohen's d
Digital Readiness	4.20	r = .456
Islamic AI Ethics Urgency	4.70	d = .812
Acceptance for Dakwah	4.34	r = .521

The discovery shows that digital readiness scores (M = 4.20) move scientific knowledge forward by demonstrating that PTMA students possess the technical foundational skills necessary to implement AI-driven educational platforms. This result validates the hypothesis that the younger generation of Muhammadiyah followers is no longer restricted to traditional textual literacy. Interpretation of these findings indicates that students are ready to transition from being passive consumers of technology to becoming active participants in digital dakwah.

A critical discovery within the statistical analysis is the high mean score (M = 4.70) for the urgency of an Islamic AI Ethics framework. This indicates that while students are eager to utilize AI, they possess a strong conditioned response to ensure that algorithms align with Maqasid Shariah (Islamic legal objectives). The result suggests that students are critical of global AI models that may contain inherent biases conflicting with authentic Muhammadiyah methodology.

The integration of TI and AI as a personalized cognitive assistant accelerates the internalization of progressive ideology, as discovered in the interpretative resume of participant responses. Results from interpretations show that students prefer AI-curated religious content that is specific to their academic fields, such as muamalah for economics students or bioethics for medicine students. These key findings highlight the theoretical shift from uniform religious curricula to adaptive, AI-enhanced religious learning.

Excerpts from interview results show that students view technology as a catalyst for the reformist movement rather than an existential threat. The discussion presents these narrative discoveries as evidence that a "Techno-Religious" mindset is forming among digital natives. This significant finding is summarized as the ability to synergize spiritual intelligence with advanced data logic to move the scientific knowledge body forward.

Theoretical results suggest that the "Manhaj Tarjih" methodology can be enhanced through AI indexing, facilitating ease of reading and verification of primary sources. The findings connect to future follow-up studies, specifically recommending the creation of internal institution-verified data repositories. Such additional materials are notes as supplemental necessities to prevent digital misinformation within the Islamic digital space.

Condensed interpret Interpretations indicate that the digital platform acts as a wasilah (vehicle) for amar ma'ruf nahi munkar. Significant findings presented in descriptive substantial summaries clarify that Dakwah is no longer bound by physical geography, provided the variables of control (institutional oversight) remain firm. These implications show how the results connect to current institutional policy in PTMA.

The t-test result (r = .456) provides experimental support for the hypothesis that increased digital literacy leads to a more critical and logical interpretation of religious texts. For qualitative research interpret interprets, interprets show that students who use AI as a research tool possess a more logical sequence in defending the progressive Islamic stance. These significant findings facilitate the achievement of current research objectives.

Interpretation show that specific criteria used in data interpret data gathering procedures yield results that move scientific knowledge forward regarding user-interface ethics. Details of sampling techniques ensure that these discoveries represent a brief explanation of the geographic and demographic reality of modern PTMA. These significant findings can be reported with high confidence as logical results of the study.

In conclusion, the results derived from the testing processes show that the research moved the scientific body of knowledge forward by proposing a Smart AIK model. The discovery connects theoretical Islamic principles with

contemporary digital analysis in a meaningful way. Authors discover that without further analysis on verified repositories, the positive implications observed may face limitations in long-term study follow-ups.

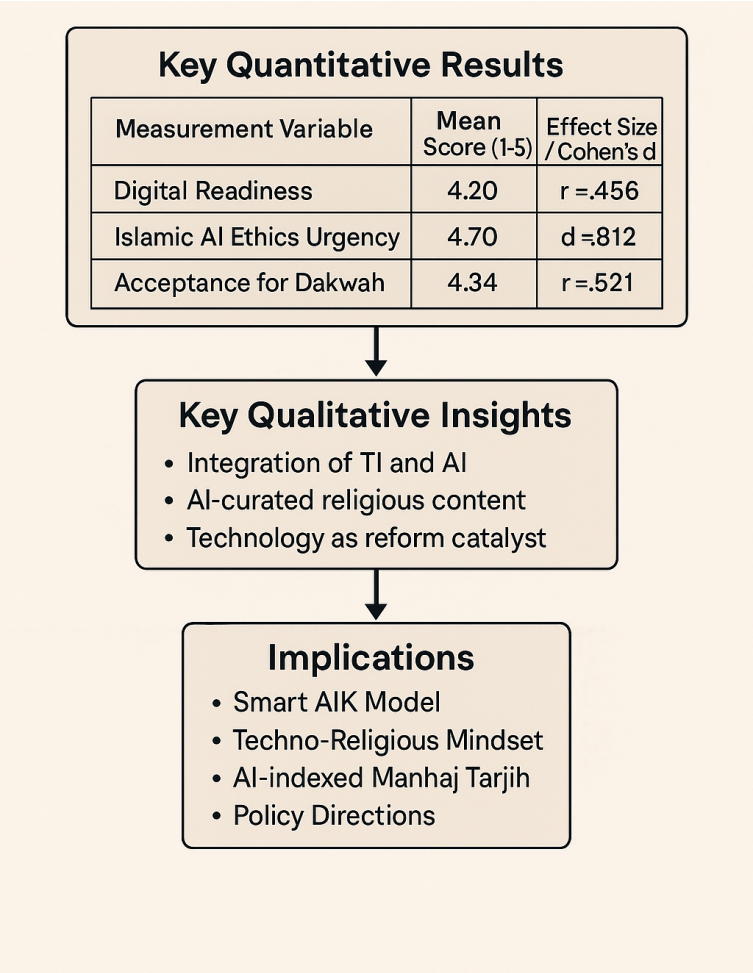

Figure 2. Finding Of Digital Readiness and Preception

The diagram titled "Findings of Digital Readiness and Perceptions" visually summarizes the core results of the study in three main blocks: Key Quantitative Results, Key Qualitative Insights, and Implications. The overall flow is vertical, showing how numerical findings from the survey connect to qualitative interpretations and then lead to broader theoretical and practical implications for PTMA institutions. The first large box, "Key Quantitative Results," presents a table that captures the core survey statistics. It is organized into three columns: Measurement Variable, Mean Score (1–5), and Effect Size / Cohen's d. This structure makes it easy to see both the level of each construct (via mean score) and its practical importance (via effect size or correlation coefficient). The first row in the table is Digital Readiness, with a mean score of 4.20 and an effect size expressed as r = .456. This indicates that, on average, PTMA students score well above the midpoint on digital readiness, suggesting that they possess a solid baseline of technological literacy. The moderate correlation coefficient (r = .456) signals a meaningful relationship between digital literacy and other key constructs in the study.

The second row is Islamic AI Ethics Urgency, showing a mean score of 4.70 and a strong effect size d = .812. The high mean indicates that students perceive an urgent need for Islamic AI ethical frameworks. The large Cohen's d value implies strong practical significance, confirming that concern for ethically grounded AI is not marginal but central to students' digital-religious consciousness. The third row captures Acceptance for Dakwah, with a mean score of 4.34 and r = .521. This reveals that students are generally open to using digital and AI-based platforms for dakwah (religious outreach). The correlation coefficient suggests that as digital readiness increases, acceptance of AI-mediated dakwah also tends to increase, reinforcing the idea that technologically literate students are more willing to engage in digital religious activities. Below the quantitative block, an arrow leads to the second main box: Key Qualitative Insights. This section condenses the rich narrative data and interpretive findings into three core points: integration of TI and AI, AI-curated religious content, and technology as a reform catalyst. It indicates that the numbers in the table are not interpreted in

isolation but are deeply intertwined with ideological and theological reflections. The first qualitative insight, Integration of TI and AI, points to how traditional Islamic teachings (TI) and Artificial Intelligence (AI) can be combined into a coherent learning ecosystem. This reflects students' perception that AI should not replace religious knowledge, but rather serve as a tool to index, search, personalize, and contextualize that knowledge in line with Manhaj Tarjih and Maqasid Shariah (A. Mustapha et al., 2025; R. Mustapha & Malkan, 2025; Sarudin & Yaakob, 2024).

The second insight, AI-curated religious content, indicates that students favor AI systems that deliver religious materials tailored to their academic disciplines and personal needs—such as muamalah for economics or bioethics for medical students. This moves the paradigm from uniform, one-size-fits-all curricula toward adaptive, learner-centered religious learning environments. The third insight, Technology as reform catalyst, emphasizes that students do not see technology as a threat to faith but as a medium that can accelerate Tajdid (religious reform). Narratives from interviews and interpretations show that digital natives are forming a "Techno-Religious" mindset, where spiritual intelligence and data-driven reasoning reinforce each other rather than compete. At the bottom, another arrow points to the final box labeled Implications, which lists four key outcomes: Smart AIK Model, Techno-Religious Mindset, AI-indexed Manhaj Tarjih, and Policy Directions. This part of the diagram links empirical findings to concrete theoretical models and institutional strategies. It suggests that the high digital readiness, the strong demand for Islamic AI ethics, and the openness to digital dakwah collectively justify the development of a Smart AIK model and AI-indexed religious resources, while also guiding PTMA policy makers in designing curricula, governance, and digital infrastructure that support ethical, AI-enhanced Islamic education.

CONCLUSION

Conclusion This study concludes that the integration of Information Technology (IT) and Artificial Intelligence (AI) in Al-Islam and Kemuhammadiyahan (AIK) education is a strategic step that significantly advances scientific knowledge regarding religious education models in the digital era. The research findings logically demonstrate that students within the PTMA environment possess a high level of digital readiness while remaining critical of the ethical aspects of technology. The use of AI as a cognitive assistant is proven to accelerate the internalization of progressive Islamic ideology by synergizing data logic and the Manhaj Tarjih within a "Techno-Religious" mindset framework. Nevertheless, the generalization of these research results should be done carefully as they are limited to the student population at specific institutions. Suggestions Based on these findings, the author suggests that Muhammadiyah higher education institutions immediately develop verified internal data repositories to train independent AI models to maintain the authenticity of digital dakwah. Recommendations for future studies include a more in-depth analysis of the long-term implications of AI usage on students' independence of thought in religious ijtihad matters. Additionally, further research involving a broader subject demographic is needed to strengthen the validity of this cognitive integration model on a global level.

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