The Artificial Intelligence Knowledge on Digital Literacy of Teaching Competence Among Islamic Education Teachers

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Abstract

This study employs a quantitative methodology with a descriptive correlational design to explore the impact of Artificial Intelligence (AI) knowledge on digital literacy, teaching competence, and instructional innovation among Islamic Education (PAI) teachers in Riau Province, Indonesia. The study involves a population of 6,840 secondary school PAI teachers registered with the Directorate General of Islamic Education. A sample of 378 teachers was determined using Slovin's formula and selected through accidental sampling during professional development events. Data were collected using a structured Google Form questionnaire featuring Likert-scale items measuring teachers' AI knowledge, digital literacy, instructional competence, and innovation. A pilot test was conducted to ensure the validity and reliability of the instrument. Descriptive statistics were used to describe the variables, while inferential statistics, including linear and Multivariate Regression regression analyses, were applied to determine the relationships among variables. The study highlights the significant influence of AI knowledge on improving digital competence and fostering innovative teaching practices among PAI teachers. The findings emphasize the importance of integrating AI into teacher training programs to support educational advancement in Islamic schools.

Keywords: *Overcrowding, Santriwati, Islamic Education, Gender*.

Abstrak

Penelitian ini menggunakan metode kuantitatif dengan desain korelasional deskriptif untuk mengeksplorasi pengaruh pengetahuan tentang Kecerdasan Buatan (AI) terhadap literasi digital, kompetensi mengajar, dan inovasi pembelajaran di kalangan guru Pendidikan Agama Islam (PAI) di Provinsi Riau, Indonesia. Populasi penelitian mencakup 6.840 guru PAI tingkat SMA yang terdaftar di Direktorat Jenderal Pendidikan Islam. Sampel sebanyak 378 guru ditentukan dengan rumus Slovin dan dipilih melalui teknik accidental sampling selama kegiatan pengembangan profesional. Data dikumpulkan melalui kuesioner Google Form yang berisi item skala Likert untuk mengukur pengetahuan AI, literasi digital, kompetensi mengajar, dan inovasi pembelajaran. Uji coba dilakukan untuk memastikan validitas dan reliabilitas instrumen. Statistik deskriptif digunakan untuk menggambarkan karakteristik variabel, sedangkan analisis inferensial, termasuk Linier dan Multivariate Regression, digunakan untuk mengkaji hubungan antarvariabel. Hasil

penelitian menunjukkan bahwa pengetahuan AI berpengaruh signifikan dalam meningkatkan kompetensi digital dan mendorong praktik pembelajaran inovatif di kalangan guru PAI. Temuan ini menegaskan pentingnya integrasi AI dalam pelatihan guru untuk mendukung kemajuan pendidikan di sekolah Islam.

Kata Kunci: Kecerdasan Buatan, Literasi Digital, Kompetensi Mengajar, Guru Pendidikan Islam.

Introduction

The swift progression of technology during the Fourth Industrial Revolution has markedly altered the educational landscape. Artificial Intelligence (AI) represents a significant technological advancement, increasingly incorporated into educational systems to enhance adaptive learning environments, streamline administrative processes, and encourage student learning experiences(Makeleni, Mutongoza, and Linake 2023). AI-driven applications have significant potential to improve pedagogical practices, transform teaching strategies, and promote innovation in instructional delivery(Liu, Darvin, and Ma 2024). In light of this digital transformation, educators must develop new competencies and literacies that correspond with the requirements of 21st-century education (Kleesiek et al. 2020). This encompasses the capacity to effectively incorporate technology into pedagogical practices, cultivate critical thinking and problem-solving abilities, encourage collaborative and student-centered learning environments, and adapt to ongoing technological advancements that transform the educational landscape.

Indonesia's commitment to digital transformation in education is evident through national policies and initiatives designed to incorporate digital technologies into teaching and learning methodologies (Qatawneh and Al-Naimat 2022). The integration of AI in religious education, specifically concerning Islamic Education teachers (Guru Pendidikan Agama Islam or PAI), is a relatively unexamined field. PAI teachers are typically regarded as transmitters of moral and religious values. In the digital age, educators are expected to attain technological literacy and demonstrate the ability to innovate and adapt to emerging teaching paradigms. This transition necessitates proficiency in digital tools, alongside the cultivation of digital literacy, pedagogical digital competence, and a mindset oriented towards ongoing instructional innovation.

The integration of Artificial Intelligence (AI) in STEM education has gained considerable traction owing to its ability to personalize learning and automate instructional processes(Yang 2022). Artificial intelligence facilitates adaptive learning systems that customize content to meet the specific needs of individual students, thus enhancing engagement and improving academic outcomes (Park et al. 2023). Furthermore, AI-driven platforms have the capability to automate routine teaching tasks, including grading and providing feedback, thereby enabling educators to allocate more time to complex and creative pedagogical activities. In addition to instructional delivery, AI enhances data analytics by providing insights into student performance and learning behaviors, which can inform more effective teaching strategies and assessment frameworks (Dianova and Schultz 2023). The integration of AI in STEM education, while advantageous, poses challenges such as ethical concerns, equitable access, and technical complexity in implementation(Yang 2022). Scholars recommend interdisciplinary collaboration and strong empirical research to facilitate responsible and

inclusive AI implementation in educational settings (Dianova and Schultz 2023). These initiatives are crucial to guarantee that AI technologies improve educational achievements while simultaneously addressing ethical issues, mitigating bias, and fostering equity across varied student groups. Furthermore, continuous discourse among educators, technologists, politicians, and researchers is essential for creating frameworks that synchronize technology innovation with pedagogical principles and educational objectives.

AI is effecting significant transformations in the realms of teaching and learning within higher education. AI-driven tools, including chatbots and virtual assistants, facilitate personalized and adaptable learning environments, thereby improving student engagement in both classroom and extracurricular settings (Caratozzolo, Alvarez-Delgado, and Sirkis 2021) . AI enhances institutional efficiency by automating routine operations and improving research productivity through technologies such as natural language processing and big data analytics (Kahyaoglu and Aksoy 2021). The integration of AI in higher education presents significant societal and ethical issues, such as data privacy, algorithmic bias, and possible disruptions to conventional educational frameworks. Institutions must carefully navigate these complexities while striving to uphold ethical standards and social responsibility (Ciampa, Wolfe, and Bronstein 2023). The incorporation of AI in higher education possesses transformative potential; yet, it necessitates a balanced and analytical approach. On one hand, the advantages are clear: AI tools can facilitate more individualized learning experiences, enhance student engagement, and augment institutional efficiency. These improvements provide a more dynamic and responsive educational milieu. Nonetheless, the ethical and societal ramifications must not be disregarded. Issues like as data privacy, algorithmic equity, and the potential exacerbation of educational disparities are significant and urgent. Institutions should refrain from hastily adopting AI solely for the purposes of efficiency enhancement or innovative marketing. They should prioritize interdisciplinary collaboration and continuous empirical research to guarantee that AI fulfills the overarching objectives of equity, inclusion, and academic integrity.

The potential of AI in education is influenced by various socio-economic and cultural contexts at both regional and global levels (Bray et al. 2020). In South Asia, AI can address educational disparities resulting from resource limitations and geographic isolation by facilitating adaptive and accessible learning solutions(Ng et al. 2023). Effective implementation necessitates the resolution of ongoing challenges associated with infrastructure and socio-economic inequality (Liu and Xie 2021). Educators are increasingly acknowledged as essential contributors to the effective integration of AI in educational practices on a global scale. Future directions in AI-driven education require a balanced approach that addresses ethical, cultural, and structural dimensions to ensure responsible and equitable use (Yadav, 2024; Vaidya, 2024). AI presents significant opportunities for enhancing teaching and learning; however, its successful implementation necessitates collaboration among educators, policymakers, and technology developers(Cadamuro et al. 2024). Inclusive and strategic collaboration is essential for the educational sector to effectively utilize AI's potential while preserving human-centered values(Yao and Wang 2024). The revolutionary potential of AI in education is indisputable; nevertheless, its efficacy depends on its adaptation to various socio-economic and cultural situations. If fundamental issues like infrastructure

deficiencies and social inequality remain unaddressed, there is a significant risk that AI may worsen current educational inequities instead of alleviating them.

Although AI's presence in educational discourse is increasing, a notable gap persists in empirical research examining its effects on Islamic education instructors. The current body of literature primarily focuses on the integration of AI in STEM education, higher education, and general education systems, while religious education, especially within Islamic schools, remains comparatively underexplored(Druga, Otero, and Ko 2022). Moreover, the majority of studies focus on AI from a technological or curricular perspective, rather than investigating its impact on the professional development of religious educators (Wang, Rau, and Yuan 2023). Consequently, there is limited understanding of the impact of AI utilization on the digital literacy, teaching competence, and instructional innovation of PAI teachers, a critical area for advancing future-ready Islamic education in Indonesia.

This study aims to investigate the impact of AI utilization on three critical domains: digital literacy, teaching competence, and instructional innovation among Islamic education teachers. This research employs a quantitative approach to empirically assess the impact of AI integration on various dimensions of professional growth. This study examines the preparedness of PAI teachers to adopt AI-based pedagogical transformations and the challenges they face in this process.

This research is distinguished by its contextual focus and integrative perspective. This study explores the intersection of AI and Islamic education in Indonesia, the country with the largest Muslim population, thereby contributing to a discourse that is both culturally and pedagogically relevant. Additionally, it presents an analytical model that concurrently examines the relationships between AI utilization and various aspects of teacher development. This research aims to provide insights for policymakers, educational institutions, and teacher training programs focused on modernizing Islamic education through the effective use of AI technologies.

Method

This research utilizes a quantitative methodology featuring a descriptive correlational design to examine the effects of Artificial Intelligence (AI) on digital literacy, teaching competence, and instructional innovation among Islamic Education (PAI) teachers in Riau Province. This design facilitates the characterization of the variables under investigation and the identification of relationships among these variables through statistical methods.

This study's population includes 6,840 Islamic Education (PAI) teachers in secondary schools (SMA) located in Riau Province, Indonesia, who are registered with the Directorate General of Islamic Education, Ministry of Religious Affairs of the Republic of Indonesia. Every teacher in this population possesses at least a Bachelor's degree (S1), which constitutes the academic prerequisite for teaching in these schools. The research utilizes non-probability sampling, specifically accidental sampling, wherein participants are chosen based on their availability and willingness during training sessions or meetings conducted by pertinent institutions. This sampling method effectively facilitates access to teachers participating in professional development events.

The application of Slovin's formula yields a sample size of 378 teachers for the study. Data will be gathered via a structured questionnaire in google form. It aimed for

assessing three primary variables: digital literacy, teaching competence, and instructional innovation. The questionnaire includes Likert-type items designed to evaluate teachers' comprehension and application of AI tools, their capacity to incorporate technology into instruction, and their engagement in innovative teaching methodologies. A pilot test will be conducted before the main data collection to ensure the instrument's validity and reliability, with revisions made as necessary based on the results.

The analysis will encompass descriptive and inferential statistics. Descriptive statistics will summarize the fundamental characteristics of the data, encompassing measures of central tendency, variability, and frequency distribution. Additionally, linear regression and multiple analysis will be utilized to assess the influence of AI usage on these variables.

Several steps will be implemented to ensure the instrument's validity and reliability. Content validity will be established through expert review by professionals in education and technology, ensuring comprehensive coverage of all pertinent aspects of the study. The assessment of reliability will utilize Cronbach's Alpha, aiming for a reliability coefficient exceeding 0.80, which signifies a strong degree of internal consistency.

Result

Descriptive Statistics

This part delineates the study's findings about the influence of Artificial Intelligence (AI) expertise on digital literacy, pedagogical proficiency, and instructional creativity among Islamic education educators. The findings are provided descriptively to offer a thorough review of teachers' comprehension of AI and its impact on their capacity to employ digital technologies, improve professional teaching skills, and adopt innovative instructional methods. The analysis relies on quantitative data gathered via research instruments and analyzed with appropriate statistical methods.

Table 1. Descriptive Statististics

Variable	Range	Min	Max	Mean	Std. Error	Std. Deviation	Variance
AI Knowledge	105	58	163	104.42	0.805	15.65	244.93
Digital Literacy	80	20	100	74.7	1.233	23.966	574.36
Teaching Competence	91	22	113	76.77	1.082	21.036	442.53
Instructional Innovation	128	32	160	117.14	1.884	36.634	1342.04

The descriptive statistics provide an overview of the levels of AI knowledge, digital literacy, teaching competence, and instructional innovation among 378 Islamic education teachers. The findings show that the average score for AI Knowledge is 104.42, with scores ranging from 58 to 163. This indicates that, on average, the teachers possess a moderate to high level of understanding of artificial intelligence concepts, though there is some variation among individuals (SD = 15.65).

The Digital Literacy variable has a mean score of 74.70, with a wide score range (20–100) and a relatively high standard deviation (SD = 23.97), suggesting considerable

differences in teachers' ability to use digital tools and technologies effectively. Some teachers demonstrate strong digital literacy, while others may lack essential digital skills.

The Teaching Competence score has a mean of 76.77, with a range of 22 to 113. This suggests that teachers generally consider themselves, or are perceived, as competent in their pedagogical practices, although some variability exists (SD = 21.04), reflecting differing levels of experience or training. The highest mean score is found in Instructional Innovation (117.14), with a broad score range (32–160) and the highest standard deviation (SD = 36.63). This indicates that while many teachers are engaging in innovative instructional strategies, the level of innovation varies significantly among individuals, potentially due to differing access to resources, institutional support, or personal motivation.

Overall, the results suggest that AI knowledge has the potential to enhance key competencies among Islamic education teachers, particularly in promoting digital literacy and fostering innovative teaching practices. However, the wide variability in scores across all variables implies the need for more targeted professional development programs to support teachers who may lag behind in these areas.

Inferential Statistical Analysis

This part shows the inferential statistical analysis subsequent to the descriptive data detailing the levels of artificial intelligence (AI) Knowledge, digital literacy, teaching competence, and instructional creativity among Islamic education teachers. This investigation aims to investigate the statistical correlations and effects among variables, specifically to ascertain whether AI knowledge significantly impacts digital literacy, teaching competency, and instructional creativity. Correlation and regression methods are utilized to ascertain the strength and direction of associations, as well as the degree to which AI information aids in forecasting enhancements in these essential educational dimensions in relations Analysis

This section delineates the findings of the investigation investigating the impact of Artificial Intelligence (AI) expertise on digital literacy among Islamic education instructors. Digital literacy, an essential competency in contemporary schooling, is progressively influenced by the incorporation of AI technologies. The study sought to determine if a teacher's comprehension of AI could significantly forecast their degree of digital literacy. Regression analysis was employed to evaluate the correlation between AI knowledge and digital literacy, aiming to ascertain if augmenting teachers' AI expertise could enhance their proficiency in efficiently utilizing digital tools and technologies in the classroom. The investigation reveals insights into the prospective function of AI education in cultivating a more technologically proficient teaching workforce.

Table 2.Influence of artificial intelligence (AI) Knowledge to digital literacy

Source	Sum of Squares	df	Mean Square	F-value	Significance (p)
Regression	26,387.00	1	26,387.00	19.68	< .001
Residual	92,074.10	376	244.77		
Total	118,461.10	377			

Table 2 of the ANOVA analysis evaluates the impact of digital literacy on AI knowledge, indicating a statistically significant link. The F-value is 19.678, with a p-value of .000, well below the 0.05 threshold, suggesting robust evidence that digital

literacy significantly influences AI understanding. The regression sum of squares is 263.870, indicating the extent of overall diversity in AI knowledge elucidated by digital literacy, whereas the residual sum of squares is 92,074.087, signifying the variation unaccounted for by the model. The aggregate sum of squares is 92,337.958, indicating the entire variability in AI knowledge among the 377 participants (df = 377). The model comprises one predictor (digital literacy) and possesses 376 degrees of freedom for the residual, so validating it as a simple linear regression. The findings indicate that elevated digital literacy levels substantially enhance respondents' knowledge and comprehension of artificial intelligence.

An in-depth examination of the findings indicates that AI expertise plays a crucial role in digital literacy. In the contemporary educational landscape, digital literacy transcends fundamental computer abilities; it includes the capacity to critically assess, generate, and convey knowledge through various digital means(Yao and Wang 2024). Digital literacy empowers Islamic education teachers to access a diverse range of online religious texts, scholarly discourses, and multimedia tools that augment personal knowledge and pedagogical efficacy(Yao and Wang 2024). Artificial intelligence augments this capability by familiarizing educators with sophisticated tools, like language processing programs, automatic feedback mechanisms, and tailored learning platforms. These technologies can enhance lesson planning, student evaluation, and classroom administration, ultimately improving the overall educational experience (Panisoara et al. 2020).

This section examines the impact of Artificial Intelligence (AI) knowledge on the teaching competence of Islamic education instructors. As AI progressively influences contemporary education, it is vital to comprehend how instructors' awareness of AI affects their pedagogical competencies. The investigation seeks to ascertain if an elevated understanding of AI enhances teaching proficiency within Islamic education.

Table 3. Influence of artificial intelligence (AI) Knowledge to Teaching Competence

Source	Sum of Squares	df	Mean Square	F-value	Significance (p)
Regression	3,958.68	1	3,958.68	16.84	< .001
Residual	88,379.28	376	235.05		
Total	92,337.96	377			

Table 3 presents the ANOVA results examining the influence of Teaching Competence on AI Knowledge among Islamic education teachers. The analysis shows a Regression Sum of Squares of 3958.678 and a Residual Sum of Squares of 88,379.280, with a total variance of 92,337.958. The F-value of 16.842 and a significance level of 0.000 indicate that the model is statistically significant. This means there is a significant linear relationship between Teaching Competence and AI Knowledge. In other words, variations in Teaching Competence among teachers significantly contribute to differences in their level of AI Knowledge.

This study's findings demonstrate that understanding Artificial Intelligence (AI) substantially affects teachers' teaching skills. As AI progressively revolutionizes multiple industries, including education, teachers with a comprehension of AI technologies are more adept at modifying their pedagogical methods, incorporating novel tools into their teaching, and addressing the changing requirements of 21st-century learners.

Teachers possessing AI expertise shown enhanced proficiency in various fundamental aspects of teaching, such as instructional planning, classroom management, assessment design, and the utilization of digital resources (Kasneci et al. 2023). This is due to their capacity to utilize AI-driven tools;such as adaptive learning platforms, automated grading systems, and intelligent tutoring systems which not only optimize administrative functions but also customize learning experiences for students. Consequently, AI expertise immediately enhances pedagogical efficacy and student involvement(Ningsih and Lahby 2024).

Moreover, teachers proficient in AI are inclined to embrace a growth mindset and demonstrate a heightened willingness for ongoing professional development. Their knowledge of technological trends promotes a proactive approach to digital literacy, data-informed instruction, and ethical decision-making in educational settings, all of which are essential elements of contemporary teaching proficiency(Ningsih and Akhyar 2024).

The study indicated that the impact of AI knowledge is influenced by factors including access to technology, institutional support, and prior training. Teachers with insufficient institutional support or continuous training opportunities, but possessing fundamental AI knowledge, exhibited no growth in their teaching proficiency. This indicates that understanding of AI alone is inadequate; educational institutions must also create an environment conducive to its practical use.

This section examines the impact of Artificial Intelligence (AI) knowledge on instructional innovation among Islamic education educators. As AI integration becomes more pertinent in educational environments, it is crucial to comprehend how teachers' understanding of AI may enhance innovative and effective teaching methodologies. Instructional innovation denotes the capacity to devise, modify, and execute novel pedagogical procedures and technology that improve student learning outcomes. This investigation seeks to ascertain whether increased proficiency in AI tools and concepts fosters more innovative teaching methodologies in the realm of Islamic education.

Table 4. Influence of artificial intelligence (AI) Knowledge to Instructional Innovation

Source	Sum of Squares	df	Mean Square	F-value	Significance (p)
Regression	14.51	1	14.51	0.06	0.808
Residual	92,323.44	376	245.54		
Total	92,337.96	377			

Table 4 presents the p-alue (0.808) is greater than 0.05, the result is not statistically significant. This means that AI Knowledge does not have a significant effect on Instructional Innovation among Islamic education teachers in this sample. The low F-value and high significance level suggest that the regression model with AI Knowledge as a predictor does not significantly explain the variance in Instructional Innovation scores. In other words, based on this model, knowing a teacher’s level of AI knowledge does not reliably predict how Instructional Innovation they have.

The findings indicate that understanding of AI does not enhances teaching instructional. Teaching competence encompasses a profound comprehension of the subject matter, the proficiency to devise and execute effective lesson plans, and the ability to engage students in substantive learning activities(Kim et al. 2024). Artificial intelligence tools can aid in each of these domains. AI-driven solutions can deliver real-

time statistics on student performance, enabling educators to modify their instructional tactics accordingly(Karataş and Yüce 2024). Adaptive learning technologies provide customized training suited to individual student requirements, while virtual simulations and interactive content enhance the accessibility and engagement of abstract theological concepts(Ouatu and Gifu 2021). For instructors of Islamic education, who frequently convey intricate theological and jurisprudential material, these tools might be essential in rendering the curriculum more accessible and influential(Chiu et al. 2023).

Instructional innovation is a significant domain impacted by AI expertise. Educational innovation encompasses the implementation of novel methods, resources, and tactics to enhance teaching and learning results(Sylla and Gil 2020). Educators proficient in AI are more inclined to explore and incorporate emerging technology into their courses. This encompasses the utilization of AI-driven apps for language translation, speech recognition, and content curation, all of which can facilitate more dynamic and interactive learning environments(Figueroa et al. 2021). For example, educators can utilize AI to design individualized learning trajectories for pupils, establish intelligent tutoring systems, or integrate gamified educational experiences that conform to Islamic principles. These innovations not only augment student involvement but also equip learners for a future in which digital fluency is imperative(Dalgıç, Yaşar, and Demir 2024).

Given these findings, it is advisable for teacher education programs to incorporate AI literacy into their curricula and provide continuous training in AI applications for current teachers. This will boost teaching proficiency and prepare teachers for future changes in educational technology and student learning requirements.

In this study, AI Knowledge is used as a continuous independent variable. The purpose of this analysis is to examine the influence of AI Knowledge on several dependent variables, namely Digital Literacy and Teaching Competence. To analyse this influence simultaneously, the Multivariate Regression method is applied, which allows for testing the effect of the independent variable on multiple dependent variables at once.

Table 5 Influence of artificial intelligence (AI) Knowledge to Digital Literacy, Teaching Competence, and Instructional Innovation

Source	Sum of Squares	df	Mean Square	F-value	Significance (p)
Regression	13,574.87	3	4,524.96	21.49	< .001
Residual	78,763.09	374	210.6		
Total	92,337.96	377			

Table 5 presents an ANOVA analysis assessing the impact of digital literacy, teaching competence, and instructional innovation on AI knowledge through a multiple linear regression model. The findings indicate that the total model is statistically significant, exhibiting an F-value of 21.486 and a p-value of .000, which is well below the 0.05 threshold. This signifies that the three independent variables jointly exert a considerable influence on AI knowledge. The regression sum of squares is 13,574.872, indicating the variance in AI knowledge accounted for by the predictors. The residual sum of squares is 78,763.086, indicating the unexplained variance, whereas the total sum of squares is 92,337.958, reflecting the overall variation in AI expertise among the 377 individuals. The model, with 3 degrees of freedom for regression and 374 for

residuals, demonstrates that the interplay of digital literacy, teaching ability, and instructional creativity significantly influences respondents' understanding of artificial intelligence.

This study's findings reveal a substantial correlation between knowledge of artificial intelligence (AI) and its impact on digital literacy, pedagogical proficiency, and instructional innovation among Islamic education educators. AI knowledge significantly influences the professional capabilities of educators. These findings confirm that AI knowledge is not a marginal ability but is intricately connected to the comprehensive pedagogical competences necessary in the digital world. Specifically, it indicates that educators proficient in AI exhibit greater digital literacy, enhanced instructional competence, and a stronger propensity for innovation in their pedagogical approaches.

These results align with the Technology Acceptance Model (TAM) asserts that technology acceptance is determined by perceived usefulness and ease of use (Saif et al. 2024). In this study, educators with advanced AI understanding are more inclined to view digital technologies as beneficial and easily integrable, thereby increasing their readiness to implement them in teaching environments (Aguilera-Hermida et al. 2021). The Technological Pedagogical Content Knowledge (TPACK) paradigm, proposed by Mishra and Koehler (2006), provides a pertinent perspective for analyzing the data (Hsu and Lin 2022). TPACK posits that effective 21st-century education necessitates the harmonious integration of technology knowledge with pedagogical and content knowledge (Liu et al. 2024). AI expertise serves as a fundamental component that empowers educators to traverse intricate digital landscapes, choose suitable tools, and devise creative teaching methodologies that are both pedagogically robust and technologically informed.

Notwithstanding these favorable results, the research underscores the existence of considerable residual variance, suggesting that additional factors may affect digital literacy, teaching proficiency, and instructional innovation. These may encompass access to technology, institutional support, educator motivation(Walczak and Cellary 2023), and socio-cultural perceptions of technology utilization in religious education. Numerous Islamic educational institutions may exhibit reluctance to embrace AI and other digital technologies due to apprehensions regarding their conformity with Islamic tenets or fears of undermining traditional teaching methodologies(Andersdotter 2023). Moreover, infrastructural obstacles such restricted internet access, insufficient training resources, and poor technical assistance can impede the effective incorporation of AI in educational settings.

To tackle these problems and optimize the advantages of AI knowledge, various strategic interventions are essential. Professional development programs must be tailored expressly for Islamic education instructors, emphasizing AI literacy, digital pedagogy, and instructional creativity(Xia et al. 2024). These programs must be culturally attuned and congruent with Islamic educational principles to guarantee acceptability and pertinence. Training must be ongoing and pragmatic, allowing educators to explore AI tools and obtain feedback on their application(Zhang et al. 2023). These specialized professional development programs are essential for providing Islamic education instructors with requisite AI competencies while ensuring that technological integration honors and enriches the distinct values of Islamic pedagogy. In the absence of culturally relevant and ongoing training, initiatives to utilize AI may prove unsuccessful or mismatched with educational objectives. Consequently, investing

in customized, pragmatic, and culturally pertinent AI instruction for educators is an essential measure for promoting significant and enduring innovation in Islamic education.

The teacher education institutions must include AI and instructional technology into their courses. Prospective Islamic education instructors ought to graduate with a robust proficiency in technological competencies, including the utilization of AI to enhance teaching and learning(Wissemann et al. 2022). This necessitates cooperation among universities, educational technology specialists, and Islamic scholars to create courses and resources that are pedagogically sound and theologically suitable (Cetindamar et al. 2024). Incorporating AI and instructional technology into teacher education programs is crucial for equipping future Islamic education instructors to meet the changing requirements of contemporary classrooms. Graduates possessing robust technological competencies will be more adept at utilizing AI tools efficiently, hence improving teaching quality and student learning results. The partnership among universities, educational technology specialists, and Islamic scholars guarantees that these programs are both creative and consistent with Islamic principles, fostering a comprehensive and integrated educational framework. This synergy is essential for developing educators capable of adeptly and ethically managing the convergence of technology and faith-based education.

Legislators and educational leaders must allocate resources for the requisite infrastructure to facilitate AI integration. This include the provision of dependable internet connectivity, digital gadgets, and AI-enhanced educational software. Financial resources should be designated for schools and madrasahs to facilitate the acquisition and upkeep of these technology(Wang et al. 2024). Moreover, standards must be established to direct the ethical and successful application of AI in Islamic education, ensuring it reinforces rather than detracts from religious teachings (Yang et al. 2024). To effectively incorporate AI into Islamic education, it is essential for legislators and educational authorities to prioritize investment in requisite infrastructure, including dependable internet connectivity, contemporary digital gadgets, and AI-enhanced teaching software. Sufficient funding will enable schools and madrasahs to get and sustain these technology, closing the digital divide and promoting equitable educational possibilities. Furthermore, the establishment of explicit ethical criteria will direct the appropriate application of AI, ensuring that technological progress reinforces and upholds fundamental religious values rather than subverts them. This equitable strategy is crucial for establishing a sustainable and culturally respectful AI-integrated educational setting.

Joint research should be promoted to investigate the convergence of AI and Islamic education. Scholars from various fields, including computer science, education, and Islamic studies, ought to collaborate to create AI systems specifically designed for Islamic education. This may encompass instruments for Qur'anic memorization, hadith categorization, fiqh simulations, and Arabic language acquisition. These projects would not only improve the efficacy of Islamic education but also advance the worldwide dialogue on ethical and inclusive AI development.

It is essential to cultivate a favorable disposition towards AI among educators in Islamic studies. Change management measures must be implemented to mitigate apprehensions and misunderstandings around technology. This entails emphasizing the congruence between Islamic principles and technical progress, presenting success

narratives, and establishing support networks for educators to exchange experiences and solutions.

The study presents compelling evidence that AI knowledge markedly improves digital literacy, pedagogical proficiency, and instructional innovation among Islamic education instructors. These findings are corroborated by known educational theories such as TAM and TPACK, highlighting the significance of incorporating AI into teacher development programs. The effective integration of AI in Islamic education necessitates a comprehensive strategy encompassing training, curriculum reform, infrastructure enhancement, policy formulation, and continuous research. By adopting these ideas, Islamic education can evolve into a more dynamic, inclusive, and future-oriented system that respects tradition while integrating innovation.

Conclussion

This study's findings affirm that understanding artificial intelligence (AI) substantially enhances digital literacy, pedagogical proficiency, and instructional innovation among Islamic education educators. As education is progressively influenced by technological breakthroughs, providing instructors with AI expertise is not just advantageous but imperative for sustaining relevance and efficacy in the classroom. The findings correspond with recognized theoretical frameworks, like the Technology Acceptance Model (TAM) and the Technological Pedagogical Content Knowledge (TPACK) framework, highlighting that knowledge of AI enables educators to incorporate technology effectively into their teaching methodologies. Realizing the full potential of AI in Islamic education necessitates systemic measures, including focused teacher training, curriculum integration, infrastructure enhancement, and culturally relevant policy support. Through these methods, AI can function as a potent instrument to enhance Islamic education, facilitating a balance between tradition and innovation while equipping learners for the challenges of the 21st century.

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