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Intelligent Tutoring for Hadith: Evaluating ChatGPT-Enhanced Pedagogy in Islamic Higher Education

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Abstract: This study examines the integration of ChatGPT as an intelligent tutoring tool in the teaching of Hadith to undergraduate Islamic studies students at the University of Benghazi. By employing a mixed-methods design, the research involved 25 participants over four weeks of structured Hadith study using ChatGPT. Quantitative results demonstrated significant improvements in learning outcomes, with average scores increasing from 56.7 on the pre-test to 73.2 on the post-test, representing a mean gain of 16.5 points ($p < .001$, Cohen's $d = 1.45$). Qualitative analysis of interviews and reflective journals revealed that students valued ChatGPT for enhancing comprehension, providing personalized explanations, and fostering motivation. At the same time, concerns emerged regarding the accuracy of responses and the potential for over-reliance on AI, underscoring the importance of teacher mediation. The integration of findings highlights that ChatGPT functions most effectively as a supplementary cognitive and motivational tool rather than a replacement for scholarly guidance. The study contributes to growing literature on AI in education by extending its application to religious studies, specifically Hadith pedagogy, and offers broader implications for Islamic higher education. Findings suggest that AI can facilitate access to knowledge, but careful implementation is required to safeguard authenticity and critical engagement.

INTRODUCTION

The rapid expansion of artificial intelligence (AI) tools into the educational sphere has provoked both excitement and caution among scholars, practitioners, and policymakers. While AI applications such as intelligent tutoring systems have demonstrated considerable promise in enhancing comprehension, personalization, and student motivation (Ma et al., 2014; Alrumayh et al., 2025; Alsayd et al., 2025), their adoption in religious education and particularly in Islamic higher education remains underexplored. The teaching of Hadith, as a cornerstone of Islamic knowledge, requires not only cognitive understanding but also interpretive depth, contextual sensitivity, and fidelity to scholarly tradition (Masuwd, 2024; Solihah et al., 2025; Yahya et al., 2025; Abushafa, 2025). As such, integrating AI into Hadith pedagogy raises important pedagogical, epistemological, and ethical questions.

Research on AI in education has primarily focused on STEM fields, language learning, and professional training, where adaptive systems have been shown to improve performance and learner engagement (Kulik & Fletcher, 2016; Primarni et al., 2025; Aljarmi et al., 2025). A smaller but growing body of work has examined AI in the humanities and social sciences, highlighting its potential for supporting discussion-based learning, improving critical thinking, and facilitating personalized feedback (Kasneci et al., 2023; Kasheem et al., 2025 ; Almajri et al., 2025). In the context of religious education, however, global scholarship remains limited. Studies in religious education have experimented with AI-driven text analysis and online platforms for scriptural study (Hasibuan et al., 2024; Papakostas, 2025; Shalghoum, et al., 2025; Syarofi et al., 2025), but systematic empirical investigations are rare. Even fewer studies have examined AI in Islamic pedagogy, despite the unique challenges and opportunities posed by Qur'anic and Hadith studies, which combine textual analysis, memorization, and interpretive reasoning.

Within Islamic education, existing scholarship has largely focused on digital learning tools such as e-learning platforms, mobile Qur'an applications, and online databases for Hadith verification (Al Lily et al., 2020; Hakimi, et al., 2024; Baroud, 2024). While these innovations have increased access and flexibility, they primarily function as repositories or delivery mechanisms rather than as adaptive learning partners. To date, there has been little empirical exploration of how AI conversational agents, such as ChatGPT, can actively shape comprehension, engagement, and critical inquiry in Islamic higher education. This represents a significant gap in both educational technology research and Islamic pedagogy.

This study seeks to address this gap by examining the potential of ChatGPT, a large language model, as an intelligent tutoring system for undergraduate Hadith students at the University of Benghazi. Specifically, it evaluates how ChatGPT mediated instruction affects students' learning outcomes, motivation, and critical engagement with Hadith studies. In doing so, the study aims to move beyond general debates about AI in education to provide a context-specific analysis of its role in Islamic pedagogy.

The objectives of this research are twofold: first, to assess whether AI enhanced instruction can lead to measurable improvements in students' comprehension and application of Hadith concepts; and second, to explore students' perceptions of its benefits and limitations in supporting their learning journey. The central research question is: How does ChatGPT function as an intelligent tutoring system in the teaching of Hadith at the University of Benghazi, and what are its implications for Islamic higher education?

By adopting a mixed-methods approach that combines quantitative measures of achievement with qualitative insights into learner experiences, this study contributes both empirically and conceptually to ongoing discussions of AI in higher education. It also offers practical guidance for educators seeking to improve the use of technological innovation without compromising the integrity and interpretive richness of Islamic studies (Nafi et al., 2024; Husayn et al., 2025; Masuwd, 2025; Mahmudin et al., 2025).

METHODOLOGY

This study employed a mixed-methods quasi-experimental design, combining quantitative and qualitative approaches to capture both measurable learning outcomes and the lived experiences of students. Specifically, the study uses an explanatory sequential mixed-methods design, in which quantitative data collection and analysis are conducted first, followed by qualitative inquiry to explain, interpret, and contextualize the numerical trends (Creswell & Plano Clark, 2017; Tashakkori & Teddlie, 2010). The research was conducted at the University of Benghazi with a purposive sample of 25 undergraduate students enrolled in a Hadith studies course. The intervention lasted four weeks and involved structured sessions where ChatGPT was integrated into students' study routines as an intelligent tutoring assistant.

To evaluate learning gains, students completed a pre-test prior to the intervention and a post-test at its conclusion. Both tests were designed to assess comprehension, interpretation, and application of Hadith material. Before administration, the test instruments underwent expert validation by two specialists in Hadith pedagogy and Islamic education, followed by reliability analysis using Cronbach's alpha ($\alpha = 0.82$), indicating strong internal consistency. Quantitative data from these assessments were analyzed using paired-samples statistical tests to determine significance levels, while effect sizes were calculated to gauge the magnitude of improvement.

Qualitative insights were gathered through semi-structured interviews and reflective journals, which allowed students to articulate their experiences, perceptions, and concerns about using ChatGPT in their studies. These data were analyzed thematically, producing a set of recurring patterns that complemented the statistical findings. The integration of quantitative and qualitative strands followed the explanatory sequential logic, where qualitative themes were used to interpret significant quantitative gains, thereby enhancing the study's methodological rigor (Creswell & Plano Clark, 2017). Through this design, the methodology balanced rigor with sensitivity to the pedagogical and ethical dimensions of introducing artificial intelligence into the study of Hadith.

RESULTS AND DISCUSSION

A. Quantitative Findings

The quantitative phase of this study sought to evaluate whether the integration of ChatGPT into Hadith pedagogy produced measurable improvements in student learning outcomes. Diagram 1 presents the pre-test and post-test scores of the 25 undergraduate participants. The results reveal a consistent upward trajectory across the cohort, with all students demonstrating positive gains in performance.
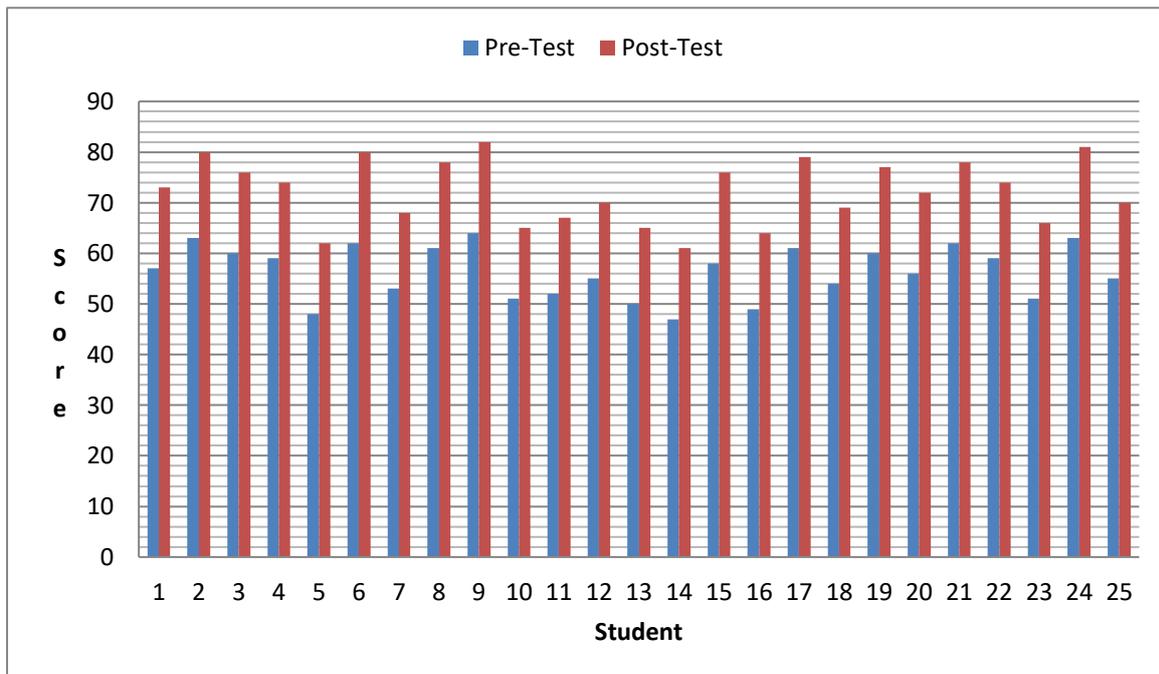
Diagram 1.
Pre-Test and Post Test Scores

Across the sample, the mean pre-test score was 56.7, while the mean post-test score rose to 73.2, indicating an average improvement of 16.5 points. This represents a 29.1% relative increase in performance. Importantly, every participant demonstrated a positive gain, ranging from +14 to +18 points, suggesting that the intervention was consistently beneficial rather than effective only for select learners. Diagram 2 illustrates the aggregated pre-test and post-test averages, visually highlighting the substantial upward shift in performance.
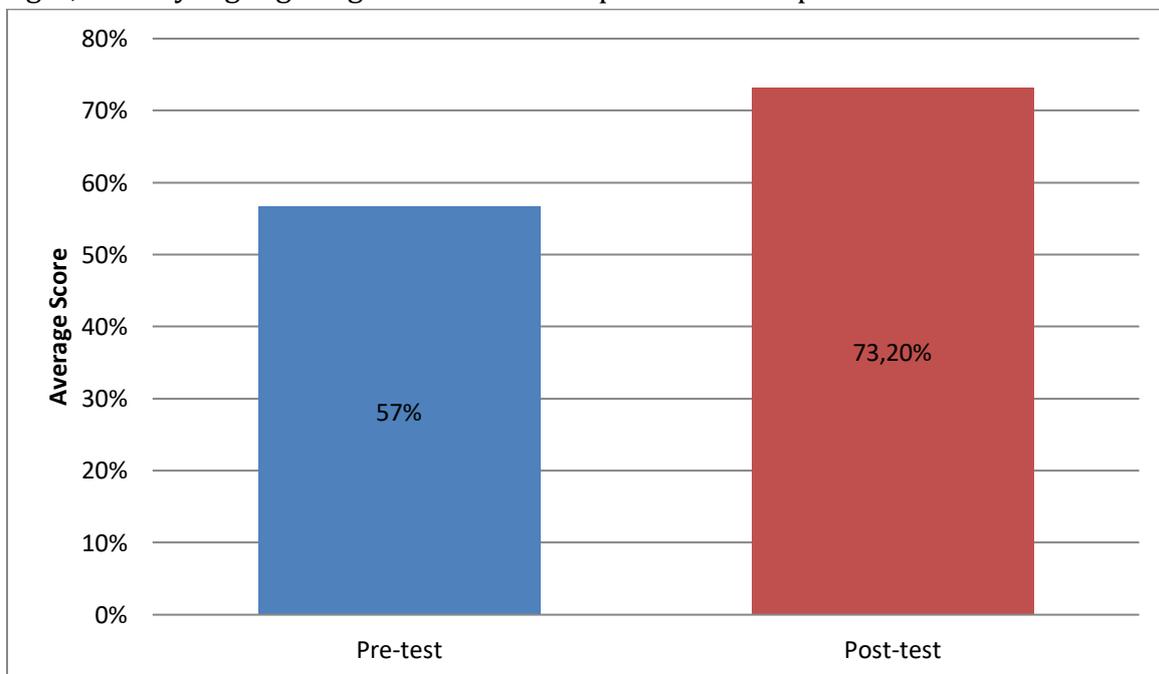

Diagram 2.
Comparison of Pre-Test and Post-Test Average Scores

To test the statistical significance of these differences, a paired-samples t-test was conducted. Results indicated a significant increase in post-test scores (t(24) = 19.82, p < .001), demonstrating that the observed improvement was highly unlikely to be due to chance. The calculated effect size (Cohen's d) was 1.45, which is conventionally regarded as a large effect (Cohen, 2013). This suggests that the integration of ChatGPT into Hadith study had a strong and substantial impact on students' academic performance. In addition to mean differences, Diagram 3 presents the distribution of improvement scores across the cohort. The histogram demonstrates a tight clustering between +14 and +18 points, reinforcing the consistency of the intervention's effectiveness.
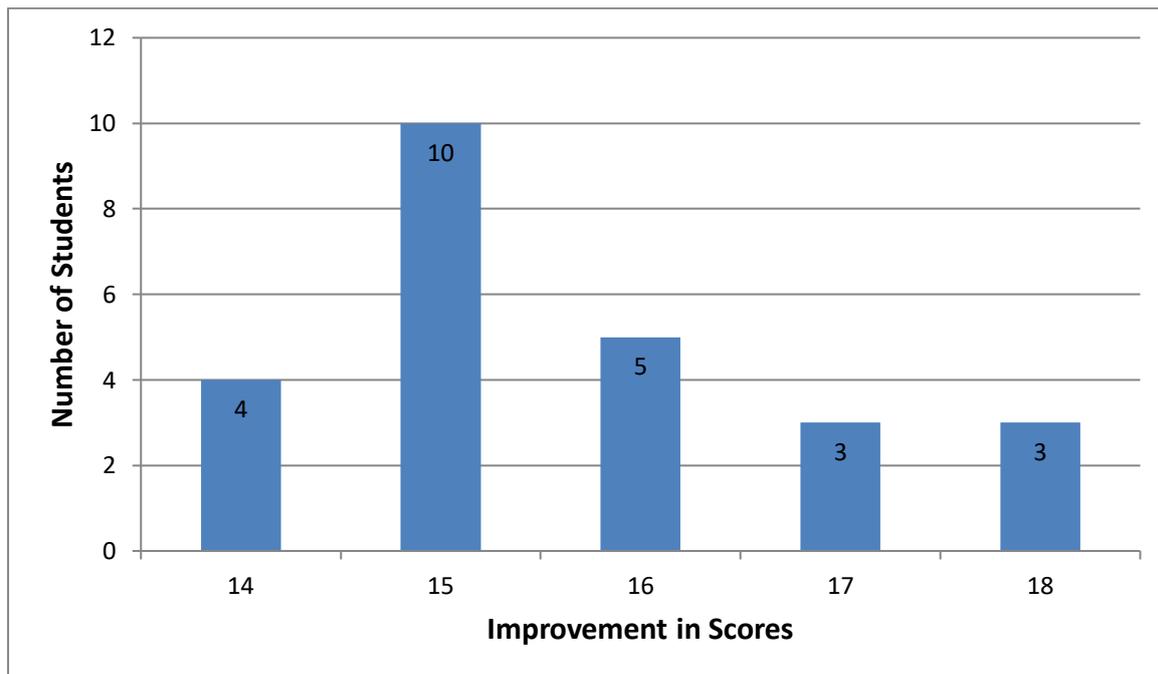

Diagram 3.
Distribution of Student Score Improvements

These findings align with prior meta-analytic evidence on the effectiveness of intelligent tutoring systems in higher education, which have been shown to produce learning gains of similar or greater magnitude (Ma et al., 2014; Hajijah et al., 2025; Husin et al., 2025).). The consistent upward trajectory across all 25 participants also echoes claims in the literature that adaptive AI feedback supports more uniform student achievement by offering real-time, personalized scaffolding (Masuwd et al., 2024; Manshur et al., 2025; Kasheem et al., 2025). Moreover, the large effect size observed here is comparable to those reported in studies of AI-enhanced STEM and language education (Alam et al., 2022; Setiawan et al., 2023; Abdulghani & Alrumayh, 2025), suggesting that these benefits can be extended meaningfully into religious education contexts such as Hadith studies.

In sum, the quantitative results provide compelling evidence that ChatGPT functioned as an effective intelligent tutor for Hadith instruction. Students not only improved significantly on standardized assessments but did so with a degree of consistency rarely observed in classroom-based interventions, highlighting the promise of AI integration in Islamic higher education.

B. Qualitative Findings

While the quantitative results demonstrated significant improvements in learning outcomes, the qualitative data provided deeper insight into the student experience of using ChatGPT as a learning tool for Hadith studies. Thematic analysis of interviews and reflective journals revealed three dominant themes: enhanced comprehension, increased motivation and engagement, and concerns over accuracy and over-reliance.

1. Enhanced Comprehension

Many students emphasized that ChatGPT helped clarify difficult Hadith concepts and Arabic terminology that they had previously struggled to understand. One participant reflected: *"Sometimes the textbook explanation was too short or too complex, but ChatGPT gave me simpler examples, and I finally understood the meaning clearly."* Another student explained that the AI's ability to provide multiple explanations of the same concept allowed them to approach Hadith interpretation from different angles, thereby deepening their comprehension. These findings align with Holmes et al. (2019) and Baroud & Aljarmi, (2025), who argue that AI systems can act as flexible learning companions, adapting explanations to match students' needs and improving cognitive accessibility.

2. Increased Motivation and Engagement

Students also reported that ChatGPT fostered greater confidence and willingness to engage with the material. The immediacy of responses, as well as the absence of judgment, encouraged more active questioning. As one student noted: *"I used to feel shy asking questions in class, but with ChatGPT I could ask anything and get an answer instantly."* This theme resonates with Deci and Ryan's (2000) self-determination theory, particularly the notion that autonomy and competence are central to intrinsic motivation. Prior studies on AI in education (Kasneci et al., 2023; Abdulghani et al., 2025; Abrahem & Baroud, 2025) similarly highlight how adaptive tutoring environments increase engagement by lowering barriers to participation.

3. Concerns over Accuracy and Over-Reliance

Despite the largely positive responses, some students expressed caution about depending too heavily on ChatGPT. A few pointed out minor inaccuracies or inconsistencies in the responses, particularly when nuanced contextual details of Hadith were involved. One student reflected: *"It was helpful, but I was not always sure if the answers were fully correct. I needed to check with the teacher."* Others noted that while ChatGPT made learning easier, it could risk diminishing the effort required for critical thinking and independent analysis. These concerns echo critiques in the broader AI and education literature, which warn of potential over-reliance on algorithmic outputs and the risk of uncritical acceptance (Sain et al., 2024; Kasheem et al., 2025; Firdaus et al., 2025).

C. Integrating Quantitative and Qualitative Insights

The convergence of quantitative and qualitative evidence provides a richer understanding of how ChatGPT shaped student learning in the Hadith course. The quantitative analysis demonstrated that all students achieved measurable gains, with a statistically significant improvement and a large effect size. The uniformity of these gains is noteworthy: no participant showed stagnation or regression, suggesting that the intervention had a broadly equitable impact across the cohort. However, numbers alone cannot explain why these improvements occurred or how students experienced the learning process. This explanatory dimension emerged through the qualitative findings.

The theme of enhanced comprehension complements the statistical evidence by showing that ChatGPT's capacity to reframe complex concepts in simpler terms likely underpinned the score increases. Students' testimonies that the AI provided "clearer explanations" and multiple examples mirror the consistency of performance gains across the sample. In this sense, the improvement in test scores and the lived experiences of clearer understanding are mutually reinforcing strands of evidence.

Similarly, the theme of increased motivation and engagement helps to contextualize the robustness of the results. Students noted that the immediacy of responses and the non-judgmental space created by ChatGPT encouraged them to persist with tasks they may have otherwise abandoned. This motivational boost is consistent with the strong average improvement (+16.5 points), since sustained engagement is a well-documented predictor of academic success (Deci & Ryan, 2000; Alouzi, 2024). In line with earlier studies on AI tutoring systems (Kasneci et al., 2023; Ma et al., 2014; Masoud et., 2025), the triangulated evidence suggests that ChatGPT did not merely convey information but fostered an environment conducive to continuous learning.

At the same time, the concerns voiced by students about accuracy and dependence provide a necessary counterbalance to the otherwise positive quantitative results. While test scores indicated mastery of the assessment material, students' reflections remind us that such improvements may come at the cost of uncritical reliance if not carefully mediated by instructors. This tension illustrates a key point: statistical significance does not equate to pedagogical sufficiency. Without teacher oversight, AI-supported learning could risk undermining the interpretive rigor central to Hadith scholarship.

Thus, triangulation of the two data streams leads to a nuanced conclusion. The quantitative evidence confirms that ChatGPT significantly improved students' Hadith comprehension in measurable terms. The qualitative insights explain the mechanisms of these gains, personalization, motivation, and engagement, while also cautioning against over-reliance and inaccuracy. Together, the findings demonstrate that AI has the potential to enrich Islamic higher education, but only when integrated thoughtfully, with clear pedagogical boundaries and ongoing human oversight.

D. Implications for Islamic Higher Education and Beyond

The outcomes of this study carry significant implications not only for the teaching of Hadith at the University of Benghazi but also for the wider landscape of Islamic higher education. The demonstrated effectiveness of ChatGPT in enhancing comprehension and motivation suggests that AI-based learning environments can become powerful supplementary tools within faith-based educational contexts. This is particularly relevant in disciplines such as Hadith, Qur'anic studies, and Islamic jurisprudence, where the complexity of texts often requires interpretive scaffolding. In line with recent multidisciplinary Qur'anic analyses such as (Alsaeh et al., 2025; Andriawan & Alrumayh, 2025), which illustrate how classical Islamic texts can be illuminated through contemporary analytical tools, this study similarly demonstrates how emerging technologies like AI can deepen students' engagement with and understanding of Hadith.

At the same time, the results caution against an uncritical embrace of technological tools. The concerns voiced by students regarding over-reliance on ChatGPT and potential inaccuracies echo broader debates in Islamic scholarship about balancing innovation with

fidelity to tradition. As Ichwan et al. (2024) remind us in their analysis of Sufism and Qur'anic interpretation, the cultural and spiritual dimensions of Islamic learning remain essential, and cannot be replaced by algorithmic outputs. Our findings reinforce the view that while AI can function as a valuable interpretive aid, it must be carefully integrated within pedagogical frameworks guided by scholars who ensure theological rigor and contextual sensitivity.

The findings also resonate with wider currents in contemporary Islamic thought. For instance, Alriteemi et al. (2025) and Alrumayh et al. (2025) show how hermeneutical approaches to Qur'anic narratives reveal pedagogical dimensions that deepen comprehension, much like AI's potential to illuminate complex Hadith themes. Similarly, Ayad et al. (2025) and Lestari et al. (2025) argue that Islamic principles must remain distinct when engaging with modern systems, whether in economics or pedagogy, underscoring the need to align AI-based education with maqāṣid al-sharīʿah and maslahah. Students' concerns about accuracy in ChatGPT's responses also parallel the issues raised by Hasanuddin et al. (2024) and Sulaksono et al. (2025), who emphasize the necessity of safeguards and ethical frameworks when integrating technology into Islamic contexts.

A growing body of contemporary scholarship, ranging from philosophical hermeneutics in religious literature (Masuwd, 2025) to critical examinations of Hadith and Qur'anic historicity within broader debates on religious syncretism and revisionist approaches (Pulungan et al., 2025; Aini et al., 2025), demonstrates the ongoing relevance of interpretive rigor and methodological plurality in Islamic studies, a principle that likewise underpins the thoughtful integration of AI tools into Hadith pedagogy.

Moreover, the motivational role of AI in this study mirrors broader sociological findings. Luhuringbudi et al. (2025), for example, highlight how the "living Qur'an" profoundly influences Generation Z's religious identity formation. In a similar way, the interactive and accessible features of ChatGPT appear to have strengthened students' engagement with Hadith, nurturing a more confident and motivated learning culture. This finding is in line with Padang and Kasheem's (2025) and Pallawagau et al. (2025) observation that organizational and cultural factors significantly shape human behavior, suggesting that pedagogical environments enriched with AI may foster not only academic gains but also shifts in student identity and agency. In the same spirit of evidence-based caution highlighted in studies such as Alsae et al. (2025), Albshkar et al. (2024), the integration of AI into Islamic education likewise requires rigorous evaluation to ensure its safety, appropriateness, and alignment with established scholarly standards.

The study nevertheless has limitations that should be acknowledged. The small, single-institution sample restricts the generalization of the findings, and the short intervention period makes it uncertain whether the gains in comprehension and motivation would endure over time. Moreover, the absence of a comparison group limits the conclusions about ChatGPT's impact relative to traditional pedagogies, despite expert validation of the assessment tools. Future research should employ more rigorous designs, such as randomized controlled trials, longitudinal analyses, and cross-institutional comparisons, to better assess the long-term and context-specific effects of AI-assisted learning in Islamic studies.

CONCLUSION

This study provides compelling evidence that ChatGPT can serve as a valuable pedagogical supplement in Islamic higher education, particularly in Hadith instruction. Quantitative findings revealed consistent and statistically significant improvements across all participants, while qualitative evidence explained these gains through enhanced comprehension, motivation, and engagement. At the same time, students' concerns regarding accuracy and over-reliance highlight the limitations of AI tools in religious education, where authenticity and critical scholarship are paramount.

The implications are twofold. Pedagogically, ChatGPT offers opportunities for more personalized and accessible learning experiences, particularly in resource-limited contexts such as the University of Benghazi. Strategically, its structured integration, supported by teacher oversight and digital literacy training, can help institutions harness the benefits of AI while mitigating risks. More broadly, the study positions AI not as a replacement for traditional scholarship but as a complementary tool that can enrich Islamic education when critically mediated.

By extending research on AI in education into the domain of Hadith studies, this work fills an important gap in the literature and demonstrates how technological innovation can be aligned with the intellectual and spiritual rigor of Islamic scholarship. Future studies should explore longer interventions, comparative cohorts, and cross-cultural contexts to deepen understanding of AI's role in religious education.

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