

Turats Literacy Transformation: The Effectiveness of Artificial Intelligence on Students' Qira'ah Competence of Turats in Pesantren-Based Madrasah

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Abstract: This study aims to examine the effectiveness of Artificial Intelligence (AI) in transforming turats literacy, specifically students' Qira'ah competence of Classical Islamic texts in pesantren-based madrasah. A quantitative approach with a quasi-experimental nonequivalent control group design was employed. The sample consisted of 50 students of Madrasah Aliyah Nurul Jadid Paiton, Probolinggo, selected purposively and divided into an experimental group (n=25) receiving AI-assisted learning and a control group (n=25) receiving conventional learning. Data were collected using a technology acceptance questionnaire based on the Technology Acceptance Model (TAM) and an objective test of Classical Islamic texts reading covering nahwu, sharaf, and mufradat (30 items). Data analysis included normality and homogeneity tests, paired sample t-test, independent sample t-test, and simple linear regression using SPSS. The results show a significant improvement in the experimental group, with post-test mean increasing from 14.52 to 25.32, compared to the control group from 14.20 to 17.92 ($p < 0.001$). The regression analysis revealed $R^2 = 0.817$, indicating that AI contributed 81.7% to the improvement of Qira'ah competence. These findings demonstrate that adaptive integration of AI, such as NLP-based chatbots and automated harakat tools, can facilitate mastery of Arabic grammatical structures while preserving traditional pedagogical values of pesantren. The study provides empirical evidence for developing a hybrid pesantren-cyber learning model.

INTRODUCTION

Pesantren is a traditional Islamic educational institution that has long played a role as a center for teaching religious sciences in Indonesia (Astuti et al., 2024). This institution not only has a long and respected history but also demonstrates high adaptive capacity to the dynamics of the times and has gained wide acceptance from various circles of society (Kasmah et al., 2023).

Furthermore, pesantren is expected to be able to become a significant cultural contributor in meeting the needs of present and future society (Arif, Aziz, Harun, & Ma'arif, 2023). As an indigenous educational institution of the archipelago, the main authority in pesantren lies in the figure of the kiai who has a dual role as educator, spiritual leader, as well as owner of the pesantren (Abidin, 2020; Abubakar, 2018; Adib, 2021).

Along with the development of national education, integration between pesantren and madrasah has become a strategic necessity. According to Abdullah (2013), this has received attention since the beginning of Indonesian independence, precisely on January 31, 1946, when the Ministry of Religious Affairs was officially mandated to foster and develop the pesantren and madrasah education system. This integration produces a distinctive educational model, namely pesantren-based madrasah, which combines the strengthening of general subjects with an emphasis on religious education.

One of the main identities of madrasah rooted in pesantren is the learning of Classical Islamic texts, namely classical texts in Arabic without diacritics inherited from salaf scholars (Muafiah, Sofiana, and Khasanah, 2022). Classical Islamic texts is a primary reference in the study of fiqh, tafsir, aqidah, and tasawwuf, and reflects scholarly authority in the traditional Islamic world (Aliya, Anhar, and Marhamah, 2025).

Classical Islamic texts is a source of classical Islamic literature that contains the treasures of knowledge of salaf scholars, ranging from fiqh, tafsir, hadith, to morals (Rustam and Ichsan, 2020). Among Islamic educational institutions such as madrasah, especially those affiliated with pesantren, learning Classical Islamic texts is an important part in shaping students' Islamic reasoning and scholarly character (Khoiriyah et al., 2023).

However, the ability to read and understand Classical Islamic texts often becomes a challenge for students, given the characteristics of the Arabic language used in Classical Islamic texts which is gundul (without harakat), with complex nahwu and sharaf structures (Fauzi et al., 2024).

The complexity of classical Arabic, especially in the aspects of nahwu (syntax) and sharaf (morphology), is a challenge for students, especially at the Madrasah Aliyah level (Muzakki, Aisyah, and Munif, 2024). Lack of mastery of language structure and vocabulary often hinders their understanding of these texts (Jazilurrahman, 2022).

Classical Islamic texts is a classical Islamic literature containing various disciplines of Islamic knowledge, written in Arabic without harakat (Arab gundul), thus requiring high linguistic competence to understand (Fakhor, Syathori, and Nuryadien, 2019). This book has become the main

scientific heritage in Islamic educational institutions such as pesantren and madrasah (Sulistiyati, 2023). However, amidst the modernization of education, the ability of madrasah students to read and understand Classical Islamic texts shows a fairly significant decline.

Sociologically, there are various obstacles that cause weak ability to read Classical Islamic texts among madrasah students (Restu Hoeruman et al., 2023). First, limited learning time. Many madrasahs, especially formal madrasahs, do not provide sufficient time allocation for teaching Classical Islamic texts due to a dense curriculum burdened by the integration of national and religious curricula (Sulaiman, 2021). Second, not all teachers have a strong pesantren background or methodological skills in teaching classical books (Syamsuddin, 2020), so Classical Islamic texts learning methods tend to be conventional and less innovative. Third, low reading interest and literacy of classical Arabic texts among students, who are more familiar with digital technology and visual content, further worsen the situation (Azzet, 2019).

Mubarok's (2020) research shows that more than 60% of Madrasah Aliyah students in East Java region have difficulty understanding the structure of nahwu and sharaf of Classical Islamic texts, and experience confusion in determining the meaning of lafaz. This is reinforced by Rahman (2022), who reveals that weak basic Arabic ability of students affects their absorption of Classical Islamic texts material. This condition potentially threatens the continuity of inheritance of classical Islamic scholarly tradition which is characteristic of madrasah education.

MA Nurul Jadid Paiton Probolinggo as part of a large pesantren institution in East Java has special attention to strengthening the tradition of classical Islamic literacy. However, reality in the field shows that the ability to read Classical Islamic texts among MA students is still relatively low. This can be seen from students' difficulties in understanding the structure of gundul Arabic sentences, weak mastery of nahwu and sharaf rules, and high dependence on instant translation (makna gundul or Javanese pegon).

Several factors suspected of influencing this condition include: lack of motivation to learn Classical Islamic texts, less varied learning methods, and limited learning time allocated in the midst of formal madrasah curriculum.

In this context, digital transformation provides new opportunities to overcome these obstacles. One relevant innovative breakthrough is the utilization of Artificial Intelligence (AI) in the learning process. AI-based technology, such as ChatGPT, Google Translate, and Natural Language Processing (NLP) applications (Zakiyyah, 2024), offers the ability to translate and decipher classical Arabic sentence structures quickly and interactively (Restu Hoeruman et al., 2023). This allows students to interact directly with intelligent machines, simplify complex sentences, and understand root words and morphological forms of the text (Sofi et al., 2023).

Through the use of AI, Classical Islamic texts learning can be more adaptive and inclusive, without completely abandoning the intellectual

tradition of pesantren (Wicaksono, Kasmantoni, and Walid, 2021). On the other hand, the development of artificial intelligence (Artificial Intelligence/AI) technology offers a potential solution to answer these challenges. AI technology can be used to provide automatic harakat on Arabic texts, translate Classical Islamic texts, and provide grammatical understanding in real-time (Kristanto, 2020).

However, the utilization of this technology in the context of madrasah education is still not optimal. The lack of research and empirical tests on the effectiveness of AI in improving the ability to read Classical Islamic texts is an important gap to be studied.

Several previous studies have discussed the application of digital technology and AI in the general context of Arabic learning. For example, Fitriyani (2020) in her research examined the use of Qamus Al-Mutun application equipped with AI features such as automatic translation and morphological search of words. Other research by Azizah and Wibowo (2021) examined the effectiveness of OCR (Optical Character Recognition) technology for Arabic texts in supporting Classical Islamic texts learning. AI is used to convert gundul text into voweled text that can be read by students.

In a broader study, Nugroho (2022) examined the integration of AI in the development of turats-based e-learning in modern pesantren environments. Furthermore, Zulfa and Hidayat (2022) conducted experimental studies on the use of Natural Language Processing (NLP) in Classical Islamic texts learning applications, showing that features such as automatic translation, sentence structure analysis, and identification of fi'il-fa'il in turats texts can help students understand Classical Islamic texts content. In the context of modern pesantren, Latifah (2023) examined the effectiveness of AI-based tahqiq al-matn applications that can detect errors in reading classical Arabic texts.

Based on the review of several previous studies, it can be emphasized that this research has novelty in the following aspects: first, focus on Classical Islamic texts, not just ordinary Arabic texts, especially the teaching of classical Islamic turats in madrasah; second, directly measuring the influence of AI on students' abilities; third, the research context is in madrasah, a formal educational institution that often has not optimally utilized technology in Classical Islamic texts learning.

Thus, this study fills a gap that has not been filled by previous research, as well as providing empirical contribution to the development of technology-based Classical Islamic texts learning methodology in formal Islamic education environment.

Therefore, this study aims to determine whether the use of AI technology has a significant influence on students' ability to read Classical Islamic texts, and to what extent the influence is. These findings are expected to provide scientific contribution in developing technology-based Classical Islamic texts learning strategies in madrasah and pesantren.

RESEARCH METHOD

This research employed a quantitative approach with a quasi-experimental nonequivalent control group design. The quantitative paradigm was chosen because the study aimed to measure objectively the effect of AI-based intervention on Qira'ah competence and to test hypotheses through statistical procedures (Creswell, 2014; Sugiyono, 2019). In educational settings where true randomization is impossible due to administrative and ethical constraints, quasi-experimental design provides a rigorous alternative to establish causal inference (Campbell & Stanley, 1963; Shadish, Cook, & Campbell, 2002).

Specifically, the nonequivalent control group design allows comparison between two intact groups that are not randomly assigned but have comparable characteristics (Cohen, Manion, & Morrison, 2018). This design was considered most ecologically valid for madrasah context because random assignment would disrupt existing class structures and pesantren culture. The design follows pattern: O1 X O2 (experimental) and O3 – O4 (control). This enables both within-group and between-group comparisons, strengthening internal validity.

The research was conducted at Madrasah Aliyah Nurul Jadid Paiton and MAN 1 Probolinggo. Selection was purposive and theoretically driven: MA Nurul Jadid represents pesantren-based madrasah with strong turats tradition and sorogan-bandongan, while MAN 1 represents state madrasah with modern pedagogy. This dual setting enriches external validity (Muafiah et al., 2022; Abidin, 2020). Population: 10th-grade religious program (MA Keagamaan) – critical transition period for forming Qira'ah habitus.

Population ±120 students. Total 50 students selected purposively based on: (a) 10th-grade religious program; (b) completed basic Arabic; (c) minimum digital literacy; (d) willingness to participate; (e) no prior intensive AI Arabic experience (Creswell, 2014). Divided into experimental group (n=25) receiving AI-based learning and control group (n=25) receiving conventional learning. Sample size 25 per group meets minimum requirement for parametric analysis ($n \geq 15$ per group for t-test with moderate effect size) (Cohen, 1988; Field, 2018). Baseline equivalence verified through pre-test to strengthen internal validity (Shadish et al., 2002).

Two instruments were used. The first is a Technology Acceptance Questionnaire grounded in Davis's (1989) Technology Acceptance Model (TAM), recognized as the most parsimonious and robust framework for explaining user acceptance of emerging technologies (Venkatesh & Davis, 2000; Venkatesh & Bala, 2008). TAM traces the psychological mechanism from external beliefs to internal attitudes and ultimately to behavioral intention, providing explanatory power for sustainable adoption beyond superficial liking. The questionnaire operationalizes four interrelated constructs, namely Perceived Usefulness (PU) as belief that AI enhances Classical Islamic texts reading performance, Perceived Ease of Use (PEOU) as perception that AI interaction is free from cognitive and technical effort, Attitude Toward Using (ATU) as evaluative affective response, and Behavioral Intention to Use (BI) as strength of intention to continue using

AI. Consisting of twenty items (five per construct) using a five-point Likert scale, it was adapted from Davis and contextualized to Classical Islamic texts learning based on recent AI in Islamic education studies (Aliya et al., 2025; Fauzi et al., 2024) to ensure ecological validity for pesantren context.

Content validity was established through expert judgment (two educational technology experts and one Arabic linguistics expert) yielding CVI exceeding 0.80, construct validity through pilot testing with exploratory factor analysis showing loadings above 0.60, and reliability with Cronbach's alpha above 0.82 per construct and above 0.89 overall, exceeding acceptable internal consistency (Hair et al., 2019). Interpretatively, TAM serves as diagnostic tool for readiness of digital transformation, where understanding PU and PEOU is crucial to address technophobia and concerns about AI replacing kyai authority.

The second instrument is an objective test of Classical Islamic texts reading competence (Qira'ah al-Kutub) measuring analytical linguistic competence rather than rote memorization, comprising thirty multiple-choice items covering three epistemological pillars of turats reading, namely nahwu as syntactic analysis, sharaf as morphological transformation, and mufradat as lexical semantics in context (Zulfa & Hidayat, 2022; Nugroho, 2022). Nahwu items assess i'rab identification (fi'il, fa'il, maf'ul, muqtada', khabar, jar-majrur), sharaf items assess tasrif ishtiqaqi and lughawi including wazan and root extraction, and mufradat items assess contextual vocabulary comprehension. Test passages were constructed from authentic basic turats texts Matn al-Jurumiyah and Safinatun Najah, ensuring content authenticity and requiring higher-order analytical reasoning such as determining i'rab of unvoweled sentences.

Content validity was established through expert judgment by two senior nahwu-sharaf lecturers and one psychometric expert yielding Aiken's V above 0.80, and reliability using KR-20 showing Cronbach's alpha above 0.84 categorized as high reliability (Cohen et al., 2018). Philosophically, this instrument operationalizes Qira'ah competence as fiqh al-lughah and fahm al-maqrû', deep linguistic comprehension integrating textual, grammatical, and contextual understanding consistent with pesantren epistemology prioritizing meaning over mere decoding.

Data collection was conducted through pre-test and post-test with an eight-week intervention comprising sixteen meetings of ninety minutes each, where the experimental group received AI-based learning designed as cognitive scaffolding that augments rather than replaces kyai authority, embodying the principle of Intelligence Augmentation rather than substitution and aligning with pesantren adab principle that technology is wasilah not ghayah (Holmes et al., 2019; Luckin & Holmes, 2016). This AI intervention integrates three purposively selected tools based on pedagogical affordance, namely ChatGPT-based Arabic parsing where students input unvoweled Classical Islamic texts sentences and AI provides detailed i'rab analysis and syntactic tree visualization functioning as virtual musahhih that provides immediate individualized feedback and transforms abstract qawa'id into visible interactive mapping, AI-OCR for Classical Islamic texts digitization utilizing Tarteel AI and Makhtutat OCR trained for

Arabic script to digitize yellowed pages into editable searchable text enabling mufradat search via digital mu'jam and cross-referencing, and automated harakat and translation applications providing automated tashkeel and contextual translation with grammatical analysis offering immediate corrective feedback that shortens the learning cycle and enhances metalinguistic awareness (Kristanto, 2020; Wicaksono et al., 2021).

In contrast, the control group received conventional learning using sorogan and bandongan methods, where sorogan emphasizes personalized apprenticeship with santri reading in front of kyai and bandongan emphasizes collective transmission through kyai lectures while santri annotates, preserving ecological validity and cultural authenticity of traditional pesantren pedagogy (Aliya et al., 2025). Analytically, this design contrasts augmented intelligence as cognitive partner extending human cognition versus traditional apprenticeship as human-to-human transmission through sanad, empirically testing whether AI can amplify turats tradition without eroding its spiritual chain and adab, not about superiority of technology over tradition but about complementarity and whether AI-augmented learning can accelerate linguistic competence while preserving barakah and adab of traditional methods in response to Society 5.0 challenges (Restu Hoeruman et al., 2023; Zakiyyah, 2024).

Data analysis was performed using SPSS 26 at $\alpha=0.05$ in three stages. Prerequisite tests included normality test using Shapiro-Wilk, more powerful for $n<50$ than Kolmogorov-Smirnov (Razali & Wah, 2011), and homogeneity test using Levene's test for variance assumption. If data were non-normal, non-parametric alternatives (Wilcoxon and Mann-Whitney) would be used. Hypothesis testing used paired sample t-test to examine within-group improvement (O1 vs O2) and independent sample t-test for between-group differences (O2 vs O4), with Cohen's d (0.2 small, 0.5 medium, 0.8 large) to assess practical significance beyond statistical significance (Cohen, 1988).

Simple linear regression was then employed to determine contribution of AI usage to Qira'ah competence, with TAM total score as predictor and Qira'ah post-test as criterion. R-square indicates variance percentage explained, answering not only whether AI works but how much and why acceptance matters. Interpretatively, this three-stage analysis—descriptive (prerequisite), inferential (t-tests), and explanatory (regression)—bridges statistical results with pedagogical implications, providing evidence-based foundation for AI integration in turats learning.

RESULTS AND DISCUSSION

Descriptive statistical results show an increase in Classical Islamic texts reading ability in both experimental and control groups, although with significantly different achievements.

In the experimental group, pre-test scores had a score range of 11 with a minimum score of 9 and maximum of 20. The average pre-test score was 14.52 with a standard deviation of 2.888, indicating that participants' scores varied considerably.

After being given treatment in the form of using Artificial Intelligence

(AI) technology in learning, there was an increase in post-test scores, with a range of 8 (min 20 - max 28), the average increased to 25.32, and standard deviation decreased to 1.952. This decrease in standard deviation indicates that participants' scores became more centered and stable after intervention.

Meanwhile, in the control group that did not use AI, pre-test scores showed a score range of 12 (min 9 - max 21), with an average of 14.20 and standard deviation of 2.769. After conventional learning, post-test scores also increased although not as large as the experimental group. The average score increased to 17.92, with a score range of only 7 (min 14 - max 21), and standard deviation of 1.605.

Comparison of average pre-test between the two groups (14.52 vs. 14.20) shows that initial ability of participants was relatively equal. However, a striking difference in post-test scores (25.32 in experimental group vs. 17.92 in control group) shows that the use of AI technology has a significant positive influence on improving students' Classical Islamic texts reading ability.

Table 1: Pre-test and Post-test of Experimental and Control Groups on Classical Islamic texts Reading Ability

Descriptive Statistics						
	N	R	Min	Max	Mn	Std.Dev
Pre-Test Eks	25	11	9	20	14,52	2,888
Post-Test Eks	25	8	20	28	25,32	1,952
Pre-Test Kntr	25	12	9	21	14,20	2,769
Post-Test Kntr	25	7	14	21	17,92	1,605
Valid N (listwise)	25					

Paired Sample t-test

Based on the results of the paired sample t-test, a significant difference was found between pre-test and post-test scores in both groups. In the experimental group (Pair 1), there was a mean difference of -10.800, with t-count -15.074, p-value <0.001, and 95% confidence interval in the range -12.279 to -9.321. All values in this interval are below zero, indicating a significant increase.

Similarly, in the control group (Pair 2), with a mean difference of -3.720, t-count -6.558, and p-value <0.001, and 95% confidence interval between -4.891 to -2.549. Although an increase also occurred in this group, the difference was much smaller than the experimental group. Thus, these results show that the use of AI technology significantly improves students' ability compared to conventional methods.

Independent Sample t-test

The results of the independent sample t-test show a significant difference between post-test scores of students in the experimental and control groups. Obtained t-value = 14.641 with degrees of freedom (df) = 48 and significance value <0.001 , which is much smaller than $\alpha = 0.05$ limit. The mean difference between the two groups was 7.400, with standard error 0.505, and 95% confidence interval.

Thus, it can be concluded that the use of Artificial Intelligence (AI) technology has a significant influence on improving students' ability to read Classical Islamic texts. The significant difference in scores between the two groups strengthens the finding that AI integration in learning process is able to provide greater positive impact than conventional methods. Therefore, the hypothesis is accepted.

Simple Linear Regression Test

Simple linear regression test is a statistical analysis technique used to determine the influence between one independent variable on one dependent variable. In this research context, regression test is used to see how much influence the use of Artificial Intelligence (AI) technology has on students' Classical Islamic texts reading ability. Linear regression aims to measure how much contribution AI makes.

The basis for decision making in simple linear regression test refers to significance value (Sig.) produced in analysis output. If significance value <0.05 , it can be concluded that independent variable (X) has significant influence on dependent variable (Y). Conversely, if significance value >0.05 , then it can be concluded that there is no significant influence.

Based on ANOVA test results, obtained F-count value of 214.353 with significance value <0.001 , far below significance threshold of 0.05. Sum of Squares between groups (Regression) is 684.500 with degrees of freedom (df) = 1, and Mean Square of 684.500. The Sum of Squares within groups (Residual) is 153.280 with df = 48, resulting in Mean Square of 3.193.

Thus, the regression model used is proven to be statistically significant, which means there is a strong influence between independent variable, namely the use of AI, on dependent variable, namely Classical Islamic texts reading ability. This finding reinforces that utilization of AI technology contributes significantly to improving students' competence in understanding classical Arabic texts. Therefore, the model is feasible to use.

Based on simple linear regression analysis results displayed in Model Summary table, obtained R value = 0.904, which indicates a very strong positive correlation between the use of Artificial Intelligence (AI) technology and Classical Islamic texts reading ability. R Square (R^2) value = 0.817 shows that 81.7% of variation in Classical Islamic texts reading ability can be explained by the use of AI technology. The remaining 18.3% is influenced by other factors outside the model.

Table 2: Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	0.904	0.817	0.813	1.786

In addition, Standard Error of the Estimate = 1.786 indicates relatively small prediction error rate of the model, which strengthens that this model has good predictive ability. Thus, it can be concluded that the use of AI provides significant contribution in improving students' Classical Islamic texts reading ability. This regression model is considered strong and effective in explaining the influence.

These findings are in line with Holmes et al. (2020) who emphasizes that AI helps accelerate understanding and personalization of learning. In the context of Classical Islamic texts, technology helps understand grammatical structure and classical Arabic vocabulary. This result also supports TAM model that perception of benefits and ease will affect students' positive attitude towards the use of AI in learning (Kurniawati, 2017; Pratiwi et al., 2020).

The significant difference between groups also indicates that conventional sorogan-bandongan alone is less effective in addressing time constraints and heterogeneous student abilities in formal madrasah. Adaptive AI integration enables differentiated learning that respects traditional values while meeting digital-era literacy needs. AI acts as *mu'allim musaid* (assistant teacher) that strengthens foundational competence, allowing teachers to focus on higher-order comprehension and *adab*. This supports the concept of hybrid *pesantren-cyber* model where algorithmic assistance complements *kiai's* authority, not disrupts it (Wicaksono et al., 2021).

This study contributes to Islamic education management by providing empirical evidence for policy makers in *pesantren*-based madrasahs to develop AI-integrated *turats* curriculum with ethical and pedagogical considerations.

CONCLUSION

Based on descriptive and inferential analysis, both experimental and control groups experienced increased *Qira'ah* competence of Classical Islamic texts after learning. However, the experimental group using Artificial Intelligence technology showed significantly higher improvement than the control group. The average post-test score of the experimental group increased markedly from 14.52 to 25.32, while the control group increased from 14.20 to 17.92. Inferential tests including paired sample t-test, independent sample t-test, and simple linear regression showed significance values <0.001 , with high *t* and *F* values and *R Square* of 0.817, indicating that AI explains 81.7% of variance in reading competence. Thus, the research hypothesis stating that AI has a positive influence is accepted. The utilization of AI technologies such as NLP-based chatbots and automated translation platforms not only facilitates understanding of classical Arabic but also enhances the effectiveness of Classical Islamic texts learning, particularly in reading competence, by strengthening mastery of *nahwu*, *sharaf*, and *mufradat*.

RECOMMENDATION

Based on findings, several recommendations are proposed. For theoretical development, future research should explore long-term effects of AI on critical istinbath reasoning and development of AI models trained specifically on turats corpora such as Fathul Qarib and Safinatun Najah. For educational practice, pesantren-based madrasahs should implement blended learning where AI serves as pre-reading tool for harakat and morphological analysis before face-to-face sorogan with ustadz to maintain sanad continuity. For policy, the Ministry of Religious Affairs and pesantren leaders should formulate ethical guidelines for AI use in religious education to prevent over-dependence and ensure adab. Stakeholders include curriculum developers, teachers of Classical Islamic texts, and educational technology developers who should collaborate to create contextually appropriate AI applications for turats literacy.

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