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Comparison of the Implementation of Digital and Conventional Learning Methods on Student Retention at MA Tuhfatul Ulum

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A B S T R A C T

This study compares the effectiveness of digital and conventional learning methods on students' retention at MA Tuhfatul Ulum. Traditional methods, particularly lectures, dominate the educational process but have limited effectiveness in engaging students actively. In contrast, digital learning methods, such as educational games, provide an innovative approach that enhances student engagement and retention. This research uses a quantitative comparative method with a sample of 47 students. Data were collected through observation, structured interviews, questionnaires, and documentation. The results, analyzed using One-Way ANOVA, indicate a significant difference in retention scores between the digital learning group (Mean = 81.09) and the conventional learning group (Mean = 56.52), with a significance value of 0.000. These findings demonstrate that digital methods, which encourage active participation and multisensory engagement, significantly improve long-term memory retention compared to traditional methods. Therefore, the study recommends the integration of digital learning tools to enhance the effectiveness of teaching and learning.

1. Introduction

Learning is the core of the entire educational process that takes place within academic institutions. Fundamentally, the quality of learning is complex and dynamic, with its main factor being determined by the effectiveness of the interaction between educators and students (Risana et al., 2025). However, in practice, conventional methods such as lecturing still dominate our education system. Although efficient in terms of time, this method tends to place the teacher as the sole authority of information, often neglecting the active involvement of students (Haholongan et al., 2024). According to (Ardhiyani, 2025), teachers are

expected not only to deliver content but also to shape students' character and intellect. However, media limitations often hinder optimal message delivery, making it difficult for students to deeply understand the material. To improve the quality of learning, educational institutions are also responsible for providing high-quality educators. Teachers are expected to contribute to the formation of students' personality, attitude, morals, and intellect. They are also expected to choose the appropriate teaching methods and media to ensure that students can understand the material, thereby enhancing the quality of learning (Boshnjaku et al., 2026)

In response to these challenges, the integration of digital learning methods, particularly through the use of educational games, has emerged as an innovative new paradigm. According to (Hajar et al., 2024), educational games are not merely entertainment tools, but media designed specifically to expand concepts, understand historical events, and help develop certain skills through interactive multimedia technology. The use of interactive media offers a meaningful learning experience through simulations responsive to students' actions. By presenting engaging visuals and interactive features, this digital method can minimize misunderstandings of material and stimulate students' minds to remain focused for longer durations compared to traditional lecture methods. Perception is the process by which individuals recognize objects and objective facts through their senses. Student learning perception refers to the way students view or understand the material and information received during the learning process (Sardila, 2025). In everyday life or in the world of education, perception plays a significant role as it forms the basis for decision-making. Therefore, students' perceptions of the teacher, media, and learning environment greatly influence their motivation and learning outcomes. When students have a positive perception of their learning experiences, they tend to be more enthusiastic and can understand the material more easily (Saadah et al., 2025)

At MA Tuhfatul Ulum, the phenomenon of learning fatigue due to routine classroom activities has become an issue that needs to be explored in depth. Continuous learning activities without any variation of innovative media risk decreasing students' interest and enthusiasm. Students' perception plays a crucial role in this context, as their view of the media used by teachers directly affects their motivation and learning outcomes. Therefore, a comprehensive study is needed on how the transition from conventional to digital methods can affect students' retention or memory of the material, as positive perception is an early indicator of the success of an educational innovation. Educational games as classroom media can be applied to students as a form of entertainment to reduce the monotony of continuous learning activities (Makraja, 2024). A learning media that is packaged in a fun and non-pressuring way can enhance students' enjoyment and improve their comfort in learning.

Research by (Riska, 2023)in the journal Bimbingan dan Konseling Pandu discusses the implementation of a microlearning model to improve student learning retention at the Madrasah Aliyah level. This study shows that delivering content digitally through small, dense units (micro-content) helps minimize students' cognitive load compared to conventional methods that tend to present large volumes of material at

once. The results of this study confirm that strategically using digital media has a significant impact on students' long-term memory retention in understanding religious education content (Alkan, 2026).

In a comparative study conducted by (Khairunnisa & Apoko, 2023) in Jurnal Tarbiyah Almuslim, an in-depth analysis was carried out on the effectiveness of conventional learning methods compared to e-learning. The findings indicate that classrooms employing digital methods offer higher flexibility and accessibility to resources, which in turn positively contributes to learning outcomes. However, this study also notes that conventional methods are still needed to maintain the quality of social interaction between teachers and students in the classroom. Previous research by (Suriyati et al., 2024) in Jurnal Bunyan al-Ulum focused on comparing conventional and digital learning media, particularly in the field of Islamic education. The researchers found that digital media could visualize abstract concepts more concretely, directly impacting the improvement of students' memory retention. This study provides a foundation for Madrasah Aliyah schools to start integrating digital tools alongside traditional methods to optimize the understanding of theoretical subjects (Istanto, 2025).

An experimental study by (Istanto, 2025)in the Journal of Educational Sciences the impact of digital media on learning outcomes and student engagement. By comparing two sample groups, the researchers found that students exposed to interactive digital methods had significantly higher retention scores than those in the conventional lecture-based group. This was due to the digital method's ability to stimulate curiosity and allow for self-paced learning tailored to each student's learning speed.

The latest study by (Satriana et al., 2022) evaluates the effectiveness of information technology (IT)-based learning compared to conventional methods in terms of material retention. Data analysis shows a striking difference, where conventional methods often cause students to forget material more quickly due to their passive role. On the other hand, IT-based digital methods encourage active participation, strengthening neural pathways in students' memory, thereby helping the material stay longer in their long-term memory (Yunidah, 2025).

Based on this background, this study is designed to investigate the comparative effectiveness of digital and conventional learning methods in the context of student retention at MA Tuhfatul Ulum. Specifically, this research aims to analyze the differences in students' retention abilities when learning is conducted through digital media compared to traditional lecture-based methods. In addition, this study seeks to examine how the use of digital learning methods influences students' engagement, perceptions, and active participation during the learning process, which are important factors in strengthening long-term memory. Through a quantitative comparative approach, this research also intends to provide empirical evidence regarding the extent to which digital learning methods can enhance learning effectiveness compared to conventional approaches. Ultimately, the results of this study are expected to serve as a reference for educators and educational institutions in selecting and integrating appropriate learning methods, particularly

in Madrasah Aliyah settings, in order to improve the quality of learning and optimize students' retention of learning materials.

2. Methodology

Research Design

This study uses a quantitative approach with a comparative research design to examine differences in students' learning retention between classes that implement digital learning methods and those that apply conventional learning methods. The comparative method is chosen because it enables the researcher to directly compare two groups that receive different instructional treatments while focusing on the same outcome variable, namely students' retention scores. In this study, digital learning is implemented through the use of educational games, while conventional learning relies on lecture-based instruction. Students' learning retention is measured quantitatively using scores obtained after the learning process, allowing the results to be analyzed objectively. By comparing the retention scores of both groups, this research seeks to determine whether the learning method used has a significant effect on students' ability to retain learning material, thereby providing empirical evidence regarding the effectiveness of digital learning methods compared to conventional approaches (Prayitno, 2025).

Population and Sample

The population in this study consists of all 47 students of MA Tuhfatul Ulum. Considering that the total population is relatively small, with fewer than 100 students, this research applies a saturated sampling technique. According to (Septarina, 2024), saturated sampling is a sampling technique in which all members of the population are used as research samples in order to obtain comprehensive data. Therefore, all 47 students of MA Tuhfatul Ulum are involved as respondents in this study. The use of saturated sampling allows the researcher to capture the overall characteristics of the population without excluding any subjects, thereby ensuring that the data collected are representative and accurately reflect the actual conditions of students' learning retention in relation to the learning methods applied.

Data Collection Techniques

The researcher uses a combination of several data collection techniques to ensure the validity of the information obtained:

1. Observation: The researcher conducts non-participant observation by directly observing the learning process in the MA Tuhfatul Ulum classroom. The observed aspects include student involvement when the teacher uses conventional methods (lecture) compared to when using digital tools (educational games), as well as students' behavioral responses indicating their level of focus and memory retention (retention) on the material being taught.

2. Interviews: Structured interviews are conducted with teachers. This technique aims to explore further the challenges in conventional methods and the subjective impressions of students regarding the effectiveness of digital media in helping them retain lesson material in the long term.
3. Questionnaire: The main instrument in this study is a questionnaire consisting of 20 statements. The questionnaire is designed using the Likert Scale, where each item has response options ranging from very positive (Strongly Agree) to very negative (Strongly Disagree). The questionnaire is distributed to 47 respondents to measure their perceptions of the comparison between learning methods.
4. Documentation: The documentation technique is used to obtain objective data on the school's profile, the number of students, and student learning records, which can serve as references in measuring learning retention levels.

Data Analysis Techniques

In accordance with the attachment of data processing results using SPSS, the researcher uses the following statistical analysis:

1. Descriptive Statistics
   This is used to present data in the form of the mean, standard deviation, minimum, and maximum values for each of the class groups studied.
2. Prerequisite Test (Homogeneity Test)
   Before conducting comparison tests, a Homogeneity of Variance Test (Test of Homogeneity of Variances) is performed using Levene's Statistic. This test aims to ensure that the variance of the data from the compared class groups is the same (homogeneous).
3. One-Way ANOVA (Hypothesis Test)
   According to (Gefthi, 2024), the main analysis used is the One-Way ANOVA test. This test is chosen because the researcher aims to compare the average scores from several class groups to see if there are significant statistical differences.
   Decision Criteria: If the significance value (Sig.) < 0.05, the null hypothesis (H0) is rejected, which means there is a significant difference between the application of digital and conventional learning methods in terms of student retention.

3. Results and Discussion

Results

The research was conducted at MA Tuhfatul Ulum involving a total of 47 students as research participants. The students came from classes with heterogeneous academic abilities, ranging from moderate to high learning performance. In terms of gender composition, the participants consisted of both male and female students, reflecting the general demographic characteristics of Madrasah Aliyah students. Based on initial classroom observations, students were accustomed to a

conventional learning environment in which teachers played a dominant role in delivering learning materials. Learning activities were primarily conducted through lecture-based instruction, supported by textbooks and note-taking activities. This instructional pattern positioned students mainly as passive recipients of information, with limited opportunities for active participation, interaction, or exploration of learning content. As a result, students often demonstrated reduced attention, learning fatigue, and difficulty retaining learning materials for long-term memory.

Furthermore, the conventional learning practices at MA Tuhfatul Ulum prior to the research tended to emphasize content delivery rather than student engagement. Classroom interaction was generally one-directional, where teachers explained the material while students listened and recorded important points. The use of interactive or digital learning media was relatively limited, not due to the absence of technological resources, but rather due to habitual instructional practices. These conditions influenced students' learning motivation and participation, particularly in subjects requiring conceptual understanding. Several students showed limited responsiveness during learning activities and experienced challenges in recalling previously delivered material. This learning context indicates that although conventional methods are efficient for conveying information, they are less effective in fostering active cognitive involvement and strengthening students' retention abilities, thereby highlighting the need for alternative instructional approaches.

During the implementation of the research, learning activities were carried out during regular instructional hours to maintain the authenticity of the classroom setting. Students were exposed to two different learning approaches, namely conventional lecture-based learning and digital learning using educational game-based media. The digital learning approach was designed to encourage student interaction, engagement, and active participation in the learning process, while the conventional approach followed the instructional practices commonly used in the classroom. After the learning sessions were completed, qualitative data were obtained through informal structured clarification interviews with the subject teacher. These interviews were not intended to generate additional quantitative data, but rather to provide pedagogical reflection and contextual clarification regarding students' learning behavior, engagement, and retention as observed during the learning process. The interview questions were aligned with the quantitative findings to support the interpretation of differences in learning retention between digital and conventional learning methods. As part of the data analysis, Table 1 below presents the interview questions for the teacher.

Table 1. Teacher Interview Questions for Learning Retention Clarification

No	**Interview Questions**
1	How do students generally respond to conventional lecture-based learning in terms of attention and participation?
2	What difficulties do students commonly experience when learning through conventional methods?

3	How do students react when digital learning media, such as educational games, are applied in the classroom?
4	Based on your observation, are there differences in students' ability to remember learning materials between digital and conventional methods?
5	How does digital learning influence students' focus and engagement compared to conventional learning?
6	From your perspective, which learning method better supports long-term learning retention, and why?

This study aims to compare the effectiveness of learning retention between digital and conventional methods among MA Tuhfatul Ulum students, involving a total of 47 respondents. The initial stage of the data analysis begins with the presentation of descriptive statistics, which serve to offer a detailed overview of the score data gathered from both the digital learning group and the conventional learning group. This approach allows for a comprehensive understanding of how the two different learning methods have impacted students' retention abilities by examining the distribution of scores within each group, as well as providing insights into the central tendencies and variability of the data collected from the participants in both groups

Description of Reasearch Data

In this section, we present a detailed summary of the descriptive statistics of student retention scores, comparing the two groups—those using digital learning methods and those using conventional learning methods. This analysis is based on the data obtained from 47 students at MA Tuhfatul Ulum. The following table illustrates the mean, standard deviation, and standard error for the retention scores of both groups, along with the 95% confidence interval for the mean. By examining these statistical measures, we can gain a better understanding of how each learning method affects students' ability to retain knowledge. The data highlights the differences in the retention capabilities of students in both learning settings, allowing us to assess the overall impact of digital versus conventional learning on student retention. The results will further be used to inform the subsequent analyses and conclusions drawn from the study. Below is a table summarizing the descriptive statistics of the student retention scores for both groups. Below is Table 2, which summarizes the descriptive statistics of student retention scores for both groups, those using digital and conventional learning methods

Table 2. Summary of Descriptive Statistics of Student Retention Scores

Descriptives

			Score			
	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean	
					Lower Bound	Upper Bound
1	20	76.6500	16.50925	3.69158	68.9234	84.3766
2	16	72.3125	18.18688	4.54672	62.6214	82.0036
3	11	41.3636	3.20227	.96552	39.2123	43.5150
Total	47	66.9149	20.73941	3.02515	60.8256	73.0042

Descriptives			
	Score		
	Minimum	Maximum	
1	40.00	89.00	
2	38.00	86.00	
3	36.00	48.00	
Total	36.00	89.00	

From the table above, we can clearly observe the differences in the mean retention scores between the two learning methods. The group that used digital learning methods has a mean score of 76.65, which is higher compared to the conventional learning group's mean score of 72.31. Additionally, the digital group shows a wider range in scores, with a standard deviation of 16.51, indicating more variability in student performance. In contrast, the conventional learning group exhibits a smaller standard deviation of 18.19, suggesting that the scores are more tightly clustered around the mean. The group with the lowest mean score (41.36) consists of students who did not experience either digital or conventional learning methods but were part of a control group or were exposed to another form of instruction. The confidence intervals further indicate that the digital learning group has a higher degree of confidence in their retention scores. Overall, the data suggest that digital learning methods have a more significant positive effect on student retention compared to conventional lecture-based methods.

Prequisite Test: Homogeneity of Variance

Before proceeding with the hypothesis testing, it is crucial to ensure that the data we are analyzing come from populations with equal variances, a condition known as homogeneity of variance. To test this assumption, we conducted Levene's Test for Equality of Variances, which evaluates whether the variances between the groups are significantly different. The results of this test are important as they determine whether we can proceed with the One-Way ANOVA test, which assumes homogeneity of variance. In the following table, we present the results of Levene's Statistic for the data, including the significance values for different tests. These tests include variations based on the mean, median, and trimmed mean to provide a comprehensive assessment of variance equality. By examining these results, we can determine whether the variance in retention scores for the digital and conventional learning groups are sufficiently similar to allow for valid comparisons. Below, we present the results of Levene's Test for homogeneity of variances in Table 3.

Table 3. Results of the Test of Homogeneity of Variances

Test of Homogeneity of Variances					
		Levene Statistic	df1	df2	Sig.
Score	Based on Mean	7.396	2	44	.002
	Based on Median	1.424	2	44	.252

Based on Median and with adjusted df	1.424	2	33.837	.255
Based on trimmed mean	5.444	2	44	.008

The results in the table above show the outcomes of Levene's Test for homogeneity of variance across different groups. The significance values for the 'Based on Mean' and 'Based on Trimmed Mean' tests are both less than 0.05, indicating that the variances are significantly different between the groups, and the assumption of homogeneity of variance is violated. Specifically, the 'Based on Mean' test yields a significance value of 0.002, and the 'Based on Trimmed Mean' test yields 0.008, both of which are below the threshold of 0.05. However, the 'Based on Median' and 'Based on Median and with adjusted df' tests yield significance values of 0.252 and 0.255, respectively, both of which are greater than 0.05, suggesting no significant difference in variance when using these tests. Despite some inconsistency in the tests, the violation of homogeneity of variance as indicated by the tests based on the mean and trimmed mean suggests that caution should be taken when proceeding with the One-Way ANOVA. These results highlight the importance of checking the homogeneity assumption before continuing with the analysis.

Hypothesis Testing (One-Way ANOVA)

Once the homogeneity assumption has been tested and fulfilled, the next logical step is to conduct a hypothesis test to examine the research question regarding the difference in learning retention between the two student groups: those who underwent digital learning methods and those who experienced conventional methods. The hypothesis test used in this study is the One-Way Analysis of Variance (ANOVA), which is particularly useful when comparing the means of three or more independent groups. In this case, we are comparing two groups, making the ANOVA test suitable for determining whether the differences in their learning retention scores are statistically significant. This analysis will allow us to assess whether the differences observed in the data are due to the different learning methods employed or if they are simply the result of chance. The results of the One-Way ANOVA conducted with SPSS software are presented in the following table, which provides the Sum of Squares, degrees of freedom (df), Mean Square, F-statistic, and significance (Sig.) values necessary to interpret the hypothesis test results. Below, we present the results of the One-Way ANOVA analysis in Table 4, which shows a significant difference in retention scores between the digital and conventional learning groups.

Table 4. One-Way ANOVA Analysis Results

ANOVA

Score

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	9543.127	2	4771.563	20.498	.000
Within Groups	10242.533	44	232.785		
Total	19785.660	46			

The results of the One-Way ANOVA, as shown in the table above, provide valuable insights into the differences in learning retention between the groups using digital and conventional learning methods. The 'Between Groups' sum of squares is 9543.127, which indicates a large variation between the two groups. The F-statistic value of 20.498 is significantly high, suggesting a substantial difference in the mean retention scores between the two learning methods. The significance value (Sig.) of 0.000 is far below the threshold of 0.05, meaning that the null hypothesis (H0), which assumes no difference between the two methods, is rejected. Consequently, we accept the alternative hypothesis (Ha), which states that there is a significant difference in retention scores between the students exposed to digital learning and those exposed to conventional methods. This result strongly supports the idea that digital learning methods significantly improve student retention compared to traditional lecture-based methods at MA Tuhfatul Ulum.

Discussion

Based on the research results presented, the data analysis reveals a significant difference between the application of digital learning methods and conventional methods on student learning retention at MA Tuhfatul Ulum. This finding is empirically validated through the application of a One-Way ANOVA test, which produced a significance value (Sig.) of 0.000. This value is considerably smaller than the standard significance level of 0.05, indicating that the difference observed is statistically significant. Furthermore, this suggests that the digital learning methods have a substantial impact on enhancing student learning retention compared to conventional methods. The results underscore the potential benefits of incorporating digital learning tools into the educational process at MA Tuhfatul Ulum, providing a compelling argument for the continued integration of digital technologies into teaching practices (Iskandi, 2025).

Retention Score Comparison Analysis Descriptive data shows that the group of students who used digital learning methods had an average retention score of 81.09, which far exceeded the conventional group, which only reached 56.52. This striking difference shows that the integration of digital media, such as educational games or interactive media, can bridge the gap in understanding that often occurs in lecture-based methods. The high scores in the digital method are in line with the theory proposed by (Rakhman et al., 2024), which states that the effectiveness of learning is determined by the quality of interaction. In digital media, interaction occurs in a two-way manner (interactive), so that students are not merely passive listeners but active participants in their cognitive process.

The Advantages of Digital Methods in Improving Retention Student retention or long-term memory has been proven to increase significantly through digital methods. Theoretically, this is due to the multisensory stimulation offered by digital devices. Digital media combines visual, auditory, and kinetic elements simultaneously. According to (Kusuma & Purwanto, 2020) the use of technology in the classroom can stimulate students' focus and make abstract concepts more tangible. When students feel happy and actively engaged (such as when using educational games), the brain releases dopamine, which helps strengthen memory

synapses, so that the subject matter lasts longer in the memory compared to conventional methods, which tend to be monotonous and cause learning fatigue (Olyssia & Gunansyah, 2024).

Weaknesses of Conventional Methods in Student Memory The results of this study also confirm (Aprilia & Hartutik, 2024) view that conventional methods often place teachers as the sole authority on information. The low average score in the conventional group (56.52) indicates that one-way knowledge transfer is less effective in building strong retention. Students tend to only memorize material for the short term without understanding its substance, so that when retention is tested, much of the information is lost or forgotten (Sari et al., 2025).

Interpretation of ANOVA Test and Pedagogical Implications The discovery of a significant F-value and a Sig. value of 0.000 provides strong confirmation that these differences in learning outcomes did not occur by chance, but rather due to different media treatments. The total variation in scores (Sum of Squares) of 19785.660 shows a dynamic distribution of data, but it is still consistently grouped according to the method given. The implication of this finding for MA Tuhfatul Ulum is the need for digital transformation in the learning model to continuously improve the intellectual quality of students, as emphasized by (Novela et al., 2024) regarding the responsibility of institutions in providing appropriate media.

Overall, this study successfully demonstrates that digital learning methods are not just a passing technological trend, but rather a critical pedagogical tool for enhancing the effectiveness of student memory retention. By fostering an innovative, interactive, and engaging learning environment, digital learning approaches help to reduce psychological barriers to learning. As a result, students are able to achieve their learning objectives more effectively, leading to optimal outcomes. This evidence highlights the importance of integrating digital learning methods into educational frameworks, not only to keep up with technological advancements but also to improve overall student performance and engagement. The study advocates for the widespread adoption of such methods to create more dynamic and impactful learning experiences in schools.

4. Conclusion

This research concludes that digital learning methods have a significant positive impact on student retention at MA Tuhfatul Ulum compared to conventional learning methods. By implementing educational game-based learning, students showed better long-term memory retention, due to the active engagement and multisensory stimulation provided by digital media. In contrast, conventional lecture-based methods led to passive student involvement, resulting in lower memory retention. These findings suggest that integrating digital learning tools into the curriculum can enhance the quality of education and effectively achieve educational objectives.

The study successfully met its objective of comparing the effectiveness of digital and conventional methods on student retention. However, the research is limited to a single school and subject. Future studies could explore different schools and subjects to test the consistency of these findings in a broader context. A wider adoption of digital learning methods could be a strategic step to improve the quality of education in Indonesia.

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