



The Impact of Quizizz-Based Learning on Students' Creativity and Learning Outcomes in Islamic Cultural History

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Abstract

The development of digital technology has encouraged the use of digital learning platforms to support the learning process in schools. One of the digital learning platforms that is widely used is Quizizz, which offers interactive and technology-based learning. This study aims to analyze the effect of using a Quizizz-based digital learning platform on students' creativity and learning outcomes. This study uses a quantitative approach with a Quasi-Experimental Design employing a Pretest-Posttest Control Group Design. Research data were obtained through questionnaires to measure learning creativity and tests to measure students' learning outcomes. The collected data were then analyzed using Simple Linear Regression, Difference Test (Paired Sample T-Test), and Multivariate Analysis of Variance (MANOVA). The results of the study show that the use of Quizizz in the learning process has a significant effect on students' creativity and learning outcomes. This is evidenced by the significance value of the simple linear regression test of $0.005 < 0.05$, the Paired Sample T-Test of $0.000 < 0.05$, and the MANOVA test of $0.000 < 0.05$. Therefore, the use of Quizizz can be an effective alternative digital learning medium for improving students' creativity and learning outcomes.

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INTRODUCTION

Education is a fundamental aspect in national development (Hosna, 2020) Acting as the primary foundation for social, economic, scientific, and technological progress, Abiogu emphasized that the success of a nation's development is largely determined by the quality of its education (Durya, 2022). In the global context, the quality of education worldwide today is not only assessed based on academic achievement, but also on higher-order thinking skills such as learning creativity, problem-solving, and reflective thinking abilities. This is in line with the results of the 2022 Programme for International Student Assessment (PISA) survey, which provides an overview of students' abilities across various countries, including Indonesia. In the domain of creative thinking, Indonesia's average score reached only 19 out of 60 points, far below the OECD average of 33 points. In addition, only about

5% of Indonesian students were classified in the high achievement category (Levels 5–6) in creativity, compared to the OECD average of 27%. These findings indicate that the learning creativity of Indonesian students remains relatively low and requires more innovative, interactive, and student-centered learning strategies (Indonesia, n.d.).

In terms of academic learning outcomes, the achievement of Indonesian students also remains below the average of developed countries. PISA 2022 recorded that Indonesia's reading literacy score was 371 points, mathematics 379 points, and science 398 points, all of which were significantly below the OECD average (Aswani et al., 2025). These low achievements indicate that the majority of students have not yet reached the minimum level of proficiency in understanding texts, processing information, and applying numerical as well as scientific concepts. Accordingly, PISA data emphasize that both learning creativity and learning outcomes of Indonesian students still require serious attention and significant improvement through the renewal of teaching methods, approaches, and learning media in schools. Therefore, in the field of education, the development of creativity and learning outcomes becomes an important aspect that must be considered by educators as part of efforts to improve the quality of learning and the achievement of 21st-century competencies (Hosna et al., 2025).

One strategy to enhance students' creativity and learning outcomes is through student-centered learning. Through this approach, learners are given opportunities to make choices, access a variety of learning materials, explore, engage in self-evaluation, identify problems, and solve them independently as well as collaboratively (Sadikin & Siburian, 2024). This strategy can also be strengthened through the implementation of continuous formative assessment, the provision of timely and constructive feedback, the presentation of learning materials in varied formats, and the use of learning technologies that provide repeated practice and enable the monitoring of students' progress (Sarnoto, 2025). The combination of these strategies not only helps students develop a deeper understanding of concepts and correct errors promptly, but also enhances their engagement in the learning process. Consequently, meaningful and exploration-oriented learning experiences have been shown to improve self-efficacy, motivation, conceptual mastery, creativity, as well as students' overall learning outcomes.

One digital platform that can support interactive learning and enhance students' creativity and learning outcomes is Quizizz. Quizizz is a game-based learning medium that allows teachers to create quizzes, practice activities, or educational games that can be accessed by students both online and offline (Suryadi et al., 2024). Quizizz provides features such as automated feedback, real-time assessment, and elements of positive competition that can enhance students' engagement in learning. Through quiz activities and educational games, students are encouraged to think quickly, analyze problems, and make decisions, thereby potentially developing creativity while simultaneously improving learning outcomes. Nevertheless, previous research by (Astuti et al., 2022; Dwika & Aslam, 2021; Handayani, Faslah, & Sholikhah, 2024; Handayani, Faslah, & Sholikhah, 2024; Intizhami et

al., 2023; Jiemsak & Jiemsak, 2021; Junior, 2020; A. Mawaddah et al., 2021; K. Mawaddah et al., 2022; Mesterjon et al., 2024; Mulatsih, 2019; Octaviana et al., 2024; Pham, 2019; Siboro et al., 2022; Utama et al., 2024) indicates that Quizizz has generally still been focused on improving cognitive learning outcomes, while studies examining its effects on learning creativity, particularly when analyzed simultaneously with learning outcomes, remain limited.

Most previous studies have focused on public schools and exact/language subjects, so that studies on madrasahs, especially Islamic Cultural History subjects, are still limited. Therefore, this study aims to analyze the effect of the Quizizz-based digital platform on student creativity and learning outcomes in Islamic Cultural History at MTs Perguruan Mu'allimat Cukir Jombang as a contribution to the development of digital learning in the modern era.

METHODS

The approach employed in this study is a quantitative approach with a quasi-experimental research design. The specific design used is the pretest-posttest control group design (Sugiyono, 2021). This design involves two groups that are randomly selected and then administered a pretest to determine their initial conditions and to identify whether there are differences between the experimental group and the control group.

The population in this study was all eighth-grade students at MTs Perguruan Mu'allimat Cukir Jombang. The research sample was determined using random sampling techniques on 10 eighth-grade classes, then two classes were randomly selected, namely one class as the experimental class and one class as the control class (Djunaidi M. Ghony, 1988). The data collection techniques used in this study included observation, documentation, questionnaires, and tests. The questionnaire was employed to measure the variables of Quizizz usage and students' learning creativity using a Likert scale, while the test was used to measure students' learning outcomes in the form of multiple-choice questions.

The research instrument blueprint includes three variables, namely the Quizizz-based digital learning platform, learning creativity, and learning outcomes. The Quizizz-based digital learning platform variable is measured through six indicators, namely interesting and enjoyable learning, interactive learning, automatic and adaptive feedback, personalized learning, formative and effective assessment, and independent learning support with 15 statements. The learning creativity variable is measured through four indicators, namely fluency, originality, flexibility, and elaboration, which also consists of 15 statements. The learning outcome variable is measured using a test consisting of 20 questions.

Empirical validity tests were conducted on questionnaires regarding the use of the Quizizz-based digital learning platform and learning creativity. The test results showed that each questionnaire contained 13 valid statements and 2 invalid statements, so that 13 statements from each questionnaire were used in the study. Furthermore, the reliability test showed that the Quizizz-based digital learning platform instrument had a Cronbach's

Alpha value of 0.742 and the learning creativity instrument had a value of 0.751. Since all Cronbach's Alpha values were greater than 0.60, both instruments were declared reliable and suitable for use in the study.

The learning outcome test instruments were not tested using empirical validity tests, but were first tested using expert judgment validity. Expert judgment validity tests were conducted by subject matter experts and learning experts to assess the suitability of the questions with the indicators, the competencies being measured, the clarity of the wording, and the level of suitability of the difficulty level of the questions.

Data analysis techniques include simple linear regression to test the effect of using the Quizizz-based digital platform on learning creativity, Paired Sample T-Test and Independent Sample T-Test to compare learning outcomes, and MANOVA to test its simultaneous effect on creativity and learning outcomes, with a significance level of 0.05.

RESULTS AND DISCUSSION

This study involved 52 eighth-grade female students at MTs Perguruan Mu'allimat Cukir Jombang, divided into experimental and control classes, each with 26 students. All respondents were 13.5 years old and had similar characteristics, making them suitable for comparison. The following are the demographic data of students in the experimental and control classes.

Table 1. 1 Student Demographic Data

Class	Number of Stude	Gender	Age Range	Average Age
Experiment	26	Woman	13-14 th	13.5 th
Control	26	Woman	13-14 th	13.5 th

Descriptive Analysis of Quizizz-Based Learning Platform Variables (X)

Data on the Quizizz-based digital learning platform variable were obtained through a questionnaire consisting of 15 items using a Likert scale with multiple response alternatives. Based on the 15 questionnaire items, the number of respondents was 26 students. The data are presented in the following table:

Table 1. 2 Description of Respondents' Answers Regarding the Quizizz-based Digital Learning Platform Variable (X)

Variabel	Item	Frequency of Answers (f) & Percentage										Mean
		SS		S		R		TS		STS		
		f	%	f	%	f	%	f	%	f	%	
Quiziz (X)-Based Digital Learning Platform	X.1	17	65.4%	9	34.6%	0	0.0%	0	0.0%	0	0.0%	4.65
	X.2	16	61.5%	10	38.5%	0	0.0%	0	0.0%	0	0.0%	4.62
	X.3	19	73.1%	6	23.1%	1	3.8%	0	0.0%	0	0.0%	4.69
	X.4	20	76.9%	6	3.0%	0	0.0%	0	0.0%	0	0.0%	4.77
	X.5	15	57.7%	10	38.5%	1	3.8%	0	0.0%	0	0.0%	4.54
	X.6	20	76.9%	6	23.1%	0	0.0%	0	0.0%	0	0.0%	4.77
	X.7	11	42.3%	9	34.6%	6	23.1%	0	0.0%	0	0.0%	4.19

Variabel	Item	Frequency of Answers (f) & Percentage										Mean
		SS		S		R		TS		STS		
		f	%	f	%	f	%	f	%	f	%	
	X.8	15	57.7%	9	34.6%	2	7.7%	0	0.0%	0	0.0%	4.50
	X.9	17	65.4%	8	30.8%	1	3.8%	0	0.0%	0	0.0%	4.62
	X.10	13	50.0%	13	50.0%	0	0.0%	0	0.0%	0	0.0%	4.50
	X.11	15	57.7%	10	38.5%	1	3.8%	0	0.0%	0	0.0%	4.54
	X.12	17	65.4%	8	30.8%	8	30.8%	0	0.0%	0	0.0%	4.27
	X.13	17	65.4%	9	34.6%	0	0.0%	0	0.0%	0	0.0%	4.65
	X.14	11	42.3%	14	53.8%	1	3.8%	0	0.0%	0	0.0%	4.38
	X.15	16	61.5%	10	38.5%	0	0.0%	0	0.0%	0	0.0%	4.62
Average		61.3%		33.8%		5.4%		0.0%		0.0%		
Average Learning Creativity Indicator											4.55	
Description: SS= Strongly Agree, S= Agree, N= Neutral, TS= Disagree, STS= Strongly Disagree												

Based on this data, the majority of students responded positively to the use of Quizizz, with 61.3% choosing strongly agree and 33.8% agreeing. A total of 5.4% of students expressed doubts, and no students chose to disagree or strongly disagree. The average score of 4.55 indicates that students' understanding through Quizizz is in the excellent category. These findings indicate that Quizizz is effective as an evaluation tool for increasing student motivation and learning comprehension.

Descriptive Analysis of Learning Creativity Variable (Y1)

Data on the learning creativity variable were obtained through a questionnaire consisting of 15 items using a Likert scale with multiple response alternatives. Based on the 15 questionnaire items, the number of respondents was 26 students. The data are presented in the following table:

Table 1. 3 Description of Respondents' Answers Regarding the Variable of Student Learning Creativity (Y1)

Variabel	Item	Frequency of Answers (f) & Percentage										Mean
		SS		S		N		TS		STS		
		f	%	f	%	f	%	f	%	f	%	
	Y1.1	6	23.1%	18	69.2%	2	7.7%	0	0.0%	0	0.0%	4.15
	Y1.2	14	53.8%	10	38.5%	2	7.7%	0	0.0%	0	0.0%	4.46
	Y1.3	10	38.5%	16	61.5%	0	0.0%	0	0.0%	0	0.0%	4.38
	Y1.4	10	38.5%	12	46.2%	3	11.5%	1	3.8%	0	0.0%	4.19
	Y1.5	12	46.2%	12	46.2%	2	7.7%	0	0.0%	0	0.0%	4.38
Learning Creativity (Y1)	Y1.6	12	46.2%	9	34.6%	5	19.2%	0	0.0%	0	0.0%	4.27
	Y1.7	13	50.0%	11	42.3%	2	7.7%	0	0.0%	0	0.0%	4.42
	Y1.8	11	42.3%	14	53.8%	1	3.8%	0	0.0%	0	0.0%	4.44
	Y1.9	8	30.8%	15	57.7%	3	11.5%	0	0.0%	0	0.0%	4.19
	Y1.10	11	42.3%	13	50.0%	2	7.7%	0	0.0%	0	0.0%	4.35
	Y1.11	13	50.0%	10	38.5%	3	11.5%	0	0.0%	0	0.0%	4.38
	Y1.12	13	50.0%	11	42.3%	2	7.7%	0	0.0%	0	0.0%	4.42
	Y1.13	12	46.2%	12	46.2%	2	7.7%	0	0.0%	0	0.0%	4.38

Variabel	Item	Frequency of Answers (f) & Percentage										Mean
		SS		S		N		TS		STS		
		f	%	f	%	f	%	f	%	f	%	
	Y1.14	7	26.9%	16	61.5%	3	11.5%	0	0.0%	0	0.0%	4.15
	Y1.15	11	42.3%	13	50.0%	2	7.7%	0	0.0%	0	0.0%	4.35
Average		41.8%		49.2%		8.7%		0.3%		0.0%		4.33

Average Learning Creativity Indicator
 Description: SS= Strongly Agree, S= Agree, N= Neutral, TS= Disagree, STS= Strongly Disagree

Based on the questionnaire results, the majority of students responded positively to learning creativity, with 41.8% answering Strongly Agree and 49.2% Agree. Meanwhile, only 8.7% were Neutral and very few disagreed. The average learning creativity score of 4.33 (on a scale of 5) indicates that students' learning creativity levels are relatively high. This indicates that students have a strong and positive perception of creativity in learning.

Descriptive Analysis of Learning Outcome Variables (Y₂)

The results of the pre-test and post-test scores for the experimental and control classes are presented as follows:

Table 1. 4 Pre-Test and Post-Test Results for Experimental and Control Classes

Descriptive Statistics						
	N	Minimum	Maximum	Mean	Std. Deviation	
Pre-Test Experiment	26	15	55	33.65	8.192	
Post-Test Experiment	26	55	95	72.69	12.102	
Pre-Test Control	26	15	55	35.58	9.729	
Post-Test Control	26	25	65	43.46	8.575	
Valid N (listwise)	26					

Based on the output, the average score of the experimental class increased from 33.65 (pre-test) to 72.69 (post-test), or an increase of 115.9%. Meanwhile, the control class increased from 35.58 to 43.46, or an increase of 22.15%. Thus, the increase in learning outcomes in the experimental class was much higher than in the control class.

Hypothesis 1: The Impact of Quizizz-Based on Learning Creativity

Before testing the hypothesis to determine the effect of the Quizizz-based digital learning platform on student learning creativity, a prerequisite analysis test was conducted, which included a normality test, linearity test, and heteroscedasticity test. The results of the prerequisite analysis test are presented below.

The first is the data normality test, used to see the distribution of data on the diagonal source of the data normality histogram graph, the normal P-plot graph of regression standardized residuals, and the One Sample Kolmogorov Smirnov test. The following is the data normality histogram test.

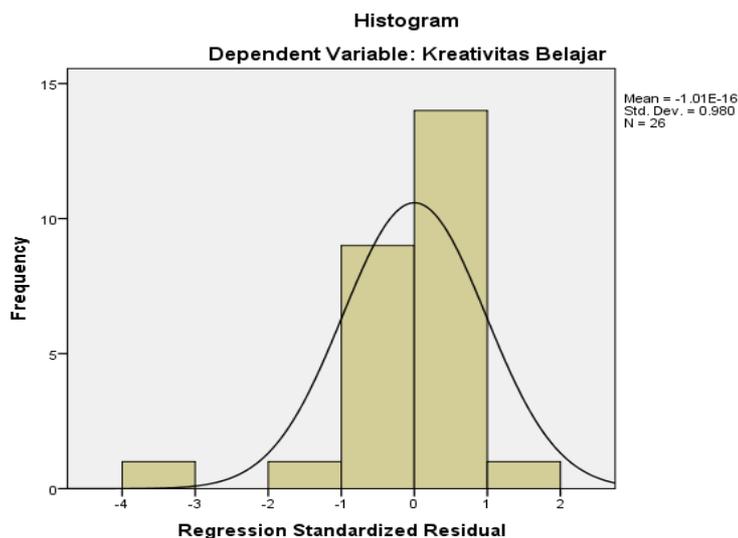


Figure 1. 1 Data Normality Histogram

Figure 1.1 shows that the histogram mostly follows a normal curve and the curve appears to form a bell shape, so it can be said that the data distribution is normal. Next, the One Sample Kolmogorov-Smirnov Test was conducted.

Table 1. 5 Kolmogorov Smirnov Analysis Results

One-Sample Kolmogorov-Smirnov Test		
		Unstandardized Residual
N		26
Normal Parameters ^{a,b}	Mean	.0000000
	Std. Deviation	6.54442516
Most Extreme Differences	Absolute	.148
	Positive	.127
	Negative	-.148
Test Statistic		.148
Asymp. Sig. (2-tailed)		.150 ^c

The results of data normality using SPSS in Table 4.6 obtained a Sig (2-tailed) value of 0.150 > 0.05. Thus, it can be concluded that the tested data is normally distributed.

The second prerequisite test includes a linearity test as follows:

Table 1. 6 Results of Linearity Test X on Y1

ANOVA Table							
			Sum of Squares	df	Mean Square	F	Sig.
Learning Creativity * AI Quizizz	Between Groups	(Combined)	850.505	12	70.875	2.718	.043
		Linearity	118.801	1	118.801	4.555	.052
		Deviation from Linearity	731.704	11	66.519	2.551	.056

Within Groups	339.033	13	26.079
Total	1189.538	25	

Based on the table above, it shows that the significant deviation from linearity value of $0.056 > 0.05$, which means there is a linear relationship between the Quizizz-based Digital Learning Platform variable and the Learning Creativity variable.

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Next is the third prerequisite test, namely the Heteroscedasticity test, as follows:

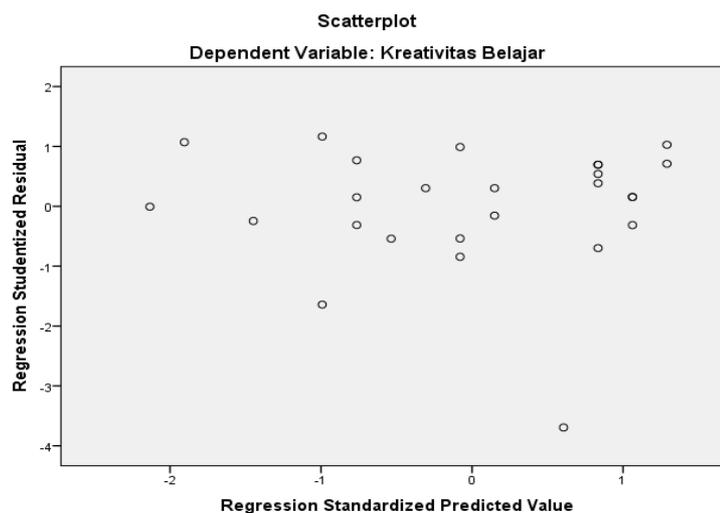


Figure 1. 2 Heteroskedasticity Test Results

The results above show that there is no clear pattern, and the points are scattered above and below the number 0 on the Y-axis. Therefore, it can be said that there is no heteroscedasticity in this regression model, so the regression model is suitable for use with the Quizizz-based Digital Learning Platform variable that interprets the Learning Creativity variable.

Thus, the research data was declared to have met the prerequisite analysis test, making it suitable to proceed to the hypothesis testing stage using simple linear regression analysis. The results of the analysis using IBM SPSS Statistics 23 showed that:

Table 1. 7 Variables Entered/Removed with the Enter Method

Variables Entered/Removed ^a			
Model	Variables Entered	Variables Removed	Method

The table above explains the variables entered and the method used. In this case, the Quizizz-based digital learning platform variable was included as the independent variable, while learning creativity was included as the dependent variable, and the method applied was the Enter method.

Table 1. 8 Correlation Coefficient Test Results (X against Y1)

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.532 ^a	.283	.253	5.70675

The table above explains the magnitude of the correlation coefficient (R), which is 0.532. From the table, the coefficient of determination (R Square) is 0.283, indicating that the influence of the independent variable (the Quizizz-based digital learning platform) on the dependent variable (learning creativity) is 28.3%.

Table 1. 9 F Test Results (X against Y1)

ANOVA ^a						
Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	308.431	1	308.431	9.471	.005 ^b
	Residual	781.607	24	32.567		
	Total	1090.038	25			

From the table, it is known that the calculated F value is 9.471 with a significance level of 0.005, which is less than 0.05. Therefore, the regression model can be used to predict the learning creativity variable, or in other words, there is a significant effect of the Quizizz-based digital learning platform variable (X) on the learning creativity variable (Y).

Table 1. 10 Regression Coefficient Test Results

Model	Unstandardized Coefficients		Standardized Coefficients		t	Sig.
	B	Std. Error	Beta			
1 (Constant)	4.563	19.733			.231	.819
AI Quizizz	.870	.283	.532		3.077	.005

The results of the analysis show that the constant (a) value is 4.563, while the coefficient (b) of the Quizizz-based digital learning platform variable is 0.870. Therefore, the regression equation can be written as:

$$Y = a + Bx$$

$$Y = 4.563 + 0,870X$$

The equation can be interpreted as follows: a constant value of 4.563 indicates that the consistent value of the learning creativity variable is 4.563. The regression coefficient of X of 0.870 indicates that for every 1% increase in the value of the Quizizz-based digital learning platform, the learning creativity value increases by 0.870. This regression coefficient is positive, indicating that the direction of the influence of variable X on variable Y is positive.

Based on the significance value in the Coefficients table, a significance value of 0.005 was obtained, which is less than 0.05. Therefore, it can be concluded that the Quizizz-based digital learning platform variable has a significant effect on the learning creativity variable (Y). In addition, based on the *t* value, the calculated t_{hitung} is 3.077, which is greater than the

t table value of 2.064, indicating that the Quizizz-based digital learning platform variable (X) significantly affects the learning creativity variable (Y1).

Hypothesis 2: The Impact of Quizizz-Based on Learning Outcomes

Paired Sample T-Test

The Paired Sample T-Test is used to compare paired data, namely pre-test and post-test scores in the same class that received different treatments (Putra & Hanggara, 2022). Before this test is conducted, the data must meet the prerequisite of normal distribution. The results of the data normality test are presented below. The following is a test of data normality:

Table 1. 11 Results of Normality Test X on Y2

		Tests of Normality					
		Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Learning Outcomes	Pre-Test Experiment	.219	26	.002	.936	26	.109
	Post-Test Experiment	.161	26	.083	.937	26	.116
	Pre-Test Control	.214	26	.004	.926	26	.064
	Post-Test Control	.160	26	.087	.944	26	.172

Based on the above output, the significance value (sig) for the data in the Shapiro-Wilk test is > 0.05, so it can be concluded that the research data is normally distributed.

Based on the normality test results, the students' pre-test and post-test scores are normally distributed. Therefore, the research data is deemed suitable for analysis using the Paired Sample t-test.

The following are the results of the Paired Sample *t*-Test using IBM SPSS Statistics version 23, which indicate that:

Table 1. 12 Results of the Paired Sample T-Test

		Paired Samples Test								
		Paired Differences						t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error	95% Confidence Interval of the Difference					
					Lower	Upper				
Pair 1	Pre-Post Eksperimen	-39.038	13.192	2.587	-44.367	-33.710	-	15.089	25	.000
Pair 2	Pre-Post Kontrol	-7.885	14.777	2.898	-13.853	-1.916	-	-2.721	25	.012

For Pair 1, the two-tailed significance value (Sig. 2-Tailed) was found to be 0.000 < 0.05 Thus, H0 is rejected and Ha is accepted. It can be concluded that there is a significant difference between the pre-test and post-test means in the experimental class. Meanwhile,

for Pair 2, the two-tailed significance value (Sig. 2-Tailed) was found to be $0.012 < 0.05$. Thus, H_0 is rejected and H_a is accepted. It can be concluded that there is a significant difference between the pre-test and post-test means in the control class. Based on the discussion of Pair 1, it can be concluded that the Quizizz-based digital learning platform variable (X) has an effect on the learning outcomes variable (Y_2).

Independent Sample T-Test

The Independent Sample T-Test is used to determine whether there is a difference in the means of two unpaired samples. The requirements for parametric statistical testing are that the data must be normal and homogeneous. The following are tests of normality and homogeneity. First, a test of data normality is performed.

Table 1. 13 Results of Normality Test X on Y_2

		Tests of Normality					
		Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
Learning Outcomes	Pre-Test Experiment	.219	26	.002	.936	26	.109
	Post-Test Experiment	.161	26	.083	.937	26	.116
	Pre-Test Control	.214	26	.004	.926	26	.064
	Post-Test Control	.160	26	.087	.944	26	.172

Based on the above output, it is known that the significance value (sig) for the data in the Shapiro-Wilk test is > 0.05 , so it can be concluded that the research data is normally distributed.

Furthermore, a homogeneity test using IBM SPSS Statistics 23 shows that:

Table 1. 14 Homogeneity Test Results

		Test of Homogeneity of Variance			
		Levene Statistic	df1	df2	Sig.
Learning Outcomes	Based on Mean	2.673	3	100	.051
	Based on Median	2.129	3	100	.101
	Based on Median and with adjusted df	2.129	3	92.874	.102
	Based on trimmed mean	2.680	3	100	.051

Based on the above output, the Significance (Sig) Based on Mean value is $0.051 > 0.05$, so it can be concluded that the variance of the Post-Test data for the Experiment class and the Post-Test data for the control class are the same or homogeneous.

The prerequisite test results show that the learning outcome data in the experimental class and control class are normally distributed and have homogeneous variance, so the data are suitable for analysis using the Independent Sample t-test.

The Independent Sample T-Test using IBM SPSS Statistics 23 shows that:

Table 1. 15 Results of the Independent Sample T-Test

		Independent Samples Test								
		Levene's Test for Equality of Variances			t-test for Equality of Means					
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower		Upper
Learning outcomes	Equal variances assumed	6.650	.013	13.621	50	.000	-39.038	2.866	-44.795	-33.282
	Equal variances not assumed			13.621	43.936	.000	-39.038	2.866	-44.815	-33.262

Based on the output above Sig. (2-Tailed) $0.000 < 0.05$ Therefore, there is a significant difference in learning outcomes between the experimental class, which was taught using the Quizizz-based digital learning platform, and the control class, which was taught using conventional media.

Hypothesis 3: The Impact of Quizizz-Based on Creativity and Learning Outcomes Independent Sample T-Test

MANOVA (Multivariate Analysis of Variance) is used to examine differences in means or the effect of a treatment on more than one dependent variable. Before conducting MANOVA (Multivariate Analysis of Variance), prerequisite tests were first carried out, including univariate normality tests (Kolmogorov-Smirnov and Shapiro -Wilk), multivariate normality test using Mahalanobis distance compared with Chi-square value, correlation test between dependent variables, homogeneity of variance test using Levene's Test, and Box's M Test to test the similarity of covariance matrices between groups.

The first prerequisite test is the normality test.

Table 1. 16 Results of Normality Test of X against Y1 Y2

Tests of Normality		Kolmogorov-Smirnov ^a		Shapiro-Wilk			
		Statistic	df	Sig.	Statistic	df	Sig.
Learning Creativity		.068	52	.200*	.965	52	.128
Learning Outcomes		.107	52	.197	.970	52	.215

Based on the above output, it is known that the significance value (sig) for the data in the Kolmogorov-Smirnov & Shapiro-Wilk test is > 0.05, so it can be concluded that the research data is normally distributed.

Next, a Mahalanobis–Chi-square test was conducted, which showed that:

Table 1. 17 Mahalanobis Test Results

Residuals Statistics^a					
	Minimum	Maximum	Mean	Std. Deviation	N
Predicted Value	.71	2.44	1.50	.398	52
Std. Predicted Value	-1.997	2.374	.000	1.000	52
Standard Error of Predicted Value	.044	.155	.073	.020	52
Adjusted Predicted Value	.67	2.58	1.50	.406	52
Residual	-.564	.686	.000	.311	52
Std. Residual	-1.778	2.162	.000	.980	52
Stud. Residual	-1.799	2.192	-.003	1.010	52
Deleted Residual	-.583	.705	-.002	.331	52
Stud. Deleted Residual	-1.842	2.284	-.004	1.021	52
Mahal. Distance	.006	11.143	1.962	1.895	52
Cook's Distance	.000	.267	.022	.040	52
Centered Leverage Value	.000	.218	.038	.037	52

Since the maximum Mahalanobis distance (11.143) is lower than the Chi-square critical value (13.82), no multivariate outliers were detected. Therefore, the data can be considered suitable for MANOVA analysis.

Next, the second prerequisite test was conducted, namely the Correlation test. The correlation test is as follows:

Table 1. 18 Results of Correlation Test X on Y1 Y2

Correlations			
		Learning Creativity	Learning Outcomes
Learning Creativity	Pearson Correlation	1	.477**
	Sig. (2-tailed)		.000
	N	52	52
Learning Outcomes	Pearson Correlation	.477**	1
	Sig. (2-tailed)	.000	
	N	52	52

The significance value of the correlation test is $0.000 < 0.05$, so it can be concluded that there is a relationship between the dependent variable (Y) with a correlation level of 0.477, which means a moderate correlation.

The third prerequisite test is Levene's Test of Homogeneity of Variance and Box's M Test. Levene's Test of Homogeneity of Variance and Box's M Test are as follows: first is Levene's Test of Variance, which shows that:

Table 1. 19 Levene's Test of Variance Homogeneity Results

Levene's Test of Equality of Error Variances^a				
	F	df1	df2	Sig.
Learning Creativity	.063	1	50	.803
Learning Outcomes	.903	1	50	.347

The significance value of Levene's Test of Homogeneity of Variance for Learning Creativity is $0.803 > 0.05$ and for Learning Outcomes is $0.347 > 0.05$, so it can be concluded that the variance of Learning Creativity and Learning Outcomes is homogeneous or similar.

Next, Box's M test shows that:

Table 1. 20 Box's M test homogeneity test results

Box's Test of Equality of Covariance Matrices^a	
Box's M	.291
F	.093
df1	3
df2	450000.000
Sig.	.964

The significance value of Box's M test is $0.964 > 0.05$, which means that there is no difference in covariance/variance matrix between groups, so the samples are declared homogeneous.

The results of the prerequisite analysis show that the research data meets the assumptions for MANOVA (Multivariate Analysis of Variance). The MANOVA test: Multivariate Analysis of Variance using IBM SPSS Statistics 23 shows that:

Table 1. 21 Simultaneous Test Results

Multivariate Tests^a						
Effect		Value	F	Hypothesis df	Error df	Sig.
Intercept	Pillai's Trace	.991	2557.927 ^b	2.000	49.000	.000
	Wilks' Lambda	.009	2557.927 ^b	2.000	49.000	.000
	Hotelling's Trace	104.405	2557.927 ^b	2.000	49.000	.000
	Roy's Largest Root	104.405	2557.927 ^b	2.000	49.000	.000
Quizizz	Pillai's Trace	.620	40.030 ^b	2.000	49.000	.000

Wilks' Lambda	.380	40.030 ^b	2.000	49.000	.000
Hotelling's Trace	1.634	40.030 ^b	2.000	49.000	.000
Roy's Largest Root	1.634	40.030 ^b	2.000	49.000	.000

The results of the simultaneous test indicate a significance value (Sig.) of $0.000 < 0.05$. Therefore, it can be concluded that the Quizizz-based digital learning platform has a significant effect on both learning creativity and learning outcomes.

Table 1. 22 Partial Test Results for Dependent Variables (Y)

Tests of Between-Subjects Effects						
Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	Learning Creativity	1173.250 ^a	1	1173.250	25.734	.000
	Learning Outcomes	8250.481 ^b	1	8250.481	61.810	.000
Intercept	Learning Creativity	189970.173	1	189970.173	4166.786	.000
	Learning Outcomes	187800.481	1	187800.481	1406.948	.000
Quizizz	Learning Creativity	1173.250	1	1173.250	25.734	.000
	Hasil Belajar	8250.481	1	8250.481	61.810	.000
Error	Learning Creativity	2279.577	50	45.592		
	Learning Outcomes	6674.038	50	133.481		
Total	Learning Creativity	193423.000	52			
	Learning Outcomes	202725.000	52			
Corrected Total	Learning Creativity	3452.827	51			
Total	Learning Outcomes	14924.519	51			

a. R Squared = .340 (Adjusted R Squared = .327)
b. R Squared = .553 (Adjusted R Squared = .544)

The results of the partial test, or for each dependent variable (Y), indicate the significance value of the MANOVA test. For Learning Creativity $0.000 < 0.05$, It can be concluded that there is a significant effect of the Quizizz-based digital learning platform on learning creativity. Meanwhile, for Learning Outcomes $0.000 < 0.05$, It can be concluded that there is a significant effect of the Quizizz-based digital learning platform on students' learning outcomes. Thus, H_0 is rejected and H_a is accepted, indicating that the Quizizz-based digital learning platform has a significant effect on both students' learning creativity and learning outcomes.

Discussion

The Impact of Quizizz-Based Learning on Students' Creativity in Islamic Cultural History

The results of simple linear regression show that the Constant value (a) = 4.563 and the Quizizz regression coefficient (b) = 0.870. The constant value indicates that the learning

creativity value is 4.563, while the coefficient of 0.870 means that every 1% increase in the use of Quizizz will increase learning creativity by 0.870. The coefficient is positive, so the effect of Quizizz on learning creativity is positive.

Based on the significance value in the Coefficients table, a significance value of $0,005 < 0,05$. Therefore, it can be concluded that the AI Quizizz variable has an effect on the learning creativity variable (Y). And based on the t value, it is known that the value is t_{hitung} as big as $3.077 > t_{tabel} 2.064$, So it can be concluded that the Quizizz variable (X) affects the learning creativity variable so it can be concluded that the Quizizz variable (X) affects the learning creativity variable. (Y₁). Thus, the implementation of the Quizizz-based digital learning platform has proven to make a positive and significant contribution to enhancing student creativity, both in terms of creative thinking skills, exploring ideas, and solving problems innovatively.

The results of this study are in line with the findings of (Siboro et al., 2022) and (Octaviana et al., 2024) which show that the use of Quizizz effectively increases student creativity because learning becomes more interactive and enjoyable, so that Quizizz not only functions as an evaluation medium but also as a means of developing student creativity. In line with Piaget and Vygotsky's constructivist theory, student creativity develops through active learning activities, exploration, and social interaction support (Khasanah et al., 2024). In the context of Quizizz, interactive learning, immediate feedback, gamification, and healthy competition encourage students to participate actively, think critically, and increase their creativity and motivation to learn.

Further interpretation indicates that the integration of Quizizz in learning supports 21st-century education, which emphasizes the development of critical thinking, creativity, collaboration, communication, and digital literacy skills (Ledoh et al., 2023). The use of the Quizizz-based digital learning platform effectively enhances student learning creativity and is in line with the principles of constructivism, as it encourages active, interactive, and meaningful learning activities. In addition, Quizizz also supports 21st-century learning by stimulating creativity and critical thinking among students at MTs Perguruan Mu'allimat Cukir Jombang.

The Impact of Quizizz-Based on Learning Outcomes in Islamic Cultural History

The results of the Paired Sample T-Test and Independent Sample T-Test show that the use of Quizizz has a significant effect on student learning outcomes. In the experimental class, the Sig. (2-Tailed) value = $0.000 < 0.05$, so H₀ is rejected and H_a is accepted, indicating a significant difference between the Pre-Test and Post-Test scores. In the control class, the Sig. (2-Tailed) value = $0.012 < 0.05$, but the improvement was smaller than in the experimental class. Furthermore, the Independent Sample T-Test results showed a Sig. (2-Tailed) value of $0.000 < 0.05$, indicating a significant difference between the experimental class and the control class. Thus, the use of Quizizz was proven to significantly improve student learning outcomes.

These findings are in line with previous research (A. Mawaddah et al., 2021; Utama et al., 2024) which found that the implementation of Quizizz significantly improved learning outcomes, thus both studies reinforce the finding that Quizizz is an effective learning medium. Linked to B. F. Skinner's behaviorist theory, the use of Quizizz can be explained through the principle of operant conditioning, namely that learning occurs because of students' responses to stimuli that are reinforced (Amir et al., 2025). The provision of scores and instant feedback as positive reinforcement encourages students to repeat correct learning behaviors, thereby increasing motivation and learning outcomes.

The use of Quizizz increases student interactivity and motivation through gamification in the form of points, leaderboards, and time challenges that make learning more interesting, competitive, and fun, thereby encouraging students to participate more actively in learning. Support from previous research by (Nurwijaya, 2022) The results of the study indicate that the use of Quizizz positively and significantly improves students' creative thinking skills and learning outcomes. This is in line with the principles of interactivity and learning motivation in digital learning, particularly in the subject of Islamic Cultural History at MTs Perguruan Mu'allimat Cukir Jombang.

The Impact of Quizizz-Based on Student's Creativity and Learning Outcomes

The analysis results from the MANOVA (Multivariate Analysis of Variance) indicate that the simultaneous test shows a significance value (Sig.) of $0.000 < 0.05$, Therefore, it can be concluded that AI Quizizz has a significant effect on both learning creativity and learning outcomes. These findings are in line with the grand theory of constructivism proposed by Piaget and Vygotsky. Piaget emphasizes that effective learning occurs through active activities, exploration, and students' direct experiences in constructing knowledge. Meanwhile, Vygotsky highlights the importance of social interaction and scaffolding in supporting students' cognitive development and creativity. (Khasanah et al., 2024). In the context of Quizizz, students can explore material through interactive quizzes and immediate feedback, encouraging critical thinking, creativity, and innovative problem solving in line with the principles of active and meaningful constructivist learning.

Meanwhile, the improvement in learning outcomes can be explained through Skinner's behaviorist theory, which emphasizes the importance of reinforcement in learning. (Amir et al., 2025). Quizizz provides instant feedback and rewards that reinforce positive learning behaviors, increase motivation, and help strengthen students' understanding and memory through repeated quiz practice.

This study confirms that the Quizizz-based digital learning platform effectively improves student learning creativity and learning outcomes simultaneously. These findings are in line with the principles of constructivism and behaviorism, which emphasize the importance of meaningful learning activities and behavior reinforcement. In addition, Quizizz supports the development of 21st-century skills through interactive and enjoyable learning, making it a suitable innovative digital learning strategy for improving the quality

of learning, creativity, and student learning outcomes at MTs Perguruan Mu'allimat Cukir Jombang.

CONCLUSION

Based on the results of data analysis and discussion, it can be concluded that the use of AI Quizizz-based learning has a positive and significant effect on students' learning creativity and learning outcomes in the Islamic Cultural History subject at MTs Perguruan Mu'allimat Cukir Jombang. The simple linear regression analysis shows that AI Quizizz positively influences learning creativity, and the significance tests confirm that this effect is statistically significant. Furthermore, the Paired Sample t-Test and Independent Sample t-Test indicate significant differences between pre-test and post-test scores, with the experimental class demonstrating greater improvement compared to the control class, confirming the effectiveness of AI Quizizz in improving learning outcomes. The MANOVA results also reveal that AI Quizizz has a significant simultaneous and partial effect on both learning creativity and learning outcomes, leading to the acceptance of the alternative hypothesis (H_a). These findings are consistent with constructivist theory (Piaget and Vygotsky) and behaviorist theory (Skinner), emphasizing active, interactive, and reinforced learning. Therefore, AI Quizizz can be considered an effective digital learning strategy to enhance students' creativity and learning outcomes in modern educational settings.

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