



The Effectiveness of Using Quizizz as an Interactive Medium in Van Hiele Model Geometry Learning to Improve Creative Thinking Skills of Students at MTs Negeri 1 Donggala

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ABSTRACT

This study aims to determine the effectiveness of using Quizizz as an interactive learning medium in Van Hiele model geometry learning on the creative thinking skills of students at MTs Negeri 1 Donggala. This study used a quantitative approach with a quasi-experimental type and a nonequivalent control group pretest-posttest design. The research population was all eighth-grade students at MTs Negeri 1 Donggala, with a sample of 47 students consisting of two classes, selected through random sampling. The instrument used to measure creative thinking skills was a test consisting of two essay questions. The data were analyzed using prerequisite tests (normality and homogeneity tests) and hypothesis testing using an independent-sample t-test with the help of the SPSS program. The results showed that the significance value of the posttest t-test was $0.002 < 0.05$, so H_0 was rejected and H_1 was accepted. The average posttest score of the experimental class was higher than that of the control class. Thus, it can be concluded that the use of Quizizz as an interactive learning medium in Van Hiele model geometry learning is effective in improving the creative thinking skills of students at MTs Negeri 1 Donggala.

1. Introduction

Education is one aspect that is never absent from human life. Education is also seen as an investment made by a nation to produce a higher quality generation. Mathematics is one branch of science that can develop students' abilities and intelligence. Mathematics is not only about calculating and applying mathematical logic, but it can also guide students to think creatively in solving problems encountered in everyday life. This is in line with Junaedi's (2022) opinion that one

of the abilities that students need to have, in addition to other abilities, is the ability to think creatively, because by thinking creatively, students can broaden their minds to come up with new ideas or new ways of solving mathematical problems. Mathematics is a science that can guide students to think creatively. This is in line with the opinion of Saidah et al. (2020) that one of the subjects that can guide and direct students to think creatively is mathematics.

Effectiveness comes from the word effective, which means success. According to Fidri et al. (2022), effectiveness generally shows the extent to which a predetermined goal has been achieved. The indicators that can be used to measure the effectiveness of learning according to Kadir (2020) are that the quality of learning can be seen from the learning process and outcomes, where the suitability of the activities of teachers and students with the learning steps is an important indicator, while learning outcomes are reflected in the level of student mastery. Learning must also have an appropriate level of teaching, which is when teachers are able to provide the knowledge and skills needed by students to learn new material. In addition, teachers need to provide appropriate teaching incentives so that students remain motivated to do their assignments and learn the material. The effectiveness of learning becomes more apparent when students have enough time to understand the material and are able to complete all activities according to the allocated time. Thus, quality, teaching suitability, motivation, and time management are important elements in successful learning.

Quizizz is an interactive learning medium designed to make classroom learning more interesting and enjoyable because it contains images, videos, and audio. According to Situmeang et al. (2022), Quizizz is an interactive medium that encourages interactive learning between teachers and students through various features such as games, quizzes, assignments, and presentations. The use of interactive media in mathematics learning allows students to experience a more interactive and interesting approach that can improve their understanding of complex mathematical concepts (Indrawati et al., 2024). According to Nurwijaya (2022), Quizizz is a learning tool or medium used to create interactive quizzes. Quizizz itself, apart from being used as a facility for delivering material, can also be used as an interesting and enjoyable learning assessment method. Meanwhile, according to Adwiyah et al. (2024), Quizizz is a learning medium that can combine material and evaluation questions, making learning interactive, more interesting, and enjoyable.

Creative thinking is the ability to analyze something based on new, more perfect concepts and determine alternatives with various ideas that can be used to solve problems. According to Marni & Pasaribu, (2021), creative thinking is the ability to think with the aim of creating or discovering new ideas that are different, unusual, and original. Meanwhile, according to Ardiana et al. (2024), creative thinking ability is a process that creates a wide variety of ideas and methods in a broad and diverse manner through smooth or quick thinking, and obtains relevant answers and the ability to produce varied ideas and questions, as well as having different directions of thought. According to Huliatusunisa et al. (2019), creative thinking is

thinking that is original, reflective, and produces complex products in mathematical problems. This is in line with the opinion of Satria et al. (2023) that creative thinking is a thinking process that is able to provide different ideas or concepts which can then become new knowledge and the answers needed. Ferawati & Suhendri (2020) also argue that creative thinking ability is the ability to generate new ideas obtained from various kinds of thinking. Munandar in Novita & Ramlah (2021) defines the indicators of creative thinking as comprising four criteria, namely fluency, flexibility, originality, and elaboration.

Geometry is a branch of mathematics that studies points, lines, planes, spaces, measurements, and the properties and relationships between them. The Van Hiele Model of geometry learning is an approach designed to improve students' understanding of geometric concepts through five sequential levels of thinking (Yudianto et al., 2022). This theory was developed by Pieter and Dina Van Hiele, who observed students' difficulties in understanding geometry. The Pythagorean theorem is a theorem that explains the relationship between the lengths of the sides of a right triangle. A right triangle has the characteristic that one of its angles is 90° . Pythagoras stated that the square of the length of the sloping side (hypotenuse) in a right triangle is equal to the sum of the squares of the lengths of the other sides.

This study aims to determine whether the use of Quizizz as an interactive medium in Van Hiele model geometry learning is effective in improving students' creative thinking skills. Effectiveness in this study is defined as the level of success in using Quizizz as an interactive learning medium in achieving predetermined learning objectives, particularly in improving students' creative thinking skills. This success is measured through changes in students' creative thinking skills after participating in the learning process. Thus, the use of Quizizz is expected to help students understand the learning material more optimally. In this study, geometry learning was applied using the Van Hiele model, which emphasizes the stages of students' thinking in understanding geometric concepts in a gradual and systematic manner. Creative thinking skills are higher-order thinking skills that enable students to produce various alternative answers, express new ideas, and solve problems in diverse and unique ways. These skills also reflect students' ability to view a problem from different perspectives.

2. Methodology

This study used a quantitative approach with a quasi-experimental research design in the form of a nonequivalent control group design with pretest-posttest to measure the effectiveness of using Quizizz in Van Hiele model geometry learning on students' creative thinking skills (Abraham & Supriyati, 2022). The research was conducted at MTs Negeri 1 Donggala in the odd semester of the 2025/2026 academic year. The population consisted of all eighth-grade students. The sample consisted of 47 students from two classes, selected based on Arikunto's random sampling technique (Asari et al., 2023; Firmansyah & Dede, 2022). The data collection technique included tests to measure creative thinking skills.

The research instrument consisted of two essay questions to measure students' creative thinking skills on the Pythagorean Theorem, covering the aspects of fluency, flexibility, originality, and elaboration, which were given as pre-tests and post-tests to the experimental and control classes. The Creative Thinking Ability Test Question Grid can be seen in Table 1.

Table 1. Creative Thinking Ability Test Question Grid

Creative Thinking Ability Indicators	Aspects of Ability Measured	Question Item
(Fluency) & (Flexibility)	Students are able to solve problems in many ways or with varied and correct answers.	1
(Originality) & (Elaboration)	Students are able to solve problems in unusual ways and can explain these methods in detail.	2
(Fluency) & (Flexibility)	Students are able to solve problems in many ways or with varied and correct answers.	1
(Originality) & (Elaboration)	Students are able to solve problems in unusual ways and can explain these methods in detail.	2

The tests in this study were administered to the experimental class and the control class, with two tests given: a pre-test and a post-test. The validity of the instruments was tested through expert validity testing and construct validity testing using Pearson's correlation to ensure that the questions accurately measured creative thinking skills (Sugiono & Wahyu, 2020) & Arikunto in (Hutauruk et al., 2025). Reliability was measured using Cronbach's Alpha formula to assess the consistency of test results (Magdalena et al., 2021). In addition, a test of question difficulty was conducted to ensure that the questions were not too easy or too difficult (Putra et al., 2024) & (Fitriani, 2021) and a discrimination power test was conducted to ensure that the questions could distinguish between high and low student abilities (Salmina & Adyansyah, 2017). All analyses were performed using SPSS and Microsoft Excel to obtain valid and reliable data.

The data analysis for this study was conducted using prerequisite tests, namely normality and homogeneity tests, to ensure that the data were normally distributed and the variance was homogeneous. The normality test was performed using Shapiro-Wilk with the help of SPSS, while the homogeneity test was performed using the Test of Homogeneity of Variance in SPSS. Hypothesis testing used a two-tailed t-test to compare the mean values of the experimental and control classes after treatment, with a significance level of 0.05, to assess the effectiveness of using Quizizz as an interactive medium in improving students' creative thinking skills. In addition, the improvement in students' abilities was also analyzed using a normalized N-Gain test to determine the extent of the increase in pre-test and post-test scores.

The research stages included preparation, implementation, and the final stage. The preparation stage included literature collection, population and sample determination, and instrument validity and reliability testing. The implementation stage was carried out through pre-testing, interactive learning using Quizizz in the experimental class and conventional learning in the control class, and post-testing.

The final stage included data processing, analysis, and drawing conclusions from the research results.

3. Result and Discussion

Research Results

This research was conducted at MTs Negeri 1 Donggala in the odd semester of the 2025/2026 academic year. Before the research was conducted, the researcher first submitted an official request for permission to the Head of MTs Negeri 1 Donggala on August 20, 2025. After obtaining permission, the researcher was directed to coordinate with the eighth-grade mathematics teacher, Mrs. Nuraningsih, S.Pd., who played a role in assisting with the initial observation process and providing assistance during the research. The researchers and subject teachers then agreed on a research schedule so as not to interfere with the regular learning process. The research was conducted for approximately three weeks, starting on August 25, 2025, to September 15, 2025. During this period, the research was conducted in six meetings, consisting of one meeting for the pretest, four meetings for learning activities, and one meeting for the posttest. There were 47 students participating in the research, consisting of 23 students from class VIII D as the experimental class and 24 students from class VIII C as the control class. In the experimental class, learning was carried out using the interactive media Quizizz in conjunction with the Van Hiele learning model. Meanwhile, the control class was taught using conventional learning methods as commonly applied by teachers at the school. Research data was obtained through creative thinking ability tests administered before and after the treatment. The use of Quizizz as interactive media can be seen in Figure 1.

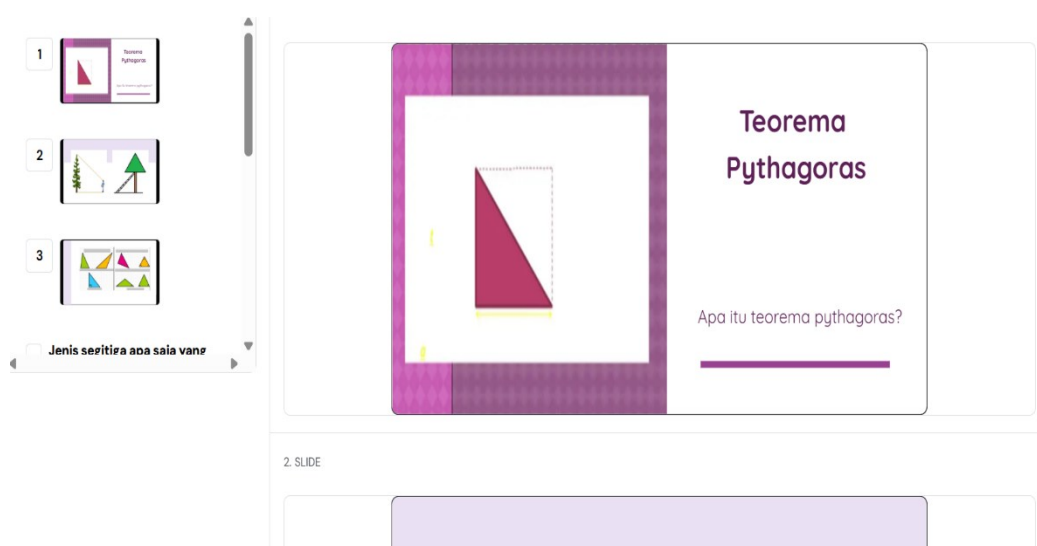
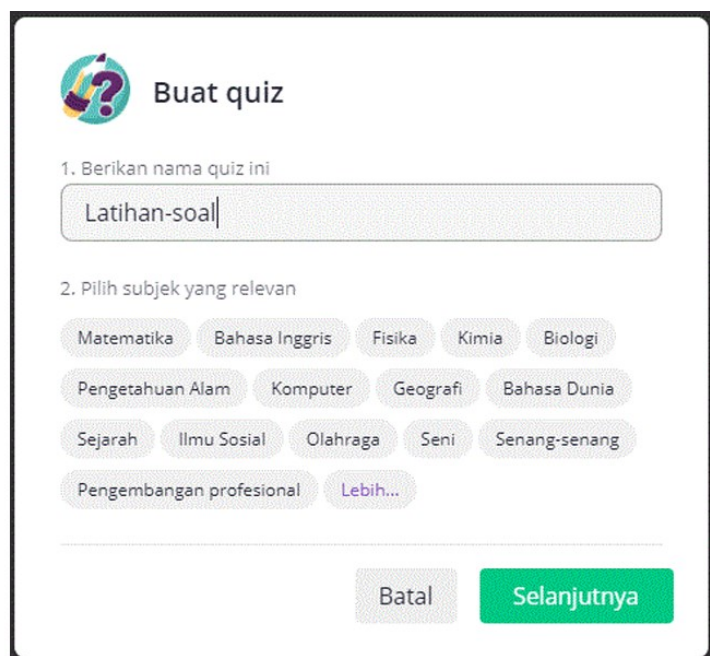


Figure 1. Using Quizizz as an Interactive Medium

To operate Quizizz, go to www.quizizz.com. Then, click on “teacher” as an instructor. Enter your identity, including your username, email, and password. Once you have logged in, create a quiz by clicking on “create a quiz.” The “Let's Create a Quiz” screen will appear, as shown in Figure 2.



The screenshot displays the 'Buat quiz' (Create Quiz) interface on the Quizizz platform. At the top left, there is a logo with a question mark and the text 'Buat quiz'. Below this, the first step is '1. Berikan nama quiz ini' (Give a name to this quiz), with a text input field containing 'Latihan-soal'. The second step is '2. Pilih subjek yang relevan' (Choose relevant subjects), showing a grid of subject buttons: Matematika, Bahasa Inggris, Fisika, Kimia, Biologi, Pengetahuan Alam, Komputer, Geografi, Bahasa Dunia, Sejarah, Ilmu Sosial, Olahraga, Seni, Senang-senang, and Pengembangan profesional. A 'Lebih...' (More...) button is also present. At the bottom, there are two buttons: 'Batal' (Cancel) and 'Selanjutnya' (Next).

Figure 2. Lets Create a Quiz Display

Enter the name of the quiz, for example: Mathematics Lesson. Write the questions in the column provided, “Write Question Here,” then enter the answer options (if using multiple choice) in the columns “Answer option 1, answer option 2, and so on.” When you have finished filling out the quiz, click “Finish Quiz.”

Analysis of Student Creative Thinking Ability Data

After the entire learning series was completed, the researcher collected data in the form of student creative thinking ability test results. The data was then analyzed quantitatively using the SPSS program. Data analysis began with descriptive analysis, followed by prerequisite testing and hypothesis testing.

Students' Creative Thinking Ability Pretest

A pretest was conducted to determine students' initial creative thinking abilities before the treatment was given. The results of the descriptive analysis showed that the average pretest score for the control class was 30.83, while the experimental class had an average score of 33.96. The difference in the average scores of the two classes was only 3.13, which indicates that the initial abilities of the students in both classes were relatively equal, as shown in Table 2.

Table 2. Descriptive Analysis of the Pre-Test Scores of Students in the Control Class and Experimental Class

Class	N	Descriptive Statistik				
		Minimum Value	Maximum Value	Std. Dev	Variance	Mean
Control	24	20	44	6,618	43,797	30,83
Experiment	23	24	48	7,462	55,680	33,96

In addition, the standard deviation values of 6.618 for the control class and 7.462 for the experimental class indicate that the data distribution of both classes is fairly uniform. Thus, it can be concluded that before the treatment was given, there was no significant difference in the creative thinking abilities of students in both classes.

Prerequisite Test

Normality Test

After obtaining the descriptive statistics of the pre-test scores of the students in the experimental and control classes, the next step was to conduct a normality test. The criteria for deciding on normality in SPSS is that when the p-value $> \alpha$, the data is normally distributed, whereas if the p-value $< \alpha$, the data is not normally distributed. The results can be seen in Table 3.

Table 3. Normality Test of Pre-test Data for Students in the Experimental Class and Control Class

Results	Class	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistik	db	Sig.	Statistik	db	Sig.
	Experimental Class Pretest	0,180	23	0,051	0,922	23	0,072
	Control Class Pretest	0,175	24	0,055	0,908	24	0,031

a. Lilliefors Significance Correction

Based on the data obtained in Table 3, it is known that the sample size (N) in the experimental class is 23 students and in the control class is 24 students. Because each class has a sample size of less than 50, the table used for the normality test is the Shapiro-Wilk test table. The test results for the experimental class have a significant value of 0.072, while the test results for the control class have a significant value of 0.031. Because the p-value for both classes is $> \alpha$, it can be concluded that the pretest data for the experimental class and control class are normally distributed.

Variance Homogeneity Test

Next, the researcher will conduct a homogeneity of variance test. The data used in the homogeneity of variance test are the pretest scores of students in the experimental and control classes. The calculation of the homogeneity of variance test using the SPSS program is presented in Table 4.

Table 4. Homogeneity of Variance Test of Pretest Data of Students in the Experimental and Control Classes

		Levene Statistic	db1	db2	Sig.
Result	Based on Average	0,792	1	45	0,378
	Based on the Median	0,712	1	45	0,403

Based on Table 4, it can be seen that the significant value of the homogeneity of variance test obtained a sig. value of 0.378. So, based on the decision in the homogeneity test, this shows that the $p\text{-value} > \alpha$, meaning that the variance of the pretest data on the creative thinking abilities of students in the control class and the experimental class is homogeneous.

Difference Test

After the prerequisite test was completed, a difference test was conducted using the Independent-Sample Test. The results of the Independent-Sample Test showed a significance value (2-tailed) of 0.136. The $p\text{-value} > \alpha$, so H_0 was accepted. This means that there was no significant difference between the initial creative thinking abilities of students in the experimental class and the control class. Thus, both classes are suitable for use as research samples. The results of the Independent-Sample Test calculation using the SPSS program are presented in Table 5.

Table 5. Independent-Sample Test of Pretest Data for Students in the Experimental Class and Control Class

t-test for Equality of Means						
		t	db	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Results Pretest	The same variance is assumed	1.520	45	0,136	3.123	2.055
	The same variance is not assumed	1.516	43.840	0,137	3.123	2.061

Posttest on Students' Creative Thinking Skills

The posttest was conducted after students attended four lessons. Descriptive analysis showed that the average posttest score for the experimental class was 81.30, while the control class only scored 72.54. The average difference of 8.76 indicates that the experimental class experienced a higher increase in creative thinking skills than the control class. In addition, the standard deviation score of the experimental class was smaller than that of the control class, indicating that the abilities of students in the experimental class were more evenly distributed. This indicates that learning using Quizizz combined with the Van Hiele model not only increased the average ability of students but also helped students with low abilities to develop better, as shown in Table 6.

Table 6. Descriptive Analysis of Posttest Scores of Students in the Control Class and Experimental Class

Class	N	Descriptive Statistik				
		Minimum Value	Maximum Value	Std. Dev	variance	Mean
Control	24	45	87	9,908	98,172	72,54
Experiment	23	65	94	8,154	66,494	81,30

Prerequisite Test

Normality Test

The normality test of the posttest data showed a significance value of 0.144 for the experimental class and 0.097 for the control class. Because the p-value of both classes was $> \alpha$, it can be concluded that the posttest data of the experimental class and control class were normally distributed.

Table 7. Normality Test of Pretest Data for Students in the Experimental Class and Control Class

Result	Class	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
		Statistik	db	Sig.	Statistik	db	Sig.
	Experimental Class Pretest	0,161	23	0,125	0,936	23	0,144
	Control Class Pretest	0,157	24	0,132	0,930	24	0,097

a. Lilliefors Significance Correction

Variance Homogeneity Test

Next, the researcher will conduct a variance homogeneity test. The data used in the variance homogeneity test are the posttest scores of students in the experimental class and control class. The calculation of the variance homogeneity test using the SPSS program is presented in Table 8.

Table 8. Test of Variance Homogeneity of Posttest Data of Students in the Experimental Class and Control Class

Result		Levene Statistic	db1	db2	Sig.
		Based on Average	0,173	1	45
	Based on Median	0,169	1	45	0,683

Based on Table 8, it can be seen that the significant value of the homogeneity of variance test can be seen from the sig. value, which is 0.679. So, based on the decision in the homogeneity test, this shows that the p-value $> \alpha$, meaning that the variance of the posttest data on the creative thinking abilities of students in the control class and the experimental class is homogeneous.

Hypothesis Testing

After the prerequisite test was completed, hypothesis testing was carried out using the Independent-Sample Test.

Table 9. Independent-Sample Test of Pretest and Posttest Data of Students in the Experimental Class

t-test for Equality of Means						
		t	db	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Result	The same variance is assumed	-20.544	44	.000	-47.348	2.305
	The same variance is not assumed	-20.544	43.658	.000	-47.348	2.305

Based on Table 9, it can be seen that the Independent-Sample Test results show a significance value (2-tailed) of 0.000. The p-value is $< \alpha$. The average difference of -47.348 shows a very significant increase from the pre-test to the post-test. In addition, the calculated t-value of -20.544 shows that the treatment given to the experimental class was very strong and consistent, creating a very substantial difference.

Table 10. Independent-Sample Test of Pre-test and Post-test Data for Control Class Students

t-test for Equality of Means						
		t	db	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Result	The same variance is assumed	-17.149	46	.000	-41.708	2.432
	The same variance is not assumed	-17.149	40.115	.000	-41.708	2.432

Based on Table 10, it can be seen that the Independent-Sample Test results show a significance value (2-tailed) of 0.000. The p-value is $< \alpha$. The average difference of -41.708 shows a significant increase from the pre-test to the post-test, although not as large as in the experimental class.

Table 11. Independent-Sample Test Results for Mathematics Learning of Students in the Experimental Class and Control Class

t-test for Equality of Means						
		t	db	Sig. (2-tailed)	Mean Difference	Std. Error Difference
Results Posttest	The same variance is assumed	3.303	45	0,002	8.763	2.653
	The same variance is not assumed	3.316	44.015	0,002	8.763	2.642

Based on Table 11, it can be seen that the Independent-Sample Test results show a significance value (2-tailed) of 0.002. The p-value is $< \alpha$. Thus, H_0 is rejected and H_1 is accepted. This indicates that the use of Quizizz as an interactive medium in Van Hiele model geometry learning is effective in improving the creative thinking skills of students at MTs Negeri 1 Donggala.

Normalized N-Gain Test

The N-Gain test was conducted to determine the extent of improvement in students' creative thinking skills. The results show that the average N-Gain value for the experimental class was 0.71, which is in the high category, while the control class had an average N-Gain value of 0.60, which is in the moderate category. These results indicate that the improvement in creative thinking skills among students in the experimental class was higher than that in the control class.

Discussion

The results of the study show that the use of Quizizz as an interactive medium combined with the Van Hiele learning model is effective in improving students' creative thinking skills. This can be seen from the significant difference in posttest scores and N-Gain scores between the experimental class and the control class. Learning with Quizizz makes students more active, enthusiastic, and directly involved in the learning process. The interactive quiz feature and immediate feedback help students understand geometric concepts gradually in accordance with the Van Hiele thinking stages. These findings are in line with the research by Ardiana et al. (2024), which states that Quizizz can improve students' mathematical creative thinking skills. Conversely, conventional learning tends to make students passive and less involved in the learning process. This results in low improvement in students' creative thinking skills in the control class. Thus, it can be concluded that the integration of interactive learning media such as Quizizz in geometry learning contributes positively to improving the quality of learning and students' creative thinking skills.

4. Conclusion

Based on the research conducted, the researcher concluded that the use of Quizizz as an interactive medium in Van Hiele model geometry learning effectively improved the creative thinking skills of students at MTs Negeri 1 Donggala. This was proven by the results of hypothesis testing using an independent-sample test at a significance level of 5% (0.05), which yielded a p-value $< \alpha$. Because the p-value $< \alpha$, H_0 was rejected and H_1 was accepted. The results of data analysis in this study showed that learning in the experimental class using Quizizz as an interactive medium had a more significant impact on students' creative thinking skills than the control class, which used conventional learning methods.

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