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Implementation of Geogebra in Improving Understanding of Geometry Concepts in Junior High School Students

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abstract

In the digital era, the integration of information and communication technology in education is essential for enhancing students' learning experiences. This study investigates the effectiveness of GeoGebra, a dynamic mathematics software, in improving eighth-grade students' understanding of geometric concepts at MTS Negeri 1 Maros. Employing a quasi-experimental design, the research involved two groups: an experimental class using GeoGebra and a control class utilizing conventional teaching methods. Data were collected through pre-tests, post-tests, and student questionnaires. Results indicated a significant improvement in the experimental class, with an average post-test score of 84.82 compared to 71.25 in the control class, and an N-Gain of 0.804 versus 0.636, respectively. Statistical analysis confirmed a significant difference between the two groups ($p < 0.001$), indicating that GeoGebra effectively enhances students' understanding of geometry. Additionally, student responses were overwhelmingly positive, with 82% expressing enjoyment in learning with GeoGebra. This study concludes that GeoGebra not only improves academic performance but also fosters a more engaging and interactive learning environment, making mathematics more accessible and enjoyable for students.

Keywords:
GeoGebra; Geometry; Student Understanding; Interactive Learning; Educational Technology.

INTRODUCTION

The development of information and communication technology in the digital era has brought significant innovations that have an impact on various aspects of life, including education. Education, as one of the main foundations in building students' knowledge, skills and character, is required to adapt to the changing times in order to remain relevant and effective. In this context, the transformation of learning methods from conventional approaches to digital technology-based approaches is an urgent need. The integration of technology in learning not only aims to increase access and flexibility in learning, but also to create learning experiences that are more interesting, interactive, and in accordance with the needs of the 21st century (Nurdyansyah, 2017).

The needs of the 21st century refer to the skills, competencies and abilities that must be developed through the learning process to prepare students for the challenges and opportunities in the modern world that continue to evolve. Therefore, 21st century education is required to not only teach basic knowledge, but also equip students with critical thinking skills, creativity, and the ability to adapt to technology and global change (Saputra, 2024).

In line with that, one of the compulsory subjects in school is mathematics. Mathematics is one of the subjects that plays an important role in the world of education, because it contains the ability to think logically, analytically, and problem-solving skills that are relevant to everyday life (Suciati et al., 2022). However, in practice, math is often considered difficult and boring by most students. This view is often the cause of low concept understanding, especially in abstract material such as geometry, including the material of building spaces.

Spatial materials require good visualization skills so that students can understand the shape, size, and relationship between elements in a shape. However, conventional learning methods that only rely on two-dimensional images in textbooks or whiteboards are often not enough to help students visualize three-dimensional shapes (Agung, 2019). As a result, students tend to lack understanding of the concept of building space.

Based on observations made at MTS Negeri 1 Maros school, it shows that the media used in the learning process is currently limited to PowerPoint, books, and whiteboards. This monotonous use of media contributes to the lack of student involvement in teaching and learning activities. As a result, students not only become passive, but also have difficulty in understanding the mathematical concepts taught. This inactivity can hinder the development of students' critical and analytical thinking skills, which are very important in learning mathematics. Therefore, innovation is needed in the selection and use of more varied and interactive learning media, so that students can be more involved and understand the material better.

In a study conducted by Sinaga at SMP Negeri 2 Pematangsiantar, it showed that the use of the GeoGebra application had a significant effect on student interest and learning outcomes in the material of building cubes and beams. Students who study with the help of GeoGebra have higher learning interest and learning outcomes compared to students who study without the help of GeoGebra (Sinaga, 2022).

This is supported by research conducted by Hermawan, Yuspriyati, and Purwasih which analyzed the learning interest of eighth-grade students in flat-sided spatial figures with the help of the GeoGebra application. The results of the study showed that the use of GeoGebra had a positive response in increasing students' interest in learning mathematics, especially in flat-sided spatial figures. The overall average percentage reached 76.89% with a good classification (Hermawan et al., 2022). However, there are differences between the two studies and the study to be conducted. The previous study focused more on students' interest and learning outcomes in using GeoGebra, while this study will focus on understanding mathematical concepts with the help of GeoGebra.

Mathematical concept understanding is the ability to absorb, comprehend, and connect mathematical concepts with other concepts, as well as the ability to present them in mathematical form and create accurate, efficient problem-solving algorithms using one's own language, and then apply that knowledge to solve everyday problems (Sengkey et al., 2023). Along with technological developments, various innovations in learning have been developed to improve the quality of the teaching and learning process. The teaching and learning process is a dynamic interaction between teachers and students that aims to facilitate understanding, mastery, and application of learning materials. One such innovation is the use of interactive software such as GeoGebra (Anggreni, 2020).

GeoGebra is dynamic mathematics software that combines geometry, algebra, statistics, and calculus. GeoGebra allows students to interactively visualize spatial objects, making abstract concepts more concrete and easier to understand. GeoGebra is an ICT software that can dynamically visualize geometry, helping students understand spatial concepts more easily and interactively through engaging and comprehensive visual representations. With GeoGebra software, students can more easily visualize mathematical concepts while also fostering their creativity (Hermawan et al., 2022).

GeoGebra can be accessed via mobile devices, as the application is available on the Play Store. With this ease of access, students can use it to learn anytime and anywhere (Agung, 2019). GeoGebra is also equipped with various features that support mathematics learning, making it a very effective tool to use in the learning process. The use of GeoGebra in learning allows students to visualize and manipulate geometric objects interactively, thereby helping students understand concepts better. GeoGebra's interactive and dynamic features allow students to explore various shapes of solid figures and understand their properties more deeply (Lonto et al., 2024).

Thus, the purpose of this study is to determine whether the use of GeoGebra is effective in improving students' understanding of geometric concepts and to examine students' responses to the use of GeoGebra in geometry learning.

METHODS

Reseach Design

This research design is quantitative research with a quasi-experimental approach. This study aims to investigate the effect of using GeoGebra media on students' understanding of geometry concepts at MTS Negeri 1 Maros. The research design used is a non-equivalent control group design, where two subject groups, namely the experimental class and the control class, will undergo measurements before (pre-test) and after (post-test) the treatment.

Population and Sample

The population of this study consists of all students at MTS Negeri 1 Maros, specifically the 2023 cohort, namely eighth-grade students. Sampling was conducted using non-probability sampling, specifically purposive sampling, where two equivalent classes were selected based on their suitability for the research objectives. The experimental class used

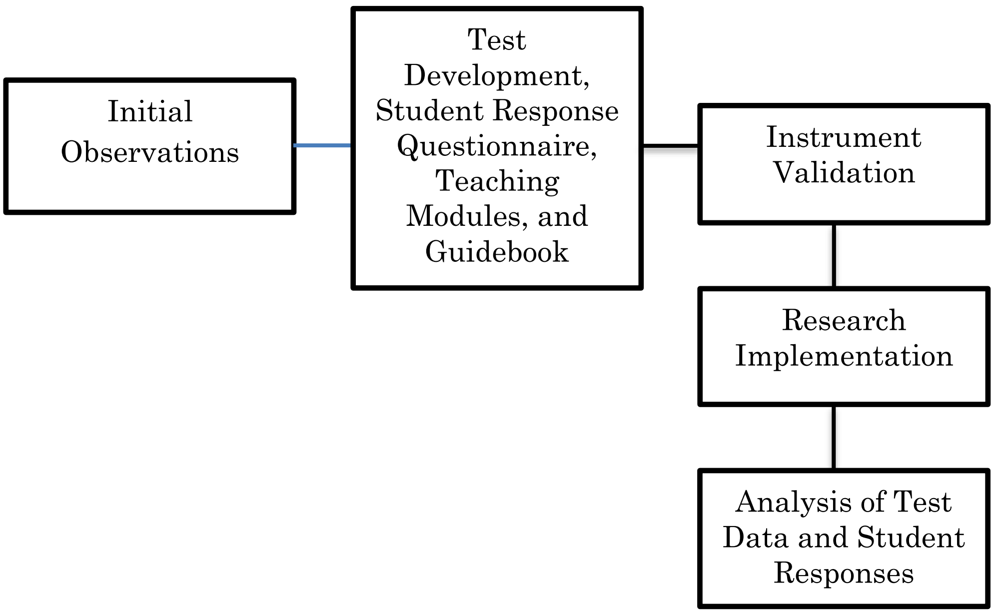
GeoGebra media, while the control class used conventional methods. The experimental class was VIII A with 21 students, while the control class was VIII B with 20 students.

Data Collection Techniques

The data collection techniques used in this study included observation, concept comprehension tests, and questionnaires. Observation was conducted to determine the classroom conditions and media used in learning before the study was conducted. The concept comprehension test consisted of a pre-test and post-test designed to measure students' understanding of geometry material. The concept comprehension test consists of 5 essay questions that refer to the following indicators: Expressing and Explaining Concepts, Classification and Grouping, Application of Examples and Non-Examples, and Applying Concepts or Problem-Solving Algorithms. A questionnaire was used to measure students' responses to the use of GeoGebra in learning. It was given to the experimental class to find out students' responses to the use of GeoGebra.

Research Implementation Procedure

The research implementation procedure consisted of three stages, namely: the Planning Stage, the Implementation Stage, and finally the Reporting Stage. The framework for the research implementation procedure is as follows:



Gambar 1. Research Implementation Procedure

Data Analysis Techniques

Descriptive statistical analysis was used to analyze students' concept comprehension test results and responses to the use of GeoGebra using JASP 0.19.3 for Windows to calculate the mean, standard deviation, maximum, and minimum values. Student concept understanding data will be analyzed to describe mathematical understanding before and after participating in the experimental class with GeoGebra, as well as the control class that uses conventional methods such as lectures and textbooks. The assessment of students' understanding of mathematical concepts was classified into three categories, namely high, medium, and low, according to each indicator. This classification was presented in tabular form, with reference to the school's Minimum Passing Criteria (KKM) set at 77.

$$NP = \frac{R}{SM} X\ 100\%$$

Explanation:

NP = Percentage score sought

R = Score obtained by students

SM = Highest or ideal score

Table 1. Categories of Mathematical Conceptual Understanding Ability

Category	**Score (%)**
Very Good	86-100
Good	76-85
Adequate	60-75
Poor	55-59
Very Poor	≤ 54

(Badraeni et al., 2020)

Descriptive gain analysis is used to evaluate improvements in student learning outcomes. Gain is calculated by comparing the pretest and posttest results of the experimental class and the control class, using the N-Gain formula as follows:

$$N - Gain = \frac{\text{Posttest Score} - \text{Pretest Score}}{\text{Ideal Score} - \text{Pretest Score}}$$

Explanation:

Ideal Score: The maximum score obtained by students

The classification of normalized gain is shown in the following table

Table 2. Normalized N-Gain Classification

Score	Category
$\boldsymbol{g < 0,30}$	Low
$\boldsymbol{0,30 \leq g < 0,77}$	Moderate
$\boldsymbol{0,77 < g}$	High

(Anjarwati & Pujiastuti, 2020)

Data from the pretest and posttest in the experimental class and control class will be used to analyze students' conceptual understanding. The experimental class using GeoGebra is expected to improve students' understanding compared to the control class using conventional methods such as lectures and textbooks. By comparing the results of both methods, this study aims to identify the more effective method in enhancing students' conceptual understanding.

The questionnaire in this descriptive analysis was used to determine students' responses to the use of GeoGebra in learning, particularly from the experimental class, in order to evaluate student responses. The assessment criteria in the student response questionnaire sheet are as follows:

Table 2. Student Response Questionnaire Assessment Criteria

Answer Criteria	Score
SS (Strongly Agree)	5
S (Agree)	4
CS (Somewhat Agree)	3
KS (Disagree)	2
TS (Strongly Disagree)	1

From the questionnaire results obtained, data analysis can be performed using the following formula.

$$N = \frac{\sum a}{\sum b}\, x\, 100$$

Explanation:

N : Value

$\sum a$: total score obtained

$\sum b$: highest score

Based on the percentage of respondents, the results can be seen according to the score interpretation criteria presented in the Likert scale in the following table.

Table 3. Score Interpretation Criteria

No	Persentase (%)	**Explanation**
1.	0 – 49,99	Very Poor/Uninteresting
2.	50,00 – 59,99	Poor/Uninteresting
3.	60,00 - 79,99	Good/Interesting
4.	80,00 - 100	Very Good/Very Interesting

(Agustianingsih et al., 2021)

The prerequisite tests include the Shapiro-Wilk normality test (sig>0.05=normal) and the Levene homogeneity test (sig>0.05=homogeneous). If met, a hypothesis test is conducted using an Independent Samples t-test (p-value <0.05 significant) to compare N-Gain between the experimental class and the control class (Widana & Muliani, 2020).

The hypotheses in this study are as follows:

(H0): The use of GeoGebra is not effective in improving students' understanding of geometric concepts.

(H1): The use of GeoGebra is effective in improving students' understanding of geometric concepts.

RESULT AND DISCUSSION

research results

Results description of pre-test and post-test data obtained from students in both classes both in the experimental class using GeoGebra and in the control class using conventional learning methods. This study aims to determine the extent of improvement in students' understanding of geometric concepts after treatment. The following is Table 4, which shows the results of statistical data description.

Table 4. Recapitulation of Descriptive Statistical Data in Pre-Test and Post-Test

	Pre-Test		Post-Test	
	Experiment	Control	Experiment	Experiment
Mean	24.408	20.471	84.824	71.252
Std. Deviation	12.087	11.221	11.911	13.550
Minimum	3.130	3.130	53.130	46.880
Maximum	50.000	40.630	100.000	96.880

Based on Table 4, in the pre-test results, the experimental class had a minimum score of 3,130 and a maximum score of 50,000, with an average of 24,408 and a standard deviation of 12,087. Meanwhile, the control class had the same minimum score of 3.130, but a lower maximum score of 40,630, with an average of 20,471 and a standard deviation of 11,221. After the treatment, the post-test results showed a significant improvement in both classes. The experimental class had a minimum score of 53,130 and a maximum score of 100,000, with an average score of 84,824 and a standard deviation of 11,911, while the control class had a minimum score of 46,880 and a maximum score of 96,880, with an average score of 71,252 and a standard deviation of 13,550.

This data shows that the experimental class experienced a higher and more consistent increase in concept understanding compared to the control group. This indicates that the use of Geogebra media in geometry learning has a positive impact on students' achievement of geometry concept understanding.

Furthermore, after analyzing the statistical description results of the pre-test and post-test, the data was classified into five categories of students' conceptual understanding abilities. The results of this analysis can be seen in the frequency distribution and percentage of scores obtained by students in both classes. Table 5 below presents a recapitulation of frequency and percentage data for the pre-test and post-test.

Table 5. Summary of Pre-Test and Post-Test Frequency and Percentage Data

Category	Score	Pre-Test				Post-Test			
		Experimental		Control		Experimental		Control	
		f	(%)	F	(%)	f	(%)	F	(%)
Very good	86-100	0	0	0	0	12	57.14	3	15
Very	76-85	0	0	0	0	5	23.80	5	25
Fair	60-75	0	0	0	0	3	14.30	7	35
Poor	55-59	0	0	0	0	0	0	3	15
Very Poor	≤ 54	21	100	20	100	1	4.76	2	10
	Total	21	100	20	100	21	100	20	100

Based on Table 5 above, both classes showed a very poor understanding of geometric concepts, with average scores below the Minimum Passing Criteria (KKM) set at 77. Before the treatment was applied in the learning process, all students in the experimental class and control class were in the "Very Poor" category (score ≤ 54). The results of the statistical description of the pre-test showed that the experimental class had an average score of 24.408, while the control class had an average score of 20.471, indicating that both classes did not understand the material well.

However, after the intervention, the post-test results showed significant changes. In the experimental class, 17 students (81%) achieved the "Good" and "Very Good" categories, with the average score increasing to 84.824, meaning they had exceeded the KKM. In contrast, in the control class, only 8 students (40%) achieved the same categories, with a post-test average score of 71.252, and most students were still below the minimum passing grade. This shows that the students' understanding of geometric concepts in the experimental class improved significantly after the GeoGebra-assisted learning treatment, compared to the control class that used conventional methods.

This improvement is consistent with the findings from the N-gain data analysis, which was conducted to measure the level of improvement between the two classes. The results of the N-gain analysis between the experimental and control classes can be seen in Table 6 below.

Table 6. N-Gain Results for the Experimental Class and Control Class

	Group	N	Mean	SD	SE	Coefficient of variation	Mean Rank	Sum Rank
N-Gain	N-Gain Experimental	21	0.804	0.146	0.032	0.0181	26.881	564.500
	N-Gain Control	20	0.636	0.163	0.037	0.257	14.825	296.500

In Table 6 above, it can be seen that the N-Gain value is calculated to measure the extent of improvement in students' understanding after the treatment. The average N-Gain in the experimental class is 0.804 with a standard deviation of 0.146, indicating that most students in the experimental class experienced a significant increase in their understanding of geometric concepts. In contrast, the control class has an average N-Gain of 0.636 with a standard deviation of 0.163, indicating that although there was an increase, the level of increase was still moderate.

Table 7 Classification of Normalized Gain in the Experimental Class and Control Class

No	Value	Category	Frequency	
			Experimental Class	Control Class
1	$g < 0{,}30$	Low	0	1
2	$0{,}30 \leq g < 0{,}77$	Moderate	5	15
3	$0{,}77 < g$	High	16	4
	Total		21	20

Based on Table 7, the classification of N-Gain in the experimental class and control class shows several categories. In the Low category (g < 0.30), there were no students in the experimental class who fell into this category, while there was 1 student in the control class. This indicates that no students in the experimental class experienced very low gains. In the Moderate category (0.30 ≤ g < 0.77), there were 5 students in the experimental class, while the control class had 15 students. This indicates that although there were some students in the experimental class who experienced moderate gains, the number was significantly fewer compared to the control class. Finally, in the High category (0.77 < g), the experimental class had 16 students in this category, while the control class had only 4 students. This shows that most students in the experimental class experienced a significant increase in their understanding of geometric concepts.

A student response questionnaire on the use of GeoGebra was given to students in the sixth meeting in the experimental class to evaluate the effectiveness of the GeoGebra application in the learning process. Table 8 shows the results of statistical descriptive data on the student response questionnaire on the use of GeoGebra.

Table 8. Recap of Student Response Questionnaire

	Student Response Questionnaire
Mean	57.333
Std. Deviation	7.742
Minimum	33.000
Maximum	66.000

Based on the data obtained, the average student response was 57.33, which is equivalent to 82% when converted to a percentage. This indicates that students gave positive responses and fell into the “Very Good/Very Interesting” category according to the established criteria. The minimum score is 33, which is equivalent to 47% when converted to a percentage, and the maximum score is 66, equivalent to 94%, with a standard deviation of 7.742, indicating variation in student responses, reflecting differences in their level of acceptance of GeoGebra.

Table 9. Score Interpretation Criteria

No	**Percentage (%)**	**Description**	**Frequency**	Percentage
1.	0 – 49,99	Very Poor/Not Interesting	1	4.8
2.	50,00 – 59,99	Poor/Uninteresting	0	0
3.	60,00 - 79,99	Good/Interesting	5	23.8

4.	80,00 - 100	Good/Very Interesting	15	71.4

Based on the score interpretation criteria shown in Table 9, there were 15 students who responded in the "Very Good/Very Interesting" category, so the percentage of students who gave positive responses was 71.4%. This shows that most students feel that GeoGebra is very useful in the learning process. Only 1 student felt that GeoGebra was "Very Poor/Not Interesting," accounting for 4.8% of all students. Therefore, it can be concluded that GeoGebra has great potential as a learning tool and is generally well-received by students.

Data analysis for the normality test was conducted using the Shapiro-Wilk test with the assistance of JASP 0.19.3 for Windows software. Decision criteria: if the significance value (p) > 0.05, then the N-Gain data is normally distributed. The following table shows the normality test results for N-Gain.

Table 10. Normality Test Results for N-Gain

Residuals	W	p
N-GAIN	0.972	0.391

Based on the results of the Shapiro-Wilk normality test in Table 4.7, the value of W = 0.972 and the significance value (p) = 0.391 were obtained for the N-Gain data. Referring to the established criteria, the p-value = 0.391 > 0.05 indicates that the N-Gain data for the experimental and control groups are normally distributed. Therefore, it can be concluded that the N-Gain data meet the normality assumption, allowing for the continuation of parametric statistical analysis.

The homogeneity test was conducted using Levene's test with the assistance of JASP 0.19.3 for Windows software. Decision criteria: if the significance value (p) > 0.05, then the variances of the two groups are homogeneous, whereas if the significance value (p) < 0.05, then the variances of the two groups are not homogeneous.

Table 11. Results of the Homogeneity Test on N-Gain

	F	df_1	df_2	p
N-GAIN	0.472	1	39	0.496

The results of the Levene's homogeneity test presented in Table 4.8 show an F value of 0.472 with degrees of freedom (df1 = 1, df2 = 39) and a significance level (p) of 0.496. Since p = 0.496 > 0.05, the variance of N-Gain between the experimental class and the control class is homogeneous, so we can proceed to the independent samples t-test to evaluate any possible differences between the two groups.

After the data is proven to be normally distributed and have homogeneous variance, the next step is to perform an independent samples t-test. This test aims to compare the mean N-Gain of the experimental class and the control class to determine the significant difference between the two. The significance level used is p-value < 0.05. The following is a table of the results of the independent samples t-test.

Table 12. Results of the Independent Samples t-Test on N-Gain for the Experimental Class and Control Class

Statistical Test	Statistical Value	df	p-value	Effect Size	SE Effect Size
Student	3.474	39.000	< .001	1.027	0.354
Welch	3.464	37.983	< .001	1.027	0.352
Mann-Whitney	333.500		< .001	0.588	0.181

Based on Table 12 above, the results of the Student t-test show that the t-test produced a statistical value of 3.474 with degrees of freedom (df) = 39.000 and a p-value < 0.001. Since the p-value is < 0.001 < 0.05, the null hypothesis (Ho) is rejected and the alternative hypothesis (H1) is accepted. This indicates a significant difference between the N-Gain of the experimental class and the control class. Additionally, the effect size of 1.027 indicates a large effect, proving that learning using GeoGebra is significantly more effective than conventional methods. This finding is supported by the results of the Mann-Whitney test, where this non-parametric test shows a p-value < 0.001 with an effect size = 0.588, which falls into the medium to large effect category. These results reinforce the conclusion that the experimental class outperformed the control class. Therefore, it can be concluded that H0 is rejected and H1 is accepted, indicating that the use of GeoGebra is effective in improving students' understanding of geometric concepts.

Discussion

This study was conducted at MTS Negeri 1 Maros and consisted of three preparatory stages, namely the planning stage, the implementation stage, and the reporting stage. In the first stage, planning was carried out, which included initial observations at MTS Negeri 1 Maros. These observations aimed to identify the media used in learning and the existing classroom conditions. During the observation, the researcher asked the mathematics teacher questions about the learning media used. The results of the observation showed that the media used were limited to PowerPoint, books, and whiteboards. The monotonous use of these media contributed to a lack of student engagement in teaching and learning activities, so that students were not only passive but also had difficulty understanding the mathematical concepts taught. This highlights the importance of designing more interactive treatments through the use of GeoGebra.

Based on the initial observation results, this study was conducted to compare two classes to see the differences in the improvement of geometry concept understanding. Class VIII A was designated as the experimental class that used GeoGebra to visualize the material, while class VIII B was the control class that applied conventional teaching methods.

The results of this study show that the use of GeoGebra significantly improves students' understanding of geometric concepts. This is evidenced by an increase in the average N-Gain of 0.804 in the experimental class, compared to 0.636 in the control class. This finding is in line with research by Julita, Lalu Sucipto, and Ahmad Nasrullah (2022), which shows that the use of GeoGebra can improve students' conceptual understanding, with an average N-Gain value of 73% (Julita et al., 2022). Research by Ikwan Subandi, Atiqoh, and Hartono (2025) also shows that the use of GeoGebra has a higher average score compared to conventional methods (Subandi et al., 2025). These results indicate that GeoGebra helps students understand difficult concepts in an easier and more engaging way.

The difference in concept understanding test results between the two classes was also proven through statistical testing. The t-test showed a significance value (p-value) < 0.001, indicating a highly significant difference between the two groups. Additionally, the measurement of the treatment effect using Glass's Delta yielded a value of 1.027, which falls into the category of a large effect. This means that GeoGebra not only improves scores but also has a strong impact on the quality of student learning. The Mann-Whitney test also showed similar results with an effect size of 0.588, which is classified as moderate to large. This is also evidenced by the average score on the four concept understanding indicators used after using GeoGebra, which was 81.55% in the "good" category. Thus, it can be concluded that students' concept understanding improved significantly after using GeoGebra.

Not only from the test results, but students' responses to learning using GeoGebra were also very positive. The survey results showed that around 82% of students really liked learning with GeoGebra, with an average survey score of 57.33, which falls into the "Very Good" or "Very Interesting" category. They felt that learning geometry became more enjoyable, easier to understand, and not boring. These findings align with research by Faradiba Jabnabillah and Mahfudz Reza Fahlevi, which showed that students' responses to the use of GeoGebra were highly effective, with an 82% percentage reflecting the application's attractive interface and ease of use (Jabnabillah & Reza Fahlevi, 2023).

One of the advantages of GeoGebra discovered during the research was its ability to display spatial figures in the form of three-dimensional images that can be moved and viewed from various angles. This feature helps students understand the relationships between the parts of spatial figures, such as points, lines, planes, as well as volume and surface area. The visualizations presented through GeoGebra make the material feel more tangible for students. With this approach, students become more engaged in the learning process and are not merely sitting and listening to explanations. They can create and practice the material on their phones during the learning process, which makes it easier for them to grasp the concepts. Additionally, GeoGebra encourages students to be more active in the learning process.

CONCLUSION

Based on the results of the study conducted at MTs Negeri 1 Maros, the following conclusions can be drawn: The use of GeoGebra as a learning medium has proven to be effective in improving students' understanding of geometric concepts. The analysis results show that the average post-test scores of students in the experimental class using GeoGebra reached 84.82, while the control class using conventional methods only reached 71.25. Additionally, the N-Gain value in the experimental class was 0.804, indicating a significant improvement in geometric concept understanding. This is supported by statistical test results showing a significant difference between the two groups, with a p-value < 0.001 and a large effect (Glass's Delta = 1.027). Thus, GeoGebra has a positive impact on students' understanding of geometry material. Students' responses to the use of GeoGebra in learning were also very positive. The questionnaire results show that around 82% of students really like learning with GeoGebra, with an average questionnaire score of 57.33, which falls into the "Very Good" or "Very Interesting" category. Students feel that learning geometry has become more fun, easy to understand, and not boring. Thus, students have become more active and confident in attending lessons.

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