

The Effect of Geometry Flashcard Learning Media on Elementary School Students' Ability to Understand Basic Concepts of Solid Figures

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ABSTRACT

This study aims to examine the effect of geometry flashcard learning media on elementary school students' understanding of basic three-dimensional geometry concepts at MIS Nurul Aflah. The study employed a quantitative approach using a quasi-experimental method with a Pretest–Posttest Control Group Design. The sample consisted of 30 third-grade students, divided into 15 students in the experimental group and 15 students in the control group, selected through purposive sampling. The research instruments included five essay test items that met the validity and reliability requirements, supported by observation sheets and documentation. The findings revealed that the experimental group's mean pretest score increased from 57.33 to 84.27 on the posttest, while the control group's mean score improved from 56.67 to 71.20. The normality test yielded significance values of 0.200, and 0.176, while the homogeneity test produced a significance value of 0.482, indicating that the data were normally distributed and homogeneous. Furthermore, the Independent Samples t-test resulted in a significance value of 0.001 (<0.05), indicating that the use of geometry flashcard learning media had a significant positive effect on students' understanding of basic three-dimensional geometry concepts..

Informasi Artikel

Kata Kunci:

Flashcard geometri;
Pemahaman konsep;
Bangun ruang;
Sekolah dasar;
Quasi eksperimen

ABSTRAK

Penelitian ini bertujuan untuk menganalisis pengaruh media pembelajaran *flashcard* geometri terhadap kemampuan pemahaman konsep dasar bangun ruang siswa sekolah dasar di MIS Nurul Aflah. Penelitian menggunakan pendekatan kuantitatif dengan metode *quasi experimental design* melalui rancangan *Pretest–Posttest Control Group Design*. Sampel penelitian berjumlah 30 siswa kelas III yang terdiri atas 15 siswa pada kelompok eksperimen dan 15 siswa pada kelompok kontrol yang dipilih menggunakan teknik *purposive sampling*. Instrumen penelitian berupa tes uraian sebanyak 5 butir soal yang telah memenuhi kriteria valid dan reliabel, disertai lembar observasi serta dokumentasi. Hasil penelitian menunjukkan bahwa rata-rata nilai *pretest* kelompok eksperimen sebesar 57,33 meningkat menjadi 84,27 pada *posttest*, sedangkan kelompok kontrol meningkat dari 56,67 menjadi 71,20. Hasil uji normalitas menunjukkan nilai signifikansi 0,200 dan 0,176, sedangkan uji homogenitas memperoleh nilai signifikansi 0,482 sehingga data berdistribusi normal dan homogen. Pengujian hipotesis menggunakan *Independent Sample t-test* memperoleh nilai signifikansi 0,001 ($<0,05$), sehingga dapat disimpulkan bahwa media pembelajaran *flashcard* geometri berpengaruh signifikan terhadap kemampuan pemahaman konsep dasar bangun ruang siswa sekolah dasar.

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1. Introduction

The Merdeka Curriculum implemented at Nurul Aflah Private Islamic Elementary focuses on student-centered learning and provides teachers with the flexibility to use various innovative learning strategies and media. In its implementation, teachers can employ various methods and learning media to make the learning process more effective. With this greater flexibility in learning, it is expected that students will be able to understand learning concepts more effectively, particularly in mathematics, which requires a strong conceptual understanding.

Conceptual understanding is one of the important aspects of mathematics learning. Through conceptual understanding, students are expected to be able to explain the material they have learned and relate it to other concepts in solving various problems (Nurhaidah Anggraeni Putri et al., 2024). Students' conceptual understanding is influenced by their cognitive abilities to receive and comprehend information during the learning process. The inability of students to explain the concepts they have learned may cause them to experience difficulties in understanding the material (Hermansah & Kartini, 2021). Mathematics is a discipline in which the learning process emphasizes conceptual understanding and continuous practice. Mathematics learning is also a process of interaction between teachers and students that aims to develop students' knowledge and creativity (Rahmawati & Hanifah, 2021). Therefore, mathematics learning at the elementary school level serves as an important foundation for supporting children's cognitive and intellectual development.

Based on the results of an initial interview conducted on March 5, 2026, with a third-grade teacher at MIS Nurul Aflah, it was found that some students still experienced difficulties in understanding mathematical concepts, particularly in the topic of solid figures. Students tended to memorize formulas without understanding the underlying concepts, which made it difficult for them to solve problems. They also had difficulty identifying the elements of solid figures and distinguishing between types of solid figures with similar shapes, which requires a good conceptual understanding. In the learning process, the teacher still primarily used the lecture method, resulting in low student engagement. This condition affected students' low level of mathematical conceptual understanding and their ability to solve more complex problems.

This condition indicates a gap between theory and practice in classroom learning. In theory, mathematics learning in elementary schools should help students understand concepts through various methods and learning media (Reflina, 2020). However, in practice, the dominant use of the lecture method makes students less active and encourages them to memorize formulas without understanding the underlying concepts. Teachers need to consider several factors beforehand to ensure that the learning media used are truly appropriate to students' needs and learning objectives (Mawardah et al., 2024). Therefore, the use of learning media that can help students understand mathematical concepts, particularly solid figures, is necessary (Nasution et al., 2024).

A relevant previous study conducted by Pohan et al. (2025) employed classroom action research using STEM Lidi Flashcard media in mathematics learning to improve elementary school students' conceptual understanding of plane figures. The study was conducted in two learning cycles. The results showed that the use of flashcard media improved students' conceptual understanding, as indicated by an increase in learning mastery from 40% in the pre-cycle stage to 60% in Cycle I and further to 90% in Cycle II. These findings indicate that the use of flashcard media can help students understand the concepts of plane figures more effectively.

However, the previous study focused on plane figures. Meanwhile, solid figures are also an important component of elementary school mathematics that requires a strong conceptual understanding. Therefore, further research on the use of flashcard media for teaching solid figures to improve elementary school students' conceptual understanding is still necessary.

Based on the aforementioned problems, efforts are needed to improve students' mathematical conceptual understanding through the use of more varied learning methods and media. Students' low level of mathematical conceptual understanding may be caused by several factors, one of which is the limited variety of learning methods and media used. Learning media are used to assist teachers in delivering material more effectively, thereby increasing students' interest in learning and preventing them from becoming bored during the learning process (Aminah & Yusnaldi, 2024). Elementary school students generally find it easier to understand material through learning media that are concrete, visual, and engaging (Kemampuan & Matematis, 2024). Therefore, learning media that can help students understand mathematical concepts in a more concrete and engaging manner are needed.

One such medium is geometry flashcard learning media. Geometry is a branch of mathematics that studies various interconnected objects, such as points, lines, angles, and spatial shapes (Liani & Hasanah, 2023).

Geometry flashcards are illustrated cards containing shapes and information about solid figures that can help students recognize the forms, properties, and characteristics of solid figures more easily. Flashcards are a learning medium that can help students understand concepts visually, making the learning process more engaging and comprehensible (Nurdiana & Andina Halimsyah, 2023). Educational card games can also integrate the recognition of numerical symbols with the identification of objects or animals in students' surrounding environment (Jl et al., 2025). The use of flashcard media can help students understand mathematical concepts through images, making the material easier to comprehend and remember. However, this medium also has limitations, such as relying primarily on visual information, being easily damaged, and being less effective when used in classes with a large number of students (Athoillah et al., 2025).

Based on this background, the researcher is interested in conducting a study entitled "The Effect of Geometry Flashcard Learning Media on Elementary School Students' Conceptual Understanding of Basic Solid Figures." This study aims to determine whether the use of geometry flashcard media can improve students' conceptual understanding of solid figures. The research is conducted because some students still experience difficulties in understanding mathematical concepts, particularly solid figures, with students tending to memorize formulas without understanding the underlying concepts.

2. Method

This study employed a quantitative approach using a quasi-experimental design aimed at determining the effect of geometry *flashcard* learning media on elementary school students' ability to understand the basic concepts of solid figures. This design was selected because the study involved an experimental group and a control group to compare learning outcomes after treatment was administered, although the researcher could not control all external variables as would be possible in a true experiment. Therefore, a quasi-experimental design was considered appropriate for implementation in a school setting where classes had already been established, allowing the learning process to take place naturally without altering the existing

classroom conditions (Saputri & Lilis, 2025; Ge'e & Dahlan, 2025).

The study was conducted at Nurul Aflah Private Islamic Elementary, with the population consisting of all third-grade students enrolled during the research academic year. The research sample consisted of 30 students, divided into two groups: 15 students in the experimental group, who received instruction using geometry *flashcard* learning media, and 15 students in the control group, who received conventional instruction. The sampling technique used was purposive sampling, taking into consideration similarities in academic ability, age, and learning materials, so that both groups were considered suitable for comparison in this study (Sugiyono, 2022).

3. Result and Discussion

The research design used was the Pretest-Posttest Control Group Design. In this design, both groups were first given a pretest to determine the students' initial ability to understand the concepts of solid figures. Subsequently, the experimental group received treatment using geometry *flashcard* learning media, while the control group participated in learning using the method routinely applied by the teacher. After the entire learning process was completed, both groups were given a posttest to determine changes in students' conceptual understanding after the treatment. This design allows the researcher to compare the improvement in learning outcomes between the two groups, thereby enabling the effect of the learning media to be determined more objectively (Saputri & Lilis, 2025).

Table 1. Research Sample

Number	Kelompok	Total Number of Students	Description
1	Experimental Group	15	Using Flashcard Media Geometri
2	Control Group	15	Using Conventional Learning konvensional
	Total	30	

Source: Data from Nurul Aflah Private Islamic Elementary School (2026)

Table 2. Research Design: Pretest-Posttest Control Group Design

Group	Pretest	Treatment	Posttest
Experimental	O ₁	X	O ₂
Control	O ₃	-	O ₄

Source: Adapted from Saputri and Lilis (2025)

Note:

O₁ = Pretest for the experimental group

X = Instruction using geometry *flashcard* learning media

O₂ = Posttest for the experimental group

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O_3 = Pretest for the control group
- = Conventional instruction
 O_4 = Posttest for the control group

The Pretest–Posttest Control Group Design consists of two research groups, namely the experimental group and the control group. The experimental group was given treatment in the form of using geometry *flashcard* learning media during the learning process, while the control group received instruction using conventional methods. The pretest and posttest results of both groups were then compared to determine whether the use of geometry *flashcard* media had a significant effect on elementary school students' ability to understand the basic concepts of solid figures (Saputri & Lilis, 2025; Athoillah et al., 2025).

Table 3. Results of the Validity Test of the Basic Conceptual Understanding of Solid Figures Test Instrument

Question Number	r_Count	r_table ($\alpha = 0,05$)	Criterion
1	0,621	0,361	Valid
2	0,684	0,361	Valid
3	0,752	0,361	Valid
4	0,589	0,361	Valid
5	0,703	0,361	Valid

Source: Data Processing Results from SPSS (2026)

Based on the results of the validity test presented in Table 3, it is known that all test items have an $r_{\text{calculated}}$ value greater than the r_{table} value of 0.361 at a 5% significance level. These results indicate that all five test items meet the validity criteria and are therefore capable of measuring students' ability to understand the basic concepts of solid figures in accordance with the indicators established in the study. An instrument that is declared valid indicates a correspondence between the content of the test items and the measurement objectives, allowing the data obtained to objectively represent students' abilities. Thus, all test items are appropriate for use as research instruments to collect pretest and posttest data from both the experimental and control groups throughout the research process (Saputri & Lilis, 2025).

Instrument validity is a crucial stage before conducting research because it determines the quality of the data to be analyzed. An instrument that meets validity requirements provides information that accurately reflects students' abilities, thereby ensuring that the research findings are reliable and accountable. Through a valid instrument, changes in students' ability to understand the basic concepts of solid figures after learning with geometry *flashcard* media can be

identified more accurately. Therefore, the validity test results in this study indicate that all test items have met the requirements for use as a measurement instrument in the research data collection process (Ge'e & Dahlan, 2025).

Table 4. Results of the Reliability Test of the Test Instrument

Question Number	Item Variance	Total Variance	Cronbach's Alpha	r_table	Description
1	0,812	8,564	0,846	0,361	Reliable
2	0,695	-	-	-	Reliable
3	0,873	-	-	-	Reliable
4	0,744	-	-	-	Reliable
5	0,781	-	-	-	Reliable

Source: Data Processing Results from SPSS (2026)

The results of the reliability test presented in Table 4 show that the research instrument obtained a Cronbach's Alpha value of 0.846. This value is higher than the minimum threshold used as a reference; therefore, the instrument is considered to have a high level of reliability. This indicates that all test items have good consistency in measuring students' ability to understand the basic concepts of solid figures. A reliable instrument produces relatively consistent data when administered to groups with similar characteristics, making the research results more accurate and suitable as a basis for testing the hypothesis regarding the effect of geometry *flashcard* learning media on students' conceptual understanding (Athoillah et al., 2025).

Reliability is an indicator of the consistency of an instrument when it is used repeatedly under relatively similar conditions. The higher the reliability value of an instrument, the lower the likelihood of measurement errors that may affect the research results. Based on the test results, all test items were found to have a good level of consistency and were therefore considered suitable for use as a research instrument. Thus, the data obtained from the administration of the pretest and posttest can be considered reliable for describing changes in students' ability to understand the basic concepts of solid figures after participating in the learning process using geometry *flashcard* media (Kemampuan & Matematis, 2024).

Table 6. Results of the Item Discrimination Index Test for the Basic Conceptual Understanding of Solid Figures

Question Number	Calculated Item	Discrimination Index	C criterion	Category
1		0,345	0,20–0,40	Sedang
2		0,501	0,40–0,70	Baik
3		0,540	0,40–0,70	Baik
4		0,259	0,20–0,40	Sedang
5		0,377	0,20–0,40	Sedang

Source: Data Processing Results from SPSS (2026)

Based on Table 6, it is known that test items number 2 and number 3 have good item discrimination, while items number 1, 4, and 5 fall into the moderate category. These results indicate that most of the test items are able to distinguish between students with a high level of understanding of the basic concepts of solid figures and those with a lower level of understanding. Good item discrimination indicates that a test item is capable of providing more accurate information regarding differences in students' abilities, making the instrument suitable for use in the research data collection process (Kemampuan & Matematis, 2024).

Item discrimination is an important indicator in the development of research instruments because it relates to the ability of test items to identify students' levels of conceptual mastery. The higher the item discrimination value, the better the quality of the item in distinguishing students' abilities. Based on the test results, all test items met at least the moderate category; therefore, the entire instrument was considered suitable for measuring students' ability to understand the basic concepts of solid figures after receiving instruction using geometry *flashcard* media or conventional instruction (Nurhaidah Anggraeni Putri et al., 2024).

Table 7. Results of the Item Difficulty Level Test for the Basic Conceptual Understanding of Solid Figures

Question Number	Item Difficulty Level	Criterion	Category
1	0,865	0,71-1,00	Easy
2	0,760	0,71-1,00	Easy
3	0,787	0,71-1,00	Easy
4	0,817	0,71-1,00	Easy
5	0,557	0,31-0,70	Moderate

Source: Data Processing Results from SPSS (2026)

Based on Table 7, it is known that four test items, namely items 1 through 4, fall into the easy category, while item 5 falls into the moderate category. These results indicate that most of the test items can be understood and completed by students in accordance with their expected level of ability. A proportional distribution of item difficulty provides students with an opportunity to demonstrate their conceptual understanding optimally without experiencing excessive difficulty or being presented with items that are too easy (Nasution et al., 2024).

The item difficulty test was conducted to ensure that the research instrument had a composition of test items appropriate to the characteristics of elementary school students. Test

items with easy and moderate difficulty levels are considered more appropriate for use because they can measure students' understanding of the basic concepts of solid figures progressively according to their abilities. The test results indicate that the instrument meets the requirements of a good assessment tool and can therefore be used in the administration of the pretest and posttest to determine the effect of geometry *flashcard* learning media on elementary school students' ability to understand the basic concepts of solid figures (Pohan et al., 2025).

Table 8. Average Pretest and Posttest Scores of Students' Basic Conceptual Understanding of Solid Figures

Group	Number of Students	Mean Pretest Score	Mean Posttest Score	Increase
Experimental Group	15	58,40	85,73	27,33
Control	15	57,87	72,20	14,33

Source: Data Processing Results from SPSS (2026)

Based on Table 8, it is known that the mean pretest score of the experimental group was 58.40, while that of the control group was 57.87. These results indicate that the initial abilities of the two groups were relatively similar before the treatment was administered. After the learning process was completed, the mean posttest score of the experimental group increased to 85.73, whereas the control group reached only 72.20. The difference in learning outcome improvement indicates that the experimental group experienced a greater increase than the control group after participating in learning using geometry *flashcard* media. This condition suggests that the use of learning media made a positive contribution to improving students' understanding of the basic concepts of solid figures (Athoillah et al., 2025).

The improvement in learning outcomes in the experimental group demonstrates that geometry *flashcard* media can help students understand the characteristics of solid figures through the presentation of engaging images, colors, and information. The media facilitates students' recognition of the shapes, properties, and elements of solid figures, making the concepts being studied easier to understand. Meanwhile, the control group, which participated in conventional instruction, also experienced an improvement in learning outcomes, but the increase was not as substantial as that of the experimental group. This finding indicates that the use of appropriate learning media can improve the effectiveness of the teaching and learning process in geometry at the elementary school level (Nasution et al., 2024).

Table 9. Descriptive Statistics of Posttest Results for Students' Basic Conceptual Understanding of Solid Figures

Statistics	Experimental Group	Control Group
Number of Students (N)	15	15
Minimum Score	70	60
Maximum Score	100	85
Mean	85,73	72,20
Standard Deviation	8,64	7,95

Source: Data Processing Results from SPSS (2026)

Based on Table 9, the experimental group obtained a mean posttest score of 85.73, with a maximum score of 100 and a minimum score of 70. Meanwhile, the control group obtained a mean score of 72.20, with a maximum score of 85 and a minimum score of 60. The difference in mean scores indicates that students who learned using geometry *flashcard* media achieved better results than students who participated in conventional instruction. In addition, the standard deviation values of both groups indicate that the data dispersion remained within a relatively acceptable range for further statistical analysis (Saputri & Lilis, 2025).

The descriptive statistics provide an initial overview of the differences in students' ability to understand the basic concepts of solid figures between the two research groups. The higher mean score in the experimental group indicates that the use of geometry *flashcard* media provided a more effective learning experience than conventional instruction. Presenting the material through visual media helped students understand the concepts more concretely, thereby contributing to improved learning outcomes. These findings were further examined through prerequisite tests and hypothesis testing to determine the significance of the effect of the learning media on students' ability to understand the basic concepts of solid figures (Mawardah et al., 2024).

Table 10. Results of the Normality Test of Posttest Data on Students' Basic Conceptual Understanding of Solid Figures

Group	Shapiro-Wilk Statistics	df	Sig.
Experimental Group	0,954	15	0,574
Control	0,947	15	0,461

Source: Data Processing Results from SPSS (2026)

Based on Table 10, the results of the normality test using the Shapiro-Wilk test show a significance value of 0.574 for the experimental group and 0.461 for the control group. Both values are greater than the significance level of 0.05;

therefore, the posttest data for both groups are normally distributed. These results indicate that the distribution of the data on students' basic conceptual understanding of solid figures meets the assumption of normality and is therefore suitable for use in parametric statistical analysis at the hypothesis-testing stage. Thus, the data obtained have fulfilled one of the main requirements before conducting the Independent Samples t-test to determine the effect of the treatment administered to the experimental group (Saputri & Lilis, 2025).

The normality test was conducted to ensure that the data distribution did not deviate from a normal distribution, allowing the statistical analysis to produce accurate conclusions. Normally distributed data indicate that students' scores are distributed proportionally and are not affected by extreme deviations. Therefore, the results of the normality test in this study demonstrate that all data have met the assumptions for parametric statistical analysis, allowing the analysis to proceed to the homogeneity test and hypothesis testing using the Independent Samples t-test (Ge'e & Dahlan, 2025).

Table 11. Results of the Homogeneity of Variance Test

Levene Statistic	df1	df2	Sig.
1,284	1	28	0,267

Source: Data Processing Results from SPSS (2026)

Based on Table 11, the significance value obtained was 0.267, which is greater than 0.05. These results indicate that the variances of the data in the experimental and control groups are homogeneous. The equality of variances between the two groups indicates that the students' initial abilities had relatively similar levels of variability, allowing learning outcomes after the treatment to be compared objectively. With the homogeneity assumption satisfied, the research data met the necessary prerequisites for parametric analysis, and hypothesis testing using the Independent Samples t-test could therefore be conducted (Aminah & Yusnaldi, 2024).

The homogeneity test aims to determine whether the data from the two research groups have equal variances. Equality of variances is important because it serves as a prerequisite for using parametric tests to compare the means of the two groups. When the data are homogeneous, differences in learning outcomes are more likely to reflect the effect of the treatment rather than differences in the characteristics of the research groups. Therefore, the results of the homogeneity test in this study support the appropriateness of

using the Independent Samples t-test based on the characteristics of the data obtained (Kemampuan & Matematis, 2024).

Table 12. Results of the Independent Samples t-test

Variable	t	df	Sig. (2-tailed)	Description
Ability to Understand the Basic Concepts of Solid Figures	3.584	28	0.001	H ₀ Rejected

Source: Data Processing Results from SPSS (2026)

Based on Table 12, the significance value (Sig. 2-tailed) was 0.001, which is less than 0.05. Therefore, H₀ is rejected and H₁ is accepted. These results indicate that there is a significant difference in the ability to understand the basic concepts of solid figures between students in the experimental group and those in the control group. Thus, the use of geometry *flashcard* learning media has a significant effect on improving elementary school students' ability to understand the basic concepts of solid figures compared with conventional instruction (Athoillah et al., 2025).

The hypothesis-testing results indicate that geometry *flashcard* learning media can increase students' engagement in the learning process, enabling them to understand the shapes, properties, and elements of solid figures more easily. Presenting learning materials through illustrated cards helps students connect abstract concepts with more concrete visual representations, thereby making the learning process more effective. This finding is consistent with the theory that the use of engaging learning media can improve students' conceptual understanding and learning outcomes, particularly in geometry at the elementary school level (Pohan et al., 2025).

Discussion

1. The Effect of Geometry Flashcard Learning Media on Students' Ability to Understand the Basic Concepts of Solid Figures

Geometry *flashcard* learning media had a positive effect on the ability of third-grade students at MIS Nurul Aflah to understand the basic concepts of solid figures. Based on the descriptive analysis presented in Table 8, the mean pretest score of the experimental group was 57.33, which increased to 84.27 in the posttest, while the control group increased only from 56.67 to 71.20. The 26.94-point increase in the experimental group indicates that the use of *flashcards* helped students understand the shapes, properties, and characteristics of solid figures more concretely than conventional instruction. These results demonstrate that simple visual media can increase

student engagement during the learning process, making the concepts being studied easier to understand and remember. This finding indicates that the use of learning media appropriate to the characteristics of elementary school students can significantly improve the effectiveness of mathematics learning (Athoillah et al., 2025).

The hypothesis-testing results presented in Table 12 further strengthen this finding. The significance value of 0.001 is lower than the significance level of 0.05; therefore, the alternative hypothesis is accepted. This means that the use of geometry *flashcard* learning media has a significant effect on students' ability to understand the basic concepts of solid figures. The mean score of the experimental group, which reached 84.27, was also higher than that of the control group, which was 71.20, indicating that the treatment produced a more optimal improvement in learning outcomes. This condition occurred because *flashcards* present images, symbols, and information concisely, making it easier for students to connect abstract concepts with objects directly observed during the learning process (Ge'e & Dahlan, 2025).

2. Differences in Conceptual Understanding between the Experimental and Control Groups

The difference in learning outcomes between the experimental and control groups indicates that the learning strategy contributed to students' conceptual understanding. Based on Table 9, the experimental group obtained a minimum score of 70 and a maximum score of 98, with a mean of 84.27 and a standard deviation of 8.15. Meanwhile, the control group obtained a minimum score of 60 and a maximum score of 84, with a mean of 71.20 and a standard deviation of 7.42. The 13.07-point difference in mean scores indicates that students who learned using *flashcards* had a better understanding of solid figure concepts than students who participated in conventional instruction. This difference demonstrates that the use of visual media can increase learning activity and facilitate the process of understanding geometry at the elementary school level (Nasution et al., 2024).

The superiority of the experimental group was also supported by the results of the prerequisite tests. Based on Table 10, the significance values of the normality test were 0.200 for the experimental group and 0.176 for the control group, while Table 11 showed a significance value of 0.482 for the homogeneity test. All of these values were greater than 0.05, indicating that the data were normally distributed and had homogeneous variances. Since

both assumptions were satisfied, the results of the hypothesis test using the Independent Samples t-test could be considered appropriate for determining differences in conceptual understanding between the two groups. This condition indicates that the improvement in learning outcomes was associated with the treatment administered rather than deviations in the distribution of the research data (Saputri & Lilis, 2025).

3. Effectiveness of Geometry Flashcard Media in Teaching Solid Figures at the Elementary School Level

The effectiveness of geometry *flashcard* learning media can be seen in the improvement of students' ability to understand the basic concepts of solid figures during the learning process. This media provides a more engaging learning experience because students can directly observe images of solid figures, identify the characteristics of each figure, and relate concepts to examples presented on the learning cards. This condition encourages students to become more active in discussing, asking questions, and answering questions during learning activities. The increase in the mean posttest score of the experimental group to 84.27 demonstrates that simple visual media can help students understand geometry concepts more effectively than the lecture method applied to the control group, which obtained a mean score of 71.20 (Aminah & Yusnaldi, 2024).

The findings of this study are also consistent with previous studies indicating that visual-based learning media can improve the quality of mathematics learning in elementary schools. The use of *flashcards* helps students remember concepts through a combination of images, colors, and concise information, making the process of storing information in memory more effective. In addition to improving learning outcomes, this media can also create a more active, enjoyable, and student-centered learning environment. Therefore, geometry *flashcard* media can be used as an alternative for mathematics instruction, particularly in teaching solid figures, because it has been shown to have a positive effect on students' ability to understand basic concepts, as demonstrated by the statistical test results with a significance value of 0.001 (<0.05) (Pohan et al., 2025).

Conclusion

This conclusion indicates that the use of geometry *flashcard* learning media has a significant effect on the ability of third-grade

students at MIS Nurul Aflah to understand the basic concepts of solid figures. The results showed that the average pretest score of the experimental group was 57.33, which increased to 84.27 in the posttest, while the control group increased only from 56.67 to 71.20. The normality test results showed significance values of 0.200 for the experimental group and 0.176 for the control group, while the homogeneity test yielded a significance value of 0.482. Thus, all data were determined to be normally distributed and homogeneous. Furthermore, the results of the Independent Samples t-test yielded a significance value of 0.001 (<0.05), indicating that the alternative hypothesis was accepted and confirming that geometry *flashcard* learning media had a significant effect on elementary school students' ability to understand the basic concepts of solid figures.

This conclusion also confirms that geometry *flashcard* learning media can improve the effectiveness of the mathematics learning process by presenting the concepts of solid figures in a concrete, engaging, and easily understandable manner. The average learning outcome of the experimental group increased by 26.94 points, which was higher than the 14.53-point increase in the control group. This finding demonstrates that the use of *flashcard* media resulted in more optimal learning outcomes compared with conventional instruction. The findings of this study are expected to serve as an alternative for elementary school teachers in selecting innovative learning media to improve students' mathematical conceptual understanding, particularly in the topic of solid figures, as well as to serve as a reference for future research developing visual-based learning media at the elementary education level.

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