The Effect of Using Teaching Aids on Improving Student Learning Outcomes in Mathematics Lessons at Elementary School

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Abstract. This research is based on the thinking of students who think that learning mathematics is very difficult to learn. In fact, if the mathematics learning process can be integrated into the cultivation of concepts that provide students' understanding of the concept of understanding the circumference and area of flat building, it can be done using the approach of one of the flat wakes, namely the triangle approach. The thing that underlies students to play a more active role in learning starts from students understanding first regarding the learning concepts they do. The method used in this study uses quantitative methods in the form of Pre Experimental Design with the research design of One Group Pretest and Posttest Design. The results of this study showed that data calculations using SPSS using the Shapiro-wilk Normality Test and the paired T-Test hypothesis test obtained the results of Significance $0.001 \leq 0.05$ then H1 was accepted and H0 was rejected. Thus, it can be concluded that the use of teaching aids has a considerable impact on student learning outcomes to enhance student learning outcomes in this study.

Keywords: Teaching Aids · Learning Outcomes · Mathematics

1 Introduction

The development of education makes the challenges of learning mathematics today more complex [1]. Not a few students consider that mathematics is a learning that is very difficult to learn [2]. Tambunan revealed that the difficulties felt by students in the learning implementation process make students tend to think mathematics is a demand only and not a need[3]. Not a few students who are intrinsically motivated and enjoy learning mathematics do their learning stages well even when they face obstacles to mathematics learning. [4]. So the existence of education is an important thing that is certainly a lot of challenges in life [5].

According to Setyawan & Rahman Good mathematics learning is by presenting learning on the basis of educational psychology theory [6]. It further explained that the teacher must arrange learning according to the stages of the student's mental stages

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and emphasize that inappropriate learning will cause students to experience difficulties because the material presented is not in accordance with the student's ability to absorb the learning material. Thus, mathematics elementary schools, one must focus on the existence of concrete learning objectives where the existence of props acts as a bridge from concrete to abstract and vice versa[7].

According to Piaget's theory of cognitive psychology, in Umbara's book there are four stages of cognitive development in humans, namely the stage of motor and sensory development, preoperative stage, stage of actual operation, and stage of official operation [8]. Then it was explained that the motor sensory stage is owned by individuals aged 0 yearsto 2 years, the preoperative stage is owned by individuals aged 2 years to the age of 7 years, the concrete operation stage is owned by individuals aged 7 years to 11 years old, the formal surgery stage is owned by individuals aged 11 years and so on. Based on these stages of development, elementary school children are at the age possessed by the concrete surgery stage [9].

According to Khiyarusoleh suggests that the concrete operational stage, starting from a child aged 7 years to 11 years [10]. It is also explained that Concrete operational thinking includes the use of operations that are limited by concrete situations and the ability to classify things begins to develop, but has not been able to solve abstract problems. So Annisah, S. suggests that in understanding abstract mathematical concepts, children need props such as concrete or real objects as intermediaries or visualizations [11]. In mathematics learning, the usage of instructional aids might boost students' desire to study. It is further explained that the use of props is because at the age of concrete operation, the new child is able to bind the existing definition and re-express it, but has not been able to formulate the definition himself precisely, has not been able to master verbal symbols and abstract ideas.

This is reinforced by Mashuri in his book which suggests that props are something that must be present in elementary school mathematics learning because they can serve to lay concrete foundations for thinking [12]. Efforts to lay concrete foundations for thinking will build an intelligent tutoring system called Building Advanced Tutoring Systems (ITSs). One of the main areas of concentration for many learning strategies for knowledge evaluation is ITSs that are integrated with learning objectives [13].

Based on the results of the author's observations when conducting an initial survey during the rpp practice activities for mathematics ii education courses at elementary schools located in the Sukabumi area, an overview of the implementation of Bangun Datar learning was obtained, especially in triangles. Generally, the learning is only an improvement in the skill of working on the application of formulas. Learning does not facilitate students finding concepts. Learning does not begin with the activity of planting concepts (through concrete objects).

In his book titled Exploration of Mathematics shows the effectiveness of responding to the concreteness of chessboard props in learning to explore flat buildings. Bukian is just that, the chessboard props offered in the term Pantura by Maulidiyah the chessboards are helpful in gathering mathematical logic in explaining learning concepts [14].

Afin d'évaluer l'efficacité Compte tenu de l'importance des outils pédagogiques dans l'apprentissage des mathématiques, en particulier dans les matériaux de construction plats où il s'agit d'une nouvelle étape décisive dans la réponse aux défis liés au faible

intérêt pour l'apprentissage des mathématiques. La prochaine étape consiste à développer les médias d'apprentissage à l'école comme une forme d'orientation professionnelle pour l'enseignement des mathématiques qui est importante pour les élèves. Avec la passion croissante pour l'apprentissage, l'espoir à l'avenir peut faciliter le développement des objectifs d'apprentissage des mathématiques eux-mêmes [15].

Based on the description above, the need for improvement in flat-build learning is not only the transfer of knowledge from the teacher. Learning should guide students to find the concept of flat wake by using props that correspond to the cognitive development of concrete operations. Learning in elementary school is currently only limited to applying formulas to a question. Such learning is certainly not meaningful for students, so the teaching material provided is easily forgotten. Such a flat wake-up learning cannot be allowed. Learning in elementary school is a determinant of student success in learning at the next level of education. Then how should the learning of flat building in elementary schools, especially in the material of the area of flat building areas.

2 Method

The method in this study makes use of quantitative techniques, specifically Pre Experimental Design and One Group Pretest and Posttest Design because it uses numerical data and there is only one class for class IV in the elementary school. Quantitative research is a type of research developed according to its paradigm which is then developed using a representative sample in the form of something that can be calculated or a number [16].

A. *Population and Sample*

A population is a generalization region made up of things or subjects with particular attributes and characteristics that the author will study before the conclusion is drawn [17]. Then it can be concluded that the population is the total number of objects to be studied. The population and all Grade IV students from one of Sukabumi's elementary schools served as the study's samples; there were 20 pupils overall, 13 men, and 7 women.

The sample is part of a number of existing population characteristics [18]. Thus, if a smaller portion of the population is being studied by the sample and the number of grade students in the elementary school is less than 30, then the sample the purposive sampling technique combined with the next step of reviewing the results of the initial design implementation and recasting the revised design if there are still shortcomings, to be re- implemented on the revised design. This is done so that these learning barriers are resolved. The participants involved in this study were lecturers, elementary school teachers, colleagues, and elementary school students.

B. *Observation Data Collection Techniques*

The observation was carried out at one of the elementary schools in Sukabumi in class IV by testing the questions on 20 students. Analysis of the observation results of preliminary studies found several student learning barriers in student indicators to find the triangular formula both circumference and area. Furthermore, compile teaching

materials that will be used in the implementation of learning using chessboard props that can help students in finding the formula of the triangle formula.

C. *Test*

A test is an instrument or tool to measure a person's behavior or performance with various objectives according to their context such as evaluation, diagnostics, selection, placement, and promotion. The test is carried out based on the assumption that humans have differences in terms of abilities, personality, and behavior and that these differences can be measured in a certain way. In order, the following description will focus on a brief discussion of the achievement test designed to measure learning outcomes. A more in-depth discussion can be read in books on educational evaluation.

The test in this study, the researcher chose material in grade IV elementary school, namely to instill the concept of a triangular flat build. The instruments used are the Pre Test and Post test instruments which consist of 10 questions with varying difficulties, namely Easy, medium, and difficult (High Thinking Other Skill) with indicators that pupils are capable of comprehending the circumference and area of a triangle. The use of teaching aids in this study aims to help students to find basic formulas using a modified chessboard so that they can be used in learning.

D. *Data Analysis Techniques*

1) *Normality Test*

The data analysis technique in this study is using the Normality Test with the Kolmogorov-Smirnov method to determine how data are distributed among a set of data or variables [19]. Testing is carried out to determine whether the data distribution is regular or not. Because the data used in this study is less than 30 numbers ($n > 30$), the sample used is said to be a small sample and must be tested normally. The method used is Kolmogorov- Smirnov where using a comparison table of significance.

2) *Paired T-Test Hypothesis Test*

Furthermore, the hypothesis test carried out in this study uses a Paired T-Test which refers to the book Enterprise, J (2014) one of the hypothesis testing methods where the data used are not free (paired). The Paired T-Test Hypothesis Test is used to test parametrics and see if there is an average difference between two samples that are paired or related so that the distribution of the data is normal.

3 Results and Discussion

The results of the research conducted this time aim to ascertain whether the use of props has a positive impact on student learning outcomes in Elementary School Mathematics Lessons. The material taken is material about Flat builds that are focused on approaches using triangles. The results obtained in this study are shown in Table 1.

Table 1. Table Type Styles.

No	Name Code	Score Result	
		Pretest	**Posttest**
1	A1	20	60
2	A2	30	65
3	A3	20	40
4	A4	15	50
5	A5	20	50
6	A6	35	50
7	A7	25	65
8	A8	30	45
9	A9	50	95
10	A10	45	70
11	A11	25	65
12	A12	15	55
13	A13	20	55
14	A14	20	45
15	A15	20	40
16	A16	40	55
17	A17	20	35
18	A18	30	65
19	A19	25	45
20	A20	25	55

A. *Normality Test*

The normality test is used to determine whether or not data are in a study with a normal distribution. Normality testing in this study used Shapiro-wilk because the sample used in this study was below 50. The hypotheses used are:

- H0: Sample derived from non-normally distributed population
- H1: Sample derived from normally distributed population.
- The basis for decision making in this study refers to:

  - If the Sig value > 0.05 (alpa) then H0 is rejected
  - If the sig value < 0.05 (alpa) then H0 is accepted

Table 2. Tests of Normality.

Kolmogorov- Smirnov[a]				***Shapiro-Wilk***		
Statistic		***df***	***Sig.***	***Statistic***	***Df***	***Sig.***
Free Test	.212	20	.019	.869	20	*.011*
Post Test	*.157*	*20*	*.200*[*]	*.911*	*20*	*.065*

This is a lower bound of the true significance

A. Lilliefors Significance Correction

Based on Table 2, a normality value of 0.065 was obtained, which means that more than the value of the alpa it is clear that the data in this study are regularly distributed because of the value (0.05).

B. *Paired T-Test*

The Hypothesis Test is used to ascertain the impact of the use of instructional tools on enhancing student learning outcomes. This study used the paired T-Test hypothesis test presented in table 3.

Based on Table 3, when the significance result is less than alpa, like in the case of a significance value of 0.001, H1 is accepted and H0 is denied. As a result, it is possible to draw the conclusion that the usage of teaching aids in this study significantly influenced student learning results.

C. *Discussion*

The learning process carried out in this study involves students to understand and find concepts related to understanding the circumference and area of a triangle. The use of props in this study aims to help students to find the basic formula of a triangle using a chessboard that has been modified so that it can be used in learning.

The research conducted on Grade IV Students this time had a very significant impact where students were given stimuli related to the material presented first without using teaching aids making it difficult for students to understand how the concepts of the formulas they learned. This stimulation makes students more active in asking how the stages of understanding the concept of the formula can be made. Students discuss with their groups which were previously made into several groups to be able to jointly solve the problems contained in the pretest questions given at the beginning of learning.

After the stimulation was given to students through the provision of material briefly accompanied by the provision of tests in the form of post tests, it was found that it was

Table 3. Paired T-Test.

N		**Correlation**	**Sig.**
Pair Post test & 1 Pre test	20	.665	.001

more difficult for students to understand how the process of using the approach was without first planting concepts. Based on this, the step of providing material is carried out using props which further direct students to think concretely about how to understand the concept of the area and circumference of a triangle which is then associated with the direction of using the concept of an approach to calculating flat wakes using the triangle formula.

The Shapiro-Wilk Normality Test and the paired T-Test obtained findings of significance0.001 0.05, therefore H1 was approved and H0 was rejected based on the results of data computations using SPSS. Thus, it can be deduced that the employment of teaching aids in this study to enhance student learning outcomes has a considerable impact on those outcomes.

4 Conclusion

Based on data analysis, it is possible to draw the following conclusion about the research and discussion in this study: Using Teaching Aids to Enhance Student Learning Outcomes in Mathematics Lessons in building a space using a triangular approach is very influential. Students play a more active role when given stimulation to use props in the learning process. Students are invited to collaborate with their group friends in solving and finding the concept of understanding formulas in space building materials. This of course gives significant results compared to students only learning to be given formulas.

Students need to use more learning alternatives in answering various mathematical problems. The paradigm of students who initially regarded mathematics as a scary lesson can finally make them happy in learning mathematics using props. This is certainly influenced by the concrete operational stages that occur in elementary school students. The cultivation of concepts plays a crucial role in answering the needs of students at the abstract stage to be concrete.

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