



## THE USE OF CONCRETE OBJECTS MEDIA ON STUDENTS' LEARNING OUTCOMES OF NETS - CUBE NETS AND BEAMS

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<p><b>Received:</b> October 7<sup>th</sup> 2021 <b>Accepted:</b> November 7<sup>th</sup> 2021 <b>Published:</b> December 18<sup>th</sup> 2021</p>	<p>The purpose of this study was to describe the effect of using concrete objects on learning outcomes for nets of cubes and blocks in fourth grade students of SDN 60 East City, Gorontalo City. This type of quantitative research is descriptive. One group pretest-posttest research design. This research uses data collection techniques through tests and documentation. The sample of this research is the fourth grade students as many as 25 people. The results of the study show that the effect of using concrete objects has a significant effect on learning outcomes in mathematics. This result can be seen from the average pretest value in learning is 49.4 and after learning the posttest average value becomes 80.2. This is reinforced by the results of hypothesis testing with posttest t-test at significant = 0.05, obtained tcount 7,908 with ttable is 2,063 or (tcount 7,908 ttable 2,063). Thus, it is concluded that there is an effect of using concrete object media on the learning outcomes of cube and block nets in fourth grade students of SDN 60 East City, Gorontalo City.</p>

**Keywords:** Media Concrete Objects, Nets, Cubes and Blocks

### INTRODUCTION

Mathematics is a compulsory subject that needs to be given to students from elementary school to equip students with the ability to think logically, analytically, systematically, critically, and creatively, as well as the ability to work together. Good mastery of mathematics from an early age needs to be instilled so that basic mathematical concepts can be applied appropriately in everyday life. In connection with the above expectations, but in reality there are still many students who do not like learning mathematics. Mathematics is considered a difficult subject because it uses a lot of abstract symbols and formulas that are difficult to understand. In addition, in mathematics a lot of rules are used according to the order and the relationship between one material and the next which makes students experience many errors in solving math problems. Taking into account these conditions, teachers are required to be able to seek learning with appropriate media according to the level of student knowledge. In addition, learning media is needed that can help students to achieve basic competencies and learning indicators. Because learning is not just memorizing, but students must construct knowledge in their own minds. Students learn from experience, noting meaningful patterns of new knowledge themselves, and are not simply given away by the teacher. In learning, teachers must have creative teaching and educating competencies and enough time to carry out their professional duties that can improve the quality of education. There are many ways to make improvements in learning, especially mathematics, including by using interesting learning models, using varied methods or by using existing media and teaching aids. Of the many models, methods and teaching aids that exist, the media of concrete objects is chosen. This media was chosen because it is easy to obtain, easy to use, easy to carry everywhere and easy to attract the attention of students, so that the use of concrete objects media can improve student learning outcomes. And student learning outcomes on the material of nets of cubes and blocks in grade IV SDN 60 Kota Timur Gorontalo City is low. So that students have not been able to determine the nets of cubes and blocks

### Understanding Learning Outcomes

To find out the level of students' understanding of the learning material is to look at the student learning outcomes obtained during the learning process. As stated by Gagne, (2017: 195) that "Learning outcomes are behaviors obtained by students after experiencing learning activities. The acquisition of these aspects of behavior change depends on what students learn. If students learn knowledge about concepts, the behavioral changes obtained are in the form of mastery of concepts. According to Gagne (2017: 195) learning outcomes can be divided into five groups, namely: verbal information, intellectual skills, knowledge of cognitive activities, motor skills, attitudes. According to Husamah (2018: 19-20) learning outcomes will appear in various ways, namely: 1) Habits; 2) Skills; 3) Observation; 4) Associative thinking; 5) Thinking rationally and critically 6) Attitude 7) Inhibition (avoiding redundant things; 8) Appreciation (appreciating quality works); 9) Effective behavior.

In line with that, (Muhibbin, 2018:21) what is meant by learning outcomes are the results of a person after completing learning from a number of subjects as evidenced by test results in the form of learning outcomes. Completion of this learning can be in the form of results in one sub-topic, or in several subjects carried out in one test, which is the result of an earnest effort to achieve changes in student achievement that are carried out with full responsibility. According to Surya (Ibrohim, 2018: 18) argues that "Learning outcomes are changes in individual behavior as a whole which includes cognitive, affective, and psychomotor aspects".

Based on the opinions of these experts, it can be concluded that learning outcomes are essentially a process of changing student behavior in talent, experience and training. This means that the achievement of the objectives of teaching and learning activities is a change in behavior, both concerning knowledge, skills, attitudes, and even covering all personal aspects. Teaching and learning activities such as organizing learning experiences, assessing learning processes and outcomes, are included in the scope of teacher responsibilities in achieving student learning outcomes.

### **Factors Affecting Learning Outcomes**

Learning is influenced by several factors that influence it. These factors come from within students and from outside students. Here are some expert opinions that explain the factors that influence learning. Hanafiah and Cucu (2009:41) define factors that influence effective learning are strongly influenced by internal and external factors of students. Internal factors that affect effective learning include; intelligence, talents, interests, motivation, self-confidence, emotional stability, commitment, physical health. External factors that affect effective learning, including; teacher competence, teacher qualifications, supporting facilities, quality of peers, learning atmosphere, cost leadership class. According to Aunurrahman (2012:177), internal factors that affect the student learning process. Characteristics/characteristics of students; Attitude towards learning; Motivation to learn; Concentration of learning; Processing learning materials; Exploring learning outcomes; Confident; Study habits. Furthermore, Aunurrahman (2012: 187) suggests external factors that affect student learning outcomes, including:

- 1) Teacher factor, in its scope, teachers are required to have a number of skills related to the tasks they carry out. These skills are: understanding students, designing learning, implementing learning, designing and implementing learning evaluations, and developing students to actualize their various potentials.
- 2) Environmental factors (including peers), the social environment can have a positive influence and can also have a negative influence on student learning outcomes.
- 3) School Curriculum, in a series of learning processes in schools, the curriculum is a guide that is used as a frame of reference for developing the learning process, with the aim of improving student learning outcomes.
- 4) Facilities and infrastructure, learning facilities and infrastructure are factors that also influence student learning outcomes. The condition of school buildings and classrooms that are well organized, regular library rooms, availability of classroom and laboratory facilities, availability of textbooks, media/study aids are important components that can support the realization of student learning activities.

According to Slameto (2010: 54), the factors that influence learning are of many kinds, but can be classified into two groups, namely, internal factors and external factors. Internal factors are factors that exist within the individual who is learning, while external factors are factors that exist outside the individual.

1) Internal factors, including:

- a) Physical factors, which include physical factors, namely health factors and physical disabilities.
- b) Psychological factors

There are at least seven factors that are classified as psychological factors that affect learning, namely: intelligence, attention, interest, talent, maturity and readiness.

c) Fatigue factor

Fatigue in a person can be divided into two, namely physical fatigue and spiritual fatigue. Physical fatigue can be seen with the weakness of the body, while spiritual fatigue can be seen with lethargy and boredom so that interest and the urge to produce something is lost.

2) External factors, including:

a) Family factor

Students who study will receive influences from the family in the form of the way their parents educate, the relationship between family members, household atmosphere, family economic situation, understanding of parents, and cultural background.

b) School factor

School factors that influence this learning include teaching methods, curriculum, teacher-student relations, student-student relations, school discipline, learning tools, school time, lesson standards over size, building conditions, learning methods and homework assignments.

c) Community factors

Society is very influential on student learning. This influence occurs because of the existence of students in society. These factors include student activities in the community, mass media, friends to hang out with, and forms of life in society.

According to Alviana (2013:13) it is explained that there are 6 factors that affect learning outcomes, namely: A person cannot gain knowledge except with six behaviors, namely intelligent, enthusiastic, patient, quite sangu (pocket) meaning that it requires sufficient money to learn, there is piwulang ( teacher learning means that there must be a

learning process in order to transfer knowledge from an educator to students and all the time it means that acquiring knowledge does not only require a short time, but requires a long time.

Based on the opinions of these experts, it can be concluded that learning outcomes can be influenced by factors that come from within students and those from the environment around students. The learning outcomes obtained by students depend on the students themselves and there must be a learning process carried out by the teacher in order to transfer knowledge to students so that students gain knowledge that can be used in everyday life.

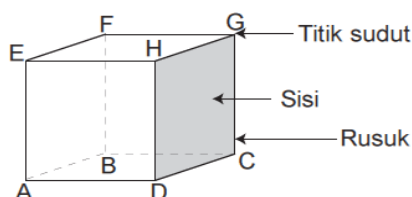
### Cubes and Blocks

#### Definition of Cube and Block

##### a) Cube

According to Saepudin, et al (2009: 105-107), the cube is a wake in which all sides or edges have the same size. The side of a cube consists of 6 squares that are all the same size. While the beam is a building that has different lengths, widths, and heights.

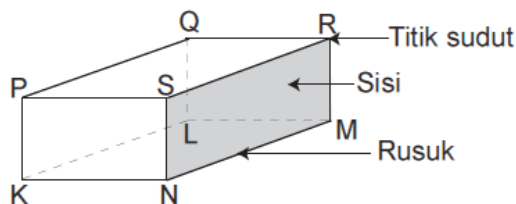
Soenarjo (2007:114) suggests that a cube is a special rectangular prism or beam. A cube has 6 sides, all of which are squares. Look at the following picture:



Note : The six sides are : ABCD, AEHD, DHGC, AEFB, BFGC, EFGH. A cube has 12 edges of equal length, namely: AB, BC, CD, DA, AE, BF, CG, DH, EF, FG, GH, and HE. A cube has 8 vertices, namely: A, B, C, D, E, F, G, and H. The image above shows an image of the cube ABCDEFGH.

##### Beam

The beam is called a right prism. The block has 6 sides, each of which is a rectangle. Look at the following image below:



Note: The six sides consist of 3 pairs of the same side. KLMN side = PQRS; side KPSN = LQRM; side KPQL = NSRM. There are 12 edges, divided into 3 groups of 4 each of the same length: KL = NM = PQ = SR; edge KN = PS = LM = QR; edge KP = NS = LQ = MR. The number of vertices of the cuboid is 8, namely: K, L, M, N, P, Q, R, and S

#### Elements and properties of Cubes and Blocks

According to Sumarmi and Kamsiyati (2009: 120-121) that the beam has the following elements: a) has 12 ribs; b) has 8 corners; and c) has 6 sides. The properties of the beam are as follows.

a. The opposite ribs are the same length

$$AB = DC = EF = HG$$

$$BC = AD = FG = EH$$

$$AE = BF = CG = DH$$

b. All the vertices of the cuboid are equal

$$A = B = C = D = E = F = G = H = 90^\circ$$

c. The opposite sides of the block are equal and are rectangles

$$ABCD = EFGH \quad ADHE = BCGF \quad ABEF = DCGH$$

While the cube has the following elements: a) has 12 edges; b) has 8 corners; and c) has 6 sides. The properties of the cube are as follows:

a. All edges of a cube are the same length

$$AB = BC = CD = AD = AE = BF = CG = DH = EF = FG = GH = EH$$

b. All vertices of a cube are equal

$$A = B = C = D = E = F = G = H = 90^\circ$$

c. All sides of a cube are square and equal

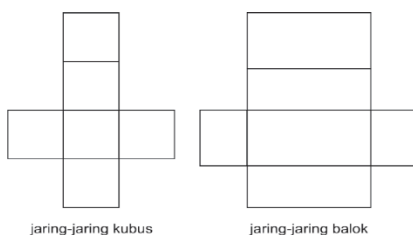
$$ABCD = EFGH = ADHE = BCGF = ABFE = DCGH$$

#### Nets of Cubes and Blocks

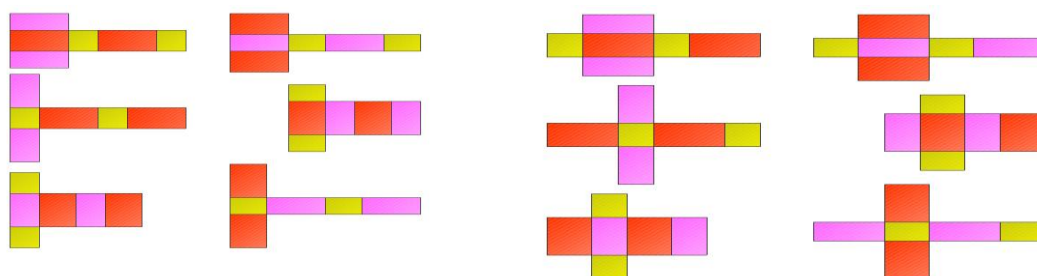
According to Saepudin, et al (2009:163-164) that cube nets are a series of flat planes (sides) which when installed or assembled will form a cube. While the beam nets are a series of flat planes (sides) which when installed or assembled will form a beam.

Sumarmi and Kamsiyati (2012:123-124) suggested that the cube nets are the sides of the cube. The beam nets are the sides of the beam forming. The beam nets are the sides of the beam that are stretched after being cut to follow the ribs. For example, in six rectangles consisting of 3 pairs of congruent rectangles, if arranged, they do not necessarily form a net of blocks. The characteristics of these nets can be seen when the shape is folded and forms a block. To be able to know the shape of the beam net, that is, by cutting the beam model on certain ribs, it will produce a network of beams. The way of cutting is the same when starting from different sides it will produce a different shape. The nets of the blocks are not much different from the shape of the nets of the cube. The difference is only in the shape of the sides of the two. In cube nets, the side shape is only in the form of a square, while on the side of the cuboid net, it consists of several square and rectangular shapes.

According to Mustaqim and Astuty, (2008: 2014-2015) Build a cube and block space formed from square and rectangular flat shapes. The combination of several squares that form a cube is called a cube net. While the beam nets are a combination of several rectangles that form a beam.



When the beam is opened it will produce 12 kinds of beam nets below:



### The Nature of Media Concrete Objects

#### Definition of Media Concrete Objects

According to Ibrahim and Nana Syaodih (2003: 119), states that "media concrete objects are real objects that will provide very important stimuli for students in learning various things, especially those concerning the development of certain skills." Understanding concrete object media can also be interpreted as teaching aids as stated by Subari (1994:95), that "props are tools used by teachers to realize or demonstrate teaching materials in order to provide a very clear understanding or description of the lessons given."

Furthermore, Subari also explained that in terms of their nature, teaching aids were divided into three, namely: original teaching aids, props made of substitute objects, and tools made of abstract objects.

Based on the three kinds of props mentioned, each has a different meaning. The understanding related to the media of concrete objects is the original teaching aids, where according to Subari "original teaching aids mean that the objects used for teaching aids are actual objects." *Kelebihan dan Kekurangan Media Benda Konkret*

#### a) Advantages of Concrete Object Media:

1. Provide maximum opportunities for children to learn and carry out tasks in real situations.
2. Provide opportunities for children to experience real situations for themselves and practice skills using their senses as much as possible

#### b) Disadvantages of Concrete Object Media:

1. The costs required are sometimes not small, especially when added to the possibility of damage in use.
2. Not always able to provide an overview of the actual object so that learning needs to be supported by other media.

Based on some of these theories, the use of concrete objects can keep children's attention in learning and make children more active. By using concrete objects, children will be able to observe, handle, manipulate, discuss directly using concrete objects in learning. However, concrete objects also have a weakness that is not always able to cover the entire picture in accordance with the original. Therefore, it is necessary to have media that supports so that learning by using concrete objects can be carried out optimally.

#### Media Concrete Objects in learning Cube Nets and Beam

The use of media is intended so that students who are involved in learning activities avoid the symptoms of verbalism, namely knowing the words conveyed by the teacher but not understanding their meaning. For example, students are divided into small groups of five students. Each group was given cardboard media in the form of blocks and cubes and scissors. Students observe various media that have been given by the teacher. Students do question and answer with the teacher about the media provided. Students are asked to cut or slice the joints on each cardboard cube and block. Students draw nets according to the shapes they cut out. Representatives of students from two groups

with different cutting results were asked to demonstrate and explain their work. Students ask and answer questions about the meaning of spatial nets. Each group was given cardboard and scissors. Students make nets of cubes and blocks from the cardboard. One group is asked to present the results of their work. Students work on the Worksheet given by the teacher. Students listen to reinforcement from the teacher. Students ask and answer questions with the teacher to conclude the learning material that has been done. The teacher gives assignments to find out students' understanding of the material that has been studied. The use of concrete object media in learning certainly has a goal so that the learning carried out reaches the target or standard of completeness that has been set, as stated by Sumarmi (2009: 156), the purpose of using media is to help teachers convey messages easily to students. so that students can master these messages quickly and accurately. In particular, the teaching media used have a purpose in teaching as stated by Sumarmi (2009: 156), the use of teaching media is used with the following objectives: providing convenience to students, providing different and varied learning experiences, fostering attitudes and skills, creating situations learning that students cannot forget.

Furthermore, Sumarmi (2009: 156), reveals the principles in the selection of media to be used in learning, including: the media must be in accordance with the objectives of teaching, the media must be in accordance with the level of development of students, the media must be adapted to the ability of the teacher, the media must be in accordance with the situation and conditions or at the right time, place and situation, and the media must understand the characteristics of the media itself.

Based on the opinion above, it can be concluded that the use of concrete object media in elementary school students' learning really helps the smoothness and delivery of subject matter to be delivered to students and can provide more durable experience and knowledge, because students get real and direct experience. As stated by Ibrahim (2010: 13) by adding media in learning, memory will increase from 14% to 38%.

### **Benefits of Media Concrete Objects**

The use of concrete media in the learning process has a very broad impact on learning patterns at the elementary school level. Most of the learning materials in elementary schools are imaginative, rational or not, both scientific and non-scientific. This is different from the pattern of vocational school learning which absolutely must display original media into the learning room. However, with the breadth of learning fields in elementary schools which include science, social studies, mathematics, language to skills, it makes it difficult for us if all learning must be equipped with original media. So that the idea arises to manipulate the original object to become a medium that is close to the original. This will make it easier for students to build the structure of the concept in the brain. In detail the following benefits of concrete media.

- a. Facilitate students in building cognitive structures in forming concepts.
- b. Make it easier for teachers to carry out learning in accordance with the program that has been set.
- c. Streamlining the learning process
- d. Increase the interaction of learning components

### **RESEARCH METHODS**

Research design is a research plan and structure that is structured in such a way that the researcher will be able to obtain answers to the research questions. The experimental design used in this study is "The One-Group Pretest-Posttest Design". The research design can be illustrated as follows.

Pretest Posttest Treatment

O1 X O2

Description :

O1 : Observation of student learning outcomes before using Concrete Object Media

(X): Learning treatment with Concrete Object Media

O2: Observation of student learning outcomes after the use of Concrete Object Media

Research variables are basically everything in any form that is determined to be studied and studied so that data and information are obtained for further conclusions to be drawn. Referring to the problem studied, in this study two variables were analyzed, namely: The independent variable (independent variable) is the Media of Concrete Objects and the dependent variable is the student learning outcomes on cube and block nets.

The population in this study were 25 grade IV students, the sample technique was a saturated sample, because the sample members included all fourth grade students at SDN 60 Kota Timur Gorontalo City in the even semester consisting of 14 students. The process of collecting data at the research location was carried out using a test. Observation, Interview, Documentation.

### **RESEARCH RESULTS AND DISCUSSION**

Based on the results of hypothesis testing, it was concluded that  $H_a$  was accepted and  $H_0$  was rejected with a level of 0.05. Among the learning media, the media used in this research is the media of concrete objects. This research is an experimental study with the aim of knowing the effect of using concrete objects media on student learning outcomes in the material of cube and block nets in class IV SDN 60 East City, Gorontalo City. The results of the study using the Effect of the Use of Concrete Objects on Student Learning Outcomes on the Material of Cube and Block Nets can be seen from the pretest average value and the posttest average value, the pretest before the treatment was held the average value was 49.4 and the posttest after the treatment was held the average value was 80.2. The results of



this study through the evaluation of learning outcomes showed that the value of student test results in the final test after being applied the Effect of Using Concrete Object Media on Student Learning Outcomes on the Cube and Block Nets Material increased when compared to the results achieved in the initial test.

This increase is certainly influenced by the effect of the use of concrete objects on student learning outcomes in the material of cube and block nets which gives a real increase in mathematics learning outcomes in grade IV SDN 60 East City, Gorontalo City, Gorontalo City. These results are supported by the results of hypothesis testing where the effect of using concrete objects media provides a significant improvement on mathematics learning outcomes in grade IV SDN 60 Kota Timur Gorontalo City.

Based on the description above, there are differences in the average results of the two tests. With this average value, it shows that the use of Concrete Object Media which is applied to see the big influence on student learning outcomes after being given a posttest test, affects student learning outcomes before being given treatment until being given treatment. So, it is proven that the effect of using concrete objects on student learning outcomes in the material of cube and block nets in grade IV SDN 60 Kota Timur Gorontalo City is proven to be true, it can be seen from the list of student learning outcomes.

## CONCLUSIONS AND SUGGESTIONS

### Conclusion

Based on the results of the research and discussion, it was concluded that there was an effect of using concrete objects on the learning outcomes of nets of cubes and blocks in fourth grade students of SDN 60 East City, Gorontalo City. Research conducted on the effect of the use of concrete objects has a significant effect on mathematics learning outcomes, this result can be seen from the average pretest value in learning is 49.4 and after learning the posttest average value becomes 80.2. This is reinforced by the results of hypothesis testing with posttest t-test at  $\alpha = 0.05$ , obtained tcount 7,908 with ttable 2,063 or (tcount 7,908 ttable 2,063). This shows that there is an effect of using concrete objects media on learning outcomes of cube and block nets in class IV SDN 60 Kota Timur Gorontalo City.

### Suggestions

Based on the conclusions and research results obtained, suggestions are put forward as improvements in the future.

- a) Mathematics subject teachers are expected to be able to use concrete object media in learning mathematics at school.
- b) There is a need for further development which is designed according to the concrete object media learning model. This is intended to increase mastery of the material which will lead to more optimal teaching and learning activities.
- c) To be able to improve the ability of teachers in applying the concrete object media learning model, teachers should be able to optimize meeting time, so that the quality of learning will increase and have a good impact on student learning outcomes.
- d) The results of this study may be a reference for prospective teachers to conduct subsequent studies.

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