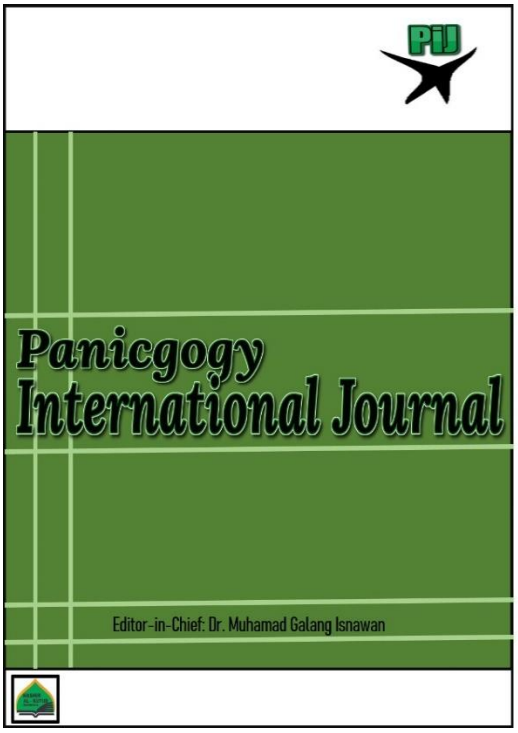
Panicgogy International Journal

Publication details, including instructions for authors and subscription information:



The efforts to improve mathematics learning in material three-dimensional shapes by use of concrete learning object

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To cite this article:
Junitawati & Abidin, A.A. (2024). The efforts to improve mathematics learning in material three-dimensional shapes by use of concrete learning objects. *Panicgogy International Journal, 2*(1), 22-32.
To link to this article: nakiscience.com/index.php/pij

Panicgogy International Journal, 2(1), 2024
https://nakiscience.com/index.php/pij

Original Article

The efforts to improve mathematics learning in material three-dimensional shapes by use of concrete learning objects

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Abstract
This research was motivated by the low learning outcomes of mathematics and the low ability of teachers to use the right learning model in mathematics lessons with three-dimensional shapes material in students. The purpose of learning improvement research is to improve student learning outcomes in mathematics lessons about the material three-dimensional shapes Space by using concrete learning objects. This study used the Kemmis and McTaggart model classroom action research procedure for two cycles with stages, including planning, action, observation, and reflection. The results showed that the use of concrete media in the material of recognizing building simple space was proven to improve the learning outcomes of students in mathematics lessons of the material three-dimensional shapes. This can be seen from the activeness of students in learning and increasing student learning outcomes. Thus, it can be concluded that the use of concrete learning object can improve the learning outcomes of mathematics material to recognize building simple spaces in students.
Keywords: Learning outcomes, Concrete Learning Object

1. Introduction
Mathematics is an important universal science, becomes the basis of, and contributes to the development of modern information and communication technology, has a role in various disciplines, and develops human thinking (Sudirman et al.,2020). Mastery of mathematics from an early age is necessary to be able to master and create new and modern technology in the future that is needed to improve the welfare of human life. Therefore, mathematics is one of the compulsory subjects that must be taught and learned by every student starting from elementary school (SD). The aim is to equip learners with the ability to think logically, analytically, systematically, critically, and creatively, as well as the ability to work together (National Education Standards Agency, 2006).

Curriculum improvement is one of the efforts to improve the quality of education. This effort is successful if there is a change in the pattern of learning activities, from teacher-centered to learner-centered, as well as the orientation of student differentiation (Basham et al., 2017). The overall change will determine the educational outcomes of the assessment affecting the approach, activities, and learning resources applied by teachers in the learning process.

Evaluation of learning conducted by teachers shows that the results of learning mathematics material Knowing to build simple spaces still tend to be low. The results of reflection with class teachers identified that the low learning outcomes of students were caused by the following factors. First, the teaching

model applied by teachers uses a lecture model so it is less effective. Both teachers are more centered on the learners' textbooks and worksheets during the learning process. As a result, students tend to be passive, look less masterful of building space material and students seem monotonous and boring.

Syarifuddin (2014) said that there are internal and external factors that affect the learning process and outcomes of students. External factors of learners, namely physiological and psychological factors. Meanwhile, external factors include the natural environment, social environment, and instrumental. One of the instrumental factors that can affect the high or low learning outcomes of participants is the learning strategy used by the teacher. Therefore, professional teachers must be able to choose and use active, creative, effective, and fun learning strategies so that students are motivated to learn and achieve optimal learning outcomes.

Based on the identification and analysis of these problems, researchers propose alternatives and problem-solving priorities to improve the quality of student learning processes and outcomes. The alternative in question is to choose and use learning by using concrete objects to improve the learning outcomes of mathematics material to know how to build simple spaces. According to Mulyasa (2011) through role-playing in character education, it is expected that students can (1) expose feelings, (2) gain insight into attitudes, values, and perceptions, (3) develop skills and attitudes in solving problems faced, and (4) exploit the core problems played through various ways.

Based on the background of the problem, the results of observations, and reflections carried out on learning, problems were identified such as the interest of students who tend to be low because they consider Mathematics lessons to know this simple space-building material boring. Teachers apply the lecture method in delivering material that causes students to feel disinterested during the learning process. In classroom learning, the media used are simple pictures and math textbooks. The lack of concrete media as a learning medium recognizes building space in students.

Based on the results of reflection on learning carried out by research teachers with fellow teachers, the identified problems are caused by many factors, including the media used in the learning process is only in the form of simple pictures and mathematics textbooks, the method used is less interesting, namely, the teacher uses the lecture method which results in lack of attention and motivation to learn students and there is still a lot of monotonous learning and dull.

The alternative problem solvers that can be used by research teachers to improve the learning process and learning outcomes of students in mathematics lessons are the use of concrete learning objects to increase student understanding and the use of concrete learning objects to improve student learning outcomes to be able to provide feedback on students.

Evaluation of Learning Outcomes in Elementary School

Student learning outcomes are the values obtained by students during teaching and learning activities. Suprijono in Thobroni, (2015) stated, "Learning outcomes of patterns of actions, values, understandings, attitudes, appreciation, and skills". According to Susanto (2013), learning outcomes are changes that occur in students, both concerning cognitive, affective, and psychomotor aspects as a result of learning. Sudjana (2016) stated that learning outcomes are the abilities possessed by students after receiving their learning experience. Based on the results of the

definition of learning outcomes above, it can be concluded that learning outcomes are the process of a person's behavior in the learning process in the form of scores or scores obtained from test results at the end of learning.

In principle, the disclosure of ideal learning outcomes includes all psychological domains that are useful as a result of the experience and learning process of students. The main key to obtaining measurements and data on student learning outcomes is to know the outline of indicators associated with the type of achievement to be achieved, assessed, or even measured. Learning outcome indicators based on those proposed by Benjamin S. Bloom with the Taxonomy of Educational Objectives divide educational goals into three domains, namely the cognitive realm, which is all related to the brain and intellectual. Affective, is everything related to attitude, while Psychomotor is related to gestures or speech both verbal and non-verbal. This study focused on one of the domains in the theory of learning outcomes, namely the cognitive realm because this research will later measure how much the increase in learning outcomes is writing percentages, where what is most needed is cognitive potential.

Mathematics Learning in Elementary School

School mathematics is mathematics taught in schools, that is, mathematics taught in primary education and secondary education. The school mathematics consists of selected parts of mathematics to develop abilities and form a person and blend in science and technology (Suherman, 2001; Taufan et al., 2023). This shows that school mathematics still has the characteristics of mathematics, namely abstract objects of occurrence and consistent deductive thinking. According to Ebbutt and Straker (Marsigit, 2013) school mathematics is defined as the activity or activity of students finding patterns, investigating, solving problems and communicating the results so that they are more concrete.

The general objectives of providing mathematics lessons at the basic education and general education levels are: Preparing students to be able to face changing circumstances in life and the world that is always evolving, through training to act on the basis of logical, rational, critical, careful, honest, effective and efficient thinking. Prepare students to be able to use mathematics and mathematical mindset in everyday life and in learning various sciences. Learning outcomes as one of the indicators of achieving learning objectives in the classroom cannot be separated from the factors that affect the learning outcomes themselves. Factors that affect learning outcomes according to Munadi in Rusman (2012) include: a). Physiological and psychological factors. In general, physiological conditions, such as excellent, are not in a state of fatigue and fatigue, not in a state of physical disability. This can affect students in receiving subject matter. b). Psychological Factors. Some psychological factors include intelligence, attention, interests, talents, motives, cognitive and reasoning power of learners. c). Environmental factors, environmental factors can be influenced by learning outcomes. These environmental factors include the physical environment and the social environment. d). Instrumental Factors. Instrumental factors are factors whose existence and use are designed by the expected learning outcomes. These instrumental factors are in the form of curriculum, facilities, and educators.

Concrete Learning Object in Mathematics Learning in Elementary Schools

The word media comes from the Latin medius which means "middle", intermediary, or intermediary (Arsyad, 2004). Gerlach and Ely say that media when

understood broadly are people, materials, or events that build conditions that make students able to acquire knowledge, skills, or attitudes. Fleming said that the media is often replaced with mediators, namely causes or tools that intervene in two parties and reconcile them. AECT (Association for Education and Communication Technology) defines media as all forms used for the process of distributing information. NEA (Educations Association) defines it as objects that can be manipulated, seen, heard, read, or talked about along with instruments that are used properly in teaching and learning activities to influence the effectiveness of instructional programs.

According to Gerlach in general media (learning) includes people, materials, equipment, or activities that create conditions that allow students to acquire knowledge, skills, and attitudes. In agreement with Gerlach, Gagne also stated that learning media are various components that exist in the student environment that can stimulate him to learn (Sanjaya, 2012).

From these definitions, it can be concluded that the understanding of media is something, be it humans or objects that can be used in teaching and learning activities to help obtain messages or information, knowledge, skills, or attitudes. Media in essence is a means to facilitate teachers in delivering material and make it easier for students to understand the material delivered by teachers. The use of media in learning can be created by students and teachers with makeshift materials, for example by using used items, items around the school environment, or using the environment itself as a learning medium. Meanwhile, according to the Big Dictionary Indonesian, concrete is real, and exists (tangible, visible, palpable, etc.). So concrete media is everything real and can be used to channel messages from sender to receiver so that it can stimulate students' thoughts, feelings, attention, and interests so that the learning process can run more effectively and efficiently toward achieving the expected goals. In addition, another definition of concrete object media is a real object that will provide a very important stimulus for students in learning various things, especially those concerning the development of certain skills (Arsyad, 2004)

Concrete media is the easiest tool to use because we do not need to make preparations other than directly using it. What is meant by real objects as media is a means of conveying information in the form of objects or objects that are actual or original and do not experience changes in concrete objects themselves can be obtained around us such as stones, dry leaves, marbles, books, pencils, tables, shoes, socks, handkerchiefs, spoons, plates, and others. Children, especially low-grade students, will get a lot of information by interacting with real and interesting objects so that children's understanding will be more easily formed. This is also supported by an explanation related to the child's development stage. According to Piaget himself, there are 3 stages of child development (Slameto, 2019). Being intuitive ± 4 years old operates concretely ± 7 years old and operates formally ± 11 years old.

Based on some of the above understandings, it can be concluded that this concrete object is an actual object, object, or media that helps the real experience of students. Real experience or direct experience is the experience that students gain as a result of their activities. Students experience, and feel for themselves everything related to the achievement of goals. Students are in direct contact with the object to be studied without the use of intermediaries. Because of this direct

experience, there is a tendency for the results obtained by students to be concrete so that they will have high accuracy (Sanjaya, 2019)

The advantages and disadvantages of material media, the advantages include: generating ideas or ideas that are conceptual, thereby reducing students' misunderstandings in learning them; Increase students' interest in learning the subject matter; Provide real experiences that stimulate one's own activity to learn; Can develop a sustainable way of thinking; Provide experiences that are not easily obtained through other materials and make the learning process deep and diverse.

The weaknesses include: taking students to various places outside of school sometimes has risks in the form of accidents and the like; The costs required to hold various real objects are not small and have the possibility of damage in using them The weaknesses above should be overcome by using original or concrete objects around the school location that can be used as support in the learning process, and are adjusted to the learning material and still try to bring real objects into the classroom that are useful for explaining the material in the scope of the class. The use of concrete or real media during the learning process will be better than just lecturing. Because the existence of learning media can help to clarify the intentions we convey and stimulate students to learn. Thus, with the use of concrete object media, students become even more active in learning and have the same experience and perception of the concepts learned.

2. Method

This research was classroom action research. A form of research that occurred in the classroom in the form of certain actions taken to improve the teaching and learning process to achieve better learning outcomes than before. This class action research chose the model of Kemiss and Taggart (1988) which divided the research procedure into four stages of activity in one cycle (cycle) of Planning, action, observation, and reflection. This model was often referenced by researchers. Action and observation activities were combined at one time. The results of the observations were reflected to determine the next activity. The cycle was carried out continuously until the researcher was satisfied, the problem was resolved, and the learning outcomes were maximum (Mulyatiningsih, 2011). The subjects of this study were 30 students at SDI Mafaza Koja-North Jakarta, and this research focused on improving mathematics learning material to build simple spaces using concrete learning objects. Learning improvement research was carried out in class I at SDI Mafaza Koja-North Jakarta which was located at Jl. Samudra No. 221 Rt.005 / Rw. 006, South Rawabadak, Koja, North Jakarta, zip code 14230.

Figure 1
Research Method model of Kemiss and Taggart

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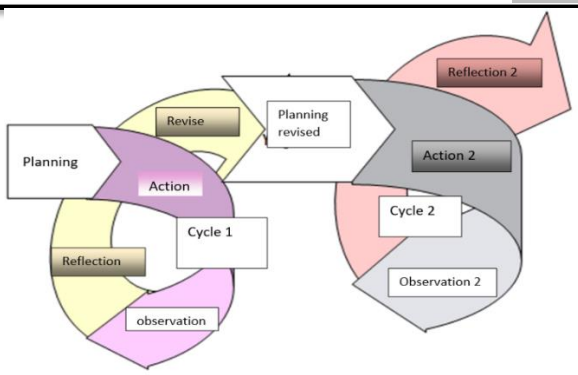

3. Research Results and Discussion

Precycle Learning in Mathematics learning using concrete learning object

Pre-cycle learning planning, researchers conduct learning that uses the lecture method for students. In pre-cycle learning, the action planning carried out is to determine the basic competencies that will be targeted in action, design lesson plans (lesson plans), compile learning scenarios, namely by lecture methods, prepare LKS, prepare learning resources, and prepare evaluation formats.

The implementation of this learning improvement research is carried out in the first week of the odd semester month. Cycle 1 learning improvement research is focused on the application of role-playing model learning to improve learning outcomes of number calculation operations related to money. The procedure for implementing learning improvement follows three learning steps, namely the initial activity, the core activity, and the final activity. The initial activities for improving pre-cycle learning include: (1) preparing lessons (2) conditioning students (3) carrying out routine activities such as checking attendance, and (4) perceiving.

Core activities of pre-cycle learning improvement. The planned pre-cycle activity is to prepare an evaluation question sheet. Then assigned to the final activities of pre-cycle learning improvement, including (1) guiding students to conclude the material, (2) providing evaluation question sheets, (3) guiding students to reflect, (4) giving homework, and (5) informing the material that will and must be learned by students for the next meeting. Research teachers collect data or observations during the learning improvement process. There are three data collected, namely learning outcomes and student activities, and teacher performance. Data on student learning outcomes are collected using extensive tests. Student activity data was collected using student activity observation sheets.

Reflection is carried out to review the strengths and weaknesses of teacher performance. The results of reflection on the implementation of pre-cycle learning carried out with lecturers, then in the pre-cycle are the learning outcomes of many students that are still incomplete, strengths and weaknesses are found as follows. First, the strength of the research teacher is that he has explained the material of building the room clearly accompanied by examples and practice questions. Second, the weakness is that the teacher does not provide concrete examples of the space being taught.

Learning Improvement Cycle 1 Mathematics learning using concrete learning object

Cycle 1 learning improvement planning is based on the results of precycle learning reflection. In this case, the research teacher focuses on concrete objects as teaching materials to build space. Furthermore, the teacher compiles learning tools including (1) RPP (planning instructional) cycle 1 by the steps and components of learning (2) designing dancing learning videos (4) making evaluation/test questions (5) observation sheets of student activities and teacher performance.

This learning improvement research was carried out in the second week of odd semesters. Cycle 1 learning improvement research is focused on the application of understanding building space and using concrete objects shown by teachers to students to improve learning outcomes. The procedure for implementing learning improvement follows three learning steps, namely the initial activity, the core activity, and the final activity. The initial activities of learning improvement cycle 1, include: (1) preparing learning tools and materials (2) conditioning students (3) carrying out routine activities such as checking attendance, and (4) conducting perceptions.

The core activity of learning improvement cycle 1 is planned to apply learning to demonstrate building space with concrete objects. The stages of this activity cycle 1 are planned, including (1) introducing the names of building space and (2) showing some concrete objects as examples of building simple space. The final activity of learning improvement cycle 1, includes: (1) guiding students to conclude the material, (2) guiding students to reflect, (4) giving homework, and (5) informing the material that will and must be learned by students for the next meeting.

Research teachers with supervisors collect data or observations during the learning improvement process. There are three data collected, namely learning outcomes student activities, and teacher performance. Data on student learning outcomes were collected using a written evaluation test with a form of description. Student activity data is collected using student activity observation sheets.

Reflection is carried out to review the strengths and weaknesses of teacher performance. Student activity learning outcomes achieved by learners' factors improve the quality of learning improvement cycle 2. The results of reflection on the implementation of cycle 1 learning improvements were carried out with the supervisor. are as follows. First, the strength of the research teacher is that it has explained the material of building space using concrete media. Second, the weakness of teachers in the process of improving cycle 1 learning is that they are less clear in explaining and students are less interactive.

Learning Improvement Cycle 2 Mathematics learning using concrete learning object

Planning for cycle 2 learning improvement is based on the results of observations of reflection on cycle 1 learning improvement with examining lecturers. In this case, the research teacher focuses on concrete objects as teaching materials for building space, coupled with the introduction of the number of each side of a simple space building. Furthermore, the teacher compiles learning tools including: (1) RPP (planning instructional) Improvement cycle 2 in accordance with the steps and components in learning. (2) designing interesting learning videos (4) making evaluation/test questions (5) observation sheets of student activities and teacher performance.

The observations made in cycle 2 are the same as the observations in cycle 1, but there are improvements in the indicators observed to improve the implementation of cycle 1. Data on student learning outcomes were collected using a written evaluation test with a form of description. Student activity data is collected using student activity observation sheets.

Reflection is carried out to review the strengths and weaknesses of teacher performance. Student activity learning outcomes achieved by learners' factors improve the quality of learning improvement cycle 2. The results of reflection on the implementation of cycle 2 learning improvements were carried out with the supervisor. are as follows. First, the strength of the research teacher is that it has explained the material of building space using concrete media. Second, students are more active and motivated during learning activities 4. Learning Improvement Cycle 1.

Cycle 2 learning improvement planning is based on the results of precycle learning reflection. In this case, the research teacher focuses on concrete objects as teaching materials to build space. Furthermore, teachers compile learning tools including: (1) RPP cycle 1 by the steps and components in learning (2) designing dancing learning videos (4) making evaluation/test questions (5) observation sheets of student activities and teacher performance.

The implementation of this learning improvement research is carried out in the second week of odd semesters. Cycle 2 learning improvement research is focused on the application of understanding building space and using concrete objects shown by teachers to students to improve learning outcomes. The procedure for implementing learning improvement follows three learning steps, namely the initial activity, the core activity, and the final activity. The initial activities of learning improvement cycle 1, include: (1) preparing learning tools and materials (2) conditioning students (3) carrying out routine activities such as checking attendance, and (4) conducting perceptions.

The core activity of learning improvement cycle 2 is planned to apply learning to demonstrate building space with concrete objects. The stages of this activity cycle 2 are planned, including (1) introducing the names of building space and (2) showing some concrete objects as examples of building simple space.

The final activities of the 2nd cycle of learning improvement, include: (1) guiding students to conclude the material, (2) guiding students to reflect, (4) assigning homework, and (5) informing the material that will and must be learned by students for the next meeting.

Observation: Research teachers with supervisors collect data or observations during the learning improvement process. There are three data collected, namely learning outcomes student activities, and teacher performance. Data on student learning outcomes were collected using a written evaluation test with a form of description. Student activity data is collected using student activity observation sheets.

Reflection is carried out to review the strengths and weaknesses of teacher performance. Student activity learning outcomes achieved by learners factors improve the quality of learning improvement cycle 2. The results of reflection on the implementation of cycle 2 learning improvements carried out with the supervisor. are as follows. First, the strength of the research teacher is that he has explained the material of building space using concrete media. Second, the

weakness of teachers in the process of improving cycle 2 learning is that they are less clear in explaining and students are less interactive.

Precycle learning results show that students tend to have not completed achieving the expected goals. Because teachers still use the lecture method. Learning is dominated by teachers who speak actively or lecture, so that students feel bored and some of them do not pay attention to the explanation of the material given by the teacher. Through the lecture model it is very difficult to know whether students already understand what is explained or not, although when students are given the opportunity to ask questions it does not guarantee that all students understand, and will cause boredom and boredom. Sutarsih (2013: 2) argues that varied lectures are teaching models that in their implementation embrace a lot of involvement/creativity of students. Students are required to be active in both asking the teacher and discussing/interacting with their friends, but there are still many weaknesses in this lecture model such as the teacher is difficult managing the allocation of time, and students will be more bored and sleepier, because in this model only the teacher is active in the teaching and learning process, while the students only sit listening to the explanation that has been given by the teacher.

The results showed an increase in the average learning outcomes and the percentage of completeness of learning outcomes in the material "Getting to Know to Build Simple Space with the Use of Concrete Media". Students seem to be easier to understand learning. Sumantri, et al (2004: 178) suggest that in general concrete media functions as a. Tool to create effective teaching and learning situations. b. An integral part of the overall teaching situation. c. Laying concrete foundations and abstract concepts to reduce the understanding of verbalism. d. Develop student motivation e. Enhance the quality of teaching and learning. This is in line with the explanation of Sudjana and Rivai (2010: 196) that the advantages of real objects (concrete media) can display size, sound, gesture, surface, weight, smell, and benefits and children will also be faster and more precise in understanding the learning material delivered by the teacher so that real objects play an important role in efforts to improve the teaching and learning process.

In addition, according to Daryanto (2013: 29) the advantages of concrete object media, namely a. Provide hands-on experience. b. Presentation concretely and avoiding verbalism c. Can show the object as a whole both construction and how it works. d. Can show the organizational structure clearly. In addition to the advantages of concrete media, it also has several disadvantages The disadvantages of concrete objects according to Daryanto (2013: 29), namely: (a) Unable to reach a large number of targets; (b) Storage requires a lot of space; (c) The treatment is complicated. However, this deficiency can be circumvented as long as the school and teachers are willing to prepare the place and take good care of it. This is practiced when students are asked questions about examples of building space in their homes, students can give correct examples. With the activeness of these students, and the grades obtained by students are also getting better, it is proven that the use of concrete media is suitable for use in learning Mathematics material to recognize building simple spaces in students.

4. Conclusion

The results showed that the learning outcomes of students on building space materials using concrete media can increase. After using concrete media, the learning outcomes of students experience an increase. From the beginning, students do not understand building a simple room to understand and look more active. The results of research using concrete media can increase students' understanding of the material to build a simple room in the classroom to be followed up for the school to facilitate and suggest that this learning be carried out on other materials so that students are more active, creative, and innovative. Follow-up advise for future researchers. Students must continue to play an active role in the classroom, responding well to every delivery of material made by the teacher. Not only has an impact on learning outcomes but also has an impact on attitude changes after learning. Students must be more confident in expressing opinions. The results of research using concrete media can increase student understanding, so the results of this research can be a suggestion for follow-up for the school to facilitate and suggest that this learning be carried out on other materials so that students are more active, creative, and innovative. Follow-up advice for future researchers. The results of this study can be used as a reference to other research related to the application of the use of concrete learning objects.

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