

IMPROVING UNDERSTANDING OF FLAT SHAPE CONCEPTS THROUGH PROJECT BASED LEARNING MODEL WITH MAKETS MEDIA

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1. Abstract

This study tries to ascertain students' cognitive comprehension of flat shapes, a topic in mathematics. This study employs project-based learning with the help of Makets media and a spiral design. 21 pupils who were divided into three levels, high, medium, and low, served as the study's subjects. In order to determine how well the subject could comprehend mathematical ideas in flat shape material, the researcher used exam questions, media Makets, and interviews. The data analysis method then compared the pre-cycle, cycle I, and cycle II using descriptive analysis. by 25% indicators of student performance. According to the study's findings, learning using the Project-Based Learning approach using Makets can increase conceptual understanding. This can be seen from the pre-cycle, where a class average of 51.90 and percentages for 9 students who completed over $\Rightarrow 70$ (42.86%) and students who did not complete as many as 12 students (57.14%) respectively. In cycle I, there were 6 students who finished with a completion rate of 28.57% and 15 students who did not finish with a completion rate of 71.43%, with a class average

of 56.24. In cycle II, there were 17 students who finished with a completion rate of 80.95% and 4 students who did not finish with a completion rate of 19.05%, with an average grade of 78.74. Readers may find this study to be an informative and useful resource.

Keywords: *understanding of concepts, media Makets, pjbl, flat shapes*

2. Introduction

A fundamental effort to improve human attributes is education. Education may also be described as a process that is ongoing at all levels and types of instruction since it is an activity that is conscious of its objectives. In a system of integrated education, everything is connected. Education as a system, according to (Djamarah, Syaiful Bahri, 1996:36), is nothing more than a functioning whole focused on a single objective. Every subsystem that is present is part of an ordered system and is inseparable from a number of elements or components that are inextricably linked together as a whole.

In spite of all efforts to overhaul the national education system, the quality of education remains a concern. Numerous initiatives to upgrade Indonesia's educational infrastructure have been launched, and as a result, a number of educational legislation have come to complement one another and replace outdated ones (Nana Sudjana, 1989:26). Nearly all aspects of education are covered by the efforts mentioned above, including updating curricula, teaching methods, and learning activities, enhancing teacher effectiveness, enhancing learning activities, acquiring textbooks and learning resources that are current with technology, enhancing the assessment system, organizing and managing education, and other initiatives aimed at raising educational standards.

When there is interaction between the teacher as a teacher and the students as

students, learning and teaching as processes take place. The existence of teaching objectives, learning methods, supporting learning material, and an assessment to determine whether the teaching objectives have been reached are the four primary components that must be present in this interaction. Mathematics is etymologically defined as information acquired via thinking and is one of the courses covered in the basic school curriculum. More focus should be placed in mathematics on reasoning and ratio-related activities. As a result of human thought regarding concepts, procedures, and reasoning, mathematics is created.

As a subject, mathematics has been systematically organized, from simple concepts to complex concepts, so the ability to understand concepts from previous materials is very important to be able to understand the concepts being studied. This is why mathematics emphasizes conceptual understanding. According to Purwanto (2009:44), understanding is the level of proficiency that assumes pupils can comprehend the meaning or concept, scenario, and facts they are already familiar with. The ability to explain information in a way that is more understandable, to offer interpretation, and to apply it are all examples of conceptual comprehension, according to Bloom's definition based on the cognitive domain.

Two-dimensional structures known as flat shapes are made of flat planes that are joined by either straight or curved lines. According to (Rahayu, 2008), flat shapes are those that only have two dimensions—length and width—and not height or thickness. Similarly, when it comes to the idea of geometric shapes, flat shapes are properties that are concrete, and what is frequently held or seen are objects that have these properties. Consider the concept of a rectangle, which is an abstract idea that is distinguished by a characteristic.

According to the regulation of the Director General of Elementary and Basic Education of the Ministry of National Education number 506/C/PP/2004 dated 11 November 2004, it is stated in the mawaddah that the following are signs of student understanding of mathematical concepts: (1) Restate a concept; (2) Classify objects according to certain characteristics according to the concept; (3) Give examples and non-examples of concepts; and (4) Present concepts in various forms of mathematics.

According to the findings of interviews with third-grade teachers at Jaranan Public Elementary School, there is still room for improvement in order to achieve the highest levels of mathematics learning achievement. This is because students still struggle to comprehend and master the concepts that are being taught, and they still have trouble applying what they have learned. Even if it was previously mentioned that one of the objectives of teaching mathematics in schools is to help students understand its significance and assimilate ideas.

In addition to this, based on first direct observations in class III, the method used still needs to be improved, which contributes to the students' poor understanding of mathematical ideas. To get around this, the instructor must be able to focus on choosing the best teaching methodology to employ, allowing pupils to grasp the concept and learn the supplied information with ease. Elementary school students are often in the concrete operational part of their education. Students can now apply logical principles while still working with physical items. One of them is the use of learning media to help pupils understand concrete objects. The choice and application of proper media helps draw students' attention to the learning process. It will be simpler for students to comprehend a concept being studied with the aid of concrete media. Since the goal of teaching

mathematics is to help students understand concepts, attempts are made to increase students' capacity to comprehend mathematical concepts in flat shape material using the PJBL learning model and Makets.

Project-based learning, or what is known as project-based learning, is a type of cooperative learning that includes students directly in the creation of specific projects from learning activities, according to (Ilyas and Purnomo, 2019: 53). According to the Guidelines from Learning Houses (2020: 40), project-based learning, which is carried out in groups or independently through scientific stages with a set time limit as outlined in a final product that will be presented to others, is a learning model that involves student activity. Whereas with this, kids are given the freedom to work autonomously to develop their own learning, which will result in a realistic product, like the work generated by the students themselves. This project-based learning approach is used because it has some benefits for the educational process, one of which is that it can help students develop skills like critical thinking, creativity, and problem-solving so that they can manage their own learning and become more self-assured. Thomas (in Rahma, 2017) lists numerous guiding principles for project-based learning (PjBL), including: (1) centrality; (2) driving questions; (3) constructive investigations; (4) autonomy; and (5) realism.

A model is a miniature imitation object with an imitation form (buildings, ships, airplanes, etc.) in three dimensions and on a small scale, typically made of wood, paper, clay, etc., according to The Big Indonesian Dictionary (2010). According to (Asyhar Rayandra, 2011), three-dimensional media is a category of non-projected media with a three-dimensional visual presentation. This category of media can include both living and deceased original materials as well as imitations that serve as representations of the

original. Teachers must use mathematics learning media to assist students in understanding the concept of learning mathematics. In particular, teachers must use learning media that allows students to operationalize the material on their own. This dummy content is helpful for providing students a sense of the actual circumstances.

Researchers use Makets media to help third-graders comprehend flat shape content by putting the Project Based Learning (PjBL) learning model into practice. Looking at the background of the article, the formulation of the problem is "Improving Conceptual Understanding of Flat Building Materials through Project-Based Learning Models Assisted by Makets Media" and the purpose of writing this article is to determine the increase in understanding of the concept of flat construction material with the Project Based Learning (PjBL)-Based Learning model Assisted by Makets as well as increasing student learning outcomes in thematic learni

3. Methods

3.1. Participants and context

This form of research is called collaborative classroom action research (PTKK), which entails teacher-led scientific research projects that are conducted on purpose in classroom settings with the goal of enhancing or improving the learning process. This study makes use of MC Taggart's spiral model, which has two cycles. The planning stage, the acting stage, the observing stage, and the final stage of reflection make up each cycle. The steps of action and watching happen simultaneously.

Both qualitative and quantitative data were analyzed for this classroom action research project. By using the Project Based Learning approach and utilizing teacher activity

observation sheets and student activity observation sheets, qualitative data is information gathered from direct observation of learning activities. Quantitative data, on the other hand, comes from the outcomes of exams that gauge a person's understanding of mathematical ideas. analysis of data utilizing descriptive comparative methods. Data were analyzed using comparative descriptive analysis, which is a method that compares the results of the pre-cycle, cycle 1 to cycle 2, with an indicator of success that achieved completeness of 80% of the total number in each cycle, and the results of the evaluation test students achieved a minimum completeness criterion value of 70. There are two meetings totaling 4x35 minutes each in each cycle. This classroom action research was conducted in class III at Jaranan Elementary School with a total of 21 students by implementing the Project Based Learning paradigm with the use of Makets during the second semester of the 2022–2023 academic year on flat form material.

3.2. Material

Research instruments are equipment or facilities used to facilitate data collection. data gathering using test methods. After using the Project Based Learning (PjBL) Based Learning technique and receiving assistance from mock exams, students take a test that takes the form of essay questions to assess their abilities. By recording both current and past events, observations can be validated. Images that serve as documentation, such as photos, live images, sketches, and others (Sugiyono, 2015: 329). Documents can take the form of words, images, or colossal works created by an individual.

3.3. Data Collection and analysis

Observation and testing are the two data gathering methods employed in this in-class action research project. In this study, the Project Based Learning paradigm was utilized in

conjunction with Makets to examine student and teacher activities during the teaching and learning process. In the meanwhile, the exams employed the students' description questions to gauge their comprehension of mathematical ideas. Test questions, observation logs of teacher and student activities, and observation logs of other activities were employed as the data gathering tools.

The study's research hypothesis is that using Makets and the PjBL learning model, efforts will be made to improve students' comprehension of mathematical ideas in flat shape material. The PJBL model's implementation of small group projects, in which there is active student discussion in their groups to find solutions to questions or assignments given by the teacher, is thought to be able to improve students' understanding skills in mathematics subject matter for class 3 flat shapes..

3.4. Ethical Considerations

Humans are used as study subjects in all types of studies. Researchers' conduct and activities when gathering, evaluating, and reporting study data are governed by a set of ethical issues, sometimes known as research ethics. These moral requirements serve to ensure that research is carried out honestly, to protect the rights and welfare of study participants, and to guarantee the trustworthiness and validity of research findings. Based on these findings, basic research ethics principles were applied in this study, including: respecting and not endangering research subjects, such as teachers and students, as well as the usefulness of research in learning, particularly in thematic learning content (Mathematics Council, 2017).

3.5. Limitations to the Study

The time, expense, and effort put into this research are its limitations. For class III primary school children studying mathematics thematically and utilizing the project-based learning paradigm, researchers have developed problem boundaries that emphasize improving conceptual understanding and student learning outcomes.

4. Results and Discussion

The study was carried out from May 15 to May 26, 2023. There were two cycles to this study. Each cycle involves two learning cycles. Each meeting will be given two times 35 minutes.

The following table displays the timetable for incorporating mathematics instruction on flat shapes into third-grade research activities. The Jaranan SD. the achievement of the assessment of concept understanding tests obtained in the category of very understanding of concepts, with a total percentage of 4.76%, according to recapitulation data from the assessment of critical thinking skills of class III students learning content Thematic Theme 8 cycle I. The overall percentage for the category of conceptual understanding was 28.57%, the percentage for the category conceptual understanding sufficiently was 42.86%, the percentage for the category conceptually unaware was 14.29%, and the percentage conceptually unaware was 9.52%. In cycle I, pupils' average understanding of mathematical concepts was 56.24 percent. evaluation of learning results Thematic Subject Eight in cycle I reached 6 students with a percentage of 28.57%, while the class average was 56.24. Of the 15 students who did not finish, a percentage of 71.43% applied.

Two meetings were held in cycle II using the project-based learning methodology with

the use of Makets. Math education resources are based on thematic theme number eight. Data recapitulated from the assessment of students in class III learning content Thematic Theme Eight Cycle II's conceptual understanding are obtained, demonstrating the success of the assessment of conceptual understanding ability test, which was obtained in the category of conceptual understanding very well, with a total percentage of 42.86%. The percentage of categories that comprehend the concept as a whole is 38.09%, the percentage of categories that do so individually are 19.05%, 0%, and 0% respectively, and the percentage of categories that do not comprehend the concept as a whole is 0%. evaluation of learning results Thematic Subject Eight learning modules in cycle II were completed by 17 students (80.95%), and the remaining 4 students (19.04%) did not, giving the class average of 78.74. The following information was gleaned from a comparison of cycle I and cycle II mathematical concept knowledge tests:

Tabel 1. compares the conceptual understanding of students during
Cycle I and Cycle II in mathematic flat shapes

No	Category	Cycle I (%)	Cycle II (%)
1	Very Understand Concept	4,76	42,86
2	Knowledge of this concept	28,57	38,09
3	Simply comprehend this concept	42,86	19,05
4	Inability to understand concepts	14,29	0
5	Lack of comprehension of the idea	9,52	0

The conceptual understanding skills of the pupils improved from cycle I to cycle II, as

seen in the table above. The mathematics learning content of the flat shape materials significantly improved between the two stages. The following information was gathered by comparing cycle I and cycle II student learning outcomes:

Tabel 2. Comparison of Cycle I and Cycle II Student Learning Outcomes

Category	Cycle I (%)	Cycle II (%)
The highest score	87,00	100,00
Lowest Value	10,00	45,00
Grade-Average	56,24	78,74
Complate	28,56	80,95
Not Complate	71,43	19,05

As noted in the table above, there was a huge increase between cycles I and II, from 28.56% to 80.95%. There was no need to carry out the subsequent cycle of action because in cycle II the extent of student learning outcomes exceeded the success indicator, namely 80.95%.

Initial observations revealed that the learning activities had not been fully utilized because students were still having trouble comprehending the concepts when they attempted to answer questions related to Mathematics Theme 8. Applying the model of project-based learning will solve this issue. In cycle I, it is not possible to say that comprehension of the concepts of the pupils is at its best. However, compared to the state of students prior to the treatment or research, the condition of students in cycle I has improved. Even if it is not ideal, students have begun to actively participate in their learning in cycle 1. Some students still like playing, talking to themselves, and being unfocused. Some students still depend on group members to finish projects during discussion events. This is so that Makets can help students who are unfamiliar with project-based learning.

According to the researchers' observations of cycle I learning, not all of the intended actions have been carried out. Researchers did not distribute group discussion time as effectively as possible. Some pupils have not given their whole attention to learning since researchers have not fully mastered the subject. In cycle II learning, researchers and students must collaborate even more effectively so that the project-based learning model can be implemented as planned and yield the best possible outcomes with the use of Makets.

5. Conclusion

Students' health in cycle II was significantly better than it was in cycle I. Makets-based learning exercises went well and were quite effective. In learning activities, students appear engaged and content. So that they don't just rely on their group members, student cooperation is maximized during group discussion activities. The discussion activities went according to schedule and without any problems. In order to maximize learning activities in the second cycle, the researcher realized the shortcomings in the first cycle. Researchers enhance student focus on learning activities by enhancing class mastery. In general, cycle II's educational activities have been going smoothly. All essential tasks have been completed as planned.

Based on the data analysis discussed above, it can be inferred that research using the Project Based Learning teaching model and Makets in Semester II of the 2022–2023 academic year can increase the comprehension capacities of third-grade students at SD Negeri Jaranan Bantul, Yogyakarta. The findings of this study support Hosnan's assertion (2014: 319) that project-based learning models are instructional strategies that employ projects or other activities as media. As the first phase in gathering and integrating new

knowledge based on experience in practical tasks, this learning approach incorporates problems. The results of this study were different from previous studies because the assessment used was more thorough and the application of the learning model was in accordance with the synoptic theory. This is because there were more assessments used in this study, teaching and learning activities could be well controlled, students could participate actively in learning activities, and they were more confident and enjoyed it.

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