

PROBLEM SOLVING FOR FIFTH GRADE IN QUADRILATERAL LEARNING USING VAN HIELE THEORY AND CONTEXTUAL APPROACH

**Debora Dwi Kurniawati, Savira Erdia Kusuma, Yulisa Ananda Putri, Haniek Sri
Pratini**

Pendidikan Matematika FKIP USD Yogyakarta Indonesia

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Abstract

This research is a literature study with a qualitative approach. This research is motivated by the importance of students' understanding of the material properties of quadrilaterals. The purpose of this study is that researchers want to find out whether Van Hiele's theory and contextual approaches are effective in increasing the understanding of fifth grade elementary school students about the material properties of quadrilaterals. Van Hiele's theory is a theory that is specifically used in the field of geometry which has 5 stages of learning, namely the information stage, the directed orientation stage, the explicitization stage, the free orientation stage, and the integration stage. While the contextual approach emphasizes on 7 contextual components, namely: (1) Constructivism, (2) Asking, (3) Finding, (4) Learning Society, (5) Modeling, (6) Reflection, (7) Actual assessment. So that learning is obtained through knowledge and experience or the real world, improving students' higher order thinking processes, student-centered, active students, critical, creative, problem solving, students learn in a fun, exciting, not boring, and use various learning resources. The results of this study indicate that there is an increase in students' understanding of the material properties of quadrilaterals by using Van Hiele's learning theory and contextual approach.

Keywords: properties of quadrilaterals, Van Hiele theory, contextual approach

INTRODUCTION

The lesson that has been learned from elementary school even from an early age to college is mathematics. This defines mathematics as a very fundamental subject. Mathematics is known as the science of numbers. Suriasumantri (Adjie, 2012), mathematics as a thinking tool other than logic, language, and statistics. According to Ruseffendi (Adjie, 2012), mathematics functions as a science of language, deductive science, regarding art, the queen of science, organized structure, and the science of patterns and relationships.

Mathematics plays an important role in human life, especially in the development of science today. Mathematics is one of the content taught in elementary schools. According to Daryanto & Raharjo (2012) mathematics material

taught in schools can be a provision for students through several competencies, namely being able to think logically, analytically, systematically, critically, creatively, and the ability to work together. Learning mathematics can develop students' thinking patterns in solving problems. Abidin (2015) states that problems are often referred to as an imbalance between expectations and reality. Activities to solve the problems encountered can be called problem solving. Polya (1985) reveals that problem solving is an attempt to find a way out of a difficulty to achieve goals that cannot be achieved immediately. When students are faced with a mathematical problem, they will try to solve it and find a solution. Problem solving activities require students to use their

experience and knowledge in order to achieve the expected goals.

In studying geometry, students need a mature concept so that students are able to apply their geometry skills such as visualizing, recognizing various shapes and spaces, describing images, sketching images of shapes, labeling certain points, and the ability to recognize differences and similarities between shapes. geometry (Muhassanah et al., 2014; Mirna, M. 2018; Moreno-Guerrero, A. J., Aznar-Díaz, I., Cáceres-Reche, P., & Alonso-García, S. 2020; Putri, S. K., & Syahputra, E. 2019).

Problem solving can be solved using a variety of ways. one of which was expressed by Polya (1985) that the steps for solving the problem include (1) knowing the problem (understanding the dilemma), (two) planning a settlement (devising a plan), (3) carrying out a settlement plan (carrying out the plan), and (4) reviewing the results (looking back). Seen from the implementation, learning problem solving is not an easy thing, this is in accordance with Yeo's statement (in Zainuri, 2016) that there are several factors that cause difficulties in solving problems, namely (1) students do not know the problems that exist, (2) knowledge in determining problem solving strategies is still lacking, (3) students are not able to translate problems into mathematical form, (4) students cannot use correct mathematical concepts. be an effort to train students' ability in problem solving, especially class V.

Budiarto's research (2009) shows that the connection between geometric concepts is weak, that is, they cannot relate one's knowledge to another's knowledge in geometry, let alone other fields in mathematics outside of geometry. Student reasoning is also weak, this can be seen from the number of students who cannot use what is known to prove the problem given. On the other hand, the geometry is arranged in a spiral and interrelated so that if there is a hole in one part it will limp in the next learning process.

In learning geometry using Van Hiele learning theory, it can be taught using contextual learning so that learning will be interesting because by using Van Hiele learning theory students will learn geometry material from the phases, each of which influences each other and forms students active in understanding the lesson which is conducted. Therefore, this study aims to: determine the understanding of the concept of the properties of rectangles, students' difficulties in the material properties of rectangles, and describe the learning process of material properties of rectangles with a contextual approach.

METHOD

This type of research is descriptive research with a qualitative approach. According to Saryono (2010), qualitative research is research that is used to investigate, find, describe, and explain the quality or privilege of social influences that cannot be explained, measured or described through a quantitative approach. In this study, the data collection technique used in this study means library research where library research is an activity to collect materials related to research from scientific journals, literatures, and authors. This literature study was conducted to receive theoretical information as a result the researcher has a strong theoretical basis as a scientific result, with the research subjects being 5th grade elementary school students. This research instrument includes articles and theses that are relevant to the research we will examine.

RESULTS AND DISCUSSION

The concept of geometry is basically abstract, but geometric concepts can be realized in a semi-concrete or concrete way. Pictures and geometric models can be observed directly by students during learning, thus making learning activities challenging and fun. Learning activities that attract students' attention will have an impact on increasing students' understanding of the concepts they learn (Sabrinah, 2006; Andriyani, N. L., & Suniasih, N. W. 2021; Licorish, S. A.,

Owen, H. E., Daniel, B., & George, J. L. 2018; Al-Kumaim, N. H., Alhazmi, A. K., Mohammed, F., Gazem, N. A., Shabbir, M. S., & Fazea, Y. 2021).

In learning geometry, students still have some learning difficulties. For example, students have difficulty in using the concept of quadrilateral properties, for example students cannot visualize rectangular shapes, students also cannot understand the concepts of sides, angles, diagonals. Students also have difficulty in solving verbal problems, for example, students cannot understand the problem in a problem, students still have difficulty in applying formulas and still have difficulty understanding theorems.

Based on the literature study of the articles and theses that we reviewed, we obtained several analytical results, as follows:

1. Based on research conducted by a student at the State University of Jember, Febta Mubayinah with the title "Application of Van Hiele Learning Theory to Improve Activities and Main Learning Outcomes of the Characteristics of Quadrilaterals in Class V SDN Antirogo 01 Jember", the researchers applied the van Hiele theory to solve the problem of learning geometry in fifth grade elementary school students. The research was conducted with the help of paper folding props to make it easier for students to analyze rectangular shapes. So it is concluded that learning by applying van Hiele theory can improve student learning activities. This is evidenced by the increase in student activity results in cycle I and cycle II. With the percentage of student learning outcomes in the first cycle is 65.21% while in the second cycle is 77.43%, in this case learning outcomes increased by 12.22%. Judging from the increase in learning outcomes, it can be said that learning with van Hiele theory is effective in improving student learning outcomes in quadrilateral material.
2. Based on research conducted by one of the students of Sebelas Maret University, Hendra Kurniawan with the title "Use of Contextual Approaches in Improving Mathematics Learning About the Properties of Flat Shapes in Student V of SD Negeri 2 Kenteng". The researcher applies a contextual approach to learning the properties of flat shapes in fifth grade elementary school students. The research was conducted by observing the surrounding environment and using props. So it is concluded, by applying 7 contextual components can improve mathematics learning about the Properties of Flat Shapes in fifth grade students of SD Negeri 2 Kenteng. The seven contextual components in question are as follows.:
 - First, in the constructivism component, the teacher builds student understanding based on observations by providing a stimulus in the form of questions related to everyday life.
 - Second, in the Asking component, there is a question and answer process carried out by teachers and students to determine students' understanding of the material so that learning activities are more lively.
 - Third, in the finding component, the teacher asks students to find and find the material being taught independently in the context of a team.
 - Fourth, in the Learning Community component, the activities carried out include group discussions, presentations and interactions in learning activities.
 - Fifth, in the modeling component, the teacher conducts modeling using real objects that are around students to make it easier for students to understand and do.
 - Sixth, in the Reflection component, the teacher asks students to reflect and recall what has been done in the learning that has just been done and provides opportunities for students to

mention material that has not been understood in learning.

Seventh, in this last component, namely the Actual Assessment, the teacher assesses the ability of students through discussion activities, student presentations and giving assignments at the end of the lesson.

This success is seen from the percentage of student learning outcomes in the observations of cycles 1, 2 and 3. In the first cycle the percentage of students who completed KKM (minimum completeness criteria) after using learning with a contextual approach was 41.94%. In cycle 2, the percentage of students who completed the KKM after using a contextual approach was 77.41%. In cycle 3, the percentage of students who completed the KKM after using the contextual approach was 93.56%. Thus, it can be concluded that learning with Van Hiele's learning theory and contextual approach can improve understanding and learning outcomes of fifth grade elementary school students.

CONCLUSION

From the results of data analysis and discussion that has been stated, it can be concluded that learning mathematics using Van Hiele learning theory and a contextual approach can improve the learning outcomes of fifth grade elementary school students, as shown by:

- a. Increased student activity in learning mathematics. This can be seen from the increase in student activity from the initial test stage to cycle III.
- b. Increased learning outcomes of geometry, especially in the material properties of a quadrilateral. This can be seen from the number of students who complete the test which continues to increase from the initial test stage to cycle III.
- c. The contextual learning process in the material properties of rectangular flat shapes that is effectively used is by observing the surrounding environment and applying 7 contextual components,

namely: constructivism, asking, finding, learning community, modeling, reflection, and actual assessment.

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