

The Reconstructing of 4th Grade Primary Students' Conception on the Concept Of Geometry using Puzzle Based Learning

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The Reconstructing of 4th Grade Primary Students' Conception on the Concept Of Geometry using Puzzle Based Learning

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Abstract. Understanding the concept is the main basis for learning mathematics, especially at the level of primary education. Misunderstanding or misconception often occur within this level, one of them is the concept of a parallelogram. Students possess an understanding that a parallelogram, square, rectangle and rhombus are separate sets, while it is scientifically proven that square, rectangle and rhombus are special forms of parallelograms. The purpose of this study was to determine and analyze the misconception and conceptual change that occurred in fourth grade primary school students regarding the concept of parallelograms.

The study utilized mixed method explanatory sequential strategy using a three tier test format conception. The test is used to determine the initial concept, final conception and conceptual change about the concept of parallelogram geometry. The result showed that the students' initial conception of the concept of parallelograms fell into the misconception category. After puzzle based learning was implemented, most students experienced a change in concept or conceptual change from misconception to scientific conception. Puzzle based learning can be an alternative learning model to correct students' misconceptions about the concept of parallelogram shapes.

Keywords: parallelogram, Misconception, conceptual change, puzzle based learning

1. Introduction

There are too many misconceptions in geometry according to several previous studies [1,2,3,4,5]. Misconception is a concept that is not in accordance with the scientific understanding or agreement of experts in the field [6,7,8,9]. Thompson & Logue defines misconception⁸ as a person's fault in understanding an idea or concept that is built on his experience [10]. It can be concluded that misconception is an understanding which opposes scientific concepts that have been agreed upon by experts.

The misconception in the concept of a rectangular shape is often found in the elementary school level, especially the concept of rectangles, squares and rhombuses which are parallelograms. Dzulfikar [3] stated the misconception that occurred in the concept of rectangles such as squares, rectangles and levels as separate sets. Farida said that the misconception that occurred in the concept of a rectangle was that students thought rectangle was the shape that had the longest side.

Based on scientific concept, parallelogram has special forms, namely rectangular, square and rhombus. Van de walle stated that the definition and relationship between specific parallelograms are as follows: (a) rectangle is a parallelogram with right angle, (b) rhombus is a parallelogram with all



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sides congruent, (c) square is a parallelogram with right angles and all sides are congruent [11]. However, students argue that square, rectangle and rhombus are not parallelograms.

The misconception occurs because teachers are accustomed to teaching students about the concept of squares separately, without examining the relationship between these rectangles [5]. The misconception that has occurred so far cannot be allowed to continue. Misconception must be resolved immediately and correct concept must be promoted, so that students can more easily to understand topics at the next level.

To be able to correct misconceptions that occur grade 4 primary school students about the concept of parallelogram geometry, puzzle-based learning can be used. Puzzle is a game that is often used in the learning process. According to a simple research conducted by Michalewicz & Michalewicz, learning that uses puzzle-based learning makes students more enthusiastic in the learning process [12].

2. Methodology

This study used a mixed method design. Mixed method is a research approach that combines qualitative methods and quantitative methods [13]. According to Sugiyono, combination research method is a research method that combines quantitative methods and qualitative methods [14]. The qualitative method is used to identify misconceptions experienced by students, especially in parallelogram geometry. The qualitative data of conception are in the form of conceptual categories, conceptual change and learning progression. The quantitative method is a frequency distribution and the percentage participants based on these categories.

Participants in this study were grade 4 students of SD Islam Al Azhar 39 Purwokerto, totaling 32 students.

The data collected during the pre-learning process was in the form of students' conception of the concept of parallelograms. Then the data was categorized based on the conception category and became the initial conception data and conceptual change both qualitatively and quantitatively. At the post-learning period, the data collected were students' conceptions after learning using puzzle-based learning and students' conception test answers about the concepts being studied. The data was used as a reference in determining the final conception category and the conceptual change of students on the parallelogram concept. The data about the misconceptions that students have is a conception test using a three tier test.

3. Results and Discussion

Puzzle Based Learning is able to improve the conceptual change of 4th grade students about the concept of parallelograms. Conceptual change for grade 4 elementary school students regarding the concept of parallelograms is presented in the following figure:



Explanation :
 Mc : Misconception Er : Error
 LK : Lack of Knowledge SC : Scientific Conception

Figure 1. Students' Conceptual Change on Rhomboid

Figure 1 shows that before the implementation of puzzle game, in general more than 65% of students had misconceptions or misconceptions about the concept of a parallelogram being studied, especially in the concepts of square, rectangle, and rhomboid which are types of parallelogram. This is shown by the students' explanation stating that the square, rectangle, and rhombus are separate or separate shapes. So, in pre-learning there is no any student who has experienced scientific conception.

Figure 1 also explains that, after the implementation of puzzle-based learning and animation videos, there was a change in the concept to scientific conception. Although there were still 6.25% who experienced misconceptions and 6.25% experienced lack of Knowledge. However, students who experienced changes to scientific conception were 87.5%. This proves that the use of appropriate learning method and media will give students better understanding in the basic concept of parallelogram shapes, which has never been introduced to students so far..

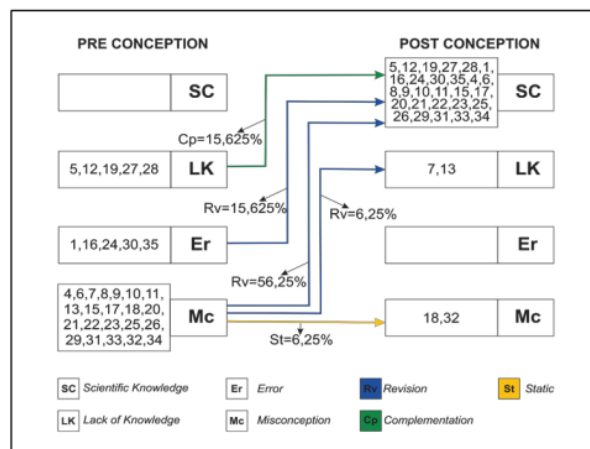


Figure 2. Conception profile and conceptual change of primary students about parallelogram

Figure 2 illustrates the conceptual profile and conceptual change of grade 4 primary school students about parallelogram shapes. Based on the figure, it proves that the students' initial conception of the parallelograms turns out to experience misconceptions, errors and lack of knowledge. There has not been any students who understand its scientific concept. After learning using puzzle-based learning and animated videos, there is a change in the concept or positive conceptual range. Students who during pre-learning experience misconceptions, change the concept to scientific conception as much as 56.3%, lack of knowledge as much as 6.3%, and still experience misconception as much as 6.3%. Students who experienced errors during pre-learning, there was a change of concept to scientific conception as much as 15.6%. Students who experience a lack of knowledge, underwent concept changes to scientific conception as much as 16%.

P Conception profile and conceptual change of 4th graders about the concept of a square, rectangle and rhombus falling into the category of parallelograms shown in Figure 3.

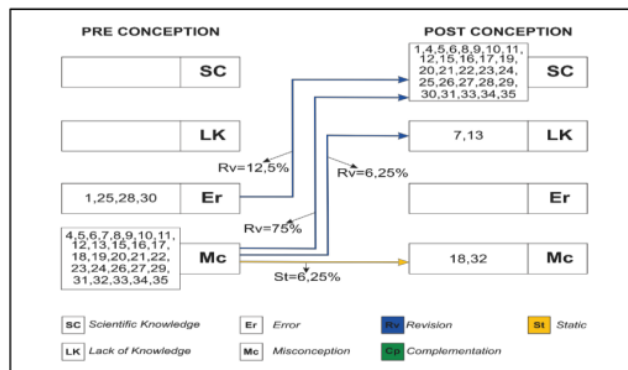


Figure 3. Conception profile and conceptual change of 4th graders about the concept of square, rectangle and rhombus

Figure 3 illustrates the conceptual profile and conceptual change of grade 4 primary school students about square, rectangle, and rhomboid which are basically parallelograms. Based on the figure, it proves that the students' initial conception had misconception and error. There has not been any student who understands scientific concept. After learning using puzzle based learning, there has been a positive change in concept or conceptual change. Students who during pre-learning experience misconceptions, 75% of the concept changes to scientific conception, 6.25% lack of knowledge, and still experiences 6.25% misconception. Students who experienced errors during pre-learning, there was a change of concept to scientific conception by 12.5%.

Understanding the concept is the main basis for learning mathematics, especially at primary school level. This is in accordance with the objectives of learning mathematics, namely understanding mathematical concept, the relationship between concept, and applying concept in a flexible, accurate, efficient and precise manner in problem solving. Misunderstanding that occur from the primary school level will have an impact on understanding other concepts at the next level.

Based on the pre-conception profile, some grade 4 students, regarding parallelogram, show that they have misconception on parallelogram shape. Most students, consider that a parallelogram, square, rectangle, and rhombus are separate sets. This is in accordance with the identification results of students' responses to the given conception test. Students experience a misconception because so far they only get material about the shape of a parallelogram only one shape. They are not explained about other forms or special forms of parallelograms. The teacher's lack of understanding of the actual concept and how teachers teach scientific concept to students can lead to misconception.

This is consistent with the results of previous research, that primary school students and teachers experience misconceptions about the geometry of parallelogram. Several studies concluded that, misconception were formed since there were still primary school levels, so it is not easy to reshape their misconception into scientific concept [15,16]. The right learning models and media can change students' initial conception from misconception to scientific conception.

In this study, the researcher provided an alternative learning method using puzzle based learning to explain the true concept of parallelogram shapes. This is supported by previous research explaining that learning using puzzle based learning makes students more enthusiastic, creative and meaningful in the learning process [17,18]. At post conception, most students experienced conceptual change towards a better or positive direction. Students experienced a concept change from misconception to scientific conception. Although there were still a small proportion of students who experienced misconception. Puzzle based learning is a learning model that is suitable for changing the initial conception of students who experience misconceptions into scientific conception. Through puzzle based learning, students are guided to develop scientific concept by practicing directly, so that students can develop their understanding and accept scientific concept.

4. Conclusion

The students' initial conception of the concept of parallelograms falls onto misconception category. Students argue that square, rectangle and rhombus are not parallelograms. This misconception happens because students have not been given a correct understanding of the concept of a parallelogram. Students experience a misconception because so far they only get material about the shape of a parallelogram only one shape. They have not got no explanation about other forms or special forms of parallelograms. Puzzle based learning is an alternative learning model that is suitable for changing students' initial conceptions of parallelogram shapes from misconception to scientific conception. As an alternative action, the researcher used animated videos and folding paper to strengthen the understanding of the concept of parallelograms.

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