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The effectiveness of contextual learning in the cooperative learning of think pair share based on mathematics concept understanding of the 7th grade junior high school

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Abstract. This research aims to describe the effectiveness of contextual learning in the cooperative learning of think pair share and scientific learning in the discussion setting based on mathematics concept understanding of the 7th grade JHS. This study was quasi-experiment. The subject of this study was all of student 7th grade JHS of Negeri 2 Kretek and the samples were Class VII B and Class VII D. The data were collected through mathematics concept understanding tests. The statistic tests were used one sample t-test and independent t-test. The results of the research show that: (1) contextual learning in the cooperative learning of think pair share and scientific learning in the discussion setting are effective based on mathematics concept understanding of the 7th grade JHS; (2) contextual learning in the cooperative learning of think pair share is more effective than scientific learning in the discussion setting based on mathematics concept understanding of the 7th grade JHS.

1. Introduction

Education is an effort to provide certain knowledge, insight, and skills to individuals to develop their talents and personalities. With education, humans are able to deal with any changes that occur due to the progress of science and technology. According to Sagala [1], with education humans are able to overcome various problems that achieved through learning.

Learning can be interpreted as the process of increasing knowledge and insight through activities that are carried out consciously by a person and changes as the result. In learning process, the right strategy is needed. The success of the implementation of learning strategies depends on choosing the right learning model. One of them is by choosing a cooperative learning model.

Cooperative learning provides opportunities for students to solve problems in groups. In cooperative learning [Slavin], students work to help another solving problems in a small group. There are many model of cooperative learning. One of them is the Think Pair Share (TPS) method. Think Pair Share (TPS) method is cooperative learning that stimulates students' thinking activities in pairs and knowledge sharing to other students, Lestari and Yudhanegara [2]. There are three main steps in this learning process, (1) Think, (2) Pair, and (3) Share.

In the Think Pair Share method, students are trained to think individually, followed by pairing to discuss, interact and learn with peers. Then, share the new knowledge. With these steps, students will find many connections in learning. The more students find many connections, the more students will have a good concept understanding, so that learning will be more meaningful. The good concept



understanding has benefit for solving problems related to real life. According to Septi [3], the cooperative learning model of Think Pair Share (TPS) is effective in learning mathematics based on mathematics concept understanding of 7th grade students in 3 Jetis JHS in the set material where the characteristics of students not involved in learning shown by students who did not want to ask questions and only memorize the given formula.

Cooperative learning model type, Think Pair Share (TPS) will be better if applied with a learning approach that is able to facilitate students to correlate the knowledge to solve problems related to real life. Agree with the 2013 curriculum which implies that learning activities are an educational process that provides opportunities for students to develop their potential for life, Syafrudin and Berdiati [4]. One of learning approach that helps students to correlate material with real life is a contextual approach. According to Wina [5], contextual approach is learning approach that emphasizes student involvement to find material that is learned and relate it to real life.

The 2013 Curriculum emphasizes the pedagogical dimension of learning, using a scientific approach. Depdikbud [6] describes the scientific approach learning including observing, asking, trying or gathering information, reasoning/associating, and communicating. The learning step in the 2013 Curriculum is appropriate with the five basic forms of learning in the contextual approach by Trianto [7], those are connecting, experiencing, applying, cooperating and the process transfer of knowledge (transferring). Siti [8] explained that scientific approach is effective based on mathematics concept understanding of 7th grade students at SMPN 4 Kendari.

Lestari and Yudhanegara [2] said that the contextual approach is based on constructivism learning theory that emphasizes the use of high-level thinking and analysis. This learning involves students to build their own knowledge, construct the concept and conduct analysis, and synthesis. Thus, contextual approach will gain students knowledge from the concepts they have and then construct the knowledge as a solution to solve problems, especially in mathematics. According to Dian [9] contextual approach is effective in mathematics concept understanding in set material where students who have less enthusiasm because of passivity in learning and difficult of applying mathematical concepts to real life because students tend to memorize formulas.

Understanding of concepts is needed in mathematics learning. Students' concept understanding can be obtained through the discovery of structures, concepts, theorems or formulas. The ability to understand mathematical concepts is the ability to understand mathematical ideas that are comprehensive and functional, Lestari & Yudhanegara [2].

Understanding of comprehensive and functional mathematical ideas requires the right learning method, a method that can provide direct experience in the daily lives of students so that they are able to understand the material easily. One of learning methods is cooperative learning type, Think Pair Share (TPS) using a contextual approach. Anita [10], states that cooperative learning type, Think Pair Share (TPS) gives students the opportunity to work alone and work together with other students so that the learning activities is more alive, active, creative, affective and fun will be created. Cooperative learning type, Think Pair Share (TPS) has advantages such as: (1) giving more time to students to think, answer and help each other, (2) students are more active because each group only consists of two students

Based on that description, it is necessary for a teacher to be more creative using approaches and learning settings, such as contextual approaches in the cooperative learning of Think Pair Share (TPS) in mathematics learning process. However, the effectiveness of this learning approach is not known, so the research entitled "The effectiveness of contextual learning in the cooperative learning of Think Pair Share (TPS) based on mathematics concept understanding of the 7th grade junior high school" is deemed necessary to achieve optimal learning goals.

2. The Research Methods

2.1 Types of research

This research is a quasi-experimental research (quasi experiment)

2.2 Time and Place of Research

The research was conducted at 2 Kretek Junior High School on 17th April to 23th May, 2017.

2.3 Research Subjects

The subjects of this study were all 7th grade students of 2 Kretek Junior High School. The research sample was class VII B as experiment class and class VII D as control class which was determined randomly by lottery method.

2.4 Data Collection Procedures, Instruments and Techniques

The research design used in this study were pretest and posttest group design. In this design, the experimental class and control class given a pretest before treatment and posttest after treatment. The instruments used in this study were a test instrument in the form of pretest-posttest questions to measure the mathematics concept understanding and non-test instruments in the form of observation sheets for learning implementation. In this study, the validity used is content validity. Content validation can be done by consulting the instrument to the expert (judgment experts) to determine the suitability of the measured aspect instrument. Validity test results show the instrument can be used with revisions.

2.5 Data analysis technique

Data analysis techniques consist of data analysis and assumptions analysis. Data description used was the average, variance, standard deviation, highest score & lowest score. Assumption analysis test used normality test, homogeneity test, and hypothesis test. The normality and homogeneity test were carried out using the Kolmogorov-Smirnov Test SPSS 21 with a significance level of 5%. Hypothesis test was using SPSS 21 with a significance level 5%.

The test results showed that the pretest data for the control class and experimental class was normal because the sig values are 0.825 and 0.632. The results of posttest data for the control class and the experimental class are normal because the sig values are 0.632 and 0.606. The homogeneity test results show that the pretest and posttest data for the control class and experimental class were homogeneous because the sig values are 0.437 and 0.891.

The effectiveness of the learning model with a contextual approach in the cooperative learning of Think Pair Share and scientific approach in discussion setting effective if the average score of mathematics concept understanding is more than 75.

The hypothesis formula used was,

$$t = \frac{\bar{x} - \mu_e}{\frac{s}{\sqrt{n}}}$$

with degrees of freedom $v = n - 1$ [11], and

$\bar{x}$: averages score of pretest and posttest experiment and control class

μ_e : hypothesis score (75)

S : deviation standard

n : sum of students

Hypothesis's test used SPSS 21. H_0 are rejected if the significance value is less than 0.05.

Comparison of effectiveness between those models, the cooperative learning of Think Pair Share is more effective than the scientific approach with discussion setting based mathematics concept understanding of 7th grade junior high school if the average posttest score of students in the class using a contextual approach with Think Pair and Share cooperative settings is greater than the average posttest of students in a class that uses a scientific approach with discussion settings.

The hypothesis formula used is,

$$t = \frac{\bar{x}_e - \bar{x}_k}{\sqrt{\frac{(n_e - 1)s_e^2 + (n_k - 1)s_k^2}{n_e + n_k - 2}} \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

with [11],

$\bar{x}_e$: The average of posttest scores mathematics concept understanding experiment class

$\bar{x}_k$: The average of posttest scores mathematics concept understanding control class

n_e : sum of experimental class student

n_k : sum of control class student

s_e^2 : variance of experimental class

s_k^2 : variance of control class

Hypothesis's test used SPSS 21. H_0 are rejected if the significance value is less than 0.05.

3. Result and Discussion

3.1 Description of learning implementation

The implementation of experimental class learning was carried out in class VII B, while for the control class carried out in the VII D class. The implementation of learning begins with pretest and ends with posttest to measure the mathematics concept understanding consist of 6 description mathematics questions in triangle topic followed by 27 students in each class. After the pretest, learning activities were carried out using contextual learning in the cooperative learning of Think Pair Share and scientific learning in the discussion setting. The implementation of learning is done by the teacher with the material taught at each meeting including: (a) analyzing the various forms of triangle and its properties (b) determining the circumference of triangle (c) determining the area of a triangle. Students understand the concepts when, could restate the concept, give examples and non examples, present concepts in various forms of mathematical representation, using concept to solve problems.

The percentage of learning in the experimental class by applying a contextual learning in the cooperative learning of Think Pair Share is very good, reaching 94.6%. The main activities of learning in the experimental class are thinking (relating, experiencing, and applying). Second is pairing (applying and cooperating), the last is sharing (transferring). The percentage of learning implementation in the control class by applying the scientific approach to the discussion setting was very good, reaching 92.4%. The main activity in the experimental class are observing, asking, gathering information, reasoning, and communicating in the discussion setting.

3.2 Data description

The data described from the result of mathematics concept understanding obtained from the control class and experimental class before and after learning.

Table 1. Data of mathematics concept understanding

Description	Control Class		Experiment Class	
	Pretest	Posttest	Pretest	Posttest
Sum of Students	27	27	27	27
Average	46,57	80,92	51,29	86,14
Highest Score	72,5	94	82,5	97
Lowest Score	17,5	70	20	70
Deviation Standard	14,36	7,51	16,25	7,69
Variance	206,21	56,41	264,12	59,14
Completeness	0%	77,77%	11,11%	85,18%

Based on Table 1, the average pretest and posttest scores of the experimental learning class with the contextual learning in the cooperative learning of Think Pair Share are greater than the control class with the scientific approach in discussion setting. The posttest value of both classes has a difference of 5.22. This results cause difference number of completeness. The posttest scores between the control class and the experimental class has different completeness scores about 7.41%.

3.3 *The effectiveness of contextual learning in the cooperative learning of Think Pair Share and the scientific approach with discussion setting based mathematics concept understanding*

The data of one sample test t-test of the contextual learning in the cooperative learning of Think Pair Share and scientific approach with discussion setting are presented in Table 2 below.

Table 2. The result of the effectiveness experimental and control class

Variable	Group	T	df	Sig.
Mathematics concept understanding	Experiment Class	7,530	26	0,000
	Control Class	4,105	26	0,000

Table 2 shows that the significance value of one sample t-test in the experimental class group is 0,000. The significance value is less than 0.05, it means that the contextual learning in the cooperative learning of Think Pair Share is effective based mathematics concept understanding. Increasing of students' mathematics concept understanding in the experimental class shows that there is a good impact of the learning. Learning using a contextual approach also provides opportunities for students to construct their own knowledge so that students can apply the concepts in their daily lives. Sanjaya [19] also said that contextual learning is learning approach that emphasizes to involve student to recall previous materials and relate it to real life. Miller in Mahfudy [16] explained that active contextual learning increase concept understanding.

Learning activities conducted at 2 Kretek Junior High School in experimental class are thinking, pairing and sharing in solving the real-world problem. The student are thinking by itself, then pairing with peer and then sharing what they got. They are focus in learning and helping their peer if their peer couldn't solve the task. This result in line with Slavin [20] and Artut[21] that cooperative learning could increase student achievement if only all of the members in the group are gaining in learning, focus in completing a group task. Student who are less confident start to compound their negative feelings about mathematics and themselves. The tasks in this experimental class are using contextual problems. Students feel that the problem close to them and challenging for weaker students. As the consequence Clarke & Roche [22] and Lee & Li [23] said that it increases student's ability to think. This is conducted with Rahmawati & Harta [27] learning process using contextual problems give opportunity for student to be more active.

The results showed that contextual learning in the cooperative learning of Think Pair Share is effective based on mathematics concept understanding. This is relevant to the research that has been done by Septi [3] which shows that the cooperative learning type Think Pair and Share (TPS) influences the understanding of mathematics concepts. In line with Sinaga [24] cooperative learning think pair share enhancing mathematical problem solving and mathematical connection, which means that increase mathematical concept understanding.

Table 2 also shows that the significance value of the one sample t-test in the control class is 0,000. The significance value is less than 0.05, it is means that the scientific approach in discussion settings was effective based on mathematics concept understanding.

Learning activities conducted at 2 Kretek Junior High School include observing, questioning, gathering information, reasoning and communicating. This is in relevant with Depdikbud [6], learning with scientific approach consists of formulating questions, collecting data, associating, drawing

conclusions and communicating results to obtain knowledge, skills and attitudes in the discussion setting. Palaki & Fahinu [17] explain that learning using scientific approach in the discussion setting viewed by mathematics comprehension ability was significantly better than ordinary scientific approach.

The effectiveness of the scientific approach with discussion settings is relevant with the research conducted by Yuselis, Ismail & Nery [12] which concluded that there is an influence of learning by using a scientific approach on mathematical concepts understanding of 7th grade students.

3.4 Comparison of the effectiveness of contextual learning in the cooperative learning of Think Pair Share and the scientific approach with discussion setting based mathematics concept understanding

Data analysis using independent sample t-Test to compare effectiveness of contextual learning in the cooperative learning of Think Pair Share and the scientific approach with discussion setting based mathematics concept understanding are presented in the following table.

Table 3. The result of independent sample t-test				
Variable		t	df	Sig.
Mathematics	concept	-2,52	52	0,0075
understanding				

Table 3 shows that the significance value independent sample t-test for mathematics concept understanding variable is 0.0075. This significance value is less than 0.05 means that contextual learning in the cooperative learning of Think Pair Share more effective than scientific approach with discussion setting based mathematics concept understanding.

Learning in the control class applied scientific steps, those were observing, asking questions, gathering information, reasoning and communicating with discussion settings. However, in learning activities students were not required to be able to explain their knowledge. Control class did not use LKS with contextual problems.

Different with learning process in the experimental class which uses a contextual learning in the cooperative learning of Think Pair Share where all students in the class were required to be able to solve mathematics problems relating to daily life by thinking and solving problems individually then paired up and discussed with their peers. This activity required students to understand concepts and ideas. In line with Hoogland [25] that student scored significantly higher on problems in real situation.

After they thought by themselves, then students report the results of their thoughts and discuss with their peers so automatically increase students' knowledge. This is agree with Azlina [13] that sharing techniques where students pair up increase participation by allowing a group of collaborators to interact and share ideas, which can lead to the knowledge building among them. Septi [3] added that cooperative learning is more effective because of the influence of discussion and longer times to think. All students are actively involved with learning in the experimental class. The teacher gave problems and student immediately did it. It was because the teacher called students randomly to solve problem in front of the class. Some student who are not interested in it, were interested again at the pair and share stages. In addition, the teacher provides worksheets (LKS) use contextual task for students to do it by themselves, the LKS contains instructions to be discussed by students to understand the material and use concepts to solve daily problems. LKS made students interested in learning. Umar [18] said that book that are good package could make student interested. The content of LKS such as find the area of playground in triangular shape. So, student relate their concept to the assignment in real life. This is related with Rusman [14] that contextual approaches will make students active, because students try to learn the concepts as well as apply and associate them in daily life.

Based on observers observations during the learning process, experimental class students were more interested in participating in learning activities. The students in the experiment class is also more conducive, students were working quietly. Slavin [20] and Artut [21] explained that cooperative learning could increase student achievement if only all of the members in the group are gaining in learning, focus in completing a group task. They did working with LKS.

Based on the description above, it means that the contextual approach with the contextual learning in the cooperative learning of Think Pair Share is more effective than the scientific approach in the discussion settings based on mathematics concept understanding of 7th grade students Junior High School. In line with research that is conducted Hendri [15] that increasing the ability on mathematical concepts of students who learn using Think Pair Share method is better than students with conventional learning. Aziz & Hossain [26] also found that the cooperative students significantly better then conventional teaching to improve students' achievement in secondary mathematics. Slavin [28] for high level cognitive, such as identifying concepts, cooperative learning is more effective than traditional individualistic techniques.

4. Conclusions and Suggestions

4.1 Conclusion

Based on the results of data analysis and discussions that have been carried out, it can be concluded that the following are: 1) the contextual learning in the cooperative learning of Think Pair Share is effective based on mathematics concept understanding, 2) the scientific approach in the discussion setting is effective based on mathematics concept understanding, 3) the contextual learning in the cooperative learning of Think Pair Share is more effective than the scientific approach in the discussion setting based on mathematics concept understanding. Scientific approach in the discussion and contextual learning in the cooperative learning of Think Pair Share have a positive impact on mathematics concept understanding because it proved effective. Therefore, it could be one of many approaches to get effective mathematics learning.

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