



The Effectiveness of Using the Cooperative Learning Model of FSLC Type on Students' Mathematical Reflective Thinking Ability

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ABSTRACT

The purpose of this study was to test the effectiveness of the cooperative learning model of Formulate Share Listen Create (FSLC) type on students' mathematical reflective thinking ability on the Pythagoras theorem. The research method used was quantitative. The population of the study was the VIII grade students of SMP Negeri 17 Singkawang, which amounted to 166 students. The sampling technique used was purposive sampling. The number of students who became the sample was 58 students. Data collection techniques in this study used measurement techniques through posttest questions, direct observation techniques through activity observation sheets, and questionnaire techniques through motivational questionnaires. The data analysis technique used was a one-sample t-test, Man-Whitney U-test, the percentage of activity, and the average analysis. The results showed that: (1) students completeness scores $KKM \geq 75$ reached 75% with $Z_{count} > Z_{table} = 0.12 > -1.96$, (2) There was the difference of students' mathematical reflective thinking ability between using the cooperative learning model of FSLC type and the direct learning with an average score of 82.35 for the experimental class and 47.42 for the control class, (3) students' activity was classified as active when the cooperative learning model of FSLC type was applied with a total percentage of 80.18% in the very high category, (4) students' learning motivation was high when the cooperative learning model of FSLC type was applied with an average of 4.15 in the high category. Thus, it could be concluded that the cooperative learning model of the FSLC type was effective for teaching students mathematical reflective thinking ability.

INTRODUCTION

Mathematics is one of the subjects taught at all levels of education and has an important role in the development of students' mathematical abilities. Mathematics is a science that underlies the

development of modern technology, has an important role in various disciplines, and advances human thinking power (Rosmayadi, Mariyam, & Julianti, 2018). However, this is not realized by a small number of students, so learning mathematics is just listening to the teacher's explanation, memorizing formulas, then increasing practice questions using formulas that have been memorized, there is never any attempt to understand and find the true meaning of the purpose of learning mathematics. themselves (Fadliati, 2012). Such learning clearly does not provide direct experience to students, so students are not able to build their own knowledge (Sumarli, Murdani, & Wijaya, 2017).

Reflective thinking is stated in the Regulation of the Minister of Education and Culture of the Republic of Indonesia No. 70 of 2013 which stated that "the philosophical foundation of the 2013 curriculum intends to develop the potential of students in reflective thinking abilities for solving social problems in society". Reflective thinking emphasizes an application approach that translates into problem-solving skills and processes (Kuswana, 2011). Choy and Oo (2012) also confirm Dewey's opinion that to think reflectively, a person should be able to include his ideas to form a stable thing towards conclusions that have consequences rather than consistent thinking. From several explanations of reflective thinking stated above, it is known that they have similarities. Based on the opinions of experts, it can be concluded that reflective thinking is one of the higher-order thinking that is used to solve problems using old knowledge to answer the problems at hand to get a conclusion.

Mathematical reflective thinking ability is an ability that must be possessed by students in the learning process because mathematical reflective thinking ability is an ability where students can use prior knowledge to identify and analyze a problem. The ability to think reflectively is important to be trained for individual learning because it is the heart of the keys to individual competencies (PISA, 2005). Problems regarding mathematical reflective thinking must be addressed immediately, considering the importance of mathematical reflective thinking abilities in developing high-level mathematical thinking skills, critical thinking, and mathematical creativity that are useful in success in learning (Nindiasari, 2011). Thus, reflective thinking abilities are needed by students to practice their ability to understand the material by analyzing, evaluating, identifying so that it is easier to solve problems. In contrast to checking the correctness of the solution, this reflection stage is broader, because it consists of the ability to interpret and examine the problems that have been studied, recognize the relationship between concepts, be able to see the similarities and differences between two concepts and even be able to raise problems related to the concepts being studied (Sabandar & Hasanah, 2010). Choi (2012) revealed from the results of his research that applying reflective thinking abilities in learning will encourage individuals to learn to think critically. This is in line with Wulan (2013) which stated that through a reflective thinking process students will be able to improve critical thinking skills by conducting in-depth studies in scientific repertoire and will be able to develop creative thinking skills by conducting scientific studies to be able to apply them to new situations.

The low mathematical reflective thinking ability is caused because the mathematical reflective thinking ability has not become one of the objectives of learning mathematics. This is in line with the statement from Sabandar (2010), that reflective thinking is still rarely introduced by teachers or developed for high school students. Teaching that involves reflective thinking refers to teachers in terms of improving teaching abilities. The results of previous studies stated that almost 60% of students had not shown satisfactory results in working on questions containing indicators of mathematical reflective thinking processes. Thus, the mathematical reflective thinking ability of high school students in Tangerang Regency, Banten Province is relatively low (Nindiasari, 2011).

Based on the results of pre-research at SMP Negeri 17 Singkawang, it was known that the students' reflective thinking ability is still low. From the results of the pre-research conducted on August 6, 2018, at SMP Negeri 17 Singkawang, the researchers gave questions related to indicators of mathematical reflective thinking abilities. As seen on the student answer sheet, in the first question, students can answer but the reasons given are not correct, so the student is not able to interpret a case based on the mathematical concepts involved. In the second question, students cannot determine the

combined set of the two sets. It can be seen that students cannot identify the mathematical concepts or formulas involved in math problems that are not simple. In the third question, students cannot draw diagrams. It can be concluded that students cannot draw an analogy from two similar cases. From the overall pre-research results, it was found that of the 24 students, 29.16% were unable to answer the first indicator, 83.33% had not answered the second indicator, and 91.67% were unable to answer the third indicator. Activity is a very important principle in teaching and learning interactions (Sardiman, 2014). Activities according to Hamalik (2011) were all activities carried out in the process of teacher and student interaction to achieve learning objectives. Without the activities of the students themselves, the learning process is impossible. In other words, without activity, the learning process may not take place properly. In addition, the observations also show that when learning mathematics takes place when the teacher gives problems related to the topic of mathematics, student activity does not appear. Even when the learning process takes place in class, some students talk about their respective affairs. It can be seen that learning is still going on passively, students are less enthusiastic in participating in mathematics learning.

In addition to learning activities, which greatly affect learning activities is student learning motivation. Motivation is something that can make every student able to move and do something for a purpose. Learning motivation according to Lestari and Yudhanegara (2015) was a power, encouragement, or strength, both coming from oneself and from outside that encourages students to learn. According to Sardiman (2014), the function of learning motivation is to encourage humans to act, namely, as a mover or motor that releases energy. From the results of interviews that researchers conducted with one of the eighth-grade students at SMP Negeri 17 Singkawang, it was found that the student felt bored and not enthusiastic about learning mathematics. Students also said that learning mathematics was difficult to understand, causing boredom and laziness in learning mathematics and the teacher's attention also did not reach the students during the teaching and learning process of mathematics in class. Whereas according to Zumaroh (2013), motivation is a force or drive within the individual that makes the individual move, act to meet needs, and achieve goals.

The low ability of reflective thinking, student learning activities, and low student motivation in mathematics can be caused by an unsupportive learning process. When talking about the process, it is closely related to the model used. Learning is still centered on the teacher while students just sit, listen and take notes. Students are still accustomed to receiving information from the teacher. In addition, in doing the exercises, students tend to follow the steps used by the teacher. As a result, student learning outcomes in mathematics are still low. The selection of the right learning model is an important part for teachers before giving lessons in class (Suliswa, Rosmaiyadi, & Buyung, 2017). Thus, there is a need for a solution to overcome this problem. One of the learning models that is thought to be able to improve mathematical reflective thinking abilities, student learning activities, and student motivation is the FSLC (Formulate, Share, Listen, Create) learning model.

The cooperative learning model of the FSLC type is a cooperative learning structure that provides opportunities for students to work in small groups consisting of 2-3 students. Before working in groups, students are assigned first to explore ideas or formulate the results of thoughts or ideas individually and then look for partners to convey the results of their work. According to Emay (2011), the cooperative learning model of the FSLC type is a cooperative learning structure that provides opportunities for students to work in small groups consisting of 2-3 students. Prayitno, Rochmad, & Mulyono (2012) also argued that FSLC is cooperative learning that can give students the flexibility to think actively and creatively. This is in line with the results of research conducted by Al Azhri (2014) which stated that in general, the quality of improving students' mathematical creative thinking skills through the cooperative learning model of FSLC type is better than students who receive conventional learning.

Cooperative learning methods can improve interaction, communication, socialization, and learning to be aware of each other's strengths and weaknesses. The cooperative learning model of the FSLC type

is expected to improve students' mathematical reflective thinking abilities because the FSLC learning model can stimulate students to think first, not directly receive the material, and provide opportunities for other students to find the right answer. So that research was conducted aims to (1) determine the ability of mathematical reflective thinking to achieve the minimum completeness criteria equal to 75 classically using the cooperative learning model of FSLC type, (2) find out the difference of students' mathematical reflective thinking abilities between using the FSLC learning model and the direct learning, (3) know the students' learning activities the cooperative learning model of FSLC type is applied. 4) know the students' learning motivation when the cooperative learning model of the FSLC type is applied.

METHOD

The type of research used was quantitative research. The research design used was quasi-experimental. The research design used was the Non-Equivalent Posttest-Only Control Group Design. The reason for using this research design was the focus in this study is to determine the students' mathematical reflective thinking abilities based on the posttest results in the experimental class after being subjected to the cooperative learning model of FSLC type and in the control class after being subjected to the direct learning.

This research was conducted at SMP Negeri 17 Singkawang. The time of the research was carried out in the even semester of the 2018/2019 academic year. The population in this study were all class VIII students which consisted of five classes, namely class VIII A, VIII B, VIII C, VIII D, and VIII E, totaling 166 students. While the samples in this study were two classes from the total population of the existing classes which amounted to 58 students. The sampling technique in this study used purposive sampling because the sample was not based on random or heterogeneous.

Data collection techniques used in this study were measurement techniques, direct observation techniques, and questionnaire techniques. The measurement technique used a posttest of mathematical reflective thinking abilities. The indicators in this mathematical reflective thinking ability test were (1) being able to interpret a case based on the mathematical concepts involved, (2) being able to identify mathematical concepts or formulas involved in math problems that are not simple, (3) being able to draw analogies from two similar cases. The direct observation technique used activity observation sheets, and questionnaire techniques used motivational questionnaires. The data analysis technique used was a one-sample t-test was used to determine students' completeness both individually and classically, Man-Whitney U-test was used to determine the difference of students' mathematical reflective thinking ability between using the cooperative learning model of FSLC type and the direct learning, the percentage of activity was to determine the level of student activity, and the average analysis was to determine the level of learning motivation.

RESULTS AND DISCUSSION

Mathematical Reflective Thinking Ability

1. Completeness of Student Learning Outcomes

Individual learning mastery was calculated using the one-sample t-test formula and the calculation results are presented in Table 1.

Table 1
Completeness Learning

Class	Completeness				Description
	Individual		Classical		
	t_{hitung}	t_{tabel}	t_{hitung}	t_{tabel}	
Experiment	4.01	2.015	-0.12	-1.96	Achieving KKM and Reaching a 75% proportion

Based on Table 1, the average mastery results of students in the experimental class or classes that use the FSLC learning model reached the KKM and the proportion of classical mastery students that got a $KKM \geq 75$ reached 75%. This showed that the results of the FSLC learning carried out in the experimental class in the form of tests had been able to achieve the specified individual and classical KKM. This is also in line with the results of research by Aini, Sukestiyarno, and Waluya (2015) which obtained the result that the proportion of experimental class students who achieved the individual KKM was more than 75% using the cooperative learning model of FSLC type.

2. Mathematical Reflective Thinking Ability

Based on results of data collection during the study obtained posttest data from classes taught with the cooperative learning model of FSLC type for the experimental class and direct learning for the control class on students' mathematical reflective thinking abilities on the Pythagoras theorem. The posttest questions given in the form of essays consist of three questions After processing the posttest data of the experimental class and the control class on students' mathematical reflective thinking abilities, the average value, the complete standard deviation is presented in Table 2.

Table 2
Differences of Student Values in Experiment Class and Control Class

Statistics	Experiment	Control
Average	82.90	45.92
Standard Deviation	10.98	8.27
The number of students	31	27

From Table 4 it was found that the average value of the experimental class was 82.90 while the control class produces an average value of 45.92. Descriptively, the experimental class posttest score data is different from the control class posttest score. Then the difference test will then be carried out on the difference of the two averages between the experimental class and the control class. To find out the difference of students' mathematical reflective thinking abilities in the experimental class using the cooperative learning model of FSLC type and students in the control class using the direct learning in this study, the one-sample t-test formula was used. But before that, normality and homogeneity tests were carried out. Based on the calculation results, the posttest data for the experimental and control classes are presented in Table 3.

Table 3
Recapitulation of Normality Test Calculations

Group	N	Significant Level	χ^2 Count	χ^2 Table	Conclusion
Experiment	31	5%	6.54	11.1	Normal Distributed Data
Control	27	5%	15.21	11.1	Abnormally Distributed Data

From Table 3, it was known that the posttest data of the control class is abnormally distributed. So to find out the difference between the use of the cooperative learning model of FSLC type and the direct learning, the researcher used the Man Whitney U-Test. The recapitulation of the calculation results of the differences in the use of the cooperative learning model of FSLC type and the direct learning on students' mathematical reflective thinking abilities can be seen in Table 4.

Table 4
Recapitulation of the Man Whitney U-Test Calculations

Description	n_1	n_2	U_1	U_2	$E(U)$	$Var(U)$
Score	31	27	4.5	697.5	351	3159
Z_{count}				-0.12		
$-Z_{table}$				-1.96		

In Table 4 can be seen that the value of $Z_{count} = -0.12$. Based on the test criteria, the use of the cooperative learning model of FSLC type and the direct learning on students' mathematical reflective thinking abilities is said to have a difference if $Z_{count} > Z_{table}$ or H_0 is rejected, on the contrary, it is said that there is no difference in the use of the cooperative learning model of FSLC type and direct learning on students' mathematical reflective thinking abilities if $-Z_{table} \leq Z_{count} \leq Z_{table}$ or H_0 is accepted. It was known that $Z_{count} > -Z_{count} = -0.12 > -1.96$, then H_0 is rejected. It can be concluded that there were differences in students' mathematical reflective thinking abilities between the experimental class given the cooperative learning model of FSLC type and the control class was given the direct learning on the Pythagoras theorem for class VIII SMP Negeri 17 Singkawang. In line with this, Prayitno (2014) stated that FSLC learning is effectively applied to mathematics learning. FSLC learning is better than the achievement and improvement of students' abilities who receive conventional learning (Anggraeni, 2013).

Students' Learning Motivation

The students' learning motivation questionnaire in this study was a questionnaire that was only given to experimental class students to find out how much students' motivation was by applying the cooperative learning model of the FSLC type. The learning motivation questionnaire is a closed questionnaire and students only choose one answer from the 5 options provided (strongly agree, agree, hesitate, disagree, and strongly disagree) that have been provided. The motivation questionnaire was used in the form of positive statements and negative statements, totaling 20 statements and consisting of 5 indicators of learning motivation.

Table 5
 Recapitulation of the Results of Student Motivation Questionnaire for Positive Statements

Indicator	Choice					Average	Criteria
	SA	A	H	D	SD		
There is a drive and a need for learning.	115	108	27	6	0	4.12	High
Shows attention and interest in the tasks given.	110	132	18	2	0	4.22	Very High
Persevere in the face of the task.	75	132	33	4	1	3.95	High
Tenacious in the face of adversity.	120	96	27	8	1	4.06	High
There is a desire and desire to succeed.	135	100	30	2	1	4.33	Very High
Overall Average						4.15	High

From Table 5, it can be seen that the average student motivation for positive statements in indicator 1 consisted of 2 statements, namely meeting the high criteria with an average of 4.12. In indicator 2 which consisted of 2 statements had an average of 4.22 in very high criteria. Then on indicator 3 which consisted of 2 statements that are obtained an average of 3.95 in the high criteria. For indicator 4 consisted of 2 statements, namely the average student motivation of 4.06 in the high criteria and the average student motivation in indicator 5 which consisted of 2 statements, namely 4.33 in the very high criteria. The overall average student motivation had high criteria with an overall average value of 4.15.

Student Learning Activities

Observation sheets were used to determine student activities during learning using the cooperative learning model of the FSLC type. Observations made during two meetings that were conducted by 3 observers are briefly stated in Table 6.

Table 6

Percentage of Observation of Student Learning Activities				
No	Observation Category	Meeting 1	Meeting 2	Average
1	Indicator 1	74.19%	90.64%	
2	Indicator 2	70.97%	83.95%	
3	Indicator 3	74.55%	84.77%	80.09%
4	Indicator 4	69.89%	90.12%	
5	Indicator 5	74.19%	87.65%	
	Amount	363.79%	437.14%	
	Average	72.76%	87.43%	
	Criteria	Very Active		

Based on Table 6, it can be seen that the percentage of student activity observations at the first and second meetings had increased and the average percentage of student activity in the first and second meetings was 80.09, so student activity was classified as very active. This is also in line with previous research which stated that experimental class student activities affect mathematical communication skills when the FSLC learning model is applied (Prayitno, 2014). The results of Zuleha's research (2017) showed that there were differences between the students' activities who used the FSLC learning model with students who were taught using direct learning.

CONCLUSIONS

Based on the results of research and discussions that had been carried out, the cooperative learning model of FSLC type was effective for teaching students' mathematical reflective thinking abilities, this was characterized by the following criteria: (1) students completeness scores $KKM \geq 75$ reached 75% with $Z_{count} > Z_{table} = 0.12 > -1.96$, (2) there was the difference of students' mathematical reflective thinking ability between using the cooperative learning model of FSLC type and the direct learning with an average score of 82.35 for the experimental class and 47.42 for the control class, (3) students' activity was classified as active when the cooperative learning model of FSLC type was applied with a total percentage of 80.18% in the very high category, (4) students' learning motivation was high when the cooperative learning model of FSLC type was applied with an average of 4.15 in the high category.

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