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Implementation of formulate share listen create strategy to improve student's problem solving and mathematics disposition ability

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Abstract. This research aims to improve students' mathematical problem solving ability and mathematical disposition use Formulate-Share-Listen-Create (FSLC) strategy. The method used in this research is quasy experimental, with the design of randomized control group only design. The instrument research are students' mathematical problem solving ability tes and mathematical disposition questionnaire. The data of posttest was obtained by using t–test after normality test and homogenity test. The results showed the student's mathematical problem solving ability who used FSLC strategy is higher than conventional strategy. The student's mathematical disposition who used FSLC strategy is better than conventional strategy.

1. Introduction

Mathematical problem solving ability is one of important aspects in mathematics learning which plays a role as a device as well as a mathematics instruction. Mathematical knowledge and mathematical principles that learned by students will help them to express everyday problems into mathematical models and determine solving of the problem [1]. Mathematical problem solving skills are not only important for elementary and middle school students, but starting from Kindergarten to College, they should already have that ability [2]

In fact, When we observed 128 student's mathematical problem solving ability of seventh class of SMPN 1 Tanjung Raya, West Sumatera, Indonesia showed that most student could not use their mathematical problem solving ability. An example of the kind of problem, which might cause difficulties, would be:

> *The price of an item, increased to 20%. If the price before the increase is Rp 80.000,00, then how much is the price after the increasing?*
>
> ***Student'S Answer:***
> ***description**: Price of Goods Up 20% .*
> *Price before increasing Rp. 80.000*
> *question: What is the price after the increasing of an item?*

The results showed of the students' answers, it is seen that there is (71.87%) who could not answer the problem. Many students still did not make any information or answer the questions based on what teacher asked. Most of the students could not describes their abilities in solve the problem. [3] States that students' mathematical abilities are determined by the quality of the students' questions in learning.

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In fact, according to [4] states that in essence the problem arises due to mathematics and mathematics which also offers a solution. Mathematical problem solving consist of two aspect are accepting and challenging [5].

Developing the ability to solve problems is inseparable from how to understand the problem and construct the problem. the way to construct a problem is to begin with understanding the problem, representing a real problem in a mathematical model and writing it into a mathematical equation [6]. A good community solver must be able to sort out relevant information and not from a problem [6,7,8]. These inferences mark the transition from a superficial situational model to a mathematical equation, which is the most challenging part for students when solving word problems [9,10,11]

In problem solving process , representations of the problem's concrete features are removed from its internal representation [12,13]. Ideally, the mathematical problem model used to serve as the initial problem state when a problem solver help problem solvers in the second step of the problem solving procedure [1]. In order to achieve problem-solving transfer, a problem solver should not simply memorize solution procedures as step-by-step recipes, but as meaningful building blocks that can be flexibly recombined to fulfill the specific requirements of a problem [14,15,16]. Thus, understanding a solution procedure means to have knowledge of the subgoals that are achieved by the individual steps or groups of steps [14] and on potential constraints and preconditions that need to be considered when selecting a solution step and when combining steps to build more complex solution procedures [16].

The next, student should have problem schemas. According to [17] states that the problem schemas is a mental construction of problem solvers in formulating problem solving strategies using previous knowledge related to problem solving. These schemas are comprehensive in that they also include a representation of the solution procedures that are valid for all problems belonging to that category.

In addition to mathematical problem solving, students also need to develop character. In mathematics strong character or positive dedication to mathematics is known as students' mathematical dispositions. [18] states that the personality and character of students can be built through mathematics learning.

Mathematical disposition is a relationship, appreciation, attitude or positive action towards mathematics [19]. whereas according to [21,22] disposition is not only an appreciation, attitude, action but also beliefs, interests, curiosity, flexibility and applying mathematics when facing problems. However, [22] found that currently students' mathematical dispositions have not been well implemented.

The low quality of learning as described above is inseparable from the method used by the teacher in learning. The researcher considers that FSLC is one of the right solutions to handle the problem. FSLC is one of the cooperative learning models modified from Think Pair Share (TPS) [3]. Through FSLC students will try to formulate their own problems, then share their stories with their classmates, besides students also hear input and responses from their friends, eventually students will create their own way to draw conclusions

Some researchs showed that FSLC is able to facilitate students in learning. According to[23], they found students' mathematical reasoning abilities improved through FSLC. [24] also found students who studied with FSLC were more effective than conventional. Therefore, we need a learning strategy to improve students' mathematical problem solving ability and mathematical disposition. In this research, researchers examined the effect of FSLC strategies in improving students 'mathematical problem solving abilities and students' mathematical dispositions.

2. Methods

The method of this research is experimental research with Randomized Control Group only Design. The study was conducted from 30 August 2017 to 26 September 2017 at SMPN 1 Tanjung Raya, West Sumatera, Indonesia. The population of this study were all students of class VII SMPN 1 of Tanjung Raya academic year 2017/2018 and the population of this research is 128 students. Sampling method is by using random sampling technique, after the test of normality and homogeneity. The selected classes are class VII.2 as the experimental class and class VII.3 as the control class. Instruments used in this study are the final test and questionnaire. The final test contains an indicator of mathematical problem

solving skills that is, 1) understanding the problem, 2) solving the problem based on the plan, 3) checking what has been done.

Questionnaire mathematical disposition contains five indicators with its aspects include confidence, diligence, flexible, inquisitive and reflection in accordance with the learning model used is FSLC. Questionnaire filled by the respondents in the experimental class VII.2 about 32 students and control class of VII.3 about 32 students. First Instruments tested try in class VII.1 SMPN 1 Tanjung Raya on September 19, 2017. From the problem of final test problem solving abilities there are 5 items about the difficulty of the level obtained by 1 point about easy criteria and 4 items of medium criteria. Differentiating power obtained for all significant problems and classification of good with reliability of 0.74. According to the criteria of [25] the instrument is reliable. To measure the mathematical problem solving ability of the student is by using rubric [26]

This questionnaire is intended to find out the data of mathematical disposition of students of class VII of SMPN 1 Tanjung Raya in mathematics subject with its aspects include confidence, diligence, flexible, inquisitive and reflection which then can be elaborated in statement items in questionnaire instrument. This disposition scale uses Likert scale. Questionnaire based on likert scale stated in that alternative answer is strongly agree (SA), agree (A), less agree (LA), disagree (D), strongly disagree (SD) [27]. Terms item is valid if the product moment of correlation $r \geq 0.3$ then it means the item is valid. Whereas if the item has $r < 0.3$ then the item is invalid [28]. After performing calculations on the results of questionnaire trials of 28 items, there are 2 items that are not valid, so obtained a valid item 26 items. From the calculation of the results, obtained the reliability of the questionnaire $r = 0.864$. It can be concluded that the questionnaire of mathematical disposition has a very high reliability.

Data analysis technique used is analysis with t-test. Before analyzing the data of the research results, the normality and homogeneity test were done, then using t test for the hypothesis . Prior to hypothesis testing the data was first converted from ordinal to interval, with interval successive method. The interval successive method is the process of converting ordinal data into interval data. As for the process of converting ordinal scale data into interval scale data, there are several ways: 1) calculate frequency, 2) calculate proportion, 3) calculate cumulative proportion, 4) calculate z value, 5) calculate the density value of z function , 6) calculate scale value, 7) calculate scaling.

3. Result and Discussion

Based on the results of data analysis obtained Problem solving skill description of data of problem solving ability of experiment class VII.2 and control class VII.3 can be seen in Table 1:

Table 1. The Description of Test Result

Scale	Experiment Class	Control Class
N	32	32
Xmin	57	46
Xmax	100	94
$\sum X$	2559	2267
Mean ($\bar{X}$)	79.97	70.84
Std.Deviation (S)	12.85	14.65
Variances (S^2)	165.257	214.588
Total of student achievement	19	14
Percentage of classical achievement	59.37%	43.75%

From the table 1 above, it can be seen that the average value of problem solving ability of experimental mathematics problem of experiment class consisting of 32 students that is 79.97 higher than average value of problem solving ability of control class consist of 32 that is 70.85. The experimental class variance is 165.257 smaller than the control class velocity of 214.588. The standard deviation of the experimental class is 12.85 less than the control class having a standard deviation of 14.65. This means that the problem solving ability of the experimental class math has a smaller diversity of control classes.

Mathematical problem solving test consists of five essays containing three indicators in detail, it can be seen through each average and the percentage of each problem solving indicator is as follows:

Table 2. Student Average Score of each Problem Solving Capability Indicator

Indicators of problem solving	Achievement Mean		Score value	
	Exp.	Ctrl.	Exp.	Ctrl.
Describe the understanding of the problem	12.09	11.03	80.62	73.50
Solved problem based on the plan	11.91	10.19	79.37	67.86
Checking on what have been done	4	3.56	80	71.24
The values of all problem solving indicators	28.00	24.78	79.97	70.84

More details are shown the percentages of achievement of each problem solving indicator in the following table:

Table 3. Indicators of Interpretation of Percentage of Problem Solving Capability

Indicator	Experiment		Control	
	(%)	Category	(%)	category
shows the understanding of the problem	80.62	Very good	73.50	Good
Solved the problem based on the plan	79.37	Good	67.86	Good
Doing the cecklist of the thing has done	80	Very good	71.24	Good
Avarage	79.97	Very good	70.84	Good

The mean value of each mathematical problem solving indicators of the student is not much different. In the indicator I, it is showing the understanding of the problem obtained from the value of experimental class 80.62 and control class is 73.50. in the indicator II, it is solved the problem according to the plan obtained from the value 79.37 in experiment class and 67.86 in control class. The value of indicator III is to re-check what has been done experimental class is 80 and 71.24 in the control class.

The indicators of mathematical disposition are confident, diligent, flexible, inquisitive and evaluation. The number of statements on the matrix disposition questionnaires is 26. By using the formula to calculate the mathematical disposition value, so that the percentage of each indicator can be seen in the following table 4. The first mathematical disposition indicator is confident in statement number 1, 2, 3, 4, 5 and 6, the percentage of first indicator in experiment class that is 86.45% with high criterion, while in control class that is 72.40% with medium criterion. The indicator of mathematical disposition of the second learner is persistent in the statements of 7, 8, 9, 10 and 11 as the second indicator of percentage in the experimental class is 85.74% with high criterion. Where as, in control class that is 74.37% with medium criterion.

Table 4. Percentage of Score Mathematical Disposition Indicator

Indicator	**S**	**Scores**		**Criteria achievement (%)**	
		Exp	**Ctr.**	**Exp.**	**Ctrl.**
Confident	1-6	830	695	84.45	72.40
				High	med
Persistent	7-11	686	595	85.74	74.37
				High	Med
Flexible	12-14	417	351	87.00	73.12
				High	Med
Curiousity	15-20	833	711	86.7	74.06
				High	Med
Reflection	21-26	804	698	83.75	72.70
				High	Med

The third criterion is flexible mathematical disposition indicator, it is shown in the statement of the numbers 12, 13 and 14 and the third indicator percentage in the experimental class is 87.00% with high criterion, while the control class is 73.12% with medium criteria. In the fourth indicator of mathematical disposition, there are 4, 16, 17, 18, 19 and 20 with the result of experimental class is 86.77% with high criterion, while the control class is 74.00% with medium criterion. The fifth is reflection mathematical

disposition indicator, there are statements of 21, 22, 23, 24, 25 and 26 with the percentage of the fifth indicator in the experimental class is 83.75% with high criterion, while the control class is 72.70% with the medium criterion.

Overall, based on the above analysis it can be seen that the mathematical disposition of experimental class participants who were taught by the model of cooperative learning type FSLC is 85.82% with high criterion while the control class is 73.31% with medium criteria. Data analysis is done in order to test the hypothesis that has been formulated, whether accepted or rejected. The hypotheses were tested by using the t-test. Before using the t-test, normality and homogeneity tests, they were conducted on both sampling classes. After normality test and homogeneity test, it is known that the test score of the students' mathematical problem solving ability in the two sample classes is normally distributed and has homogeneous variance, and then the hypothesis test is done. In the hypothesis test, the test used is a one-way hypothesis test. Criterion t-table on t-distribution list with degrees<H0 is accepted if t-count of independent df = n1 + n2 - 2 and α = 0.05, H0 is rejected if t count > t-table on t-distribution list with degrees of independent df=n1+n2-2 and α = 0.05 and df = 62 obtained t-count = 2.649 while t-table = 1.645 with 95% confidence interval. Because t-count (2.649) > t-table (1.645) then H0 hypothesis is rejected and H1 is accepted, so it can be concluded that the result of the problem solving ability of mathematics learners who taught by using cooperative learning model type Formulate Share Listen Create (FSLC) is higher than the result of ability in problem solving of the mathematics' students who are taught by using a scientific learning model only.

Mathematical Disposition Questionnaires are used to determine the mathematical disposition of learners during the learning both in the experimental class and in the control class. The questionnaire data is in the form of interval data according to the calculation of ordinal data transformation to the interval data. Before doing the hypothesis test the first test that has been done is the normality and homogeneity.

Hypothesis test is conducted to determine whether the mathematical disposition of experimental class learners is increased more than the control class, because the sample is a normal and homogeneous data, so that the data processing by using t-test. In the hypothesis test, the test used is a one-way hypothesis test. With = 0.05 and df = (32-1) + (32-1) = 62, then obtained t-count = 6.082 while t-table with 95% confidence level is t-table = 1.645. Because t > t-tabel then hypothesis H0 rejected while H1 is accepted.

Based on the data analysis and observation of the researchers during the study, it can be seen that in the teaching and learning process in the experimental class; the learner is more active and has better understanding of the material compare to the learner in the control class. This is because the experimental class of learners is taught by using cooperative learning model type Formulate Share Listen Create (FSLC). In the cooperative learning model learners work in groups and share their knowledge. These groups consist of learners with high, medium, and low learning outcomes so that learners can work together and share knowledge in the learning process. In this cooperative learning, teachers only as facilitators and motivators in empowering group work of learners so that the high-ability students are willing to help their low-skilled friends.

Formulate Share Listen Create (FSLC) cooperative learning model, A group learning structure, but firstly learners have to read students' worksheet (LKPD), then answer the questions individually (Formulate) contained in LKPD or problem given, so that learners are trained to develop the ability in solving mathematical problems both in understanding the problem, plotting the settlement, and conclusions. Then the students sharing (sharing) with group members and other group members who are active in listening the ideas, ideas given (Listen), from sharing with other group members and active group members listening to the ideas or ideas given. The next activity is creating new answers (Create) which are the best ideas or ideas of each group member and find a more correct answer.

In the model of cooperative learning, learners begin to understand the learning of mathematics. This is in accordance with Haryanto's theory (2014: 28) stated that with Formulate Share Listen Create (FSLC) type of learners develop the ability to express ideas or ideas with words verbally and compare with other people's ideas. The FSLC type is also related to Roger and David's theory in Lie (2002: 30) states elements in cooperative learning in communication among members that is the success of a group

also depends on the willingness of its members to listen and express their opinions. In addition, learning with Formulate Share Listen Create (FSLC) is more centered on learners, educators only as a facilitator who acts as a mentor in teaching and learning activities in the classroom. While scientific learning is still centered on the educators themselves, even though it has been discussed in the recommended curriculum in 2013, so that problem-solving ability is less developed.

Learning with FSLC type cooperative learning model in this research, assisted with learning tools in the form of students' worksheet. The students worksheet distributed to each group includes efforts to improve the mathematical disposition of learners. Based on the description of the research implementation, it appears that learner's confident is still low in working on the problem, at first they have to formulate the meeting stage. This is allegedly because students have not understood what they should write in the book. In the stage of sharing and listen the learners are still shy to discuss the results of the answers among members of the group and have not been really serious in doing the students' worksheet and the task given. At the stage of create, learners can not unite the ideas - ideas from the discussion of fellow group members and if told to present in front of the class they still reject it as well as the fellow group members.

This is indirectly related to the level of mathematical disposition of learners who tend to still need improvement. The effort which is done by the researcher is to give motivation to the students and will give appreciation at the end of the meeting, so that learners confident, optimistic, and will not be despair when solving a problem which is considered difficult by the learners themselves. In the end, learners gained more confident, optimistic, and do not despair in working on problems in LKPD. Actually, this is an evident in the mathematical disposition of learners in the higher experimental class and in the control class.

On giving questionnaires mathematical disposition before the research, seen many learners who do not know the meaning of the word of the questionnaire statement such as the word pessimistic. This is most likely caused by the learner's knowledge of the terms still less likely. In the end, the researcher explains the meaning of the word orally to the learners with the meaning in a row that is: not sure, not confident, various source, trying to find mistakes. The percentage of scores based on each given mathematical disposition indicator increased in the experimental class rather than the control class. This can be seen from the average score of mathematical disposition of experimental class learners higher than the average score of the control class.

4. Conclusion

Based on the research that has been done then it can be concluded: showed the student's mathematical problem solving ability who used FSLC strategy is higher than conventional strategy. The student's mathematical disposition who used FSLC strategy is better than conventional strategy..

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