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RESEARCH ARTICLE

Improving Students' Mathematical Communication Skills Through Learning Start Learning Models With A Question on Pythagoras

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ABSTRACT

This type of research is quasi-experimental. This study examines the Learning Start with a Question (LSQ) model in improving students' mathematical communication skills through the learning module. The population in this study were all students of mathematics education from the Teaching and Education Faculty, from semester V with the sample being students of class A1 and class A2. This study was divided into two learning groups, namely the experimental group by applying the Learning Start Learning Model with a Question (LSQ) and the control group with conventional learning. Based on the results of calculations using the t-test at the significance level α = 0.05 obtained a t_{test} of 4.64 with a significance value of 0.003, while the t_{table} of 1.76. Because $t_{count} > t_{table}$ (4.64 > 1.76) and significance < 0.05 (0.003 < 0.05). It can be concluded that increasing students' mathematical communication skills by applying the Learning Start Learning Model with a Question (LSQ) and using the learning module is better than the mathematical communication skills of students who obtain conventional learning without learning modules.

1. INTRODUCTION

Education is inseparable from learning activities because without learning, humans cannot possibly do anything. Only by learning humans can develop talents, interests, and personalities in accordance with their abilities. In this case, education is always related to the teaching and learning process. To achieve the quality of learning that is expected to be inseparable from the components that support education and learning (Putriani, 2018; Usmadi, 2018; Dewi, 2016). One component of learning achievement is the learning model because the learning model is a pattern of organizing teaching and learning interactions that are arranged, planned, and implemented by teachers and students to achieve optimal learning goals.

In teaching and learning interactions, communication plays a significant role, because teaching and learning can take place well if there is mutual communication between teachers and students, and between students and students (NCTM, 2000; NCTM 2008; Mursalin, 2018; Thahir, 2018; Trisnawati, 2018). Therefore, the connection must be created in such away. So that the message delivered in the form of subject matter can be received by students. Teachers are expected to be able to encourage student activities to achieve learning by using appropriate learning models. But the reality that is happening right now, the mathematical communication skills of students are low.

Based on the results of tests of student's mathematical communication skills at the Faculty of Teachers and Education of Malikussaleh University, 26 students obtained the highest scores, and the lowest scores of students' mathematical -- communication skills tests were 64.29 and 14.29 from the ideal value of 100. The average results of the average value are 42. These results indicate that the mathematical communication skills possessed by students are low.

The learning model that can be considered for use in efforts to improve the quality of mathematics learning to improve mathematical communication skills is the Learning Start with a Question (LSQ) model. The LSQ model is a student-centered learning model that starts with questions. Learning something new will be more effective if the students are active and ask questions rather than just accepting what is taught by the instructor. One way to make students learn actively is by making them ask questions about the subject matter before there is an explanation from the teacher. This model can inspire students to achieve the key to learning, namely by asking questions (Istarani, 2011). Especially with the help of learning modules so that students will be easier to understand and solve problems.

According to Istarani (2011), learning starts with a question is learning that begins with a question. Learning something new will be more effective if the student is active by asking questions rather than just accepting what is conveyed by his teacher. One way to make students learn actively is to make them ask questions about the subject matter before there is an explanation from the teacher. This model can inspire students to achieve the key to learning, namely by asking questions.

According to Silberman (2013), that active learning type Learning Starts With A Question (LSQ) model is learning that starts with a question, students are asked to ask questions to

the teacher and students are also asked to investigate or study the subject matter, without explanation from the teacher first. The LSQ learning model will give students more motivation to learn, stimulate students in asking questions, and improve students' understanding of the learning process.

Steps for Learning Starts With A Question

The steps of the LSQ model of learning starts with a question, according to Istarani (2011) are as follows; 1). Choose the appropriate reading material then share it with students. This reading should not be photocopied. Among other things is to choose a particular topic or chapter from a textbook Try the readings that contain general information or readings that provide opportunities for different types of information, 2). Ask students to study reading alone or with friends, 3). Ask students to give a mark on the part of the reading that is not understood to encourage students to give as many marks as possible. If time permits, join the learning partner with another pair, then ask them to discuss the unknown points that have been marked. 4). In pairs or small groups, ask students to write questions about the material they have read, 5) Gather questions that have been written by students, 6). Convey the subject matter by answering these questions.

Each learning model has advantages and disadvantages, as well as the LSQ model, according to Istarani (2011), the advantages of the LSQ model are as follows: 1). Questions will invite students to think about teaching material that will be delivered, 2). Increase student learning activities, because he sometimes books to find the desired answers, 3) By asking means students are increasingly curious about the lesson, 4). Presentation of the material will be more profound, because the material is conveyed through questions posed by students, 5). Learning will be more alive because the material is delivered in accordance with the wishes and abilities of students.

The disadvantages of the LSQ model are: 1). Students are not accustomed to making good and right questions, 2). Students do not know what they want to ask their teacher, 3). Questions that are made sometimes are merely made up, what is important is the question rather than not asking.

Based on the description above, the formulation of the problem that will be examined in this study is "how to improve mathematical communication skills of mathematics education department students from the Teaching and Education Faculty of Malikussaleh University with LSQ models assisted by learning modules on Pythagoras material?"

2. METHODS

The approach used in this study is a quantitative approach, which is the conclusion of the data from the research results illustrated through statistical formulas. Quantitative research is carried out with the aim to see the effect of a treatment. This type of research is quasi-experimental research. The research design used by researchers is the pretest-posttest control group design proposed by Sugiyono (2011) with the following pattern:

Table 1. Research Design

E	O1	X	O2
K	O3		O4

Information:

E is an experimental class
K is the control class
O1 and O2 are pree tests
O3 and O4 are post tests
X is the treatment of the LSQ learning model

This research was conducted on students of the Department of Mathematics Education Faculty of Teachers and Education of the Malikussaleh University of the semester V of the 2018/2019 school year. The time of the study began on June 4 until September 30, 2018. As for the population in this study were all fifth-semester students of the Department of Mathematics Education Faculty of Teachers and Education of the Malikussaleh University.

The sampling technique is to use purposive sampling, namely students of class A1 and class A2. Data collection was carried out through preliminary tests and final tests on two classes. Data is analyzed using the appropriate statistical formula so that it will provide information that is aligned with what you want to study. The collected data is processed using the t-test statistical formula as a testing tool for hypotheses.

Data collection techniques carried out through the pretest and posttest of the ability of mathematical communication skills of students from both classes. Experimental class and control class. The analysis technique was performed with SPSS 18 software to test Anava two ways.

3. RESULTS AND DISCUSSION

3.1 Results of Analysis

Based on the post-test data from the two classes, the lowest score (x_{min}), the highest score (x_{max}), the average score ($\bar{x}$), and the standard deviation (s) for each class are as shown in Table 2 below:

Table 2. Results of Post-Test Data

Class	Skor maks	***post-test***			
		x_{min}	x_{max}	$\bar{x}$	S
LSQ Model	100	22	85	58,71	19,14
Conventional	100	19	44	49,23	13,12

Based on the table 2 it can be seen that the minimum post-test value of the LSQ Model class is 85, while the minimum value of the conventional class is 44. Likewise the average value of the LSQ Model class is 58.71, while the conventional class is 49.23. Furthermore, the standard deviation value for the LSQ Model class is 19, 14. This is higher than the standard deviation value of the conventional class.

The homogeneity test results from this study are used to determine whether the sample from the study has the same variant or is termed homogeneity so that if the data is homogeneity then the hypothesis testing criteria can be determined in subsequent analyzes. The results obtained are as in table 3.

The purpose of the normality test is to find out whether the data is normally distributed or not.

Table 3. The normality test results

Class	X^2 Count	X^2 Table	Conclusion
LSQ Model	3,16	7,81	Accepted Ho
Conventional	6,13	7,81	Accepted Ho

Based on the results obtained in Table 3 above, it can be concluded that the data of both samples are normally distributed.

Table 4. The homogeneity test results

Class	S^2	The homogeneity test results		
		F_{count}	F_{table}	Conclusion
LSQ Model	321,16	1,64	1,97	Accepted Ho (homogeneity)
Conventional	213,73			

Based on the homogeneity test results from table 4 above, it can be seen that the variance value of the LSQ class is higher than the value of the conventional class variant, which is 321, 16 > 213, 73. So with the conclusion that Ho is rejected or can be meaning that the sample comes from homogeneous data group variance.

To test the hypothesis, the statistic used is the t-test with a significant level α = 0.05 and the degree of freedom to list the t distribution, namely dk = (n1 + n2 - 2). From the calculation of the average post-test score between the LSQ learning class and the conventional class, the results can be stated in Table 5 below:

Table 5. The test results

Class	t_{Count}	t_{Table}	Conclusion
LSQ Model	4,64	1,76	Accepted Ho
Conventional			

Based on the results of statistical testing for students' mathematical communication skills with the LSQ Model aided by the learning module is better than the mathematical communication skills of students with conventional learning.

3.2 Discussion

In implementing the LSQ model of learning, the researcher acts as a teacher in the class who teaches the experimental class and the control class. For the control class, researchers pursue using the module-assisted LSQ model, while in the Control class only teaches by applying conventional models. The application of LSQ Model in the experimental class gets the atmosphere of learning that is designed to follow the steps of the LSQ Model supported by a set of teaching modules used by students.

In learning, researchers begin with questions about triangular problems, then accompanied by questions in turns. Each student will get different questions about the triangle problem, measure and calculate the area of a triangle to enter the Pythagorean problem. Researcher teaching by use the steps as follows; 1). Choose the appropriate reading material then share it with students. This reading should not be photocopied. Among other things is to choose a particular topic or chapter from a textbook Try the readings that contain general information or readings that provide opportunities for different types of information, 2). Ask students to study reading alone or with friends, 3). Ask students to give a mark on the part of the reading that is not understood to encourage students to give as many marks as possible. If time permits, join the learning partner with another pair, then ask them to discuss the unknown points that have been marked. 4). In pairs or small groups, ask students to write questions about the material they have read, 5) Gather questions that have been written by students, 6). Convey the subject matter by answering these questions.

The atmosphere of learning in the experimental class conducted by researchers with the LSQ Model can be see in Figure 1. Likewise the atmosphere in the control class as shown in Figure 2. In the experimental class learning students are directed to raise questions on the object before being given an explanation by the teacher, then other students come to think of answers so that a simulation of continuous dialogue questions occurs. The LSQ model provides a different atmosphere from the control class that only listens and records, pedagogical activities not seen in conventional classes.

Fig 1. The atmosphere of learning in the experimental class

LSQ learning has a very big influence on improving the quality of student learning and aspects of students' mathematical communication skills. Because through the learning of LSQ there is interaction between the students and the instructor, so the teaching and learning process runs effectively and the students' response in solving the problem either raised by the student or by the instructor is very apparent when learning with LSQ learning. In this model students are not only active as questioners but students are seen actively answering questions and re-asking questions that are as detailed as possible.

4. CONCLUSION

Based on the results of statistical testing for students' mathematical communication skills with the LSQ Model aided by the learning module is better than the mathematical communication skills of students with conventional learning.

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