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Differences in Communication Ability and Hard Work Characters of Students between Problem Based Learning Models with Inquiry Learning Models

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ABSTRACT
This study aims to: 1) To determine differences in mathematical communication skills between students taught by Problem Based Learning and Inquiry Learning Models; 2) To find out the differences in the character of hard work between students who are taught by Problem Based Learning and Inquiry Learning Model; 3) To describe student activities during the Problem Based Learning process and Inquiry Learning Model; 4) To analyze the process of students' answers to the Problem Based Learning model and Inquiry Learning Model. The subjects in this study were students of class VIII-1 and VIII-3 SMP Wiraswasta Batang Kuis 2020/2021. The results showed that: 1) There are differences in mathematical communication skills between students who are taught with Problem Based Learning and Inquiry Learning Models; 2) Differences in the character of hard work between students taught by Problem Based Learning and Inquiry Learning Model; 3) Each student activity indicator in the Problem Based Learning model has met the achievement of time effectiveness while the student activity in the class given the inquiry learning model is said to be effective, because it is in accordance with the requirement that if four of the tolerance criteria for achieving time effectiveness used on the six indicator items are met , then the student activity is said to be effective; and 4) It can be seen that each indicator of class mathematical communication skills with the inquiry learning model has an average problem-solving score on each indicator that is higher than the average question-solving score for each class indicator with a problem-based learning model.
KEYWORDS: *problem-based learning model, inquiry learning model, communication skills, hard work character*

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I. INTRODUCTION

Mathematics is the language of symbols where everyone who learns mathematics is required to have the ability to communicate using the symbol language. Mathematical communication skills will allow a person to use mathematics for the benefit of themselves and others, so that it will increase a positive attitude towards mathematics both from within oneself and from others (Arista, 2014).

Mathematical communication can be defined as an event of mutual relationship or dialogue that occurs in a classroom environment, where messages are transferred. The message that is transferred contains mathematics material learned in class, communication in the classroom environment is the teacher and students (Susiana, et al, 2018). According to Heryan, communication skills are a mathematical skill that includes representing, listening, reading, discussing and writing skills, as well as the ability to express mathematical ideas coherently to friends, teachers and others, solve problems or do reasoning and express good mathematical ideas. in writing or orally (Wahid, 2018).

Furthermore, Veva, et al (2018) explain things that indicate students' mathematical communication skills are still lacking in class, namely: (1) in solving story problems, children tend not to know what is known and are asked in the story problems so that students are still confused how to solve it; (2) students still need a lot of guidance from the teacher in describing mathematical ideas in the form of pictures and when connecting everyday language with mathematical language that uses symbols; (3) students tend to lack confidence in

communicating their thoughts to make conjectures both verbally and in writing and students still often wait for answers from teachers in solving math problems.

One of the characters that can be formed in learning mathematics is the character of hard work. Hard work is a behavior that shows serious efforts in overcoming barriers to learning, assignments, to complete tasks (study / work) as well as possible (Buyung and Nirawati, 2018). Hard work is a term that encompasses an ongoing effort (never gives up) in completing a job or that which becomes a task to completion. Hard work does not mean working until it is complete and then stopping, what it means is leading to a big vision that must be achieved for the good / benefit of humans and the environment (El Hakiem, 2017).

The character of hard work is very important in learning mathematics, this is because the character of hard work can form an attitude that does not give up easily and continues to struggle to produce a correct answer. in using rules and concepts. In mathematics these concepts should not be violated because they can lead to misinterpretations (Maryati and Priatna, 2017). With hard work, students will get used to it and not spoil, even lazy in doing all the assignments given to them. Hard work is synonymous with great enthusiasm without feeling the least bit tired and willing to be active in carrying out activities that have positive values (Purwanti, 2016).

Yusdila, et al (2019) explained that the problem-based learning model has the following advantages: (1) it challenges the ability of students and gives satisfaction to finding new knowledge for students; (2) increasing the learning activities of students; (3) helping students how to transfer their knowledge to understand problems in real life; (4) stimulate the development of progress in thinking of students to solve the problems faced appropriately; (5) students will be accustomed to facing problems (problem solving) and challenged to solve problems not only related to classroom learning, but also facing problems that exist in everyday life (real world); (6) fostering social solidarity by accustomed to discussing with friends; (7) increasingly familiarize teachers with students; and (8) getting students used to doing experiments. Dharmawan, et al (2019) added that some of the advantages of problem-based learning models are as follows: problem-based learning is a technique that is quite good in understanding lesson content, it can provoke students' abilities and provide satisfaction to find new knowledge for students, increase student activity in activities learning, helps students to transfer knowledge to understand problems in everyday life, helps students develop new knowledge and is responsible for the learning they do.

In addition to problem-based learning models, one other learning model that can be used and applied to improve students' mathematical communication skills is an inquiry learning model. Inquiry learning emphasizes the process of searching and finding. Inquiry learning is a series of learning activities that emphasize critical and analytical thinking processes to seek and find answers on their own, answers to a questionable problem. Inquiry-based teaching is a teaching model that has been developed for the purpose of teaching students how to think (Hosnan, in Eko Saputra, 2016: 1333).

Inquiry is various forms of activity involving observation, asking questions, referring to books and other sources to get what is already known from simple experimental evidence, using tools to collect, analyze and interpret data, submit answers, explain and forecasts and communicate the results. Inquiry requires the identification of the assumptions used, the use of logical and critical thinking, and consideration of something (Said, 2017: 257). The purpose of the inquiry learning model is to develop students' ability to think logically and systematically (Fitriyanti, et al, 2019: 43).

In inquiry learning, students are actively and independently involved in making, testing and evaluating hypotheses. The teacher only acts as a guide that directs students towards learning objectives arranged in worksheets given to students (Pinasti, et al, 2019: 312). Inquiry learning is designed to engage students directly in the scientific process in a relatively short time. Learning with an inquiry model can improve understanding of science, be productive in thinking, and students become skilled in obtaining and analyzing information (Al-Tabany, 2017: 79).

The results of Wear and Indrawati's research, (2017) show that there is a significant effect of the learning method on communication skills and mathematical problem solving in a multivariate manner, which means that the two methods used are multivariate which have a significant effect on the students' mathematical communication and problem solving skills by 10.9 % through Partial Eta Squared and there is a significant effect of learning methods on mathematics communication skills in a univariate manner, which means that both the discussion method and the individual inquiry method have a significant effect on mathematics communication skills

Based on this, the researcher is interested in conducting a further study on students' mathematical communication skills and the character of hard work and the use of PBM and inquiry learning models, then the author raises it in a research title "Differences in Communication Ability and Student Hard Work in Problem Based Learning Classrooms," and Inquiry SMP Negeri 1 Delitua "

II. METHODS

Research Pattern

This study aims to determine the ability of communication between problem-based learning, inquiry learning models, in class VIII SMP Wiraswasta Batang Kuis. Therefore, this research is an experimental research with the type of research is a quasi experiment (pseudo experiment), in which the subjects are not randomly grouped, but the researcher accepts the condition of the subject as he is (Ruseffendi, 2003).

Participants

The subjects in this study were students of class VIII-1 and VIII-3 SMP Wiraswasta Batang Kuis 2020/2021..

Data Collection Technique

The instrument in this study was a test instrument and observation. The test instrument is a test of students' mathematical communication skills. The test of students 'mathematical communication skills is conducted to determine the level of students' mathematical communication skills. This mathematical communication ability test is arranged in the form of a description consisting of 5 items. Hard work will be measured through a questionnaire containing character indicators.

Data Analysis

Data on learning outcomes were analyzed using inferential statistics. In connection with the second and third research questions were analyzed by descriptive analysis. According to Sugiyono (2010: 147) statistics are statistics that are used to analyze data by describing or describing the data that has been collected as it is without intending to make general conclusions or generalizations. Descriptive analysis in this study using a table of frequencies, averages, and percentages.

III. RESULT

1) Statistical Analysis for Mathematical Communication Ability Data

The summary of the results of the hypothesis testing of students' mathematical communication skills can be seen in table 3.1. following:

Table 3.1. First Hypothesis t test

Data	N	T_{count}	t_{table}	Nilai Sig.
PBM	25	2,303	1,678	0,026
Inkuiri	25			

The first hypothesis to be tested in this study is that there are differences in mathematical communication skills between students who are taught with Problem Based Learning and Inquiry Learning Models. The testing carried out based on the hypothesis is:

Statistical Hypothesis 1: To test mathematical communication skills

$H_0 : \mu_1 = \mu_2$

$Ha : \mu_1 \neq \mu_2$

Information :

Ha : There are differences in mathematical communication skills between students who are taught with Problem Based Learning and Inquiry Learning Models.

Ho : There is no difference in mathematical communication skills between students who are taught with Problem Based Learning and Inquiry Learning Model.

Based on table 4.6. above, it is found that the value of $t_{count} > t_{table}$ is 2.303> 1.678, besides that, the Sig. It is 0.026, which means it is below the value of 0.05, so it can be concluded that there is sufficient evidence to reject H_0. This means that there are differences in mathematical communication skills between students who are taught with Problem Based Learning and Inquiry Learning Models.

2) Analysis of Research Hypotheses Regarding Hard Work

The summary of the results of the hypothesis testing of students' mathematical communication skills can be seen in table 3.2. following:

Table 3.2 Second Hypothesis t test

Data	N	t_{count}	t_{table}	Nilai Sig.
PBM	25	2,458	1,678	0,018
Inkuiri	25			

Based on the Anava test results in Table 3.2 above, information on hypothesis testing can be obtained as follows:
The second hypothesis to be tested in this study is that there are differences in the character of hard work between students who are taught by Problem-Based Learning and Inquiry Learning Models. The testing carried out based on the hypothesis is:
Statistical Hypothesis 2: To test students' hard work
$H_0 : \mu_3 = \mu_4$
Ha : $\mu_3 \neq \mu_4$
Keterangan :
Ha : There are differences in the character of hard work between students who are taught with Problem Based Learning and Inquiry Learning Models
Ho : There is no difference in the character of hard work between students who are taught with Problem Based Learning and Inquiry Learning Models
Based on table 4.11. above, it is found that the value of $t_{count} > t_{table}$ is 2.458> 1.678, besides that, the Sig. It is 0.018, which means it is under the value of 0.05. It is concluded that there is sufficient evidence to reject H_0. This means that there are differences in the character of hard work between students who are taught by Problem Based Learning and Inquiry Learning Models

3) Student Learning Activities
Observation of student activities during learning activities uses student activity observation sheets to observe two groups of students for each meeting. Every 5 minutes of running time, the observer observes student activity in writing down the results of his observations by adjusting student activity that is seen with the aspect of observing student activity. The summary of the results of learning activities for each experimental class can be seen in Table 3.3 below:

Table 3.3 Summary of Observation Results of Student Activities in PBM Class

Indicator	Meeting			Result
	1	2	3	
1	28,75	26,25	22,5	25,83
2	12,5	17,5	18,75	16,25
3	30	25	23,75	26,25
4	8,75	10	8,75	9,17
5	2,5	5	3,75	3,75
6	2,5	2,5	3,75	2,92

Based on table 3.3 above, student activity in the class given the problem-based learning model is said to be effective, because it is in accordance with the requirements that if four of the criteria for achieving tolerance for time effectiveness are met, then the student activity is said to be effective. In table 3.3, each indicator fulfills the achievement of time effectiveness. While the activities of students in the class given the inquiry learning model can be seen in table 3.4 below:

Table 3.4 Summary of Observation Results of Inquiry Class Student Activities

Indicator	Meeting			Result
	1	2	3	
1	28,75	30	26,25	28,33
2	15	13,75	20	16,25
3	23,75	27,5	21,25	24,17
4	11,25	13,75	10	11,67
5	3,75	5	5	4,58
6	3,75	5	5	4,58

Based on table 3.4 above, student activity in the class given the inquiry learning model is said to be effective, because it is in accordance with the requirements that if four of the criteria for achieving tolerance for time effectiveness are met, then the student activity is said to be effective. In table 3.4, each indicator fulfills the achievement of time effectiveness.

4) Problem Solving Process

The process of solving student questions was analyzed descriptively. Student problem solving is analyzed after being given learning through problem-based learning and inquiry learning models. The students' problem solving was seen by the maximum score of each indicator of mathematical communication skills then the average was sought. Either problem-based learning class or class with inquiry learning model, both have good problem solving on each indicator, this can be seen from the scores of each indicator obtained by students in both classes are in the range of scores of $2 < x \leq 4$, where on each indicator students in both classes obtained scores of 3 and 4. For the average score of solving the questions for each indicator of students' mathematical communication skills, it can be seen in Table 3.5 below:

Table 3.5 Average Score of Student Problem Completion on Each Indicator

Class	Average Score		
	Drawing	Writing	Representation
PBM	5,38	3,64	5,24
Inkuiri	5,44	3,72	5,54

Based on Table 3.5, it can be seen that each indicator of the class mathematics communication ability with the inquiry learning model has an average problem-solving score on each indicator that is higher than the average question-solving score for each class indicator with a problem-based learning model. In the class with the inquiry learning model the average drawing indicator was 5.44 while the class with the problem-based model was 5.38. In the class writing indicator with the inquiry learning model the average drawing indicator was 3.72 while the class with the problem-based model was 3.64 and the class representation indicator with the inquiry learning model was 5.54 while the class with the problem-based model was 5.54. 5.24.

IV. DISCUSSION

1) Mathematical Communication Skills

Mathematical communication skills in this study are the ability of students to explain a problem in writing in the form of a mathematical model, explain ideas or situations from a given problem in their own words in written or oral form. The ability of mathematical communication is then analyzed to see differences in the differences in mathematical communication skills between students taught by Masala-Based Learning and Inquiry Learning Models. Based on data analysis, the average score of mathematical communication skills for the class given the problem-based learning model is 89.93 and for the class given the inquiry learning model is 92.17.

These data show the average value of mathematical communication skills given the problem-based learning model is lower than the inquiry learning model. From the average results of mathematical communication skills, it can be seen that the differences between the two. Where the class given the inquiry learning model obtained a higher average than the class average given the problem-based learning model.

The result of t-test calculation shows that the value of tcount> ttable is 2.303> 1.678, besides that, the value of Sig. It is 0.026, which means it is below the value of 0.05, so it can be concluded that there is sufficient evidence to reject H0. This means that there are differences in mathematical communication abilities between students who are taught with Problem Based Learning and Inquiry Learning Models.

This study is in line with Hidayat's (2018) research results where the results show that (1) students' mathematical communication skills taught through a problem-based learning model with a problem-solving approach are better than students taught conventional learning. (2) the mathematical communication skills of students who have high initial knowledge taught through problem-based learning models with problem-solving approaches are better than students who have high initial knowledge who are taught conventional learning. (3) the mathematical communication skills of students who have low initial knowledge taught through problem-based learning models with problem-solving approaches are better than students who have low initial knowledge taught through conventional learning (4) there is no interaction between learning models and students' prior knowledge in affect students' mathematical communication skills.

Then the research by Ali Sadikin Wear and Renny Indrawati (2017) where the results of the study show that 1) there is a significant effect of learning methods on communication skills and mathematical problem solving in a multivariate manner; 2) there is a significant effect of the learning method on the univariate

mathematical communication skills; 3) there is an insignificant effect of the learning method on the univariate ability of mathematics problem solving.

2) Hard work

Hard work in this study is a behavior that shows serious effort in overcoming various obstacles to learning and assignments, as well as completing assignments as well as possible by students after being given problem-based learning models and inquiry learning models. Hard work is further analyzed to see the differences in hard work character between students taught by problem-based learning and inquiry learning models. Based on the data analysis, the average score of hard work for the class given the problem-based learning model is 110.4 and for the class given the inquiry learning model is 110.2.

These data indicate the average value of hard work given the problem-based learning model is higher than the inquiry learning model. From the average results of hard work, there is a difference between the two. Where the class given the inquiry learning model got a lower mean than the class average given the problem-based learning model.

The result of t test shows that the value of tcount> ttable is 2.458> 1.678, besides that, the value of Sig. It is 0.018, which means it is under the value of 0.05. It is concluded that there is sufficient evidence to reject H0. This means that there are differences in the character of hard work between students who are taught by Problem Based Learning and Inquiry Learning Models.

The character of hard work is very important in learning mathematics, this is because the character of hard work can form an attitude that does not give up easily and continues to struggle to produce a correct answer. in using rules and concepts. In mathematics these concepts should not be violated because they can lead to misinterpretations (Maryati and Priatna, 2017). With hard work, students will get used to it and not spoil, even lazy in doing all the assignments given to them. Hard work is synonymous with great enthusiasm without feeling the least bit tired and willing to be active in carrying out activities that have positive values (Purwanti, 2016). Students must be accustomed to having a hard work character in order to have a tough, patient, tenacious, and diligent character in studying, working and preparing for the future to come (Lasmita and Kartina, 2019).

V. CONCLUSION

1. There are differences in mathematical communication skills between students who are taught with the Problem Based Learning model and the Inquiry Learning Model.
2. There are differences in the character of hard work between students who are taught with Problem Based Learning and Inquiry Learning Models.
3. Each indicator of student activity in the Problem Based Learning model has met the achievement of time effectiveness while the activity of students in the class given the inquiry learning model is said to be effective, because it is in accordance with the requirement that if four of the tolerance criteria for achieving time effectiveness used in the six indicator items are met , then the student activity is said to be effective.
4. It can be seen that each indicator of class mathematical communication skills with the inquiry learning model has an average problem-solving score on each indicator that is higher than the average question-solving score on each class indicator with a problem-based learning model.

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