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Analysis of Mathematical Problem About Mathematics Students in Class Xi and Self-Efficacy Learning in 7e-Learning Cycle

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Abstract

This study aimed to testing and analyze the effectiveness of the 7E-learning cycle learning model on the derived function learning. The research design used was a combination of qualitative and quantitative methods, also known as mixed methods. The model combines quantitative and qualitative methods unbalanced and in one time. Then do the overall interpretation of data analysis to get a conclusion and suggestions. Quantitative research in phase 2, the research used is experimental research using quasi-experimental designs. The researcher chose quasi-experimental designs with non-equivalent control group design. This study there are two groups selected at random. The first group was the experimental group where the 7E-learning cycle was implemented and the second group was the control group received no special treatment or regular treatment. Based on the research results obtained conclusion as learning Cycle 7E model of learning quality to solving problems of class XI students in solving problem solving problems included in either category.

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INTRODUCTION

Education is a conscious and planned effort to create quality people. Mathematics is taught to develop basic skills, familiarize students to think logically, prepare students to be able to live and work well and develop skilled and qualified intelligent citizens (NCTM, 1999). So that mathematics becomes a subject that must be studied by every academic at every level of education from elementary to secondary school and majors in higher education.

Mathematics can not be separated from problem solving (Juhrani, 2018). The process of thinking in problem solving needs to get the attention of the teacher to help students develop problem-solving skills in both the real world context and the mathematical context. Problem solving is an integral part of mathematics learning (NCTM, 2000). Krulik and Rudnick (1995) define problem solving skills as an individual means of using prior knowledge and abilities to be synthesized and applied to new and different situations. Anderson (2009) states that problem solving is a life skill that involves the process of analyzing, interpreting, reasoning, predicting, evaluating and reflecting. So, the ability to solve problems is the ability to apply prior knowledge to new situations involving high-level thinking processes (Sefiany, 2018).

Problem solving skills are not only needed to solve problems in mathematics, but students are also needed to solve problems they experience in everyday life (Sefiany, 2018). Therefore, learning in class should not only focus on mastering the material to solve problems mathematically but also linking how students recognize mathematical problems in their daily lives and how to solve these problems with the knowledge gained in school (Barzci. 2013).

Problem solving ability is one form of higher level thinking skills. According to Bandura (1977), self-efficacy in terms of thinking facilitates cognitive processes and performance in a variety of settings, including the quality of decision making and academic achievement. In terms of behavior, self-efficacy can influence a person's choice of action (Nurhayati, 2015).

But in fact in general students in Indonesia still have a low level of self-efficacy. This is supported by the statement that there are many people who, after learning mathematics, share a modest amount that they do not understand, even many concepts are misunderstood, mathematics is considered as a difficult, complicated and a lot of deceptive science (Ruseffendi, 1991).

The low mathematical ability of students in Indonesia is known from the results of the evaluation of The Third International Mathematics and Science Study (TIMSS). Indonesia was ranked 38th out of 42 countries in 2011 (Mullis, 2012). Whereas from the results of the Program for International Student Assessment (PISA), Indonesia ranked 60th out of 72 countries in 2016.

Based on observations at SMA Negeri 1 Purwodadi, more than 50% student experience difficulties when faced with solving mathematical problems. These difficulties can be seen from the mistakes made by students in the problem solving process. This is known from the students' work on the Linear Program daily review.

Teaching mathematics at school today should focus on students (student centered), students actively build knowledge or understanding of experience and be linked to daily life. This refers to the opinion of Hudojo (1988); Suherman, et al (2003); Orton (2004); Zevenbergen, Dole, and Wright, (2004); Sternberg (2006) states that in mathematics learning students are encouraged to interpret mathematical processes derived from their experiences. The purpose of this study is to implement a learning model that can enable students to construct their knowledge and enable them to bring up problem solving skills in solving mathematical problems in linear program material in SMA Negeri 1 Purwodadi.

METHOD

The design used a combination of qualitative and quantitative methods which are also known as mixed methods (Pajares, 2002). The model used is a concurrent embedded model that combines quantitative and qualitative methods (Juhrani, 2018) in an unbalanced and at one time (Sugiyono, 2015: 537). Quantitative methods are used as the primary method, and are equipped with qualitative methods as secondary (Astarini, 2011).

The first stage of the process is, learning observation at the initial conditions of self-efficacy and a test of problem solving ability to get students' ability data in the initial conditions. The second stage carries out data collection activities through 7E-learning cycle learning to get students 'self-efficacy using observation sheets and students' problem solving skills using the Problem Solving Ability Test (TKPM).

Furthermore, qualitative data analysis was carried out to analyze the initial condition data on problem solving abilities based on self-efficacy through observation methods. While the quantitative data analysis is done to test the completeness of learning in the 7E-learning cycle, the comparison of the average results of the ability solving test of students who obtain the 7E-learning cycle with conventional learning models, and the comparison of the average difference in problem solving ability of students who earn 7E- learning cycle. Then an overall interpretation of data analysis is carried out to get a conclusion and suggestion.

Quantitative research in stage 2, the method used is an experimental method using quasi-experimental designs because all the external variables that influence the course of the experiment cannot be controlled. Quasi-experimental designs with nonequivalent design control group design forms (Sugiyono, 2012: 116). Two existing groups are then chosen randomly. The first group is the experimental group where 7E-learning cycle is applied and the second group is the control group does not get special treatment or ordinary treatment (Lestari, 2016). In accordance with the design of embedded concurrent strategies, three stages of research were carried out. The first stage is the initial condition analysis phase, the second stage is the learning implementation phase and the third stage is the data analysis stage.

The cognitive assessment instrument used in this study is a test of problem solving skills in the form of a description problem (Nadia, 2018). The feasibility of testing problem solving abilities as a measuring tool to determine the students' ability to solve construct construct validation, content validation and trial. Construction validity and content validation is done by asking for expert opinion (judgment experts) in this case is a supervisor and mathematics teacher.

Qualitative data analysis basically wants to understand social situations into parts, relationships between parts and their relationship to the whole. Qualitative data analysis is the process of systematically searching and compiling data obtained from interviews, field notes, and documentation, by organizing data into categories, describing it into units, synthesizing, composing into patterns, choosing which ones are important and what will be learned, and make conclusions so that it is easy to understand by yourself and others (Sugiyono, 2012: 336). Data analysis in qualitative research was carried out before entering the field, during the field, and after completion in the field. Qualitative data analysis in this study was carried out after data collection and formed an instrument with the aim that the data obtained was arranged systematically and easier to interpret it in accordance with the research questions. Qualitative data analysis is used to describe students' self-efficacy in learning the 7E-learning cycle model.

RESULTS AND DISCUSSION

30 students in class XI who filled out the Self-efficacy questionnaire contained 10 students in the category of high self efficacy, 16 students in the category of moderate self efficacy, and 4 students in the low self efficacy category. The quality of learning is a series of activities that can improve student competence. Learning quality is measured from 3 stages, namely (1) planning

(preparation and preparation), (2) implementation (classroom environment and instruction), (3) professional responsibility.

In the planning stage, learning tools are prepared in the form of syllabi, RPP (Design of Learning Implementation), teaching materials, LKS (Student Worksheets), and TKPM. The device that has been made is then validated by an expert validator. From the results of the validator's assessment, the average value for each device is categorized as good and very good, so that the device that has been made is ready for use.

At the implementation stage, the measurement of the quality of learning is carried out by observing the quality of learning and the implementation of learning. Observation of the quality of learning involves 2 observers consisting of one mathematics teacher at SMA N 1 Purwodadi and 1 math teacher from another school. The learning is carried out 5 times.

Observation on the quality and feasibility of learning done to assess professionalism in carrying out learning. Mas (2008) mentions that professional learning will be able to manage learning well so that it affects the quality of student learning. Based on the results of the assessment of the quality sheet of learning from the first meeting to the fifth meeting, it can be seen that the quality of learning in the first meeting to the fourth meeting is in the good category, while the fifth meeting is in the very good category. The average value for the implementation of learning from the first to the last meeting can be seen that the implementation of learning in the first meeting until the 4th meeting is in the good category. Whereas at the fifth meeting, learning was included in the very good category. From the description above it can be concluded that the implementation of learning that has been carried out is quality.

The last assessment of the quality of learning is at the assessment stage. In the assessment phase a response questionnaire is given to students to see the reaction to learning. Based on the results of the student response questionnaire, the results showed that the majority of students gave a good assessment of the learning that had been carried out.

At the assessment stage, there are results of TKPM data analysis. TKPM pretests in the experimental class and control class were then carried out. From the results of the pretest, the average students' problem solving abilities in the experimental class and the control in solving problem solving problems were almost the same. Based on the homogeneity test, information was obtained that the two classes had homogeneous variance. Based on the similarity test of the average pretest, it was concluded that the average problem solving ability of the experimental class students and the control in solving problem solving problems were not significantly different. This shows that the experimental class and control class students have the same initial ability.

After being given learning, TKPM Postes were given to the experimental class and the control class. The posttest average problem solving ability of the experimental class students is higher than the control class.

From the research, information was obtained which showed that students with low self efficacy were only able to solve problems until they understood the problem. The pattern of students' low self-efficacy ability in solving problem solving problems is low self efficacy students can understand the problem. The level of understanding of students' problems of low self efficacy is still lacking. Low self efficacy students are able to mention things that are known and asked but are incomplete. Low self efficacy students cannot plan problem solving. They cannot mention what formulas are needed to solve the problem. The inability of students to have low self-efficacy in planning problem solving results in low self-efficacy students who cannot implement problem-solving plans. Low self efficacy students wrote several answers on the answer sheet, but there were many errors in determining the size of the flat build. Low self efficacy students do not check the answer again.

Thus students with low self efficacy are only able to solve problems until they understand the problem. This indicates that students with

low self efficacy have difficulties in solving problems.

Based on the results of the study, students of self efficacy are being able to solve the problem until the re-checking stage. This is consistent with the results of the study (Nadia, 2018) which states that self efficacy students are able to identify things that are known and asked, prepare a problem solving plan and implement it, and are also able to re-check the answers. Self efficacy students are able to understand the problem well. Self efficacy students are able to determine information that is well known and considered from the problem. Self efficacy students are planning the problem solving appropriately, they can determine what formulas will be used to solve the problem correctly. Self efficacy students are not having difficulty in the stage of carrying out problem solving. This is because students of self efficacy are able to plan problem solving well. However, self efficacy students are not trying their best in carrying out problem solving. Self efficacy students are already satisfied by writing 2 or 3 answers, even though there are still many other answers and the working time is not yet finished. Self efficacy students are able to check the answers that have been obtained.

From the results of the study, students of high self efficacy can solve the problem until the re-checking stage. Students with high self efficacy can understand the problem well, they can determine the information that is known and asked in the problem well. Students with high self efficacy are able to develop problem solving plans appropriately. Students with high self efficacy are able to determine the formula that will be used to solve problems appropriately. Students with high self efficacy carry out problem solving according to plan. Students of high self efficacy try hard to find as many answers. Students with high self efficacy check again the answers obtained.

Thus learning with the Learning Cycle model can be said to be of quality. This is based on the results of the average difference test obtained results that the average ability of problem solving students of experimental class in solving problem solving problems is better than the ability of problem solving students in solving the problem solving problems. This is consistent with the results of the study (Nadia, 2018) which states that self efficacy students are able to identify things that are known and asked, prepare a problem solving plan and implement it, and are also able to re-check the answers. Self efficacy students are able to understand the problem well. Self efficacy students are able to determine information that is well known and considered from the problem. Self efficacy students are planning the problem solving appropriately, they can determine what formulas will be used to solve the problem correctly. Self efficacy students are not having difficulty in the stage of carrying out problem solving. This is because students of self efficacy are able to plan problem solving well. However, self efficacy students are not trying their best in carrying out problem solving. Self efficacy students are already satisfied by writing 2 or 3 answers, even though there are still many other answers and the working time is not yet finished. Self efficacy students are able to check the answers that have been obtained.

From the results of the study, students of high self efficacy can solve the problem until the re-checking stage. Students with high self efficacy can understand the problem well, they can determine the information that is known and asked in the problem well. Students of high self efficacy are able to compile From the above description, students of high self efficacy have good problem solving abilities. All NCTM problem solving indicators have also been achieved by students with high self efficacy.

From the results of the posttest, the experimental class completeness test was conducted. The result of the completeness test shows that the proportion of students in the experimental class who got a score of 75 has exceeded 70%. In addition, an average difference test between the experimental class and the control class was also carried out. Based on the results of the average difference test, it is obtained the results that the average ability of problem solving of experimental class students in solving problem solving problems is better than the problem solving ability of control class students in solving problem solving problems.

Thus learning with the Learning Cycle model can be said to be of quality. This is consistent with the results of research from Siribunnam and Tayraukhan (2009) and Chrismast (2013) which states that student learning outcomes with the 7E Learning Cycle model are higher than conventional students. Polyiem, et.al (2011) also stated the same thing that the problem solving ability of students who obtain 7E Learning Cycle learning is better than the problem solving ability of students who obtain conventional learning.

problem solving plan appropriately. Students with high self efficacy are able to determine the formula that will be used to solve problems appropriately. Students with high self efficacy carry out problem solving according to plan. Students of high self efficacy try hard to find as many answers. Students with high self efficacy check again the answers obtained.

CONCLUSION

Based on the results that have been described, the following conclusions are obtained. The learning quality of the 7E Learning Cycle model towards the problem solving ability of the eleventh grade students in solving problem solving problems is in the good category. The number of students who gave a positive response to 7E Learning Cycle learning reached 70%. That is, the majority of students give a good assessment of learning.

Learning the 7E Learning Cycle model to the problem solving ability of class XI students in solving problem solving problems can be said to be of high quality. The average problem solving ability of students in solving problem solving problems in Learning Cycle learning is better than students' problem solving abilities in solving problem solving problems in expository learning (Qarareh, 2012).

Students' problem solving ability is low self-efficacy in solving problem solving problems only to the stage of understanding the problem. NCTM problem solving indicators that can be achieved by students of low self efficacy are only the first indicators, namely building new mathematics through problem solving, while the other 3 indicators cannot be achieved. Students self efficacy are being able to solve the problem until the re-checking stage, but self efficacy students are not trying optimally in carrying out problem solving. Self efficacy students are able to achieve all NCTM problem solving indicators. Students with high self-efficacy can solve the problem until the check-back stage. High self efficacy students can carry out four stages of solving the Polya problem properly. Climber students can achieve all NCTM problem solving indicators.

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