Analysis of Mathematical Problem Solving Ability Based on Self confidence in Creative Problem Solving Learning and Independent Learning Assisted Module .

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Info Artikel	Abstract
	The aim of this study are (1) to describe the quality of Creative Problem Solving learning, (2) to describe the problem solving ability based on self confidence in learning reative Problem Solving and independent learning assisted module, (3) to describe the ability to solve mathematical problems after applying Creative Problem Solving learning and independent learning. assisted by modules, (4) describe the influence of students' self knowledge on problem solving abilities. This study uses mixed methods with concurrent embedded models. The results of this study shown that the planning of learning to obtain the results is quite valid, the implementation of learning is in good category, and the average value of students' problem solving abilities in both classes reaches the minimum completenes criteria and the proportion of students who complete the minimum completenes criteria reaches 75%. Students with high Self confidence have been very good at solving problems with the right steps, students with Self confidence are already good enough in solving problems, students with low Self confidence still have difficulties in solving problems with the correct completion steps. Problem solving abilities after applied Creative Problem Solving learining and independent learning assisted mosules increased by 94,5% and 97,2%. There is an influence of Self confidence on both classes of 4.7% and 4.9%. © 2019 Universitas Negeri Semarang

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INTRODUCTION

The Law of the Republic of Indonesia number 20 of 2003 concerning the National Education System (National Education System Law) formulates the functions and objectives of national education that must be used in developing educational efforts in Indonesia. Education is one of the conscious and systematic efforts in developing the potential of students. Education is also an effort of the people and the nation in preparing their young generation for the better life of the people and nation in the future. Sustainability is marked by the cultural inheritance and character that has been owned by the community and nation. According to Lutviyanti (2013) character education is very important because characters will show self actualization.

The 2013 curriculum implies the need for a paradigm shift in mathematics learning, namely from the teacher's role as the giver to the teacher's role as a learning driver. In the learning process student activities are not enough to just listen and record as is commonly found in schools today, but activities that can result in changes in student attitudes or behavior in the learning process. Learning mathematics requires a process of thinking because it is essentially related to the structure of abstract ideas that are arranged systematically and logically through a process of deductive reasoning. The purpose of learning mathematics is to equip students with mathematical abilities that include the ability to think critically, creatively, reasoning, problem solving, communication, and respect for the usefulness of mathematics. According to Santosa (2013) the ability to solve problems is a basic skill that must be possessed by a person in order to be able to lead a better life.

Parsons (2009) states that one of the students' internal non-cognitive factors is important in learning mathematics, namely self confidence, according to The Report of the Expert Panel on Student Success in Ontario (2004) Self confidence is the key to success for an individual to learn and succeed in mathematics. Self confidence according to Lestari & Yudhanegara (2015) is an attitude of confidence in one's own abilities and seeing oneself as a whole person with reference to self concept. Indicators of self confidence are (1) believe in one's own abilities, (2) act independently in making decisions, (3) have a positive self concept, (4) dare to express opinions. Lack of students' confidence in the ability to do math problems causes low self confidence in students, resulting in low mathematical problem solving abilities. According to Komara (2016) self confidence determines the success of students in their lives. The main form of student confidence in mathematics learning is the interaction of students and teachers as well as students with fellow students (Jurdak, 2009). Teachers and learning methods that are applied in the classroom will have a direct influence on students 'self confidence, when students are faced with challenging situations and pleasant feelings, students' confidence will increase (Jossey-Bass Teacher, 2009).

In addition to self confidence, efforts to improve problem solving abilities are by fostering learning independence for students. Bandura (Sumarno, 2004) defines independence of learning as the ability to monitor one's own behavior, and is the independence of human personality. Bandura suggests there are three steps in learning independence, (1) observing and supervising oneself, (2) comparing one's position with certain standards, (3) giving your own response (negative response or positive response). Students who do not have independence in learning also affect the ability to solve problems. Students are said to have independence in learning if the students: (1) take the initiative to learn with or without the help of others, (2) diagnose their own learning needs, (3) choose and apply learning strategies, (4) evaluate learning outcomes. Learning independence will be grown through learning module that have been designed by researchers.

One learning strategy that is thought to be influenceive in improving mathematical problem solving abllity is through Creative Problem Solving learning. Hayes (James and Adewale, 2013) states that the problem is said to exist when there is a gap between the current state and the desired goal, but does not know clearly how to bridge the gap. According to Lestari & Yudhanegara (2015) Creative Problem Solving is a variation of learning problem solving with systematic techniques in organizing creative ideas to solve a problem. The stages of the Creative Problem Solving model are, (1) students are grouped into several heterogeneous groups, (2) learning begins with an actual problem in accordance with the subject matter through oral question and answer, (3) students in the group identify problems that available in group worksheets (in this study using modules) with selected focus, (4) students in groups identify thoughts so that original ideas emerge to determine solutions, (5) presentations made by a representative student from the group, (6) group discussion to conclude the study that has been submitted.

In addition to Creative Problem Solving, independent learning can improve students' independence in learning. Independent learning is one of the lessons that individuals do for themselves and that maximum learning results are obtained when students work according to their own pace, are seen as active in carrying out various learning tasks. Independent learning is also interpreted as an individual effort to conduct learning activities on their own or with the help of others based on their own motivation to master certain material or competencies so that they can be used to solve problems encountered in the real world. The steps for self learning are (1) preplanning (the initial activity of the learning process), (2) creating a positive learning environment, (3) developing learning plans, (4) identifying appropriate learning activities, (5) carrying out learning activities and monitoring, (6) evaluating individual learning outcomes.

Efforts to improve problem solving ability are applied by teaching materials that can help in improving problem solving ability. The teaching material in question is a module, according to Nurhasanah (2017) the module can also be designed and arranged systematically that allows students to learn independently. According to Subekti (2016) teaching module is an effort to organize individual teaching that allows the learner to master a unit of lesson material before he switches to the next unit. This character loaded module is designed in such a way as to help students solve mathematical problems, so that their problem solving abilities increase. The characters found in this learning module are the characters of independence, students who use this character charged module are expected to foster independence in learning. Learning independence according to Muhammad Nur (2000) that someone who has knowledge of influenceive learning strategies and how and when to use that knowledge. According to Bistari (2010) value based learning independence depends largely on instructors who condition. According to Riyanto (2016) independence itself will be formed in accordance with the circumstances of the situation and conditions that can affect the formation of independence itself. This module which contains the character of independence will also guide students in understanding problems, controlling the problem solving process, and examining and making generalizations of existing mathematical problems.

Based on the previous description, this study aims to (1) determine the quality of Creative Problem Solving learning, (2) describe the problem solving ability based on Self confidence in Creative Problem Solving learning and independent learning assisted by modules, (3) describe mathematical problem solving ability after Creative Problem Solving learning and independent learning assisted by module, (4) describe the influence of students' self confidence on problem solving abilities.

METHOD

This study uses a combination of research types. According to Creswell (2013) a combination of research methods is a research approach that combines qualitative forms involving philosophical assumptions. The application of qualitative and quantitative approaches by combining the two approaches in a study. The combination model used in this study is a type of concurrent embedded strategy. This strategy can be characterized as a mixed method strategy that applies a stage of collecting quantitative and qualitative data at one time (Creswell, 2013). The selection of this strategy is due to the collection of quantitative and qualitative data in the research conducted simultaneously. This study uses quantitative methods as the primary method and qualitative methods as secondary methods. Concurrent model research embedded in this study begins with the discovery of problems that have been explained in the background of the problem and then formulated the problem formulation. After formulating the problem, the researcher chooses theories that can explain the problem and formulate the research hypothesis. After that, the researcher conducted quantitative data collection followed by qualitative data, but before that was carried out pre-field stage which consisted of, (1) compiling the research design, (2) choosing the research field, (3) arranging permits, (4) field observations, (5) preparing equipment research. Further analysis of quantitative and qualitative data is then presented data of research results and concludes and compiles suggestions related to research.

RESULTS AND DISCUSSION

Tests are carried out by prerequisite tests. Then the students' initial mathematical data is then tested for normality, homogeneity and average similarity to find out that the three classes have the same mathematical abilities, so that the three classes can be used as research samples. Prerequisite test results can be seen in table 1.

Table 1. Prerequisite Test

Prerequisite	Sig	Results
Normality Test	0.099	Data is normally distributed
Homogeneity Test	0.380	Data is homogen
Average Equality Test	0.059	All three classes have the same math ability

The results of the study that Creative Problem Solving learning has good quality, this is shown through the results of the analysis of three stages of learning quality. The first stage is the planning stage, based on the learning media by the three validators and the results of the validation of the learning device can be seen in Table 2.

Tabel 2. Recapitulations of Validation Tests

No.	Device	Average Percentage of Validation Score	Category
1	Syllabus	83.6	Valid
2	Lesson Plain	81.1	Valid
3	Module	80	Valid
4	Test Problem Solving Ability	80	Valid
5	Self confidence Questionnaire	80	Valid
6	Interview Guidelines	80	Valid

The second stage is the implementation stage, based on the results of the analysis of the implementation of Creative Problem Solving learning included in the good category. The following is a summary of the results of the assessment of the implementation of learning can be seen in Table 3.

Table 3. Summary of Assessment of Learning Implementation

Lesson	Average Score	Category
1	3.44	Good
2	3.43	Good
3	3.45	Good
4	3.5	Good

The third stage is the assessment stage. Based on data analysis, it is obtained that the results of the initial mathematical problem solving ability test in the experiment class using Creative Problem Solving learning, independent learning assested module and control classes have reached the minimum completeness criteria. These results can be seen in Table 4.

Table 4. Summary of Initial Mathematical Problem Solving Ability Test

No	Aspect	Experiment Class 1	Experiment Class 2	Control Class
1	Students	37	37	37
2	Average Score	80	79	77
3	Maximum Score	98	91	90
4	Minimum Score	68	71	68
5	Variance	37	24.3	26.1
6	Standard Deviation	6.148	4.936	5.118

The results of the minimum completeness with experiment class 1 and experiment class 2 obtained sig = 0,000 <0,05 or 0% <5%, meaning that the average score of students completeness in experiment class 1 and 2 reached minimum completenes criteria. The completeness test proportion in experiment class 1 and 2 reached 75%. This result is in line with the research that has been done by Fitriyantoro (2017) that students who get Creative Problem Solving learning have achieved the minimum completeness criteria.

Students with high Self confidence have very good mathematical problem solving abilities, this is indicated by the acquisition of scores and problem solving with the right steps. Students with self confidence are having good mathematical problem solving ability, this is indicated by solving problems with less precise steps, so that the values obtained are less than optimal. Students with low self confidence have poor mathematical problem solving ability, this is indicated by solving problems with inappropriate steps, having difficulty working on the problem to be the main cause in obtaining a score that is not optimal.

The next result is the ability to solve mathematical problems after applying Creative Problem Solving learning and independent learning assisted by module. Mathematical problem solving ability in both experiment classes has increased, an increase in experiment class 1 and experiment class 2, can be seen in Table 5.

Table 5. Summary of the Results of the Gain Test

Class	Gain Criteria				
	Decline	Constant	Low	Medium	High
Experiment 1	1	1	15	18	2
Experiment 2	0	1	13	23	0

Problemn solving abilities in both classes increased, this was indicated by an increase in grades before learning and after learning to use Creative Problem Solving and independent learning assisted by module, both increased. In the experiment class 1 as many as 35 students experienced an increase after the application of Creative Problem Solving learning, in the experiment class 2 as many as 36 students experienced an increase after the implementation of independent learning assisted by module.

The next result is the influence of self confidence on problem solving ability in classes that receive Creative Problem Solving learning and module assisted independent learning. These results can be seen in Table 6.

Table 6. Summary of Regression Test

CLASS	Sig	STATEMENT
SELF_EXPERIMENT 1	0.047	There are the influence
SELF_EXPERIMENT 2	0.049	There are the influence

Based on the Table 6, obtained sig. in experiment class 1 is 0.047 and in experiment class 2 is 0.049, this sig value is less than 5% so it can be concluded that there is an influence between self confidence and problem solving ability in both classes. Furthermore, an comparative test was carried out in experiment class 1 and the control class obtained sig = 0.046 = 4.6% <5%, meaning that the average mathematical problem solving ability in experiment class 1 was higher than the control class. The second comparative test between experiment class 2 and control class obtained sig = 0.041 = 4.1% <5%, meaning that the mathematical problem solving ability in experiment class 2 was higher than the control class. The last comparative test between experiment class 1 and experiment 2 obtained the value of sig = 0.852 = 85.2%> 5%, meaning that the mathematical problem solving ability in the experiment class 1 is the same as the experiment class 2. But in this case the experiment class 1 is better seen from the average minimum completeness value is experiment class 1 with an average of 80, and experiment 2 with an average of 79. The results of the research described above, indicate that problem solving ability is influenced by self confidence, this is in line with the findings of Sadat (2016), namely there is a significant positive relationship between mathematical problem solving ability and student self confidence.

CONCLUSION

The quality of Creative Problem Solving learning is divided into 3, namely planning, implementing, and evaluating. The quality of the planning stage can be seen from the results of expert validation and the empirical trial that is obtained results are quite valid. The quality of the implementation stage was seen from the observations with the help of the learning implementation sheet, which was obtained with good categories. The quality of the assessment phase was seen from the achievement of the minimum completenes criteria by the average results of the test of the two class problem solving abilities and completeness. The proportion of 75% students completed the minimum completenes criteria. Students with high Self confidence have very good mathematical problem-solving abilities, this is indicated by the correct completion steps. Students with Self confidence are having good mathematical problem solving ability, this is indicated by improper completion steps that affect the value obtained. Students with low self-confidence have poor mathematical problem solving ability, this is due to difficulties experienced so that the resolution steps are less precise.

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