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Mathematic Problem Solving Abilities Based on Students' Self-Efficacy By Mmp Learning The Mic Approach With Local Culture

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Abstract

Problem-solving ability is the ability to solve mathematical problems and is one of the abilities that students must have in order to be skilled in working on math problems. There are factors that support student success in solving problems, including self-efficacy. This study aims to describe the problem solving abilities of students who have high, moderate, high self-efficacy and low seen from the dimensions of magnitude, strength, and generality in mathematics learning with the MMP model with the MiC approach with local cultural nuances.. This research uses a mixed method research type with a concurrent embedded design. Based on the three stages of learning quality, MMP learning with the MiC approach to local culture nuances is quality learning. In the problem solving aspect, students with high self-efficacy were able to understand problems, plan problem solving, implement problem solving plans, and re-examine them with true and complete. Students with moderate self-efficacy are able to understand problems, plan problem solving, but are less able to carry out problem-solving plans and re-check. Students with low self-efficacy are able to understand problems and plan problem solving correctly but incomplete, inadequate in implementing problem-solving plans, and in rechecking, unable to use other methods.

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INTRODUCTION

The ability to solve problems is one of the abilities that students must have in order to be skilled in working on math problems. According to National Council of Mathematical Teachers (NCTM, 2000) there are 5 (five) process skills that students must possess through learning mathematics, including: (1) problem solving; (2) reasoning and proof; (3) connection; (4) communication; and (5) representation. Hendriana et al. (2017: 43) argues that students need to have mathematical problem solving reasons, namely (1) mathematical problem solving is an ability listed in the curriculum and mathematics learning objectives; (2) solving metematic problems includes methods, procedures and strategies which are the core and main processes in the mathematics curriculum or are general objectives of learning mathematics; (3) solving mathematical problems helps individuals think analytically; (4) learning to solve mathematical problems is essentially learning to think, reason, and apply the knowledge that is already owned; (5) solving mathematical problems helps to think critically, creatively, and develop other mathematical abilities.

Bandura defines self-efficacy as a person's judgment on his ability to plan and carry out actions that lead to the achievement of certain goals. Bandura uses the term self-efficacy to refer to beliefs about a person's ability to organize and carry out actions for the achievement of results. In other words, self-efficacy is a self-assessment belief with respect to a person's competence to succeed in his tasks. Pajares and Miller in Michaelides (2008) justify how confident he is to solve problem solving problems. The results of the research obtained by Pajares and Miller in Michaelides (2008) were that students said they were sure they could solve the problem solving problems and were asked if there were other solutions to solve this problem they just kept quiet.. Confidence in his ability (self-efficacy) in providing solutions to problem solving has not been proven. Mukhid (2009) states that self-efficacy is a key factor in the source of human action (human egency), what people think, believe and feel affects how they act.

Based on the observations of researchers when teaching in class X SMAN 1 Kaliwungu, Kendal Regency, it was found that most of the students' ability to solve problems was still low. This can be seen when students are given problem solving problems with trigonometric material in the 2018/2019 academic year, as many as 14 students out of 72 students have difficulty working on these questions and get scores below the minimum completeness criteria (KKM), which is 70. In addition, some students rely more on the answers of their friends who are considered more capable in solving questions. This is because students feel unsure and doubt about their own abilities. Apart from professionalism, the ability of teachers to teach must also be improved for the better. This is in accordance with the statement of Rochmad & Masrukan (2016), that the main support in the success of learning carried out in the classroom is because the teacher uses appropriate, varied learning models, good teaching and good questions.

A teacher is expected to optimize the students' dispositional mental function in a learning by selecting a learning model that was proper to develop the competences of cognitive, affective and conative altogether (Kusmaryono et al, 2018). Learning model that involves active students during the learning process is the cooperative learning model. In cooperative learning, students work in small groups to help each other in learning lessons (Narso, 2013). One of the appropriate models to help develop problem-solving skills with local cultural nuances and student self-efficacy is the MMP learning model with the MiC approach. Students' cooperative and independent learning in the MMP learning model is emphasized. Good & Grouws (Dwiningrat at al, 2014) argues that the MMP Model is a program designed to help teachers in the effective use of exercises so that students achieve extraordinary improvement.

Learning with the culture of Mahen makes it very possible that material learned from their culture can generate learning motivation and understanding of material by students becomes easier because the material is directly related to their culture which is their daily activity in society (Mahendra, 2017). Building cultural heritage and non-cultural heritage and traditional food, as well as the use of units of measure, mathematical modeling, and use of symbolic clocks in rural communities are related to mathematical concepts such as association, symmetry, statistics, social arithmetic, and geometry (Dwidayati, 2018). Ethnomathematic forms or local cultures can be integrated into mathematics teaching and learning activities at both the primary and secondary levels (Zaenuri & Dwidayanti, 2017).

The formulation of the problems in this study are (1) what is the quality of mathematics learning with the MMP model with the MiC approach with local cultural nuances in improving problem solving skills? (2) how can students' problem-solving abilities be viewed from self-efficacy in mathematics learning with the MMP model with the MiC approach with local cultural nuances?. This study aims to describe the problem solving abilities of students who have high, moderate, high self-efficacy and low seen from the dimensions of magnitude, strength, and generality in mathematics learning with the MMP model with the MiC approach with local cultural nuances.

METHOD

The method used in this research is the mix method. The combination design used in this study is a concurrent embedded type. The combination method or concurrent embedded design (unbalanced mixture) is a research method that combines qualitative and quantitative research methods by mixing the two methods unequally (Sugiyono, 2013). The population of this study were students of class X MIPA SMAN 1 Kaliwungu, Kendal Regency, 2018/2019 academic year. The X MIPA classes in SMAN 1 Kaliwungu, their homogeneity and normality were tested, after homogeneity, 2 classes were taken randomly as samples. The technique of determining the quantitative research sample is based on random sampling. From these techniques, you can get class X MIPA 1 as an experimental class and class X MIPA 4 as a control class. In qualitative research, research subjects focused on class X MIPA 1, namely the class that was subjected to MMP learning with the MiC approach. In this study, 6 students were taken as research subjects based on various levels of self-efficacy, consisting of 2 students with high self-efficacy, 2 students with moderate self-efficacy, and 2 students with low self-efficacy.

Sources of data in this study were students obtained from self-efficacy inventories, self-efficacy observations, problem-solving abilities tests, and interviews. A total of 34 students of class X MIPA 1 determined their self-efficacy based on the self-efficacy inventory score before learning. During learning, self-efficacy observations were carried out on research subjects. Students' answers to the problem solving ability test (TKPM) were analyzed and the research subjects were interviewed as triangulation. The quantitative data were tested using the normality test, homogeneity test, mastery test, and average difference test. Meanwhile, qualitative data analysis is done by reducing data, presenting data, and drawing conclusions from the data that has been collected and verifying these conclusions.

RESULTS AND DISCUSSIONS

The results of the learning device validation are listed in table 1 below.

Table 1. Validation Results of Learning Devices

Learning Media	Validator Code	Average Score	Category
Syllabus	V1, V2, V3, V4	4.81	Very good
RPP	V1, V2, V3, V4	4.85	Very good
Student Book	V1, V2, V3, V4	4.53	Very good
LKS	V1, V2, V3, V4	4.72	Very good

From table 1, it can be concluded that the average score for all the assistance tools is 4.73 which is in the very good category, so that the mentoring tools that have been prepared are suitable for use in research.

The results of the research instrument validation are presented in table 2 below

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Table 2 Results of Research Instrument Validation

Instrumen Penelitian	Kode Validator	Rata-Rata Skor	Kategori
Soal TKPM	V1. V2	4.5	Sangat Baik
Pedoman Wawancara KLM	V1. V2	4.5	Sangat Baik
Angket Self Efficacy	V1. V2	4.67	Sangat Baik

From table 2, it can be concluded that the average score for the instrument is 4.56 with a very good category, so the instrument that has been prepared is feasible for use in research.

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The recapitulation of data from the observation of learning implementation is listed in Table 3 below

Table 3. Observation Results of learning implementation

Meeting to	Average Score	Presentation experiments	Criteria	Average Score	Presentation Control	Criteriaa
1	4.13	82.67 %	Good	4.33	86.67 %	Very good
2	4.33	86.67 %	Very good	4.2	84 %	Very good
3	4.23	84.67 %	Very good	4.3	86 %	Very good
4	4.4	88 %	Very good	4.4	88 %	Very good
5	4.23	84.67 %	Very good	4.2	84 %	Very good

From table 3, it can be concluded that the average score of the researcher's skills in managing the experimental and control class learning is in the very good category. This shows that the learning carried out in the research is in accordance with the lesson plan.

The problem solving ability test (TKPM) in this study is a test that is used to determine students' problem solving abilities in trigonometric material. The average TKPM value for the experimental class and control class is presented in the following figure.

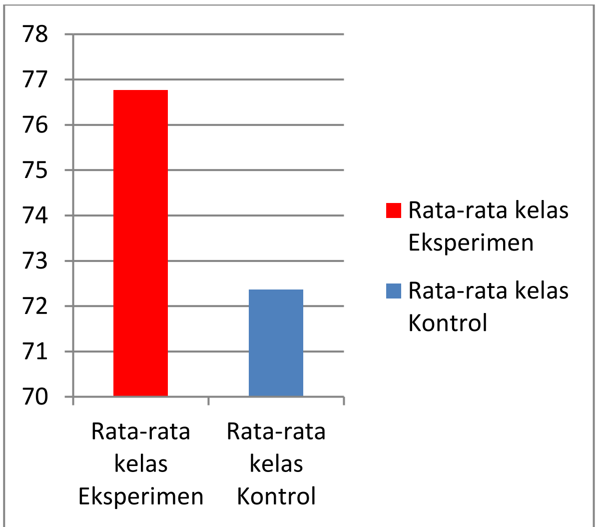

Figure 1. Average TKPM value

Based on the results of the calculation of classical learning completeness of the experimental class using the proportion test obtained $z_{count} =$ 1,78. At $\alpha = 5$ % get $z_{table} = z_{(0,5-0,05)} = z_{0,45} =$ 1,64. Because $z_{count} > z_{table}$, then H1 is accepted. So it can be concluded that the problem solving ability of the experimental class students who have reached the minimum completeness criteria, namely 70, reaches more than 75%. Based on the results of the calculation of individual learning completeness in the experimental class using the Student t distribution test, it is obtained tcount 4,6801. At α = 5 % and dk = 32, earned value t(0,95)32 is 1,694. Because tcount > t(1-α),dk, then H1 is accepted. So it can be concluded that the average problem solving ability of students from the experimental class is more than 70. Based on the results of the calculation of the proportion of the completeness test of the problem solving ability of the experimental class and the control class, the value is obtained zcount is 1,6740. At α 5% earned value z(0,5-α) is 1,64. Zcoun ≥ z(0,5-α), then H1 is accepted. So, the proportion of completeness of students in the experimental class is more than the proportion of students in the control class. Based on the results of the calculation of the difference test, the average problem-solving ability test results were obtained t_{count} = 2,2850. The real level 5% and $dk = 68$ obtained $t_{table} = 1{,}668$. Because $t_{count} > t_{table}$ then H1 is accepted. Therefore it can be concluded that the problem solving ability of the experimental class students is higher than the students in the control class. Based on the results of the calculation of the increase in student self-efficacy test before and after MMP learning with the MiC approach to local culture using a normalized gain test, the value of G = 0.12 was obtained, so it was concluded that the student's self-efficacy increased with low criteria.

The MMP learning model of the MiC approach is effective in problem solving skills with nuances of local culture. This is because (1) the percentage of students in MMP learning has reached completeness, which is 70 more than 75%; (2) the average mathematical problem solving ability of the experimental class was more than 70; (3) the proportion of completeness of students in the experimental class is more than the proportion of students in the control class; (4) the average TKPM results with local cultural nuances to measure the problem solving abilities of students who are subjected to MMP learning with the MiC approach are better than students who are subject to conventional learning; (5) students' self-efficacy before and after MMP learning with local cultural nuances has increased. The results of this study are in line with the results of research by Dwiningrat et al (2014) which showed that the average problem-solving ability of students who were taught using the MMP learning model was better than the average student taught using conventional learning. This shows a difference in problem-solving abilities between the two groups.

Students' problem solving abilities with high self-efficacy at the stage of understanding the problem state what information is known, asked, and the concept of solution used to solve the problem. At the stage of planning problem solving, students can make mathematical forms of the cases submitted correctly and correctly. Plan solving problems properly.

At the stage of implementing the problem-solving plan, being able to carry out the problem-solving plan according to the plan, being able to do calculations, and writing down final conclusions correctly and completely. At the reexamination stage, students who have high self-efficacy are able to check again by counting backwards, researching / rereading the steps taken and writing conclusions correctly and are able to use other methods.

Students' problem solving abilities with high self-efficacy at the stage of understanding the problem state what information is known, asked, and the concept of solution used to solve the problem. At the stage of planning problem solving, students can make mathematical forms of the cases submitted correctly and correctly. Planning problem solving correctly. The following is an example of student work results with high self-efficacy in implementing problem-solving plans.

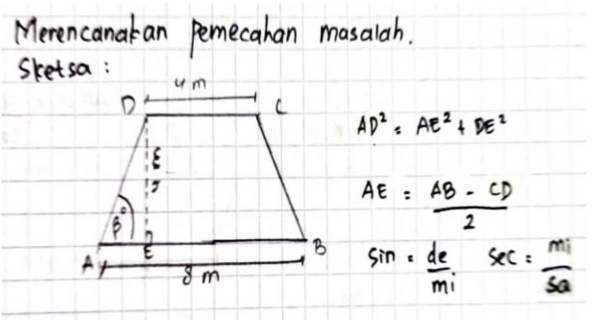

Figure 2.Examples of Student Work Results with High Self-Efficacy in Implementing Problem Solving Plan Problem Number 1.

At the stage of implementing the problem-solving plan, being able to carry out the problem-solving plan according to the plan, being able to do calculations, and writing down final conclusions correctly and completely. At the reexamination stage, students who have high self-efficacy are able to check again by counting backwards, researching / rereading the steps taken and writing conclusions correctly and are able to use other methods. The following is an example of student work results with high self-efficacy in checking again.

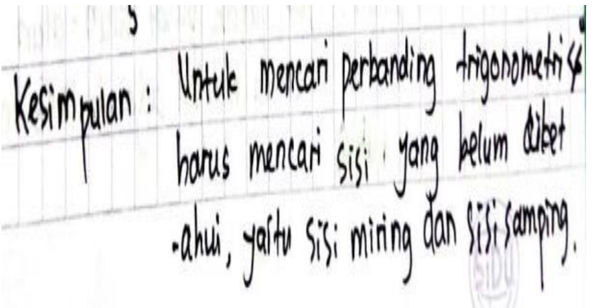

Figure 3. Examples of Student Work Results with High Self-Efficacy in Re-checking Problem Number 1.

Students' problem-solving abilities with moderate self-efficacy are at the stage of understanding the problem. Students can state the information that is known, the problem being asked, and the concept of solving problems correctly, precisely, and completely. At the planning stage of problem solving, students can make mathematical forms of correctly and precisely filed cases. Planning problem solving correctly. The following is an example of student work with medium self-efficacy in implementing problem-solving plans.

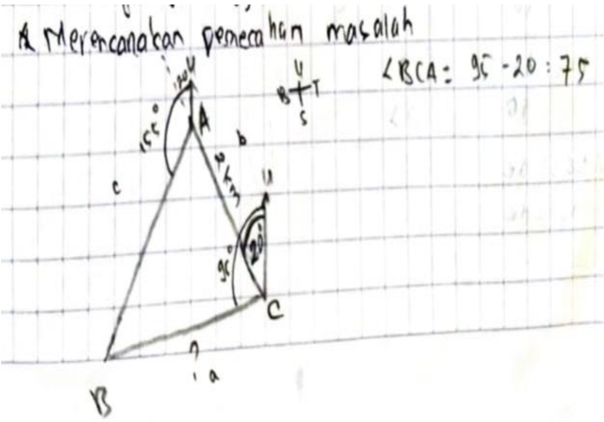

Figure 4.Examples of Student Work Results with Medium Self-Efficacy in Implementing Problem Solving Plan Problem Number 4.

At the stage of implementing the problem-solving plan, students can actually carry out the problem-solving plan but are wrong when determining the trigonometric value. At the re-examination stage, students who have intermediate self-efficacy can solve problems according to the planned concept, then make final conclusions but cannot explain in detail the reasons or basis for the conclusions of the solutions they make.

Students' problem solving abilities with low self-efficacy at the stage of understanding the problem, students mention what information is known, asked, and the concept of solving used to solve the problem. At the stage of planning problem solving, students can make mathematical forms of the cases submitted correctly and accurately but have not planned problem solving until what is asked. The following is an example of student work results with low self-efficacy in implementing problem-solving plans.

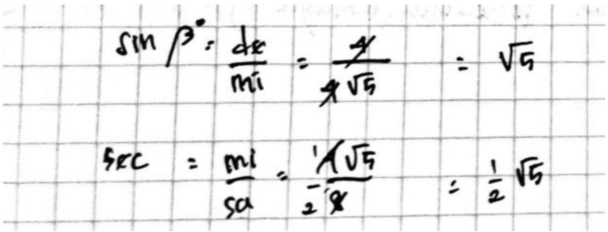

Figure 5.Examples of Student Work Results with Low Self-Efficacy in Implementing Problem Solving Plan Problem Number 1.

At the stage of implementing the problem-solving plan, students cannot carry out problem-solving planning because they have not been able to plan problem solving correctly. At the rechecking stage, students cannot plan problem solving and implementation of problem-solving plans so that they cannot make final conclusions and check again.

CONCLUSION

The results showed that: a) students with high self-efficacy are able to understand problems, plan problem solving, implement problem-solving plans, and re-check correctly and completely, b) students with medium self-efficacy are able to understand problems, plan solvers problem, not implementing the problem-solving plan correctly and completely, not being able to re-check, and c) students with low self-efficacy are able to understand problems and plan problem solving correctly but are incomplete, unable to carry out problem-solving plans and re-check .d.

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