

Differences in Mathematical Representation Ability and Self-Efficacy of Students Given the Problem Based Learning Model the Missouri Mathematics Project at Bagan Sinembah Senior High School

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Abstract
The purpose of this study is to: (1) analyze the difference in the mathematical representation ability of students who are given the *problem based learning* and students who are given the *missouri mathematics project*, (2) analyze the difference *in self-efficacy* of students who are given the *problem based learning* model and students who are given the *missouri mathematics project*, (3) analyze the interaction between the learning model and the initial mathematical ability of students' mathematical representation abilities, (4) analyze the interaction between the learning model and the initial ability of mathematics on *self-efficacy* students. This research is a quasi-experimental research. The population of this study were all students of class X Senior High School 2 Bagan Sinembah and the sample of this study were students of class X-1 and X-3, each totaling 30 students. The instrument used consisted of a mathematical representation ability test and a *self-efficacy* student. Data analysis was performed using two-way ANOVA. The results of the study show that (1) There are differences in the mathematical representation ability of students who are given a *problem based learning* and students who are given a *missouri mathematics project,* (2) There are differences *self-efficacy* of students who are given the *problem based learning* model and students who are given the *missouri mathematics project*, (3) There is no interaction between the learning model and the initial mathematical ability of the students' mathematical representation ability, and (4) There is no interaction between the learning model and the initial ability of mathematics on *self-efficacy* students.
Keywords : Problem Based Learning, Missouri Mathematics Project, Mathematical Representation Ability, and Self-Efficacy.
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1. Introduction

Education is a need for every human being to support his life. Through a good education, humans can open their horizons and live a better life. Education is also the key to all abilities and quality development because with education, humans can develop their potential to become better multiple competencies. This is in accordance with Law No. 20 of 2003 concerning National Education in Article 3 (Suwartini, 2017: 221), which states that national education functions to develop capabilities and shape the character and civilization of a dignified nation in order to educate the nation's life. National education aims to develop the potential of students to become human beings who believe and fear God Almighty, have noble character, are healthy, knowledgeable, handsome, creative, independent and become democratic and responsible citizens.

The success of educational programs through the teaching and learning process in schools as formal educational institutions is strongly influenced by several factors, namely: students, curriculum, education staff, costs, facilities and infrastructure as well as environmental factors. If these factors can be met, it will certainly facilitate the teaching and learning process, which will support the achievement of maximum learning outcomes which will ultimately improve the quality of education.

One of the subjects that have an important role in aspects of life in realizing educational goals is mathematics. Because mathematics is one of the main subjects taught starting from formal education, elementary to high level. Mathematics is also a universal science that underlies the development of modern technology, has an important role in various disciplines and develops the power of human thought.

Unfortunately, in general, the results of learning mathematics in Indonesia have not achieved encouraging results. This is evident from the results of the Trends in Mathematics and Science Study (TIMSS) survey and the Program for International Student Assessment (PISA) with an average international score = 500 and a standard deviation = 100 in Indonesia. The low mathematical communication skills of students are also supported by the results of an international survey. The Trend International Mathematics and Science Study (TIMSS). From the results of the TIMSS international survey in 2011, Indonesia is ranked 38th out of 63 in learning mathematics. Aspects assessed in mathematics are knowledge of facts, procedures, concepts, application of knowledge and understanding of concepts. According to reports on the results of international studies 47%. When compared to other countries, Indonesia's ability to translate questions into the language of mathematical ideas, diagrams or graphs is still below the average (TIMSS, 2011).

The low quality of education as mentioned above must be corrected, because mathematics is a basic science that is useful in everyday life. In addition, a nation that wants to be able to master science and technology well needs to prepare personnel who have sufficient knowledge of mathematics. Therefore, mathematics in schools must be able to strive so that students can develop the ability to think, reason, communicate ideas and can develop creative activities and problem solving. This is in line with what NCTM (2000: 29) stated. The standard abilities that must be achieved in learning mathematics include: (1) problem solving (problem solving); (2) reasoning and proof (reasoning and proof); (3) communication (communication); (4) connections (connections); and (5) representation.

Referring to one of the standard processes, namely the ability of mathematical representation is an ability that must be possessed by students. Mathematical representation ability is a very important ability for students to understand mathematical problems and solve them in ways they know and are able to express their mathematical ideas or ideas in an effort to find a solution to the problem they are facing.

Cai, Lane, & Jacabcsin (2013: 243) state that the various representations that are often used in communicating mathematics include: tables, pictures, graphs, mathematical statements, written text, or a combination of all of them. Meanwhile, Hiebert & Carpenter (Sabirin, 2014: 34) argue that basically representation can be distinguished in two forms, namely internal representation and external representation. Thinking about mathematical ideas which are then combined requires external representations whose forms include: verbal, pictures and concrete objects. Thinking about a mathematical idea that allows one's mind to work on the basis of that idea is an internal representation.

From the description above, it can be concluded that representation is a form of interpretation of students' thoughts on a problem faced and is used as a tool in finding solutions to these problems. The form of student interpretation can be in the form of words or verbal, writing, pictures, tables, graphs, concrete objects, mathematical symbols and others.

As one of the process standards, the NCTM (Sabirin, 2014: 36) sets representation standards that are expected to be mastered by students during learning at school, namely: (1) creating and using representations to recognize, record or record, and communicate mathematical ideas; (2) selecting, applying, and translating between mathematical representations to solve problems; (3) using representations to model and interpret physical, social, and mathematical phenomena.

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But in fact, from the results of the researchers' initial observations by submitting a test that measures the ability of mathematical representation which contains 1 math problem with the proposed material, namely Circles for students of SMA Negeri 2 Bagan Sinembah class X, it can be seen that students' mathematical representation abilities are still low. This was found from the results of the researchers' initial observations by giving a representation ability test to 30 students with the characteristics of the question, namely asking students to explain the procedure for solving the problems given.

From the results of the student's answer process, it was found that there were 4 students (13.3%) who answered correctly according to the indicators, while 23 students (76.7%) gave wrong answers that did not match the representation ability indicators, namely the answer process which was seen that students are not able to describe the circle in solving problems, students still have difficulty in writing mathematical expressions and students have not been able to interpret it into the correct mathematical language on the problems that have been listed. Furthermore 3 students (10%) who did not answer at all

From the results of the explanation above, it can be concluded that the process of completing the answers of SMA Negeri 2 Bagan Sinembah students who were given a mathematical representation ability test in every aspect of representation was still in the very low category. Based on the observations made, it can be seen that students are still not able to describe graphs in solving problems, students still have difficulty representing problems into mathematical symbols and students have not been able to interpret them into the correct mathematical language when writing down what is known and also what is asked in the question. which has been listed. This agrees with the research of Suningsih & Istiani (2021: 225) which illustrates that the problem in this study is the low results of students' daily tests caused by the low mathematical representation skills of students, this can be seen from the results of the analysis of answer sheets and interviews of 23 students, it can be concluded if the student's achievement on the visual representation indicator is 65.2%, the expression and equation representation indicator is 43.5% and the word representation indicator is 41.2%. This shows that students' mathematical representation skills still need to be considered to be improved.

In addition to the ability to represent, another important aspect that must be considered in the process of learning mathematics is the affective aspect. Referring to Bloom's taxonomy, mathematical skills cover the cognitive, affective and psychomotor domains (Arikunto, 2018). Therefore, in addition to the cognitive aspect, namely the ability of students' mathematical representation, the influence of the affective aspect, namely the psychological aspect related to students' self as well as supporting success in the learning process, is more specific in terms of completing tasks in the form of mathematical representation problems that require perseverance and tenacity.

Mahmudi (Muliawati, 2020: 32) states that "Mathematics learning is not only intended to develop mathematical cognitive abilities but also the affective realm". This is something that is sometimes overlooked by some teachers in schools. According to Goldin (Gagatsis, 2009: 64) affective ability is a complex system and consists of four main components, namely emotions, attitudes, values and beliefs. The cognitive aspect, namely the ability of mathematical representation with the affective aspect, has a different relationship from each student which affects his ability to solve problems, due to differences in emotional reactions. The results of Rosa's research (2015: 24) state that the relationship between affective abilities and cognitive abilities is 70%. So it can be seen that the cognitive domain has a relationship with the affective domain.

In this study, researchers focused on the dimensions of belief, especially on students' self-confidence. According to Simanungkalit (2015: 5) says that self-efficacy is a psychological aspect that has a significant influence on student success in completing assignments and good problem-solving questions. The ability to assess himself accurately is very important in doing assignments and the questions asked by the teacher, with self-confidence or self-confidence can make it easier for students in these assignments, even more so that they can improve their achievements. In relation to problem solving, self-efficacy has a function as a tool to assess student success in solving problem solving problems.

Based on the results of interviews conducted by researchers with one of the teachers at SMA Negeri 2 Bagan Sinembah, namely Mr. RAS about students' self-efficacy towards learning mathematics, the results showed that when learning took place, students still felt less confident to express their opinions, students tended to give up and lazy to solve non-routine math problems. Students are also afraid/anxious when the teacher asks students to present their answers in front of the class. This makes students tend to be passive and afraid to try to solve math problems.

The self-efficacy of students is still relatively low based on the results of initial observations made by researchers by providing a self-efficacy questionnaire in the form of a closed-scale questionnaire containing 5 statement items with answer choices strongly agree (SS), agree (S), disagree (TS) and strongly disagree (STS) with indicators based on sources that affect self-efficacy in class X students of SMA Negeri 2 Bagan Sinembah, totaling 30 students

The low ability of mathematical representation and self-efficacy of students is caused by many factors, including the learning used by the teacher is less varied and less attractive, causing students to be less interested in receiving the material presented by the teacher. Or in other words, active and interesting learning has not been implemented, such as the problem based learning model and the missouri mathematics project. Generally, students are accustomed to doing learning activities in the form of memorizing without being accompanied by the development of mathematical representation abilities and students' self-efficacy in the learning process

One effort that can be done to overcome this is by developing a learning model that actively trains students' mathematical representation abilities and self-efficacy. The learning model that can be applied is problem based learning, which is a learning model that uses problems as a starting point for learning. Problems that can be used as learning tools are problems that meet the real world context that is familiar with students' daily lives. Nurhadi (Wahyuni, 2014: 4) said problem based learning is a teaching that uses real-world problems as a context for students to learn about critical thinking and problem solving skills, as well as to acquire essential knowledge and concepts from problem based learning learning materials beginning with by giving students complex problems, thus providing opportunities for students to explore students' abilities and habits in solving a mathematical problem.

In addition to the problem based learning model, the missouri mathematics project learning model is also a learning model that can improve students' mathematical representation skills. The missouri mathematics project learning model is a model that was developed based on the constructivism view. This model emphasizes the importance of understanding the structure by developing ideas and expanding mathematical concepts accompanied by practice questions both in groups and individually as well as a combination of teacher activities and student activities. In this missouri mathematics project learning model, students are given the opportunity and the freedom to think in groups in solving problems given by the teacher related to learning materials.

In accordance with the student centered learning model, the Missouri mathematics project learning model is quite effective and efficient because this learning model combines all components, namely student activity, teacher skills, both of which will greatly affect student learning outcomes. Furthermore, through the missouri mathematics project learning model, it is hoped that it can improve students' mathematical representation abilities and self-efficacy, so that it is hoped that there will be an increase in student learning outcomes towards a better direction, and students will continue to feel the benefits.

Based on the above background, it is felt that it is necessary to find out whether the problem based learning model and the missouri mathematics project learning model have different contributions to students' mathematical representation abilities and self-efficacy. This prompted a study entitled: "The Differences in Mathematical Representation Ability and Self-Efficacy of Students Given the Problem Based Learning Model and the Missouri Mathematics Project Learning Model at Bagan Sinembah Senior High School ".

2. Research Method

Types of research

This research is a quasi-experimental study (quasi-experimental) which is used to determine the differences in students' mathematical representation abilities and self-efficacy through problem based learning and missouri mathematics project learning models in class X SMA Negeri 2 Bagan Sinembah.

Research Subjects and Objects

The subjects in this study were class X students of SMA Negeri 2 Bagan Sinembah. Meanwhile, the objects in this study were problem based learning and mathematics project learning models with students' representational abilities and self-efficacy.

Data analysis

Device and Instrument Validation.

Before conducting research, it is necessary to validate the instruments that were previously validated by experts to consider things in the form of deficiencies that may not be detected. This is done to see the validity of the devices and instruments. After the instrument is feasible to use, it is then ready to be tested on students who are outside the research sample who have studied Trigonometry material.

Research Implementation

After being validated by experts, the research applied problem based learning in the experimental group I and the missouri mathematics project learning in the experimental group II. Implement all the tools that have been prepared. Applying the learning model as many as 4 meetings in each experimental class I and experiment II in accordance with the lesson plans that have been prepared.

After the research was completed, data analysis was carried out. Data were analyzed by inferential statistics. Furthermore, statistical tests were carried out to see the differences in students' mathematical representation abilities and self-efficacy in the application of problem based learning and learning mathematics project. The description of the research procedure described above is presented in Figure 1 below:

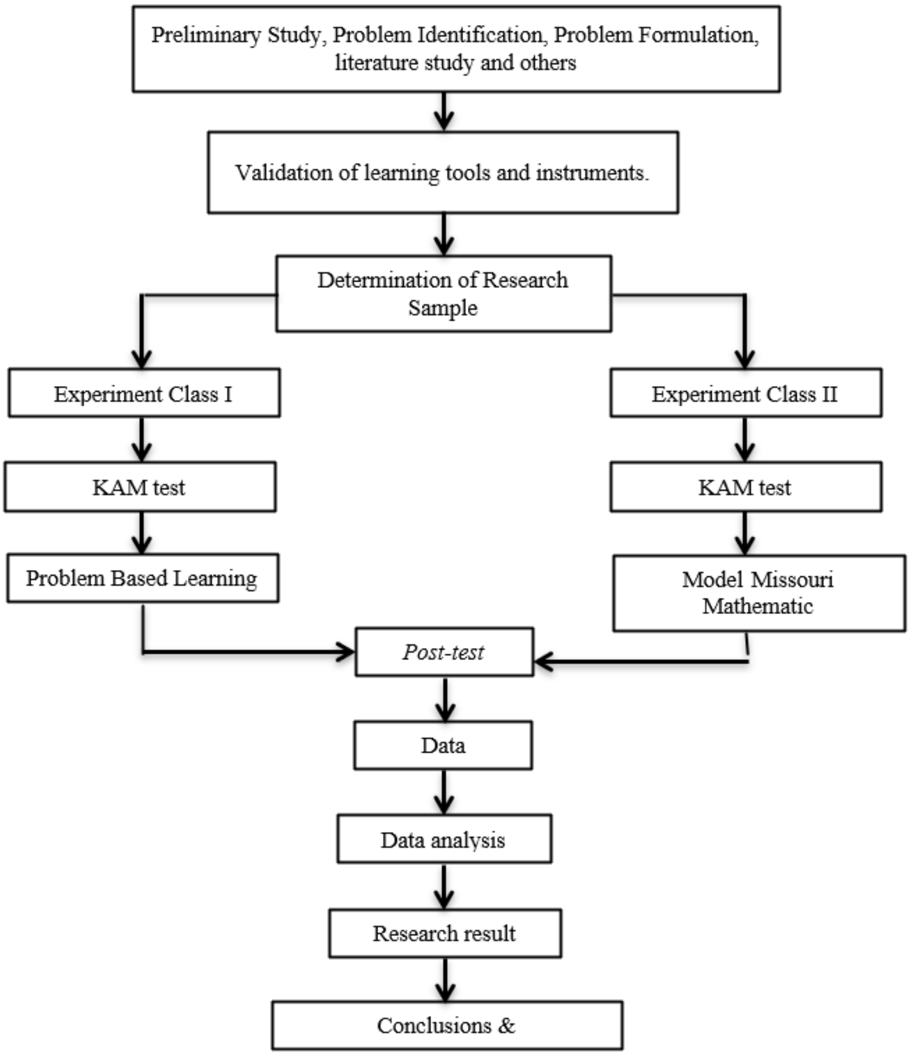

Figure 1 Research Procedure

Data Collection Instruments and Techniques

Student's Mathematical Representation Ability Test

The data collection tool used in this study is a mathematical representation ability test after being taught using the problem based learning model and the Missouri mathematics project. The test is used to measure students' mathematical representation ability. The test is given after the learning process is complete with the aim of seeing the difference in students' mathematical representation abilities after being given treatment. The mathematical representation ability test instrument was developed from the material or teaching materials on the subject of Trigonometry (measurement of angles, trigonometric ratios and trigonometric ratios on special angles). The question instrument consists of 5 items in the form of a description.

Self-efficacy Questionnaire

The use of student self-efficacy questionnaires aims to find out how students' self-efficacy is. The attitude scale model used is the Likert attitude scale model. This Likert scale is used to measure attitudes, opinions, and perceptions of a person or group of people about social phenomena (Sugiyono, 2013: 134).

This attitude scale was given to students in the experimental class I and experiment II after carrying out the learning (post-test). On the Likert scale, the answers to each instrument have a gradation from very positive to very negative (Sugiyono, 2013: 135). This study consisted of 24 statements with four answer choices, namely SS (Strongly Agree), S (Agree), TS (Disagree), STS (Strongly Disagree), without a neutral choice.

Expert Validation of Learning Tools

The validation carried out on learning tools is intended to produce appropriate tools. Based on the results of the expert assessment, a revision was made to the learning device. Suggestions from validators are used to improve learning tools. The learning tools in this research are the Learning Implementation Plan , Student Worksheets and Instruments.

Validation of learning tools includes content, format, language, illustrations and the suitability of Trigonometry material (measurement of angles, trigonometric ratios, and trigonometric ratios at special angles) with problem based learning and missouri mathematics project learning models. The results of expert validation of learning tools must be included in the "good" criteria.

Expert Validation of Research Instruments

The validation of the research instrument also focused on the content, format, language, and suitability of the materials and learning models used, namely the problem based learning model and the missouri mathematics project learning model. The validation of the research instrument was carried out on the mathematical representation ability test instrument and a self-efficacy questionnaire.

Data collection technique

In this study, the analysis used is quantitative (inferential) analysis. At the initial stage, data processing begins with descriptive analysis, namely calculating the average, standard deviation, maximum and minimum values of the initial mathematical ability test data, mathematical representation ability tests and student self-efficacy. The second stage of post-test data is tested using the requirements analysis test, the third stage is hypothesis testing

Normality test

Normality test is a test performed as a requirement to perform data analysis. The normality test was carried out before the data was processed based on the proposed research methods. The normality test was carried out to determine whether the distribution of the data was normally distributed or not. The normality of the data is needed to determine the difference between the two mean tests to be investigated.

Homogeneity Test

The homogeneity test was carried out to obtain the assumption that the research sample came from the same or homogeneous conditions. To see that the two tested classes have the same basic ability, first, the variance similarity is tested. The homogeneity test of the data used to see the homogeneity of the research data is the Levene's test with the help of the SPSS version 22.0 program

Research Statistics Hypothesis Test

To test the whole hypothesis, it was done using a two-way ANOVA test. Two-way ANOVA is an inferential statistical test that can be used to determine the interaction between two factors with one dependent variable of internal type or the ratio of several independent variables of nominal or ordinal type.

3. Research result

The research results obtained data consisting of test data, post-test data on mathematical representation abilities, and student self-efficacy data. To answer the problem formulation, a description of the students' initial mathematical abilities before treatment and mathematical representation abilities (post-test) and student self-efficacy questionnaires after treatment will be discussed.

Description of Student KAM Test Results

The students' initial mathematical ability was measured through the data that had been collected based on the KAM test that had been given to the two experimental classes. The summary results of the average and standard deviation of KAM are presented in table 1 below:

Table 1 Description of Student KAM Test Results

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
KAM_Eksperimen_I	30	50	85	68,17	10,866
KAM_Eksperimen_II	30	50	85	66,67	10,114
Valid N (listwise)	30				

Next, the students' initial mathematical abilities (high, medium, and low) were grouped based on the students' KAM scores. If the value of KAM≥x + SD, then the student is in the high student group. If the KAM score is between less than x +SD and more than x -SD, then students are in the medium group. If the value of KAM≤x - SD, then students are in the low group

Normality Test of KAM Tes Test Data

One of the requirements in quantitative analysis is the fulfillment of the assumption of normality of the distribution of the data to be analyzed. The normality test of the data used in this study used the Kolmogorov – Smirnov test with the help of the SPSS version 22.0 program.

The results of the calculation of the normality test with the help of SPSS version 22.0 are in table 2

Table 2 Normality Test Results of KAM . Test Scores
Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
KAM_Eksperimen_I	,129	30	,200*	,942	30	,101
KAM_Eksperimen_II	,132	30	,192	,956	30	,249

*. This is a lower bound of the true significance.
a. Lilliefors Significance Correction

Description of Post-Test Results of Students' Mathematical Representation AbilityDescription of Post-Test Results of Students' Mathematical Representation Ability

After applying the learning model to each experimental class, a post-test of mathematical representation skills was given to determine the extent to which students' ability to represent mathematical problems was given after learning. The post-test results for both classes are described in table 3

Table 3 Description of the Post-test Results of Students' Mathematical Representation Ability
Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
KRM_Eksperimen_I	30	62	92	78,57	7,605
KRM_Eksperimen_II	30	50	80	59,63	6,975
Valid N (listwise)	30				

Post-test Data Normality Test of Students' Mathematical Representation Ability

The normality test is intended to see whether the post-test score data of students' mathematical representation abilities in both classes are normally distributed or not. The normality test of the data used in this study used the Kolmogorov – Smirnov test with the help of the SPSS version 22.0 program.

The results of the calculation of the normality test with the help of SPSS version 22.0 are in table 4 below:

Tabel 4.Hasil Uji Normalitas Skor *Post-test* Kemampuan Representasi Matematis Siswa
Tests of Normality

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
KRM_Eksperimen_I	,153	30	,071	,950	30	,164
KRM_Eksperimen_II	,146	30	,104	,935	30	,067

a. Lilliefors Significance Correction

ANOVA Statistical Analysis Two Paths Students' Mathematical Representation Ability

After the prerequisite test is met, namely the sample comes from a population that is normally distributed and has a homogeneous variance, then a two-way ANOVA test is carried out to test hypothesis 1 and hypothesis 3.

The hypothesis testing that has been formulated is analyzed using Two-Way Analysis of Variance using F statistics with predetermined formulas and criteria. The results of the calculation of the analysis of hypothesis testing using the help of the SPSS version 22.0 program can be seen in table 5 below:

Table 5 ANOVA Test Results Two Paths of Mathematical Representation Ability
Tests of Between-Subjects Effects

Dependent Variable: Students' Mathematical Representation Ability

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	6365,751[a]	5	1273,150	32,744	,000
Intercept	213932,652	1	213932,652	5502,045	,000
KAM	904,430	2	452,215	11,630	,000
Pembelajaran	3798,231	1	3798,231	97,685	,000
KAM * Pembelajaran	21,108	2	10,554	,271	,763
Error	2099,649	54	38,882		
Total	294954,000	60			
Corrected Total	8465,400	59			

a. R Squared = ,752 (Adjusted R Squared = ,729)

In the KAM*Learning factor, F_hitung=0.271<F_tabel=3.17 with sig.=0.763, meaning that the value is sig>0.05, so H_0 is accepted, which means there is no interaction between the learning model and early math skills on students' mathematical representation abilities. This can also be described in Figure 2 below:

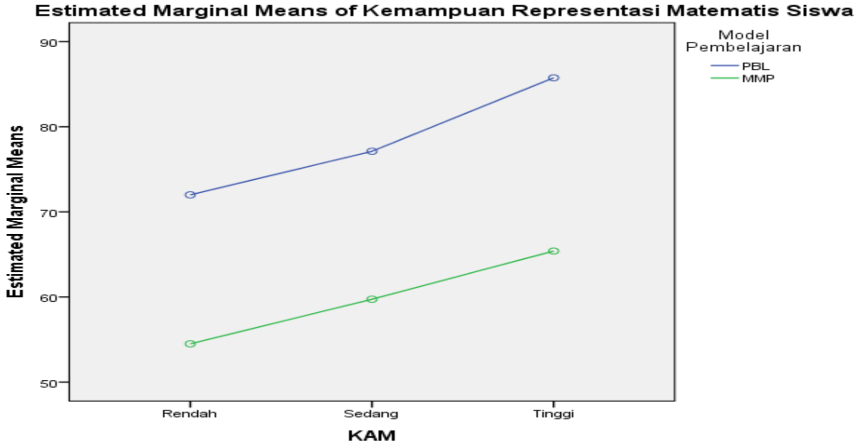

Figure 2 Interaction between Learning Model and KAM on Students' Mathematical Representation Ability

Description of Student Self-efficacy Questionnaire Results

After being treated with the application of the learning model in the two experimental classes, a student self-efficacy questionnaire was given to see how much confidence the students had after being treated with the application of the learning model.

The description of students' self-efficacy results after being given treatment is presented in table 6

Table 6 Description of Student Self-efficacy Questionnaire Results

Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
SE_Eksperimen_I	30	73	91	82,33	4,513
SE_Eksperimen_II	30	72	88	79,03	4,047
Valid N (listwise)	30				

Statistical Analysis of Two Paths ANOVA Student Self-efficacy

After the prerequisite test is met, namely the sample comes from a population that is normally distributed and has a homogeneous variance, then a two-way ANOVA test is carried out to test hypothesis 2 and hypothesis 4.

Table 7 ANOVA Test Results Two Paths of Student Self-Efficacy

Tests of Between-Subjects Effects

Dependent Variable: Self-Efficacy Student

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	239,190[a]	5	47,838	2,610	,035
Intercept	293736,331	1	293736,331	16025,326	,000
KAM	73,289	2	36,644	1,999	,145
Pembelajaran	163,112	1	163,112	8,899	,004
KAM * Pembelajaran	6,330	2	3,165	,173	,842
Error	989,793	54	18,330		
Total	391817,000	60			
Corrected Total	1228,983	59			

a. R Squared = ,195 (Adjusted R Squared = ,120)

In the KAM*Learning factor, $F\_count=0.173<F\_table=3.17$ with sig.=0842, meaning sig>0.05, so H_0 is accepted, which means that there is no interaction between the learning model and early math skills on students' self-efficacy. This can also be described in Figure 3 below:

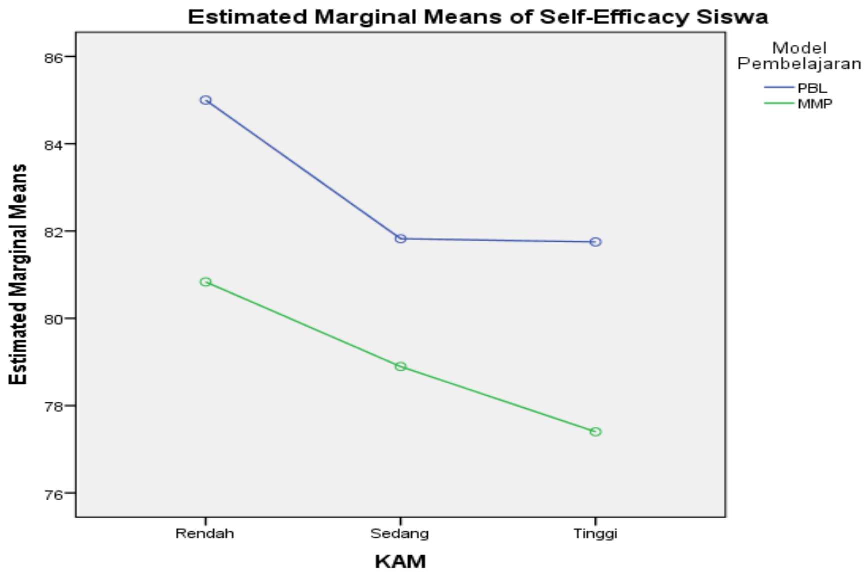

Figure 3 The Interaction Between Learning Models and KAM on Students' Self-efficacy

4. Discussion

The results of the research data analysis showed that the samples from the two experimental classes came from populations with normal distribution and homogeneous variance. In addition, the results of the two-way ANOVA test show that there are differences in the effect of the application of the problem based learning model and the missouri mathematics project learning model on students' mathematical representation abilities and self-efficacy. In addition, the results of the analysis show that there is no interaction between the learning model and the initial ability of mathematics on the mathematical representation ability and self-efficacy of students.

Learning Model Factors

This study consisted of 2 experimental classes where the experimental class I used the problem based learning model and the experimental class II used the missouri mathematics project learning model. In general, the implementation of learning goes well, so it affects the ability of mathematical representation and self-efficacy of students. This learning factor is one of the things that affect the improvement of students' mathematical representation abilities and self-efficacy. Where the stage in PBL learning contributes to the ability of mathematical representation and self-efficacy of students. The five stages of PBL learning (Aqib, 2015: 13) include stages (1) Student orientation to problems, (2) Organizing students for learning, (3) Guiding individual and group investigations, (4) Developing and presenting work, and (5) Analyze and evaluate the problem solving process.

While the stages in MMP learning (Shadiq, 2009: 21) include stages (1) Introduction or review, (2) Development, (3) Exercise with teacher guidance, (4) Independent work or seatwork, and (5) Assignment or homework .

The results showed that the mathematical representation ability and self-efficacy of students who were given the PBL learning model were higher than the mathematical representation abilities and self-efficacy of students who were given the MMP learning model. This is because PBL learning has advantages compared to MMP learning.

The application of the PBL learning model in learning mathematics requires students to learn to find concepts independently, practice thinking skills, and analyze and manipulate information. By applying this model students can find and use diverse sources of information and ideas to increase understanding of a problem, topic or issue. Students are encouraged to learn largely through their own active engagement with concepts and principles.

Based on the principles of PBL learning where the learning process begins by presenting real-world or contextual problems that aim to develop students' higher thinking patterns, think critically and be able to solve the problems presented. This given problem is used to bind students to learning curiosity. Problems are given to students, before students obtain concepts or materials related to the problems to be solved.

PBL learning also helps students to process ready-made information in their minds to construct their own knowledge about the social world and its surroundings. This learning is suitable for developing basic and complex knowledge. Apart from this, this learning model is also suitable for increasing the growth and development of student learning activities both individually and in groups. In this lesson, the teacher guides and provides minimal instructions to students in solving problems. Teachers are required to be able to create a conducive learning atmosphere in order to help students practice in the given problem solving process.

This is the big difference between students who receive PBL lessons and students who receive MMP lessons. Students who receive MMP learning will require students to express themselves with their groups to develop the material being studied using various sources or references and can practice regularly with successive questions given by the teacher. By applying this model students are given more varied questions. In addition, in this learning model there are independent work steps that require students to solve problems independently, and cooperative work steps that require students to work in groups and are given assignments at the end of the meeting. The existence of independent work and controlled exercises trains students to be more skilled and can come up with new ideas to work on problems in the form of problem solving, without having to be fixated on the examples given by the researcher.

Students' Early Mathematical Ability

The KAM test serves to determine the KAM group of students classified into high, medium and low categories. KAM grouping is also used to answer problems related to the mathematical representation ability and self-efficacy of students who are given the PBL learning model and the MMP learning model.

Based on the results of the study, the average value and standard deviation of the experimental class I were 68.17 and 10.866, while the average value and standard deviation of the experimental class II were 66.67 and 10.114. The results of the normality test in the experimental class I and the experimental class II were normally distributed and the homogeneity test of the students' initial mathematical ability test showed that the two samples came from populations that had homogeneous variance.

It is known that the KAM grouping in the experimental class I contained 8 high-ability students, 17 moderately capable students, 5 low-ability students, while in the second experimental class there were 5 high-ability students, 19 moderately capable students, 6 low-ability students.

Students' initial mathematical abilities are needed because in learning mathematics the material has a hierarchical relationship, which means that before learning new material students need to understand the basic concepts that exist in the previous material. If students do not understand the basic concepts in the material, students will not be able to continue with the next material.

Mathematical Representation Ability

Goldin (Salkind, 2007: 2) states that "a representation is a configuration that can represent something else in some manner", representation is the way in which a mathematical idea is represented so that other people understand the idea. Jones and Knuth (Hasratuddin, 2015: 123) argue that representation is a model or substitute form of a problem situation or aspect of a problem that is used to find a solution. Some mathematics education experts and cognitive school researchers state that representation is not only limited to discussing the use of symbol notation to translate a situation into mathematical steps. Representation is more than just a physical product of observation. Representation is also a cognitive process that occurs internally. Representation is an activity of interpreting a concept or problem by giving meaning. Therefore, the ability of mathematical representation is very important to be mastered by students.

Based on the results of descriptive data analysis after being given treatment, the mathematical representation ability of students who were given the PBL model was higher than students who were given the MMP model. This is shown by the average post-test score for the experimental class I, which is 78.57 while in the experimental class II it is 59.63.

Based on the explanation above, the mathematical representation ability of students who were given the PBL model was higher than the students who were given the MMP model. These results were analyzed by Two Paths ANOVA on the learning factor, the value of sig.=0,000 means that the value of sig<0.05 so that H_0 is rejected and $F_{count}=97.685>F_{table}=4.02$ so that H_0 is rejected and H_1 is accepted, it can be concluded that there is a difference in ability mathematical representation of students who were given the PBL model with students who were given the MMP model. This is in line with research with students who were given the MMP model. This is in line with the research of Nurfitriyanti, et al (2020) which states that "there is a significant difference in mathematical representation abilities between prospective educator students who receive learning through the model and the direct learning model". It can be seen in the results of the analysis of covariance that the average model is higher than the direct learning model.

Students who take part in learning with the model and the model will make students accustomed to being active in solving thinking problems individually to get concepts. Because the learning process is not just transferring knowledge from the teacher to students, but a process that is conditioned or pursued by the teacher, so that students are active in various ways to build their own knowledge. Both the model and the model are in line with Ausubel's learning theory. Ausubel's learning theory emphasizes the importance of meaningful learning theory because it links new concepts or information with cognitive structures or knowledge that students already have. In order for children's intellectual development to take place optimally, they need to link new concepts or information to build theories that explain the world around them. When studying, the teacher acts as a facilitator, companion, and director/supervisor as a form of step-by-step support for learning and solving problems. Both of these learning models, teachers are required to facilitate and encourage students to be actively involved in the learning process so that they are able to construct knowledge for themselves.

So based on the results of data analysis in this study and supported by previous studies and in accordance with the basis of a supportive learning theory, it can be concluded that there are differences in the mathematical representation ability of students who are given the PBL model and students who are given the MMP model.

Self-efficacy Student

Self-efficacy is a belief about the probability that one can carry out a task successfully and decide what actions are needed to achieve some results. Bandura (1997) defines self-efficacy as people's beliefs about their ability to produce a designated level of performance that influences exercise over events that affect their lives. The self-confidence process goes through four processes, namely cognitive, motivational, affective and selection processes.

Based on the results of descriptive data analysis after being given treatment, the self-efficacy of students who studied with the model was higher than students who studied with the model. This is indicated by the average self-efficacy score of students after being treated in the experimental class I of 82.33, while in the experimental class II of 79.03.

Based on the explanation above, the self-efficacy of students who learn through the PBL model is higher than students who learn through the MMP model. These results were analyzed by Two Paths ANOVA on the learning factor, the value of sig.=0.004 means that the value of sig<0.05 so that H_0 is rejected and $F_{count}=97.685>F_{table}=4.02$ so that H_0 is rejected and H_1 is accepted, it can be concluded that there are differences in self -efficacy of students who were given the PBL model with students who were given the MMP model. This is in line with the research of Wiratmaja, et al (2014) which states that "there is a significant difference in self-efficacy between groups of students who take problem-based learning and direct learning".

Students who take part in learning with the PBL model and the MMP model will grow students' confidence in solving mathematical problems. Because the learning process is not just transferring knowledge from the teacher to students, but a process that is conditioned or pursued by the teacher, so that students are active in various ways to build their own knowledge. Both the PBL model and the MMP model are in line with Vygotsky's learning theory. Vygotsky's learning theory has an element of social learning where students study in groups with peers in completing the assigned tasks so that students can actively participate in learning and the formation of new ideas and enrich students' intellectual development. Both of these learning models, teachers are required to facilitate and encourage students to be actively involved in the learning process so that they are able to construct knowledge for themselves.

So based on the results of data analysis in this study and supported by previous studies and in accordance with the basis of a supportive learning theory, it can be concluded that there are differences in the self-efficacy of students who are given the model and students who are given the model.

Interaction between Learning Model and Early Mathematics Ability on Students' Mathematical Representation Ability and Students' Self-Efficacy

The interaction referred to in this study is the collaboration between learning and early mathematics abilities in influencing students' mathematical representation abilities and self-efficacy. Based on the results of inferential statistical analysis for students' mathematical representation abilities with the two-way ANOVA test on the KAM*Learning factor, $F_{hitung}=0.271<F_{table}=3.17$ with sig.=0.763, meaning that the value of sig>0.05, so H_0 is accepted which means it is not there is an interaction between the learning model and the initial mathematical ability of the students' mathematical representation ability. This is in line with Eviyanti's research (2018) which states that there is no interaction between learning models and on increasing students' mathematical representation abilities.

Based on the results of inferential statistical analysis for students' self-efficacy with the two-way ANOVA test on the KAM*Learning factor, $F_{hitung}=0.173<F_{table}=3.17$ with sig.=0842, meaning the value of sig>0.05, so H_0 is accepted which means it is not there is an interaction between the learning model and the initial ability of mathematics on students' self-efficacy. This is in line with the research of Siregar, Mulyono & Asmin (2018) which states that there is no interaction between KAM and learning models on self-efficacy. Where in this case, the PBL model is more suitable to be applied to all KAM categories, namely students with high, medium and low early math abilities.

There are several factors that cause this to happen including: (1) the learning used is a learning that involves students actively in discussions. The process of solving problems with group discussions between students or between students and teachers, between students and students has a positive effect on students' abilities. Discussion activities build dependence or trust in groups that provide opportunities for students to be confident when competing to be the best group. However, there were students who did not participate in this group activity. The student feels that he has no responsibility because in the group there are smart students. (2) at the time of formation of student KAM, it is only limited to using prerequisite material tests with certain subjects. (3) the form of KAM questions presented is in the form of multiple choices so that it allows students to answer questions by guessing.

Students who have low initial abilities who are taught using special learning models will have lower learning abilities than students who have high initial abilities who are taught using special learning models as well. It is also not certain that students who have low initial abilities who are taught using a special learning model will have higher learning abilities than students who have low initial abilities who are taught using direct learning models.

Vygotsky's theory states that children learn actively better than passively. In other words, if children with high abilities are passive in a lesson, it is not impossible that children's learning outcomes will be low. On the other hand, if children with low abilities are active in learning, it is not impossible that children's learning outcomes will be high. That is, even though highly capable children are taught with special learning, being passive in a learning does not necessarily result in high learning outcomes, and vice versa.

5. Conclusion

Based on the results of the analysis of research data on the mathematical representation ability and self-efficacy of students who were given the problem based learning learning model and students who were given the missouri mathematics project learning model, several conclusions were obtained which were the answers to the questions in the problem formulation. The conclusion is that there are differences in the mathematical representation ability of students who are given the problem based learning learning model and students who are given the missouri mathematics project learning model. There are differences in the self-efficacy of students who are given the problem based learning model and students who are given the missouri mathematics project learning model. There is no interaction between the learning model and the initial mathematical ability of the students' mathematical representation ability. This means that the only thing that affects students' mathematical representation abilities is the learning model provided. There is no interaction between the learning model and the initial ability of mathematics on students' self-efficacy. This means that the only thing that affects students' self-efficacy is the learning model provided.

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