Analysis of Mathematical Thinking Ability in View of Self Efficacy in Problem Based Learning with Dynamic Assessment

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Abstract

This study aims to analysis the quality of PBL with Dynamic Assessment to improve Mathematical Thinking Ability and to describe how Mathematical Thinking Ability are viewed from students' Self-efficacy in PBL with Dynamic Assessment. Based on the results of the Self-efficacy questionnaire given to students of class X MIPA 6, it showed that there were 6 students with low Self-efficacy, 18 students with moderate Self-efficacy, and 12 students with high Self-efficacy. These results indicate that students of class XI MIPA 6 are dominated by moderate Self-efficacy with a percentage of 50%. The research subjects consisted of 6 students who were taken by 2 students in each category of Self-efficacy. Based on the results of the study, it was found that (1) The quality of PBL with Dynamic Assessment can increasing Mathematical Thinking Ability . (2) Students with low Self-efficacy can achieve one indicator, namely the ability to identify problems. (3) Students with moderate Self-efficacy can achieve three indicators, namely the ability to identify problems, the ability to formulate effective strategies and the ability to expand the scope of results obtained. (4) Students with high Self-efficacy can achieve all indicators.

Keywords: Mathematical Thinking Ability, Self-efficacy, Problem Based Learning, Dynamic Assessment

1. Introduction

One of the foundations of implementing education is a curriculum that is structured to facilitate the learning process (K. N. Fajri, 2019). In learning mathematics, the cognitive aspects are developed theoretically and chronologically so that Mathematical Thinking Ability does not only master the concept but actually implements the concept (M. Fajri, 2017). The development of Mathematical Thinking Ability give special attention to the effectiveness of the educational process (Madraximovich & Ruzimovich, 2021).

According to Sumarmo's opinion, Mathematical Thinking Ability is divided into two levels, namely the low level which consists of the ability to do simple arithmetic operations, use direct rules, and use algorithms. While the high level consists of the ability to understand meaningfully, construct conjectures, make analogies, generalize information, reasoning, problems solving, communicating and connecting the results of problem solving (Suryana, 2012).

Mathematics is given to students as a provision to have various abilities, such as: understanding mathematical concepts to solve problems, applying reasoning to generalize ideas, solving problems and interpreting solutions, communicating ideas to explain problems and exploring the function of mathematics in life (Sukmadewi, 2014).

According to The Partnership for 21st Century Skills presents the 4Cs, students need abilities to pursue developing technology include the ability to interact, work together, think unconventionally, and construct ideas for solving problems (Erdoğan, 2019).

The indicators of Mathematical Thinking Ability in this study based on Mason, Burton, and Stacey's theory include: 1) Specializing: the ability to identify problems and develop effective strategies, 2) Generalizing: the ability to expand the scope of results obtained, 3) Conjecturing: the ability to make an analogy in similar cases, and 4) Convincing: the ability to form a mathematical model (Hanifah et al., 2021).

Learning mathematics not only develops Mathematical Thinking Ability but also provides students with sufficient space to explore the usefulness of mathematics in life as indicated by curiosity, attention, interest in learning, and Self-efficacy (Sukmadewi, 2014). Self-efficacy is one of the affective aspects that influences student learning outcomes and influences students to choose the activities to be carried out (Alam, 2018). Self-efficacy is defined by Bandura as a belief about one's ability to succeed and achieve a certain level of performance (Sitzmann & Yeo, 2013). Self-efficacy in learning mathematics is defined as students' belief in their abilities to solve mathematical problems and assignments, thus influencing students' beliefs in solving problems (Utami & Wutsqa, 2017). The indicators of Self-efficacy according to Bandura's theory include: 1) Magnitude: the ability to measure how difficult a task is believed to be completed, 2) Strength: the ability to measure how strong a person's belief is about his abilitiy, and 3) Generality: the ability to measure the extent of a task that someone can do (Subaidi, 2016).

Based on interviews with math teachers at MAN 1 Kudus, students were not ready to take lessons. There are students who are afraid to take part in mathematics learning, many of them do not take the initiative to express the difficulties they are experiencing. When the teacher asks for opinions, students tend to be silent and must be appointed first. Students' Mathematical Thinking Ability is also not optimal. This is influenced by many factors, especially the lack of mastery of arithmetic skills such as multiplication and division. Of course, This is the basis for not achieving learning objectives and difficulties in understanding further material. Therefore, this study uses word problems to describe the categories of Self-efficacy and students' Mathematical Thinking Ability to find out how far students' ability to solve problems independently and help teachers measure students' abilities appropriately.

2. Research Problems

Based on the background above, there are research problems as follows: How is the quality of mathematics learning after applying PBL with Dynamic Assessment of Students' Mathematical Thinking Ability ? How is the description of Mathematical Thinking Ability in view of Self Efficacy in PBL with Dynamic Assessment?

3. Methodology of Research

The type of research used is mixed method with a sequential explanatory desain which applies the quantitative first, then qualitative (Sugiyono, 2018). In this study, there were two classes, namely the control class that was given PBL only and the experimental class that was given PBL with Dynamic Assessment.

4. Sample and Data Collection

The population in this study were all students of class XI MIPA MAN 1 Kudus for the 2022/2023 academic year. Instrument trial were carried out in class XI MIPA 4. While sampling was carried out by simple random sampling technique which chose 2 samples, namely XI MIPA 5 as the control class and XI MIPA 6 as the experimental class. The data of Self-efficacy were collected using instruments compiled based on Self-efficacy indicators and the data of Mathematical Thinking Ability were collected using pretest and post-test compiled based on indicators of Mathematical Thinking Ability . Self-efficacy questionnaires were given to the sample classes before and after being given learning treatment.

5. Finding/Results

5.1 The Quality of PBL with Dynamic Assessment in Improving Mathematical Thinking Ability

a. Preliminary Data Analysis

Preliminary data using end-of-semester assessment scores for the entire population of class XI MIPA students at MAN 1 Kudus. The normality test is used to determine whether the initial abilities of the eight population classes are normally distributed or not. The hypothesis used is as follows:

H_0: students' Mathematical Thinking Ability are normally distributed

H_1: students' Mathematical Thinking Ability are not normally distributed

Normality test using the Kolmogorov Smirnov Test. Normality test criteria with a significant level of 0.05 is to accept H_0 if the value is $sig. > 0.05$ or reject H_0 if the value is $sig. < 0.05$. Following are the results of the preliminary data normality test in Table 1.

Table 1. Preliminary Data Normality Test

Tests of Normality

	Statistic	df	Sig.
value	.052	288	.055

Based on Table 1, the value of $sig. = 0.055 > 0.05$, then H_0 is accepted and H_1 is rejected. Thus, it can be said that the preliminary data comes from a normally distributed population.

Preliminary Data Homogeneity test is used to determine whether or not the sample variations from the same population are uniform. The hypothesis used is as follows:

$H_0: {\sigma_1}^2 = {\sigma_2}^2$ sample variance is homogeneous

$H_1: {\sigma_1}^2 \neq {\sigma_2}^2$ sample variance is not homogeneous

Homogeneity test using the Levene test. Homogeneity test criteria with a significant level of 0.05 is to accept H_0 if the value is $sig. > 0.05$ or reject H_0 if the value is $sig. < 0.05$. Following are the results of the preliminary data homogeneity test in Table 2.

Table 2. Preliminary Data Homogenity Test

Test of Homogeneity of Variances

Levene Statistic	df1	df2	Sig.
1.214	7	280	.295

Based on table 2, the value of $sig. = 0.295 > 0.05$, then H_0 is accepted and H_1 is rejected. Thus, it can be said that the preliminary data of the eight classes that make up the population are the same.

b. Pretest Data Analysis

Pretest data using Mathematical Thinking Ability test scores on limit of algebraic functions given to control class and experimental class before being given treatment. Normality test using Kolmogorov Smirnov Test. Following are the results of the pretest data normality test in Table 3.

Table 3. Pretest Data Normality Test

Tests of Normality

	Statistic	df	Sig.
pretest control	.139	36	.077
pretest experiment	.125	36	.170

Based on Table 3, the pretest value of class control is $sig. = 0.077 > 0.05$ and the pretest value of class experiment is $sig. = 0.170 > 0.05$, then H_0 is accepted and H_1 is rejected. Thus, it can be said that the pretest data comes from a normally distributed data.

Homogeneity test using the Levene test. Following are the results of the pretest data homogeneity test analysis in Table 4.

Table 4. Pretest Data Homogenity Test

Test of Homogeneity of Variances

Levene Statistic	df1	df2	Sig.
.430	1	70	.514

Based on Table 4, the value of $sig. = 0.514 > 0.05$, then H_0 is accepted and H_1 is rejected. Thus, it can be said that the pretest data is homogeneous.

c. Post-test Data Analysis

Post-test data using Mathematical Thinking Ability test scores on limit of algebraic functions given to control class and experimental class after being given treatment. Normality test using the Kolmogorov Smirnov Test. Following are the results of the post-test data normality test in Table 5.

Table 5. Post-test Data Normality Test

Tests of Normality

	Statistic	df	Sig.
post-test control	.134	36	.101
post-test experiment	.138	36	.079

Based on Table 5, the post-test value of control class is $sig. = 0.130 > 0.05$ and the experiment class is $sig. = 0.075 > 0.05$, then H_0 is accepted and H_1 is rejected. Thus, it can be said that the post-test data comes from a normally distributed data.

Homogeneity test using the Levene test. Following are the results of the post-test data homogeneity test analysis in Table 6.

Table 6. Post-test Data Homogenity Test

Test of Homogeneity of Variances

Levene Statistic	df1	df2	Sig.
2.059	1	70	.156

Based on Table 6, the value of $sig. = 0.094 > 0.05$, then H_0 is accepted and H_1 is rejected. Thus, it can be said that the post-test data is homogeneous.

d. The Completeness Test (Hypothesis I)

The completeness test is used to determine the achievement of classical mastery of students' Mathematical Thinking Skills in the material limit of algebraic functions. The classical completeness test is determined at 75%. The hypothesis used in this study is as follows.

$H_0: \pi \leq 75\%$ the proportion of student completeness in PBL with Dynamic Assessment is less than or equal to 75%

$H_1 : \pi > 75\%$ the proportion of student completeness in PBL with Dynamic Assessment is more than 75%

Test criteria with a significant level of 0,05, namely H_0 is accepted if $Z_{count} \leq Z_{(0,5-\alpha)}$ while H_1 is accepted if $Z_{count} > Z_{(0,5-\alpha)}$. The calculation of z test statistics is as follows.

$$z = \frac{\frac{x}{n} - \pi_0}{\sqrt{\frac{\pi_0(1-\pi_0)}{n}}}$$

Based on the results of the research, it is known that x is 32 students who reaches the actual passing limit. π_0 is the value of the hypothesized proportion of 75% and n is the number of samples, namely 36 students.

Based on the calculations, the value $Z_{count} = 1{,}925$ is obtained, while the value $Z_{(0,5-\alpha)} = 1{,}64$. This means that $Z_{count} \geq Z_{(0,5-\alpha)}$, so that H_0 is rejected and H_1 is accepted. Thus, it can be said that more than 75% of all students who received the PBL with Dynamic Assessment had completed the actual passing limit test.

e. The Average Difference Test (Hypothesis II)

The average difference test is used to compare Mathematical Thinking Ability in PBL with Dynamic Assessment of more than Mathematical Thinking Ability in PBL learning. The average similarity test of two samples on one side was conducted to compare the Mathematical Thinking Ability of experimental class students using PBL with Dynamic Assessment better than the Mathematical Thinking Ability of control class students using PBL learning. The hypothesis used in this study is as follows.

$H_0 : \mu_1 \leq \mu_2$ the average Mathematical Thinking Ability of students using PBL with Dynamic Assessment is less than or equal to the average Mathematical Thinking Ability of students using PBL learning

$H_1 : \mu_1 > \mu_2$ the average Mathematical Thinking Ability of students using PBL with Dynamic Assessment is more than the average Mathematical Thinking Ability of students using PBL learning

The average difference test using the Independent Sample T Test. Test criteria with a significant level of 0,05, namely H_0 is accepted if $sig. > 0{,}05$ while H_1 is accepted if $sig. < 0{,}05$. Following are the results of the average difference test analysis in Table 7.

Table 7. The Average Difference Test

Independent Samples Test

		t	df	Sig. (2-tailed)
post-test	Equal variances assumed	-3.027	70	.003
	Equal variances not assumed	-3.027	61.099	.004

Based on the homogeneity test results of the post-test data has a homogeneous variance, so the calculation results used are in the Equal Variances Assumed section. Based on the table above, the value of $Sig. (2\ tailed) = 0{,}003 < 0{,}05$, then H_0 is rejected and H_1 is accepted.

Table 8. The Average Control and Experiment Class

Group Statistics

	class	N	Mean	Std. Deviation	Std. Error Mean
post-test	control	36	63.69	6.735	1.123
	experiment	36	69.81	10.068	1.678

Based on the table above, it shows that the average post-test score for the experimental class students is 69,81, which is higher than the average post-test score for the control class students, which is 63,69. So it can be concluded that the average Mathematical Thinking Ability of students in PBL with Dynamic Assessment is better than the average Mathematical Thinking Ability of students in PBL.

f. The Different Proportion Test (Hypothesis III)

The different proportion test is used to test the difference in the number of students who achieve mastery of Mathematical Thinking Ability who are taught using PBL with Dynamic Assessment and the number of students who achieve mastery of Mathematical Thinking Ability who are taught using PBL learning. The hypothesis used in this study is as follows.

$H_0: \pi_1 \leq \pi_2$ the proportion of mastery of Mathematical Thinking Ability in PBL learning with Dynamic Assessment is less than or equal to the proportion of mastery of Mathematical Thinking Ability in PBL learning

$H_1: \pi_1 > \pi_2$ the proportion of completeness of Mathematical Thinking Ability in PBL learning with Dynamic Assessment is more than the proportion of completeness of Mathematical Thinking Ability in PBL learning

Test criteria with a significant level of 0,05, namely H_0 is accepted if $Z_{count} \leq Z_{(0{,}5-\alpha)}$ while H_1 is accepted if $Z_{count} > Z_{(0{,}5-\alpha)}$. The calculation of z test is as follows.

$$z = \frac{\left(\frac{x_1}{n_1}\right) - \left(\frac{x_2}{n_2}\right)}{\sqrt{pq\left\{\left(\frac{1}{n_1}\right) + \left(\frac{1}{n_2}\right)\right\}}}$$

The overall proportion of events $p = \frac{x_1+x_2}{n_1+n_2}$ and the proportion of non-occurrence overall $q = 1 - p$. It is known that x_1 is 32 students who have scores above the actual passing limit in the experimental class and x_2 is 24 students in the control class. n_1 is 36 students in the experiment class and n_2 is 36 students in the control class. The calculation results obtained $p = 0{,}778$ and $q = 0{,}222$. So, $Z_{count} = 2{,}27$, while the value $Z_{(0{,}5-\alpha)} = 1{,}64$. This means that $Z_{count} \geq Z_{(0{,}5-\alpha)}$,, so that H_0 is rejected and H_1 is accepted.

Thus, it can be said that the proportion of students who is mastery Mathematical Thinking

Ability exceeds the actual passing limit in PBL with Dynamic Assessment is more than the proportion of students who is mastery Mathematical Thinking Ability in PBL learning models.

g. Test N-Gain Score (Hypothesis IV)

The improvement test using N-gain test was carried out to find out how much the students' Mathematical Thinking Ability increased in the control class and experimental class before and after being given treatment. The formula used is as follows.

$$g = \frac{S_{post} - S_{pre}}{S_{ideal} - S_{pre}}$$

The hypothesis used in this study is as follows.

$H_0: \pi_{g1} \leq \pi_{g2}$ the average increase in Mathematical Thinking Ability in PBL with Dynamic Assessment is less than or equal to the average increase in Mathematical Thinking Ability in PBL learning

$H_1: \pi_{g1} > \pi_{g2}$ the average increase in Mathematical Thinking Ability in PBL with Dynamic Assessment is more than the average increase in Mathematical Thinking Ability in PBL learning

Test criteria with a significant level of 0,05, namely H_0 is accepted if $sig. > 0{,}05$ while H_1 is accepted if $sig. < 0{,}05$.

Furthermore, the average gain value is compared using the Independent Samples T Test with SPSS 26 application.

Table 9. The Average N-Gain Value

Independent Samples Test

	t	df	Sig. (2-tailed)
NGain_score	-3.216	70	.002

Based on the Table 9, the value $sig. 0{,}02 < 0{,}5$ is obtained, so H_0 is rejected. Thus, it can be said that the average increase in the Mathematical Thinking Ability of students who receive PBL with Dynamic Assessment is more than the average increase in the Mathematical Thinking Ability of students who receive PBL learning.

5.2 The Description of Mathematical Thinking Ability in view of Self-efficacy in PBL with Dynamic Assessment

Self-efficacy questionnaires were given to 36 students of class XI MIPA 6 which were used to classify students into the criteria of low Self-efficacy, moderate Self-efficacy, and high Self-efficacy. Based on the results of the Self-efficacy questionnaire, the lowest score was 77 and the highest score was 240. The criteria for classifying the Self-efficacy questionnaire are presented in Table 10 as follows.

Table 10. Criteria for Classifying Criteria Self-efficacy

Intervals	Self-efficacy Criteria	∑ Subject	Percentage(%)
$X < 120$	Low Self-efficacy	6	16,7%
$120 \leq X < 210$	Moderate Self-efficacy	18	50,0%
$210 \leq X$	High Self-efficacy	12	33,3%

These results indicate that class XI MIPA 6 is dominated by moderate Self-efficacy with a percentage of 50.0%. For each criterion, 2 students of low Self-efficacy, 2 students of moderate Self-efficacy, and 2 students of high Self-efficacy were taken so that there were 6 students as research subjects. The determination of the 6 research subjects is shown in Table 11 as follows.

Table 11. Research Subject Based on Self-efficacy Criteria

Student Code	Self-efficacy Score	MTA Score	Pronouncing	Self-efficacy Criteria
E-24	108	50	S-1	Low
E-21	111	57	S-2	Low
E-35	161	71	S-3	Moderate
E-26	165	78	S-4	Moderate
E-36	214	90	S-5	High
E-14	221	93	S-6	High

Data in this study were obtained from the results of tests of Mathematical Thinking Ability and interviews that were conducted by researchers to determine the research subjects. The pre-test for control class was carried out on March 14, 2023 and experiment class on March 16, 2023. Meanwhile the post-test for control class was on April 11, 2023 and experiment class was on April 13, 2023.

Analysis of the Mathematical Thinking Ability of each research subject based on the indicators, namely (1) Specialization: the ability to identify problems; (2) Specialization: developing the most effective strategy; (3) Generalizing, the ability to expand the scope of the results obtained; (4) Conjecturing, the ability to make an analogy with similar goods; (5) Convincing, the ability to form a correct mathematical model.

A summary of students' Mathematical Thinking Ability in terms of low Self-efficacy is shown in Table 12 below.

Table 12. Summary of MTA in View of Low Self-efficacy Subject

Indicator MTA	Low Self-efficacy	
	S-1	**S-2**
1	S-1 cannot identify the problem	S-2 can identify the problem
2	S-1 is unable to devise an effective strategy	S-2 can develop an effective strategy on question 5 but fails on question 2
3	S-1 cannot link other information to broaden the scope of results	S-2 cannot link other information to broaden the scope of results
4	S-1 is unable to make an analogy to similar cases	S-2 is unable to make an analogy to similar cases
5	S-1 is not able to make a mathematical model correctly	S-2 was able to make a mathematical model in question 1 but failed in question 4

A summary of students' Mathematical Thinking Ability in terms of moderate Self-efficacy is shown in Table 13 below.

Table 13. Summary of MTA in View of Moderate Self-efficacy Subject

Indicator MTA	Low Self-efficacy	
	S-3	**S-4**
1	S-3 can identify the problem	S-4 can identify the problem
2	S-3 is able to devise an effective strategy	S-4 is able to devise an effective strategy
3	S-3 cannot link other information to broaden the scope of results	S-4 can broaden the scope of results in question 2 but fails in question 3
4	S-3 is unable to make an analogy to similar cases	S S-4 can make an analogy in question 4 but fails in question 3
5	S-3 was able to make a mathematical model in question 1 but failed question 4	S-4 is able to make mathematical models correctly

A summary of students' Mathematical Thinking Ability in terms of high Self-efficacy is shown in Table 13 below.

Table 14. Summary of MTA in View of Moderate Self-efficacy Subject

Indicator MTA	Low Self-efficacy	
	S-5	**S-6**
1	S-5 can identify the problem	S-6 can identify the problem
2	S-5 is able to devise an effective strategy	S-6 is able to devise an effective strategy
3	S-5 cannot link other information to broaden the scope of results	S-6 can relate other information to broaden the scope of results
4	S-5 is able to make an analogy in similar cases	S-6 is able to make an analogy in similar cases
5	S-5 is able to make mathematical models correctly	S-6 is able to make mathematical models correctly

6. Discussion

6.1 The Quality of learning

The quality of learning can be known through activities that are designed according to the actions taken. Quality learning involves students as a whole starting from learning to understand mathematical concepts to applying the skills they have. The teacher's actions also affect the quality of learning. What the teacher says, what the teacher does, how the teacher prepares the material, how the teacher delivers the material and interacts with students are things that influence whether the learning is quality or not. In this study, the quality of learning was reviewed quantitatively and qualitatively using learning tools and research instruments that have been validated by experts. The quality of learning that is assessed consists of: (1) the planning stage, (2) the implementation stage, and (3) the assessment stage.

The planning stage is the stage of preparing learning tools including the syllabus, lesson plans, worksheets and the stage of preparing research instruments including questions on Mathematical Thinking Ability tests, Self-efficacy questionnaires, questionnaires on the implementation of learning, student response questionnaires, and interview guidelines. Based on the results of the validators' assessment, learning tools and research instruments are in the valid category so they can be used.

The implementation stage in this study was carried out by observing learning activities which included delivering material and class management by observers using the learning implementation questionnaire sheets that had been provided. The learning given to the experimental class is PBL with Dynamic Assessment which includes: (1) student orientation on problems, (2) organizing students to learn and Dynamic Assessment Pretest stage, (3) assisting independent and group investigations and Dynamic Assessment mediation stage, (4) developing and presenting the results of the discussion and Dynamic Assessment posttest stage, and (5) analyzing and evaluating the problem solving process.

In the assessment stage in this study, students were given a student response questionnaire and a test item for Mathematical Thinking Ability to be analyzed based on the hypotheses that had been prepared. The qualitative learning assessment stage is carried out by giving a student response questionnaire to the learning that has been carried out, namely PBL with Dynamic Assessment. Student responses in participating in PBL learning with Dynamic Assessment gave very positive responses with an average student response score of 81%. It can be concluded that students are enthusiastic about participating in learning and feel comfortable with the learning model that is carried out so that they can achieve learning objectives.

6.2 Mathematical Thinking Ability in View of Self-efficacy

a. Mathematical Thinking Ability in Student with Low Self-efficacy

Students who were selected as research subjects with low Self-efficacy, namely S-1 and S-2, who received scores from the Mathematical Thinking Ability test respectively 50 and 57. Based on the results of the analysis of answer sheets and interviews with S-1 and S-2, they mastering indicators of Mathematical Thinking Ability .

Based on indicator 1, namely the ability to identify problems, S-1 was able to capture what information was presented in the questions, but failed to identify problems because they did not understand the concepts used for the problem solving process. Whereas S-2 has been able to capture the information presented in the questions and identify problems from that information. So it can be concluded that S-1 is not able to fulfill indicator 1 while S-2 is able to fulfill indicator 1 well. However, S-1 and S-2 have abilities that are not much different from other indicators of Mathematical Thinking Ability.

Based on indicator 2, namely the ability to develop effective strategies according to each student, S-1 is unable to develop strategies used to solve problems, while S-2 is able to develop strategies used to solve problems in problem 2 but fail to develop strategies in problem 3. So it can be concluded that S-1 and S-2 are not able to fulfill indicator 2 properly. The results of the interviews showed that S-1 and S-2 still had difficulty answering because they did not have ideas for problem solving.

Based on indicator 3, namely the ability to expand the scope of results obtained, S-1 and S-2 still have difficulty understanding the basic concepts used to solve problems, so that the process of expanding the scope of solution results is difficult to obtain. S-1 and S-2 are still confused about giving an explanation of what they understand. So it can be concluded that S-1 and S-2 are not able to fulfill indicator 3 properly.

Based on indicator 4, namely the ability to make an analogy in similar cases, S-1 and S-2 are unable to make an analogy in the problem-solving process presented by solving problems in other cases that have been discussed together. S-1 and S-2 have to open their notes again to help remember the previous cases that have been studied and difficulties to simplify arithmetic operations. So it can be concluded that S-1 and S-2 are not able to fulfill indicator 4 properly.

Based on indicator 5, namely the ability to form correct mathematical models, S-1 and S-2 are unable to form mathematical models based on information presented in writing or orally. S-1 uses other concepts in solving problems, but fails to find a solution. Whereas S-2 uses the correct concept, but does incorrect calculations. So it can be concluded that S-1 and S-2 are not able to fulfill indicator 5 properly.

Students who were selected as research subjects with low Self-efficacy, namely S-1 and S-2 who got Self-efficacy results respectively 108 and 111.

Based on the Magnitude dimension, S-1 and S-2 continue to study even though there are other things that are more interesting, but they are not sure that they can develop their knowledge. They also realized that they were not good at making settlement plans and were not sure that the strategy chosen for problem solving was the right strategy.

Based on the Strength dimension, S-1 and S-2 try to communicate with peers when they feel difficulties, but S-1 and S-2 lack confidence in their abilities and tend to be less thorough in finding solutions to problems. S-1 and S-2 admitted that they were enthusiastic about participating in mathematics learning at school, but were unable to motivate themselves to try their best to solve problems.

Based on the Generality dimension, when encountering problems that have never been encountered before, S-1 and S-2 do not hesitate to try, but if the problem is related to other subjects, S-1 and S-2 do not feel challenged and do not want to find new things to increase knowledge.

b. Mathematical Thinking Ability in Student with Moderate Self-efficacy

Students who were selected as research subjects with moderate Self-efficacy, namely S-3 and S-4 who received scores from the Mathematical Thinking Ability test respectively 71 and 78. Based on the results of the analysis of answer sheets and interviews with S-3 and S-4, they had mastered Some indicators of Mathematical Thinking Ability.

Based on indicator 1, namely the ability to identify problems, S-3 and S-4 have been able to conclude what information is presented in the questions and are able to identify problems correctly. During the interviews, S-3 and S-4 had high confidence in their answers.

Based on indicator 2, namely the ability to formulate effective strategies according to each student, S-3 and S-4 are able to develop effective strategies to be used to solve problems. S-3 and S-4 have different strategies from other students, but these strategies can be used to solve problems well.

Based on indicator 3, namely the ability to expand the scope of results obtained, S-3 and S-4 are still unsure in operating the basic concepts of addition and multiplication used to solve problems so that the process of expanding the scope of solving results is difficult to obtain. S-3 and S-4 lack the processing time to expand the results of problem solving, so the scope of results obtained is not correct. Therefore, it can be concluded that S-3 and S-4 are not able to fulfill indicator 3 properly.

Based on indicator 4, namely the ability to make an analogy with similar cases, S-3 and S-4 have not been able to make an analogy of the problem-solving process presented by solving problems in other cases that have been discussed. S-3 and S-4 still experience difficulties in operating mathematical operations, namely addition and multiplication. So it can be concluded that S-3 and S-4 are not able to fulfill indicator 4 properly.

Based on indicator 5, namely the ability to form correct mathematical models, S-3 is able to form correct mathematical models even though in the process of calculating they still experience errors. Whereas S-4 has been able to make a mathematical model and get the right solution. So it can be concluded that S-3 and S-4 are able to fulfill indicator 5 well.

Students who were selected as research subjects with moderate Self-efficacy, namely S-3 and S-4 who got Self-efficacy results respectively 161 and 165.

Based on the Magnitude dimension, S-3 and S-4 admitted that they were not very good at making plans to solve problems and did not have full confidence in carrying out the plans and strategies for solving the problems they chose. But S-3 and S-4 are enthusiastic about learning mathematics and always think about solving problems carefully.

Based on the Strength dimension, S-3 and S-4 always carry out assignments given by the teacher and discuss with friends to find the best solution to math problems and try to be serious in participating in learning mathematics. But S-3 and S-4 have not been challenged to solve Olympic questions.

Based on the Generality dimension, the S-3 and S-4 are not sure that they will get the best score in the math test but the S-3 and S-4 always study harder to get a satisfactory score in mathematics. S-3 and S-4 also admitted that they were not fully able to solve problems using new methods or related to other subjects.

c. Mathematical Thinking Ability in Student with High Self-efficacy

Students who were selected as research subjects with high Self-efficacy, namely S-5 and S-6 who received scores from the Mathematical Thinking Ability test respectively 90 and 93. Based on the results of the analysis of answer sheets and interviews with S-5 and S-6, they really mastered each indicator of the Mathematical Thinking Ability .

Based on indicator 1, namely the ability to identify problems, S-5 and S-6 have been able to identify problems in each question well. S-5 and S-6 had no difficulty finding what problems to solve. So it can be concluded that S-5 and S-6 master the ability to identify problems well.

Based on indicator 2, namely the ability to formulate an effective strategy, S-5 and S-6 have been able to determine which strategy is most effective according to them to be used in the problem solving process. At the time of the interview, S-5 and S-6 were very confident that the strategy they had chosen was the right strategy. So it can be concluded that S-5 and S-6 can master indicators of the ability to develop effective strategies well.

Based on indicator 3, namely the ability to expand the scope of results obtained, S-5 and S-6 already understand the basic concepts used to solve problems, thus facilitating the process of expanding the scope of results. S-5 and S-6 can provide coherent explanations regarding what they understand. So it can be concluded that S-5 and S-6 are able to fulfill indicator 3 well.

Based on indicator 4, namely the ability to make an analogy with similar cases, S-5 and S-6 have been able to connect the problems to be solved with previous problems that have been discussed together. So it can be concluded that S-5 and S-6 are able to fulfill indicator 4 well.

Based on indicator 5, namely the ability to form correct mathematical models, S-5 and S-6 are able to form mathematical models based on the information presented. The concept of addition and multiplication operations has also been well mastered by S-5 and S-6 so that there are no obstacles in the process of finding solutions to problems. Therefore, it can be concluded that S-5 and S-6 are able to fulfill indicator 5 well.

Students who were selected as research subjects with high Self-efficacy, namely S-5 and S-6 who got Self-efficacy results respectively 214 and 222.

Based on the Magnitude dimension, S-5 and S-6 can solve difficult math tasks without the help of friends. S-5 and S-6 are also good at making problem-solving plans and are able to motivate themselves to be able to solve math problems.

Based on the Strength dimension, S-5 and S-6 are able to find various sources to complete math assignments. S-5 and S-6 are confident they can complete difficult math assignments and are challenged to work on Olympic questions.

Based on the Generality dimension, when encountering problems that have never been encountered before, S-5 and S-6 always look for new ways to solve math problems and study harder when they previously received unsatisfactory math scores. S-5 and S-6 claimed to be able to manage themselves to study calmly in any situation. Slightly different from S-5, S-6 is enthusiastic to learn in advance the material that will be studied at the next meeting.

7. Conclusion

Based on the research, the following quantitative research results are obtained: (1) Students in PBL with Dynamic Assessment who achieve an actual pass mark of more than 75%. (2) Mathematical Thinking Ability of students in PBL with Dynamic Assessment is better than Mathematical Thinking Ability of students in PBL. (3) The proportion of students' Mathematical Thinking Ability mastery in PBL with Dynamic Assessment is higher than the proportion of students' Mathematical Thinking Ability mastery in PBL. (4) There is an increase in students' Mathematical Thinking Ability and Self-efficacy in PBL with Dynamic Assessment. The following qualitative research results are obtained: (1) Students with low Self-efficacy can achieve one indicator, namely the ability to identify problems. (2) Students with moderate Self-efficacy can achieve three indicators, namely the ability to identify problems, the ability to formulate effective strategies and the ability to expand the scope of results obtained. (3) Students with high Self-efficacy can achieve all indicators.

8. Recommendations

The indicators of Mathematical Thinking Ability can measure the extent to which a student's ability to solve a mathematical problem. Self-efficacy also has indicators that can measure the level of confidence of students in solving math problems. Effective learning towards improving students' Mathematical Thinking Ability and Self-efficacy will be used to help achieve learning objectives. Teachers need to know students' Mathematical Thinking Ability so they can provide an evaluation of the learning being done. The assessment carried out by the teacher must also be in accordance with the students so that students can take part in learning comfortably and have a positive impact on students.

9. Limitations

Researchers realize that this research still has many limitations, including:

a. Researchers only used 2 samples and 6 research subjects.
b. The researcher only used data on the results of Mathematical Thinking Ability tests and questionnaire results with limited statments.
c. Researchers conducted qualitative research in a short time so we could not dig deep into the root causes

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