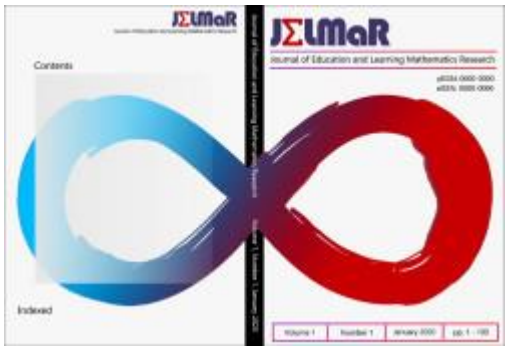

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Case Study: Learning Material-Based on Model-Eliciting Activities to Enhance Problem Solving Abilities and Self Confident

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***Abstract**: This development research aims to describe a valid and practical learning material-based on Model-Eliciting Activities (MEAs) and its effect on problem-solving abilities and self-confidence. The subjects of this research were 36 students grade 10th at MA Negeri 1 OKU Timur.* The type of research used is design research with a development study type. The instrument used test, questionnaire, walkthrough, and interview. The data analysis used descriptive techniques. The validity of learning material-based on the model eliciting activities (MEAs) is demonstrated from the results of the assessment carried out by the validator at the expert reviews stage where researchers will receive suggestions and comments in terms of content, construct, and language as well as comments and suggestions at the one-to-one stage. Meanwhile, practicality can be seen from the results at the small group stage. Learning material-based on model eliciting activities (MEAs) model has a potential effect on students' problem-solving abilities and self-confidence as seen from the results of the analysis of students' answers at the field test stage. Based on the results of the analysis of problem solving ability test scores, 29 students (80.56%) were in the positive category, while 7 students (19.44%) were negative or had not reached the minimum criteria for completing the test results. And also seen from the results of the analysis of students' answers to the self-confidence questionnaire, which shows that 17% of students have very positive self-confidence, 58% of students have positive self-confidence, 25% of students have negative self-confidence

Keyword: Model Eliciting Activities (MEAs), Problem Solving Abilities, Student Worksheet, Self Confidence

INTRODUCTION

Problem-solving is one of the objectives of learning mathematics. Problem-solving abilities as a general goal of mathematics learning. It can be interpreted that problem solving is one of the competencies that students must have. Problem solving is a process of cognitive ability by analyzing, explaining, reasoning, predicting, considering, and doing self-introspection by involving critical thinking skills to solve non-routine problems through appropriate strategies, so with good problem-solving abilities students will be able to solve problems related to daily life (Christiyanto, Sulandra, & Rahardi, 2018). Almost every day, students are often faced with various problems, so it is important for students to have problem solving abilities, one of topic in mathematics that is related to daily life is the system of linear equations with three variables.

Systems of linear equations is one of mathematic topics at the high school level, and most of the problems in this topic related to daily activities. Most students have difficulty in this topic. Some of the students make mistakes in mathematics modeling and have difficulty in in determining the solving method that will be used. Whereas the questions in story form can be used as an illustration to make the problem easier to understand the concepts of Systems of Linear Equations with Three Variables material (Patra & Pujiastuti, 2020).

Apart from that, students are also required to have confidence in solving problems. People who have good self-confidence also have a good level of understanding. Students who have high self-confidence can use the best strategies they have in solving problems, both in everyday life and in solving mathematical problems (Aeni & Afriansyah, 2022), so that problem-solving abilities and self-confidence are interconnected.

One learning strategy that can be used to overcome this problem is Model Eliciting Activities (MEAs). According to Chamberlin & Moon (2005) Model Eliciting Activities (MEAs) is learning to understand, explain and communicate the concepts contained in a problem presentation through a mathematical modeling process. Through the Model-Eliciting Activities (MEAs), students not only know directly but can also discover the concepts they are learning, where real problems of everyday life are used as a starting point for learning mathematics (Suningsih, 2015).

Previous research states that MEA can improve students' creative thinking, critical thinking, representational abilities, learning outcomes and self-confidence. However, not much research has discussed meas and their relationship with problem-solving abilities and self-confidence. Model-eliciting activities consists of three words, namely model, eliciting, and activity. Model means an attempt to replicate a phenomenon or mathematical formula. Eliciting can be interpreted as building and activity is activity. The eliciting activity model is a learning model that is carried out by training students to formulate solutions by identifying problems so that problem formulation emerges and forms a design as a basis for finding solutions (Azhari & Irfan, 2018; Martadiputra, 2014; Zairisma et al., 2020).

Learning with MEAs can make students make more use of problems that exist in everyday life to build students' learning concepts and construct new knowledge and adapt it to students' old knowledge (Hanifah, 2015; Zulkarnaen, 2015). The characteristics of the MEAs are that it can raise real problems, so that students will more easily associate abstract mathematical concepts so that students will be more interested and active in solving the problems that have been given (Zairisma et al., 2020). The activity of generating models also encourages students to create mathematical models which will then be built in other forms. The contextual problem in MEAs will have a positive impact on mathematical knowledge competency. Contextual learning is learning that connects material with real world problems (Purwanto & Rizki, 2015; Rizwan, 2016; Ronggowulan, 2018). Contextual problems will help teachers in teaching the material because the material taught is related to students' real-world situations and is encouraging. Students make connections between the knowledge they have and its application in their life learning as members of a community family. Learning that emphasizes the use of concepts and process skills in various real-world contexts that are relevant to students' backgrounds will make it easier for students to create solutions in various representations so that they will be more confident (Nilasari et al., 2016; Simbolon & Tapilouw, 2015).

Based on the description above, the aim of this research is to describe learning material-based on Model-Eliciting Activities (MEAs) and its effect to problem-solving abilities and self-confidence.

METHOD

This is design research, and the type is development studies (Van den Akker, et al., 2006). This research was carried out at MAN OKU Timur in the 2021/2022 academic year, grade 10th that consisting of 36 students. This research consists of two stages, namely preliminary and prototyping (formative evaluation) stages, which consist of self-evaluation, expert reviews, one-to-one, small group, and field tests (Tessmer, 1993; Zulkardi, 2002).

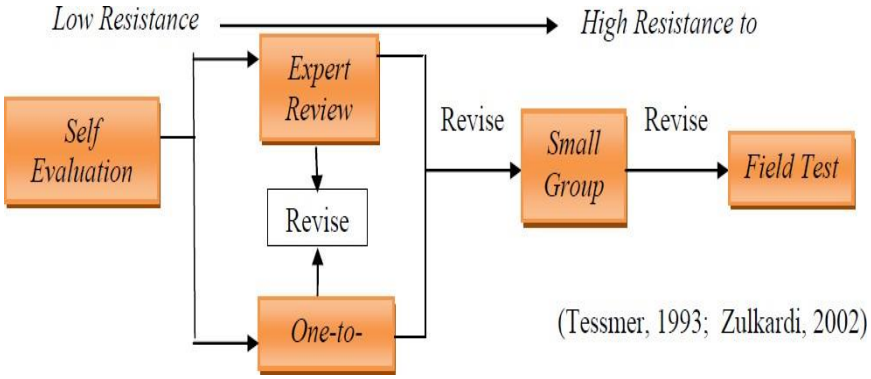

Figure 1. Formative Evaluation

At the preliminary stage, analysis curriculum and design of student worksheets as learning material based on Model-Eliciting Activities (MEAs). Then the prototyping stage consists of self-evaluation, expert review, one-to-one, small-group, and field-test. At the self-evaluation stage, the researcher evaluates the result of design student worksheet that has been produced and the results of this self-evaluation are called prototypes.

After that, an Expert Review is carried out the teaching materials that have been designed are given to experts who will become validators to validate the teaching materials that have been designed. The resulting teaching materials were validated by 2 validators, namely WDP and EK. The results of the expert validation will be used for revising the learning materials that have been designed.

The one-to-one stage was carried out to see the difficulties that might occur in using student worksheets during the mathematics learning process. The one-to-one stage was tested on three students who had heterogeneous abilities from other classes. After carrying out the one-to-one stage, the researcher made improvements to the student worksheet which was developed based on the difficulties found by students when doing worksheet. From these two stages, the researcher gets a valid worksheet based on the Model Eliciting Activities (MEAs).

Based on the results of the revision from the expert review and the one-to-one stage, a trial was carried out again on a small group of 6 people divided into 2 groups. Each group consists of students who have heterogeneous abilities and are not the subject of research. In this stage, researchers also get some findings for improving the student worksheet and get prototype 3.

After producing prototype 3, Next, the Student Worksheet will be tested on the research subject. The products used are products that meet valid and practical standards.This field trial was carried out to see the potential and effect of the worksheets that had been developed on students' problem-solving abilities and self-confidence.

The data collection techniques used in this research used walkthroughs, tests, uestionnaires and interviews. Walkthrough is a method of evaluating or validating a prototype which is carried out directly by experts in the field and leads to improvements in the prototype (Nieveen, 1999). The questionnaire was conducted to see students' self-confidence. The test is used to measure students' problem-solving abilities after learning

with Model-Eliciting Activity (MEA). Interviews are used to see student responses starting from the one-to-one, small group, and field test stages.

All of data analyzed as follows: (1) Check the answers and give grades according to the assessment rubric based on the answer key that has been created; (2) Determine the student's score on the test; (3) the calculated score will be categorized according to the existing test assessment categories.

Table 1. Conversion of 2013 Curriculum Competency Achievement Scores

No	Number Range	Letter
1	3,85 - 4,00	A
2	3,51 - 3,84	A-
3	3,18 - 3,50	B+
4	2,85 - 3,17	B
5	2,51 - 2,84	B-
6	2,18 - 2,50	C+
7	1,85 - 2,17	C
8	1,51 - 1,84	C-
9	1,18 - 1,50	D+
10	1,00 - 1,17	D

RESULT AND DISCUSSION

There are four activities at the preliminary stage, such as: analysis curriculum at school, analysis students' characteristics, find out theory of Model-Eliciting Activities (MEAs), and find out characteristics of worksheet. The results of the preliminary stage showed that the characteristics of students at the school were diverse and there were no children with special needs. Apart from that, from the results of the curriculum analysis, one of the materials that is relevant to everyday life is a system of linear equations with three variables with the following basic competencies.

Table 2. Core Competencies and Basic Competencies

Core Competencies	Basic Competencies
3.3 Developing a system of three-variable linear equations from contextual problems	4.3 Solve contextual problems related to systems of linear equations with three variables

Based on theory of Model-Eliciting Activities (MEAs), there are five steps such as: newspapers article, read lines or warm-up questions, data table or mathematical information, problem Statement. Beside that there are some elements of worksheet based on the eliciting activity model include: 1) title, cover, and general description of the material to be discussed; 2) core competencies and basic competencies, and goals to be achieved during learning, 3) challenging work instructions containing instructions for filling out LKS; 4) learning activities contain problems that must be solved by students. The following is a student worksheet on the design results that have been produced at this stage.

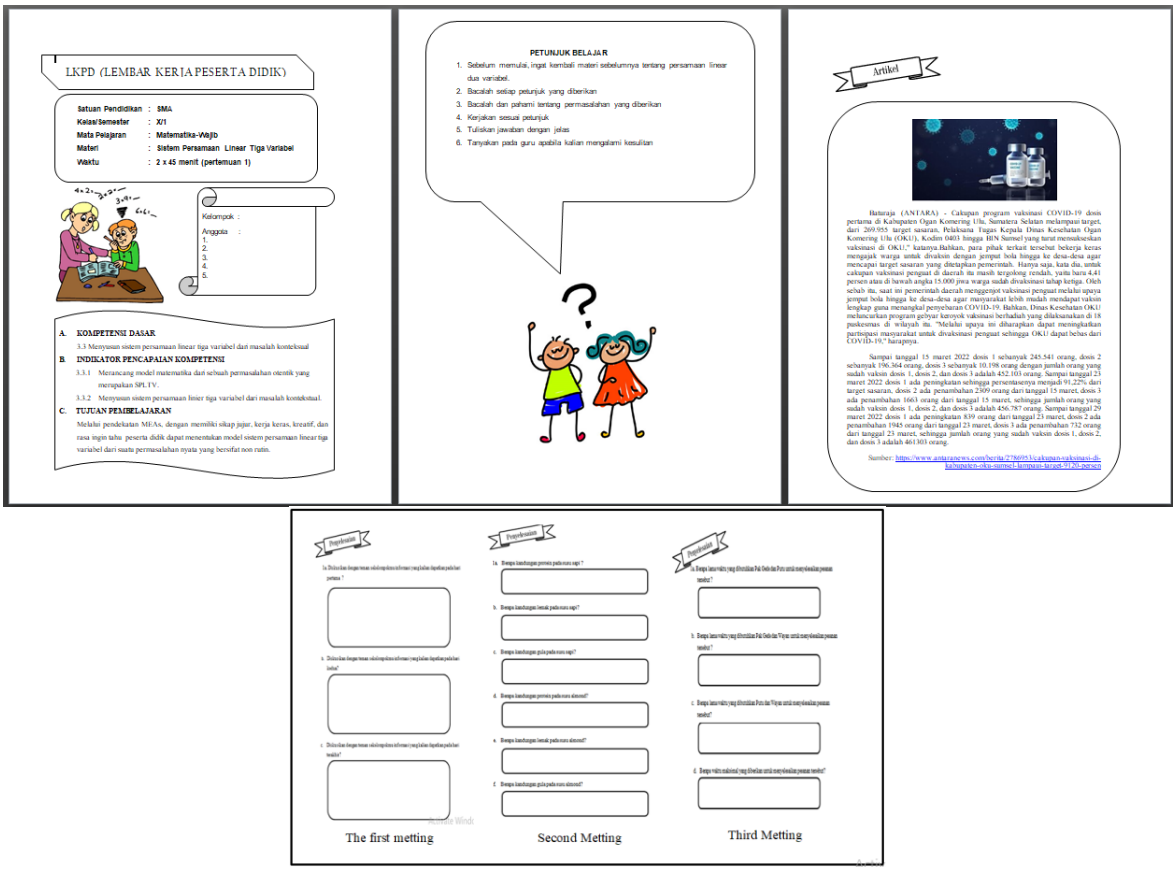

Figure 2. Students Worksheet Based on MEAs

After that, an expert review is carried out and the learning materials that have been designed are given to experts who will become validators to validate the teaching materials that have been designed. The resulting teaching materials were validated by 2 validators, namely WDP (validator 1) and EK (Validator 2). The results of the expert validation will be used for revising the learning materials that have been designed.

Table 3. Comments or Suggestions from validator

No	Validator	Comments or Suggestions
1	WDP	1. Namely for several complete entries, 2. Made in table form only to make it simpler, 3. Retained to clarify Redlines or warm-up questions steps from Model-Eliciting Activities (MEAs), 4. Questions need to be clarified/added instructions.
2	EK	1. Namely adding problems to the article, 2. for Student Worksheet 1 it is still not appropriate for the material on Systems of Linear Equations in Three Variables, 3. at stage 2 it is still unclear as to the purpose of how to solve the questions.

The one-to-one stage was carried out to see the difficulties that might occur in using student worksheets during the mathematics learning process. The one-to-one stage was tested on three students who had heterogeneous abilities from other classes.

Table 4. Comments or Suggestions from students

No	Students	Comments or Suggestions
1	RDK	In the 2nd meeting LKPD, it is better to just delete part 2b because it is already complete
2	SN	The 3rd meeting LKPD for parts b, c, and d are clearer if you add the words together after the words to complete the order
3	YRJ	For LKPD at each meeting, in 2a it will be clearer if the questions are directly instructed to create problems

After carrying out the one-to-one stage, the researcher made improvements to the student worksheet which was developed based on the difficulties found by students when doing worksheet. From these two stages, the researcher gets a valid worksheet based on the Model Eliciting Activities (MEAs).

Based on the results of the revision from the expert review and the one-to-one stage, a trial was carried out again on a small group of 6 people divided into 2 groups. Each group consists of students who have heterogeneous abilities and are not the subject of research. In this stage, researchers also get some finding for improvement the student worksheet, including for worksheet at each meeting in 2a it will be clearer if the questions are directly instructed to make excuses and there are still several typos in the article in the worksheet for the first meeting, so it can be concluded that the learning materials designed are categorized as practical.

After obtaining a valid and practical prototype 3, a field test was then carried out. The field test stage is the final stage in the formative evaluation of the development of Student Worksheets based Model-Eleciting Activities (MEAs). The field test stage was to assess the potential effects of the worksheet which had been developed to see student learning outcomes which was carried out in 4 meetings.

The learning process at each meeting begins with the teacher briefly explaining the method for solving Systems of Linear Equations with Three Variables and continues with solving contextual problems contained in the LKS. At the field test stage, the problem-solving process begins by answering questions contained in newspaper articles, namely the Redlines stage. Based on the results of data analysis. It was found that all groups were able to understand the problem well.

The first component of the eliciting activity (MEA) model is a Newspaper Article. At the newspaper article stage, students are given problems with context related to everyday life in the form of stories. At the first, second and third meetings, researchers distributed reading articles. So from the first meeting to the third meeting the students seemed enthusiastic about reading the reading articles distributed by the researcher.

Then the second component contained in the MEAs approach is readiness Or Warm-Up Questions, which is a question design to monitor students' understanding of newspaper articles whose questions range from low-level questions to high-level questions. This level of questions guides students to operationalize the definition, thereby guiding students to think cognitively. Like asking what information is contained in the article you read.

At the first meeting, the researcher will ask what information was obtained from the article, and students answer and write down the information according to the article. Like how many marbles Ridho, Hendri and Medi had on the first day, second day and third day. Then at the second meeting the researchers used a different theme, namely nutrition. From the answers on the worksheet, students know the amount of fat, protein and sugar content in each milk, as stated in the newspaper article. Meanwhile, at the third meeting, students discussed the processing time required if there were three workers working. Through these questions, students are encouraged to think cognitively, and train them to construct their thoughts, so they can understand the learning material.

Next, the third MEA component is a data table or mathematical information. At this stage the researcher acts as a student facilitator in answering and explaining questions related to existing problems, thereby helping students better understand the problems encountered during learning. When the researcher instructed students to write their answers in the LKPD column provided, there were several groups who asked the researcher to confirm what information was written on the LKPD, the researcher asked other groups to check the answers that had been given. written on the board by one of the groups and explain briefly what the group has written.

And the last component contained in MEAs is Problem Statement. After students are guided by completing very low to high level questions then to high-level core questions. In solving high-level core questions, students will mathematically model several important variables from the reading, students will make assumptions based on mathematical models. At this stage there is a connection with problem solving indicators including understanding the problem, planning, implementing the plan, checking again.

At the first meeting, the researcher wanted to create variables from the reading articles, so that students could get examples with x, y, and z. So that students can write down the equations obtained from the problems that occurred in the first, second and third meetings. Then at the second meeting the researcher asked for information contained in the article that was read first. Furthermore, when the researcher wants to create a variable from the article read, the researcher asks: Make an example to find out how many of each type, after getting the equation the students will solve the equation. Students will check the answers they get again to make sure the answers are correct or not.

At the end of the lesson, students are asked to complete questions and fill out a self-confidence questionnaire. From the analysis of test question work data, it was found that students were able to solve problems using indicators of problem-solving ability. In question number 1, all students are correct in the indicator of understanding the problem found in test question number 1, namely by writing down what is known and asked in the question, then in the indicator of making plans all students are correct in carrying out this indicator, namely by making a model mathematics from the test questions given, then on the indicator of carrying out the plan, all students correctly carry out this stage. Then in the last indicator, namely checking again, all students are correct in carrying out this indicator.

Then, from data analysis of students' work on test question number 2, it was found that almost all students were correct in the indicator of understanding the problem found in test question number 2, namely by writing down what was known and asked in the question, although there were some students who did not write known, asked. Furthermore, in the indicator of making plans for all students correctly in carrying out this indicator, namely by making a mathematical model of the test questions given, then in the indicator of implementing the plan all students correctly carry out the steps by solving the problems contained in the test questions. Then in the last indicator, namely checking again, almost all students were correct in carrying out this indicator, although there were students who did not double check the answers they had made. This shows

that students only arrive at a solution without checking again by substituting into the initial equation and do not make conclusions. The following is a snippet of students' answers to question number 1 and number 2.

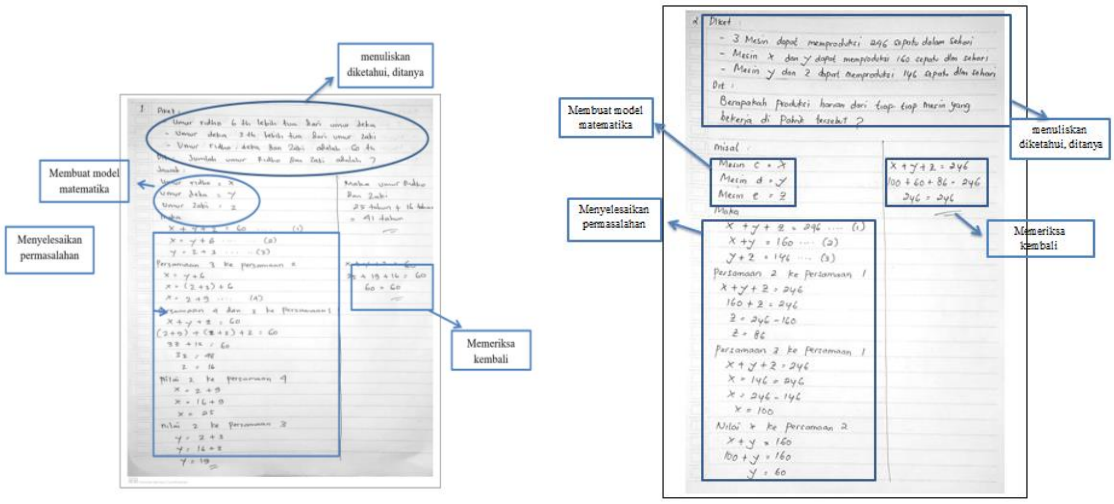

Figure 3. Student Answers from Test

Then, from data analysis of students' work on test question number 3, it was found that almost all students were correct in the indicator of understanding the problem found in test question number 3. Students can write down what they knew and what was asked in the question, although there were some students who did not write it down. Next In terms of indicators, almost all students' plans are correct in carrying out these indicators. Students can make a mathematical model of the test questions given even though there are errors in writing the mathematical model for the test questions.

Then in the indicator of implementing the plan, almost all students correctly carried out this stage, although there were some students who were not careful in solving the problems contained in the test questions. Then in the last indicator, namely checking again, almost all students were correct in carrying out this indicator by checking the answers again. This shows that students only arrive at a solution without checking again by substituting into the initial equation and do not make conclusions. Therefore, many students find solutions, but they are not the right solutions. The following is the percentage of students' answers to indicators of problem-solving ability.

Based on the results of the test scores above, 29 students (80.56%) who got a score more than 2.51 were included in the positive category. Meanwhile, 7 students (19.44%) got a scoreless than 2.51, which means they have not reached the minimum criteria for completing the test results. Based on this, it can be said that learning using teaching materials in the form of Student Work Areas based on the Model Eliciting Activities (MEAs) has a positive effect on students' problem-solving abilities. Based on the results of the analysis of students' answers to the problem-solving ability test questions, it appears that students have been able to carry out all stages of problem-solving abilities, namely understanding the problem, making a plan, implementing the plan, checking again well. The results obtained from calculating scores and categories of students' mathematical problem solving are displayed in the following table:

Table 5. Result of Percentage results of working on test questions

No	Number Range	Letter	Frequency	Percentage
1	3,85 - 4,00	A	0	0%
2	3,51 - 3,84	A-	5	13,89%
3	3,18 - 3,50	B+	13	36,11%
4	2,85 - 3,17	B	6	16,67%
5	2,51 - 2,84	B-	5	13,89%
6	2,18 - 2,50	C+	7	19,44%
7	1,85 - 2,17	C	0	0%
8	1,51 - 1,84	C-	0	0%
9	1,18 - 1,50	D+	0	0%
10	1,00 - 1,17	D	0	0%

In the indicator of understanding the problem, some participants did not write down what they knew and were asked about questions number 2 and number 3. This is in line with (Yuwono, et al, 2018) that the cause of student errors at this stage is a lack of understanding of the material. This is also in accordance with the research results of (Utami & Wutsqa 2017) that students' ability to determine what is known and asked is the first indicator of problem solving, where this indicator is the indicator that is done most by students. However, some students still show that they are not able to apply the information on the questions to solve the problem, students are not able to analyze the information on the questions given to solve the problem, there are still many students who are not able to determine the adequacy of the information on the questions.

In the indicator of making plans, there are still students who make mistakes in writing the mathematical model of question number 3. This shows that students have difficulty writing strategies/plans to solve problems. (Utami & Wutsqa, 2017) argue that students incorrectly transform problems into mathematical models due to difficulties in analyzing the facts in the problem to link them to relevant mathematical concepts.

In the indicator of implementing the plan, there are still students who are not careful in solving the problems in question number 3. The error was because students did not carry out the calculation process correctly and did not find the right solution. Mastery of calculations and accuracy are very necessary at this stage because errors that occur are caused by lack of accuracy in solving problems and errors in the calculation process carried out (Novitasari & Wilujeng, 2018). Another reason is that the solution process is not completed because time runs out before students solve the problem. This is in line with the opinion of (Zulfitri, 2019) that the cause of students making mistakes in solving problems is that students make mistakes in making plans for the second problem solving indicator so that the problem-solving process is also wrong and there are errors in the calculation process.

In the last indicator, namely re-checking, there are still students who do not re-check the answers they make to the problems in questions number 2 and number 3. This shows that students only arrive at a solution without checking again by substituting into the initial equation and do not make conclusions. Therefore, many students find solutions, but they are not the right solutions. Apart from that, students also do not complete their work, so they do not carry out the re-checking stage (Azzahra, 2020).

The questionnaire also was conducted to see students' self-confidence in learning mathematics, problem solving abilities, and language that is easy for students to understand using Student Worksheets based Model-Eliciting Activities (MEAs). In this study, researchers used a Likert scale, the questionnaire distributed to all class X10

students contained 23 questionnaire items which were divided into 4 questionnaire indicators. Based on the results of the analysis of the self-confidence questionnaire above, it can be concluded that the Student Worksheet based Model-Eliciting Activities (MEAs) that has been developed can give rise to students' self-confidence in learning mathematics and problem solving abilities. Next, an analysis was carried out of students' answers to the self-confidence questionnaire, which showed that 58% of students had very positive self-confidence, 17% had positive self-confidence, 25% had negative self-confidence. So, student worksheets based on Model-Eliciting Activities (MEAs) have a potential effect on students' self-confidence. The following are the percentages on the self-confidence questionnaire:

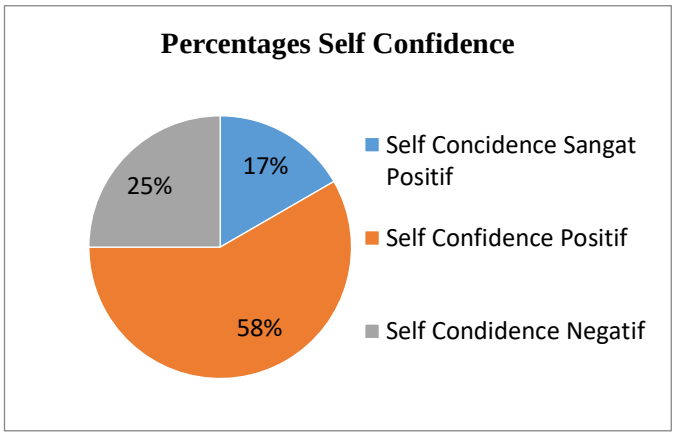

Figure 4 . Percentages Self Confidence

CONCLUSION

This research produces a valid and practical learning material-based on Model Eliciting Activities (MEAs) which is form a students worksheets. This learning material also has effect to students' problem-solving abilities and self-confidence. Based on the results of the analysis of problem solving ability test scores, 29 students (80.56%) were in the positive category, while 7 students (19.44%) were negative or had not reached the minimum criteria for completing the test results. And also seen from the results of the analysis of students' answers to the self-confidence questionnaire, which shows that 17% of students have very positive self-confidence, 58% of students have positive self-confidence, 25% of students have negative self-confidence

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