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The Development of Mathematics Higher Order Thinking Learning Using Metacognitive Strategies in Term of Model Effectiveness

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Abstract: The study developed a learning model of higher order thinking in mathematics learning employing metacognitive startegies, utilizing the ADDIE (Analysis, Design, Development, Implementation, and Evaluation) model. This article discusses the results of developing a learning model based on the implementation stage. The aim of this study was to test the effectiveness of the model and examine the development trends of students' higher order thinking skills and difficulties in the learning applying the metacognitive strategies. The research instruments were a student worksheet, a student activity observation sheet, formative tests, and a final test. The field trial was carried out on 30 Year 10 students in one of the senior high schools. The data were analyzed qualitatively based on the criterion of a practical and effective product. The findings of this study were the development trend of students' higher order thinking skills (HOTS) in the formative and final test were increased. Students' difficulties were mostly for the indicators of evaluating and creating. The results of this study concluded that the mathematics learning model of higher order thinking was practical and effective for senior high school students.

Key words: ADDIE model, HOTS, metacognitive strategies, effectiveness

1. Introduction

The change of paradigm in the Industrial Age 4.0 demands a change of working. The way a product designed has also developed in term of the efficiency at each stage leading to the increasing needs for competent human resources. There are several working competencies required in the future, namely creativity, critical, mathematical reasoning, ICT, and collaboration skills. "Therefore, a long-term strategy is needed to design the national education system. 21st-century human resources are obliged to have several competencies, namely: critical thinking, problem-solving, communication, teamwork, creativity, and innovation skills to meet the challenges previously mentioned" (Trilling & Fadel, 2009). Based on the demands of the industrial world and the preparation of the human resources for the 21st-century explained earlier, students require to be equipped with higher order thinking skills (HOTS) as HOTS involve the crucial competencies in the modern world, namely: the ability to solve problems, think critically and creatively, argue and make decisions.

Higher order thinking is thinking activities involving the high level cognitive of hierarchy in Bloom's Taxonomy, namely analysis, evaluation, and creation. This is in line with Anderson and Krathwohl (2001) who

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stated that that the domain of cognitive processes included in higher order thinking skills include analyzing, evaluating and creating. Besides, King et al. (1998) explained that higher order thinking skills include critical, logical, reflective, metacognitive and creative thinking. Such abilities are activated when individuals encounter problems, uncertainties, questions, or non-routine dilemmas. Therefore, Conklin (2012b) argued that students must be active in learning. If a student is engaged in the learning, he/she should be able to analyze, evaluate and create. Inversely, if a student is passive in learning, he/she is merely the recipient of the information provided.

This shows that the learning employing higher order thinking skills is urgent because such learning concerns more on the process resulting in an exciting class and more engaged students which in turn increase the achievement. Regarding HOTS questions and the learning process, teachers, the primary key to the success of educational reform, need to improve their teaching skills. The change of paradigm in the era of industry 4.0 will not yield a positive impact on the progress of mathematics education if teachers do not change their hard skills and teaching method. Therefore, teachers require having the academic competence (hard skills) including the ability to master the materials as well as the teaching and learning method.

This study develops the practical and effective learning model of mathematics higher order thinking for senior high school students based on the cognitive pattern of orientation, organization, and elaboration employing the metacognitive strategies, then this article discussess the development and obstacles of students in solving HOTS problems based on practical and effective criterias.

2. Literature Review

2.1 Higher Order Thinking Skill (HOTS)

Conklin (2012a) classified higher order thinking skills in three categories, namely: (1) transfer, requiring students to understand and be able to apply what they have learned, (2) critical thinking and (3) problem-solving. These descriptions are in line with the last three aspects of the revised Bloom's Taxonomy namely (1) analyzing, (2) evaluating, and (3) creating, higher order thinking skills with some characteristics distinguishing one another. Analyzing, for example, is related to the cognitive process of connecting, organizing, integrating and validating. Evaluating includes checking, criticizing, hypothesizing and experimenting. Creating involves producing, designing and elaborating (Anderson & Krathwohl, 2001). Besides that, Widana (2017) proposed that HOTS include problem-solving, critical and creative thinking skills as well as argumentative and decision-making abilities.

Furthermore, Ansari et al., (2018) mention that HOTS can be measured based on three cognitive patterns in solving problems, namely orientation, organization and elaboration of knowledge:

- Orientation includes the ability to remember concepts relevant to a problem and (2) the presentation of various alternative solutions before choosing the one considered the most accurate.
- Organization of all facts in order to systematize information and (2) the creation of patterns and drawings associated with those in the problem.
- Elaboration includes (1) The transformation of complex information into simple information via models and (2) the construction of a hypothesis to implement proper methods to problem solving.

Based on the descriptions previously presented, analyzing is relevant to orientation, evaluating is relevant to organization, and creating is relevant to elaboration. This study measures students' HOTS by combining the dimension of HOTS proposed by Krathwohl (2002) and Ansari et al. (2018) as presented in Table 1.

Table 1 The Indicators of HOTS in the Research and Rubric

Indicators	- Sub Indicators	Maxs Score
Analyzing (Analyzing the information of the problem)	- Identifying problems - Restructuring the problem into smaller parts - Recognizing patterns or relationships of complicated problems - Formulating questions and manipulating algebraic forms	32.5
Evaluating (Organizing and examining)	- Gathering some possible solutions to the problem - Assessing the solution plan using the appropriate criteria - Accepting or rejecting a solution plan - presenting figures base on information in the problem.	32.5
Creating (Designing and develop solutions)	- Understanding images for the information of a solution - Creating relationships between the information on the problem, the solving concept and previous solutions - Designing a method to solve problems via model - Elaborating a solution and performing calculations	35.0

Based on the criteria of higher order thinking skills (HOTS) presented in Table 1, students' ability in solving HOT questions is expected to prepare them to grasp some competencies for the 21st century (21st-century skills). According to Trilling and Fadel (2009), some of them are (1) critical thinking and problem-solving skills, (2) communication and collaboration skills, (3) creation and innovation skills, and (4) informational skills and media literacy. Anderson and Krathwohl (2001) argued that when students are equipped with higher order thinking skills, some changes will occur in their ways of thinking, namely:

- organizing the knowledge learned into the long-term memory, this organization increases the retention of information significantly compared to when it is kept in the short-term memory (the characteristic of lower order thinking). For example, students learning through memorizing tend to forget sooner than students learning through the problem-solving process, the latter will transfer the knowledge into the long-term memory, making it easily accessible to be used in various everchanging situations.
- developing attitudes and creative thinking to overcome the increasingly complex problems of life.

2.2 Metacognitive Strategies

Weinstein and Mayer (1986) mentioned that metacognitive strategies is the effort of someone to control all learning activities, if necessary modify the strategies commonly used to achieve goals. When applied in learning, students ask themselves to test understanding of the material being studied. Often students also use questions as a guide in understanding the contents of the problem. Furthermore, Mevarech and Kramarski (2004) mentioned that one of the efforts that can be done in metacognitive learning is by IMPROVE method. This method emphasizes the importance of each student being given the opportunity to develop mathematical meaning by involving students in metacognitive discourse.

In this research, metacognitive strategies is step-by step of the solution the problems that is included in the seven components of the IMPROVE method namely introducing new concepts, metacognitive questions, practicing, reviewing and reducting difficulties, Obtaining mastery, verification, and enrichment. The acronym indicates that there are seven interrelated components, namely knowing new concepts, metacognitive questions, exercises, reviewing and reducing difficulties, obtaining mastery, verification, and enrichment. It can be shortened to three interrelated components, cognitive strategies and processes, peers interaction and systematic activities of feedback-improvement-enrichment (Mevarech & Kramarski, 1997).

Bisides that, Matlin (2005) argued that metacognition is our knowledge, awareness, and control of our cognitive process. Then, Schoenfeld (2006), said that metacognition as one's thinking is an interaction between three critical aspects, namely: (1) knowledge of the self-thinking process, (2) self-control or self-regulation, (3) beliefs and intuition. This interaction is paramount because the knowledge they have about cognitive processes can help them to organize things around and choose strategies to improve further cognitive abilities. For example, when we realize that we often forget or do not understand a mathematical concept and we understand that the concept is harder than other concepts; we need to opt for a particular method, such as by underlining the notions and concepts to help us understand and remember. The definition of metacognition previously put forward by the experts is highly diverse, but all essentially emphasizes the awareness of one's thinking about his/her thinking process.

One of the advantages of metacognition is that someone tries to reflect on how to think or on the cognitive processes she/he does, and therefore metacognition can be interpreted as one's thinking about his/her thinking or one's cognition about his/her cognition. Thus, activities such as planning about the approach for the learning tasks, monitoring abilities and evaluating the plan in conducting the tasks are the nature of metacognition. Keiichi (2000) found that (a) metacognitive plays an important role in solving problems; (b) students are more skilled at problems solving if they have metacognitive knowledge.

Based on the above, The metacognition questions are the key presented by teachers in this method. These questions aim to enhance the ability to understand, analyze, and self-regulate the application of problem-solving as well as connect the first and new knowledge. Mevarech and Kramarski, "suggested that group learning provided metacognitive questions can be applied to improve students' ability to think concerning problem-solving. The metacognitive questions were constructed and arranged to follow the 4-stage model of the problem-solving process: orientation and problem identification, organization (link prior knowledge with current knowledge), execution (using the right strategy), and evaluation (reflect on processes and solution) (Mevarech & Kramarski, 2004). It is expected that the metacognitive questions will help students in solving mathematical problems.

According to Kramarski and Mizrachi (2001), metacognitive questions, include.

- Comprehension questions that encourage students reading the problems, describe concepts in their own words, and try to understand the meaning of a concept. Such as: "What is the overall problem about?"
- Connection questions that encourage students to see the similarities and differences in a concept/problem, such as: "What are the similarities and differences between the current and previous problems?"
- Strategy questions that encourage students to consider appropriate strategies to solve the problems given and provide reasoning for the chosen strategy, such as: "What strategies, tactics or principles are appropriate for solving the problem?"
- Reflection questions that encourage students to ask themselves about the problem-solving process, such as: "What am I doing?".

The connection between the metacognition and the IMPROVE method is identified in several stages of the technique facilitating the acquisition of students' metacognitive strategies. At the stage of Introducing New Concepts, students are asked to solve the problems provided with the help of three cards containing metacognitive questions. These questions include understanding, strategy and connection questions. Besides, at the stages of the metacognitive questioning and practicing, students are again asked to solve the exercise problems including metacognition questions to assist students in solving problems. Besides emphasizing on the metacognition activities, the IMPROVE method is also oriented on the interaction between peers and a systematic process of feedback-improvement-enrichment. Peers interaction benefits the students in developing their thinking skills by sharing their opinions and enriching their knowledge.

The questions in this study is:

How is the process of developing the practical, and effective learning model of mathematics higher order thinking for senior high school students using the metacognitive strategies?

1) What are the development and obstacles of students in implementing the learning model?

3. Research Methodology

3.1 Type and Research Design

This study is development research to yield, practical and effective learning model/instrumens (Nieveen, 1999). The products developed are a lesson plan, a discussion worksheet, a task worksheet, exercise problems and final test related to HOTS. The learning instruments were developed by using ADDIE model including "(1) Analysis, (2) Design, (3) Development, (4) Implementation, and (5) Evaluation" (Branch, 2009). This study employed a qualitative design based on Davitson et al., (2004), the cycle of the study is presented in Figure 1.

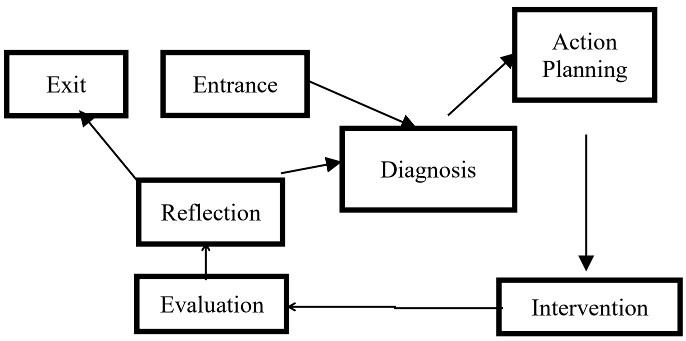

Figure 1 The Flow of Qualitative Research

The entrance in this study was the low HOTS of students, while the diagnosis was the identification based on the needs analysis phase of the teachers, the school curriculum and the student characteristics. The problem identification was evaluated using a teacher questionnaire. After identifying the symptoms and the causes, the researcher created an action plan to overcome the low HOTS. The next phase was designing the HOTS-based learning models including the lesson plan, the discussion worksheet, task worksheet and the evaluation instruments followed by the expert validation (the design and development phases of the ADDIE model). The valid learning design was then implemented in the classroom using the IMPROVE method and the metacognitive strategy (Intervention/action taking). The researcher thoroughly evaluated the learning once the learning was completed. The evaluation did not only include the learning outcome test consisting of HOTS problems but also the learning observation during the implementation of the method. Next, the reflection was conducted to examine the strengths and weaknesses of the IMPROVE method and the metacognitive strategy in overcoming the low HOTS of students. If the reflection results show that students' HOTS is still lacking, the treatment will be continued based on the previous steps. The cycle ends when the last reflection results indicate that the low HOTS of students has been resolved (Exit).

3.2 Research Subject

Participants of this study were 10th grade students who were selected purposively (aged 15–16 years old) of one of the senior high schools in Aceh Indonesia. The learning instruments trial was carried out for 30 students in three meetings. The initial stage of the trial was conducted for examining the readability of the instruments involving six students who were randomly selected.

3.3 The Implementation Procedure and the Instruments of Data Collection

The research procedure was conducting a treatment in the classroom for three lessons with the topic of "Linear Equation System with Three Variables". During the treatment, students worked on the discussion worksheet, completed the exercise problems and solved the task worksheet at home for those having the score of $x > 75$. A final test was administered for students at the end of the lessons. The students' cognitive development in solving the HOTS problems was indicated by the increasing trend of the formative test scores for three lessons and the final test, while the student difficulties were identified based on the HOTS indicators. The data were collected using the test and non-test instruments, such as formative (exercise problems) and final tests. The qualitative data was obtained using the questionnaire and the observation sheets. The non-test data aimed to examine the implementation of the learning in the classroom and the student activities during the learning process. Both the data collection and the learning instruments satisfied the construct and content validity based on the validator's opinion, as mentioned by Ansari et al. (2018) from results of previous studies that the prototype of higher order thinking learning using IMPROVE method was valid and practical. It was concluded that the prototype was ready to be piloted at schools to examine its practicality and effectiveness.

3.4 Data Processing and Analysis

The data were analyzed qualitatively through steps of data reduction, data presentation and conclusion based on the criterias of a practical and effective product. Practical concerns on whether the model developed can be well implemented in the classroom, while effective indicates whether the learning model can benefit the students to improve their HOTS. Data processing and analysis is based on the criterias of Kemp et al., who "argued that an excellent product should satisfy six criterias namely: (1) the average of students' activities on task (discussion) is at least 90%, (2) the average of students' activities is at least 90%, (3) the conformity level of the observed and the expected students' activities is at least 80%, (4) there is an increasing trend of formative and learning outcome test scores, (5) more than 50% of students provide positive responses, (6) teachers give positive responses concerning the use of this product"(Kemp et al., 1994).

The following are the items sample of the final test representing all materials students have learned for three lessons. A lens factory has three machines: A, B and C. When all machines work, they produce 5,700 lenses in a week. When only machines A and B work, they provide 3,400 lenses in a week. When only machines A and C work, they produce 4,200 lenses in a week. How many lenses does each machine produce in a week?

4. Result

4.1 The Results of Field Trial at the School

In this analysis, the data at school was obtained from (1) the observation of students' activities on task (discussion), (2) the observation of students' activities, (3) the observation sheets of the learning instrument implementation, (4) exercise problems and test of the learning outcome, (5) student response questionnaire (Kemp et al., criterias)

4.2 The Observation Data of the Learning Instrument Implementation

The observation of the learning implementation based on the lesson plan was carried out by three observers consisting of a teacher and two colleagues. The average observers' assessment of student activities is presented in

Table 2.

Table 2 The Analysis Concerning the Observation of the Learning Implementation

Aspect	Criteria	Lesson			Average	
		1	2	3	Per criteria	Per aspect
1.	Introduction	4	4	5	4.3	4.5
	Core activity	4	5	5	4.6	
	Closing	4	5	5	4.6	
2.	Class situation	4	4	4	4.0	4.0
Total Average:					4.25	

4.3 The Assessment Analysis of Discussion Worksheet

The discussion worksheet consists of one HOT question was administered to each group. The purpose of discussion worksheet was to examine students' problem-solving skills employing the metacognitive strategies in three lessons.

Table 3 The Analysis Results of the Discussion Worksheet Scores

No	**Group**	**Percentage of Score at Lesson**			**Average**
		1	**2**	**3**	
1	I	80	90	100	90.0
	II	95	100	100	98.3
	III	80	100	95	91.7
	IV	100	95	95	96.7
	V	80	90	90	86.6
Average					92.7

4.4 The Observation Data of Student Activities

Observations were carried out by two observers assessing students' activities during the learning. Data were evaluated using the percentage. The results are presented in Table 4.

Table 4 The Analysis of Observations of Student Activities

Lesson	Observer 1	Observer 2	Average
I	90	87	88.5
II	91	89	90.0
III	93	90	91.5
Total Average		90.0	

4.5 The Analysis of Formative and Final Test Scores

The formative test or exercise problems consisted of an item and was given to students at the end of each lesson for students to do individually based on the stages of the IMPROVE method. The formative tests developed consisting of exercise problem 1, exercise problem 2, exercise problem 3 and final test. The final test aimed to examine students' higher order thinking skills concerning all materials learned. In Table 5 above presented the results of the formative and final test analysis based on the indicators of analyzing, evaluating and creating.

Table 5 The Students' Abilities Based on HOTS Indicators

HOTS Indicators	N	Average ability of the Formative and Final Test							Everage
		Formative test (three times)			Final test (Four of Problems)				
Analyzing	30	31.0	31.9	32.2	31.3	32.5	32.3	31.1	31.8
Evaluating	30	22.6	23.5	25.0	26.6	26.0	23.2	22.6	24.6
Creating	30	21.2	22.4	24.3	27.0	25.1	22.8	20.7	23.9
Total		74.8	77.8	81.5	84.9	83.6	78.3	74.4	80.2

In Table 5, shows that the overall HOTS test results of the three formative and the final test are 74.8; 77.8; 81.5 and 80.2 respectively. In the final test, the average of student abilities on the indicators of analyzing the problem is 31.8 (39.7% of the maximum score). The average of students' abilities on the indicator of evaluating is 24.6 (30.7% of the maximum score). The average of students' ability on the indicator of creating is 23.9 (29.8% of the maximum score). Based on Table 5, it is indicated that the scores of each exercise and final test incline to increase.. The increase in student scores can be seen in the Figure 2.

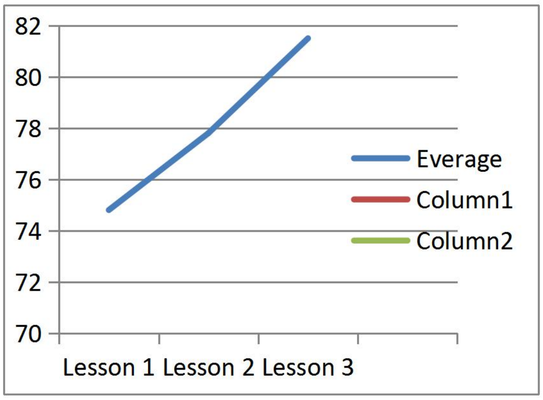

Figure 2 The Increase in Student Scores in Formative Test

The following is an analysis of the results of the answers to tests of higher order thinking skill based on the indicators.

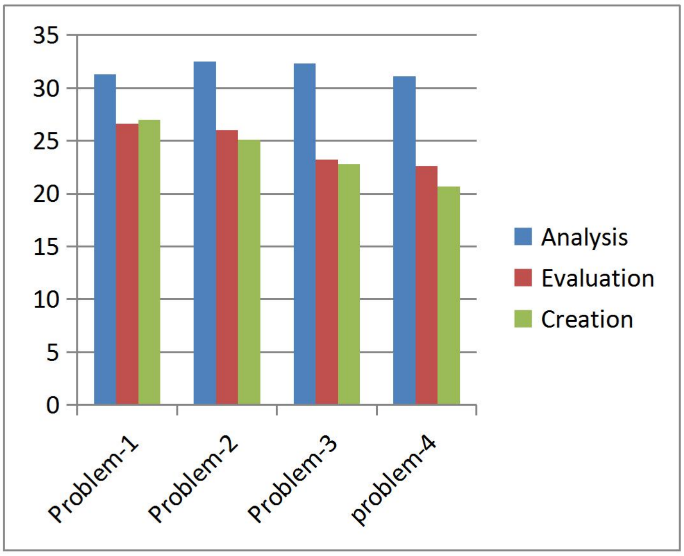

Figure 3 Chart Higher Order Thinking Skill Based on the Indicators

5. Discussion

This model was developed on the basis of constructivism theory emphasizing on students' active role in discovering a knowledge as well as metacognition theory emphasizing the process of students' self-reflection in determining a problem, selecting strategies in problem solving, analyzing the effectiveness of the strategy used and being able to change the strategy if it is inappropriate.

At the initial implementation of learning using the IMPROVE method, students were confused when the teacher asked them to answer metacognition questions at the Introducing New Concept stage, they were not used to the self-reflection process to solve problems. Therefore, the teacher guided them to understand metacognition questions. This was also observed when students answered the comprehension questions. Students could not answer the understanding questions correctly. They responded to the question only based on the fragment of words from the problem without understanding the problem. A similar case occurred when students addressed the connection questions. The students could not answer the question correctly as identified from the results of their answers which were also solely based on the fragment of words from the problems instead of focusing on the differences and similarities between the current and previous problems solved. While based on students' answers to the strategic questions, it was identified that they have been able to provide the strategies to be used to solve the problem although the strategies were not correctly written and the reasoning was not given. Generally, the solutions of Exercise 1 were inappropriate or did not match the answer key. However, students have consistently solved the problem based on the planned strategy.

In the next few lessons, it was shown that students' answers to metacognition questions were developing. To further clarify the development, we can look closely at students' answers of one group in the Exercise Problem 2: Hadi, Yuda, and Toni save their money at the bank. Yuda's savings and twice of Toni's savings is Rp. 150,000.00 more than Hadi's. The amount of Hadi's and Toni's savings is Rp 1,450,000.00. The amount of money saved by the three of them is IDR 2,000,000. Determine the saving of Yuda and Toni! Based on the results of the students' answers of the comprehension questions, students have managed to understand what the problem is about, explain the problem in their own words despite the incomplete answer. Similarly, the results of students' answers of connection questions shows that they can correctly explain the difference between the current and the previous problem despite the incorrect answer concerning the similarities of the two problems indicating that students focus only on the difference between the current and the previous problem solved instead of examining the similarities between the two problems. As for the results of the students' answers of the strategic questions, students could explain the strategy to be used to solve the problem although it is incomplete. They have performed the calculation correctly satisfying the answer key, but the steps of problem-solving were not systematically written.

The IMPROVE method requires students to study in heterogeneous groups of high, medium and low ability students. All group members must help each other if there is a member of the group experiencing difficulties so that his/her challenges in understanding the problems both in the stage of introducing new concepts and the stage of practicing can be resolved. Besides, when they encounter hard mathematics problems, they will not be hesitant to ask the teacher or group members. This is confirmed by the results of the development of discussion worksheet. Table 3 indicates that the discussion worksheet scores of each group is higher than 80%, and shows an increasing trend in the on-task activities from the first to the third lesson, while the overall average is 92.7%. In this phase, students discuss the problems in the discussion worksheets to explore, communicate and evaluate their understanding. This is supported by Slavin "who argued that Peer interaction provides ample opportunities for their students to articulate though, explain their mathematical reasoning" (Slavin, 2006). The teacher administered formative test/exercises to examine students' understanding at the end of each lesson. Students who get the test results ≥ 75 were given further assignments to work on the task sheet of enrichment questions at home and make them submit the problems at the next meeting. Students who were obtaining the quiz results < 75 were provided with the improvement activities carried out after the lesson guided by the teacher. Students who were obtaining the quiz results < 75 in the first lesson were 11 students, second lesson were 10 students and the third lesson were six student. The final test was administered once the third lesson completed, but the formative test was conducted three times during the learning. The analysis of formative and final test answers on higher order thinking skills based on the indicators are presented as follow.

5.1 Analyzing the Problem

The indicator of analyzing a problem concerns ~~on~~ measuring students' abilities to identify problems, structuring problems into smaller parts, recognizing patterns or relationships of complex problems, formulating questions and manipulating algebraic forms. Table 6 shows that generally, students can identify problems and restructure problems into smaller parts. However, some students cannot find the patterns and relationships in the problem to solve it. Also, some students have trouble in manipulating algebraic forms.

5.2 Evaluating

The evaluating indicator is to measure students' abilities, gather several possible solutions, asses the solution plan using the appropriate criteria, accept or reject a solution plan, and assess information on the problem or statement given. In general, students could collect some possible solutions of the problem; however, few can assess the solution plan using the appropriate criteria and the difficulty of understanding the information or statements provided and solving the similarities.

5.3 Creating

The indicators of creating are to measure students' ability to understand of images/figures as the source of information for the solution, make connections between the problem information with the concept of problem-solving and the previous solutions, design a method to solve the problems, elaborate a solution and perform the calculation. In general, students still have not been able to understand the images/figures for information of solution, present images/figures in symbols however they could design a method to solve the problems, and few students managed to make connections between problem information with the concept of problem-solving and previous solutions. Also, due to the lack of meticulousness, some students committed errors in calculation. Based on the three indicators measured, it is identified that the highest score is for the indicator of analyzing the problem (31.8), and the lowest score is for the indicator of creating (23.9). The scores implied that the students' highest ability in all three lessons is in analyzing the problem and the lowest ability is in the aspect of creating, designing and finding solutions. This is expected as it is noted from the first to the last lessons that most students found the connection questions challenging. However, they seem to be familiar with other metacognitive questions despite their results not being utmost. This is shown in Table 4, and 5 present the observer's assessment, the average student activities in three lessons is 90%.

6. Conclusion

Overall, this study develops a learning model through the five stages of the ADDIE model, but this paper only revealed the other side of the development process, i.e., the development trends of students' higher order thinking skills after being taught by the metacognitive strategies as well as students' difficulties (implementation stage). Students' higher order thinking skills in solving HOT problems is developing from the first to the third treatment with an average score of 74.8, 77.8 and 81.5 respectively and the average final test score is 80.2. Of the three indicators measured, it is noticeable that the highest average score is for the indicator of analyzing the problem, being 31.7 or 39.7% of the maximum students' ability, while the lowest score is for the indicator of creating, being 23.9 or 29.8%. In term of students' difficulties, the indicator of evaluating is predominantly challenging for students, namely, students find it hard to assess the solution plan by using the appropriate criteria, and they find it challenging in understanding the information provided; and some are having difficulty to solve the equations made. Another obstacle is for the indicator of evaluating, students cannot understand the picture and represent the images/figures in symbolic, yet they can design the method to solve the problem, and some can connect the problem information and the concept of the previous solution. Some students who are less meticulous make mistakes in calculation. In particular, this study concluded that the mathematics learning instruments of higher order thinking using the metacognitive strategies was practical anf effective for senior high school students on small scale in one topic. Recommendation on this study is further research should be carried out using a larger scale, different location and school levels on various topics.

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