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Research Paper

The Effectiveness of Mathematics Learning Instructions With The Inquiry Based Learning (IBL) Model to Improve The Metacognitive Skills of Eighth Grade MTs/SMP Students

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ABSTRACT: *(Based on observations, interviews and preliminary analysis conducted, it shows that the results of learning mathematics and students' metacognitive skills are still not satisfactory. This is because (1) the learning instruction used by the teacher are still general in nature and have not been linked to the daily lives of students, (2) the teacher in providing mathematics learning is still monotonous, and (3) the students are very weak in solving problem solving problems so that their skills very low metacognition. Based on this problem, the researchers developed a mathematics learning instruction with an inquiry based learning (IBL) model. The stages in the inquiry based learning (IBL) model are (1) problem orientation, (2) formulating problems, (3) proposing hypotheses, (4) collecting data, (5) testing hypotheses, and (6) formulate conclusions. This research is a development research carried out with the Plomp development model. The Plomp model consists of three stages, namely the preliminary analysis phase (Preliminary Research), the development or prototyping phase (Development or Prototyping Phase), and the assessment phase (Assessment Phase). In the preliminary stage, needs analysis, curriculum analysis, concept analysis and student analysis are carried out. At the prototype development stage, a formative evaluation was carried out consisting of self-evaluation, expert/expert review, one-on-one evaluation, and small group evaluation. The subjects of this study were students of class VIII MTs-TI Candung. Based on the development that has been carried out, obtained learning instruction in the form of RPP and LKPD based on inquiry based learning to improve students' metacognition skills that are valid, practical, and effective. Valid from the aspect of content, presentation, language, and graphics, and Practical in terms of implementation, time, ease of use. And effective in terms of student learning outcomes.*

KEYWORDS: *Effectiveness, Inquiry Based Learning, metacognitive skills.*

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I. INTRODUCTION

Learning mathematics in Indonesia, mathematical problem solving ability is the main focus, this is expressed in the education curriculum in Indonesia that "mathematics education aims to develop students' ability to use mathematics in problem solving and problem solving approaches are the focus in learning mathematics" (BSNP , 2006: 416)

So, to gain strength in mathematics in real life by facilitating thinking skills, activeness, and increasing self-confidence in mathematics and knowing one's own cognitive capacity known as metacognitive skills.Therefore, teachers must train students to develop metacognitive skills, so that students can monitor their learning outcomes to be able to identify deficiencies and make improvements to achieve better learning outcomes.

West Sumatra as part of Indonesia, especially in Agam, the MTs-TI Candung school shows that mathematics learning outcomes that reflect students' mathematical metacognition skills are still not satisfactory, this can be seen from the percentage of students presented in Table 1.

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Table 1. Percentage of Completeness Scores in Semester 1 Mathematics Subjects MTs-TI Candung Academic Year 2016/2017

NO	Class	Number of Students	Complete	Not Complete	Percentage (%)	
					Complete	Not finished
1	VIII.1	33	14	19	42.42	57.58
2	VIII.2	31	11	20	35.48	64.52
3	VIII.3	32	11	21	34.37	65.63
4	VIII.4	33	12	21	36.36	63.64
5	VIII.5	33	15	18	45.45	54.55

Source: Maths teacher at MTs-TI Candung

Based on the results of interviews with teachers at MTI Candung, information was obtained that many factors caused students' low mathematics learning outcomes. These factors are the factors of teachers, students, and learning instructions.

Factors caused by the teacher, for example, the strategies used by the teacher in learning are less varied, rarely use the media, the learning activities carried out by the teacher tend to start from opening the lesson, explaining the material, and providing further training, students are given homework. Several factors come from students such as not being ready to take part in learning, and often daydreaming in the learning process. So when the teacher asks the student's response, they just stay silent. When given training by the teacher, students do not understand what to do so they do not have the motivation to learn. This resulted in their low motivation to really understand mathematics learning. Thus causing low learning outcomes of students which can automatically be assumed that their metacognitive skills are low. The learning instruction factor is also one of the causes, due to the use of learning instruction that are not optimal, because each student does not have an adequate Student Worksheet.

Based on these problems, it is very important to develop a mathematics learning instruction with an inquiry based learning (IBL) model. According to Hossan, the stages in applying inquiry based learning are as follows: (1) problem orientation, (2) formulating problems, (3) proposing hypotheses, (4) collecting data, (5) testing hypotheses, and (6) formulating conclusions. . From the results of this study, it is hoped that a learning instruction will be obtained that can facilitate students to be actively involved in the learning process. Several studies on the development of learning instruction with the inquiry based learning model show that students are greatly helped in understanding mathematical concepts and properties.

The characteristics of the Inquiry Based Learning model according to Gulo are as follows: a. driving question or problem, b. interdisciplinary focus, c. authentic Investigation, d. production of artifacts and exhibits, e. collaboration Inquiry Based Learning organizes teaching around discovery and problem solving that are socially important and personally meaningful to students. The problem under investigation was chosen because the solution required students to explore many subjects.

The main purpose of this research is to see the effectiveness of the mathematics learning instruction with the Inquiry Based Learning (IBL) model in improving students' metacognitive skills. Metacognition is knowledge about self-learning or knowledge of how to learn, while metacognition is a method for learning, studying or solving problems. Metacognition skills are related to planning skills, prediction skills, monitoring skills, and evaluation skills. Desoete (2006) describes metacognitive skills as the ability that a person has to control his own cognitive skills. So, metacognition skills include the methods used by students in planning, predicting, monitoring, and evaluating a problem solving.

To achieve this goal, there are many research and development models that can be used, for example the 4-D model, the ADDIE model, and the Plomp model. In this study, the Plomp model was used, compared to other models, the Plomp model guarantees an effective product.

II. RESEARCH METHODS

The type of research used is design research. Design research is carried out to develop and produce a product as a solution to problems related to education. The product developed is a learning instruction in the form of RPP and LKPD based on inquiry based learning to improve the metacognitive skills of students at MTs-TI Candung class VIII.

In this study, the development model used was adapted from the model developed by Plomp and declared as Plomp's research model. The Plomp model consists of three stages, namely the preliminary analysis phase (Preliminary Research), the development or prototyping phase (Development or Prototyping Phase), and the assessment phase (Assessment Phase).

III. RESULT AND DISCUSSION

To produce the effectiveness of Inquiry Based Learning-based mathematics learning instruction through several phases, namely the initial investigation phase (preliminary research), the development or prototyping phase, and the assessment phase. Because the final stage of the assessment phase is the key to testing the effectiveness of the learning instruction.

The results of the One to one Evaluation Phase Observation can be seen from table 2:

Table 2. Results of Observation Phase One to one Evaluation

LKPD	Observation Results
LKPD 1	Students do not fully understand the instructions and instructions given. Students with high abilities can do well and are not reluctant to ask questions if they have difficulties. Students of moderate ability, do activities in a hurry and do not read the instructions well. Low ability students still really need direction in doing activities. Metacognition skills of students are still low, they have difficulty in defining problems and collecting and analyzing data
LKPD 2	High-ability students can complete the activity well even though there are some mistakes. Students with medium and low abilities find it difficult to understand the problems given. The metacognitive skills of students have begun to appear according to the instructions in the LKPD.
LKPD 3	Students with high and medium abilities can understand the problem well, although occasionally in solving it they still ask the researcher. Low ability students begin to understand a little but still need guidance in solving problems.

The results of the researcher's interviews with each student were carried out after the one to one evaluation activity was completed. The results of interviews conducted with students concluded that (1) students liked the cover and appearance of the LKPD, (2) the IBL-based LKPD was clear, (3) the IBL-based LKPD attracted the attention of students to learn so as to facilitate students in improving their metacognitive skills. .

The results of the Small Group Evaluation Phase Observation can be seen in table 3:

Table 3. Small Group Evaluation Phase Observation Recapitulation

Meeting	Observation Results
Meeting I	Students need full guidance from researchers and students are not used to solving story problems
Meeting II	Students are getting used to completing activities by following the steps, they are no longer awkward asking questions and if they don't understand they will repeat the steps again. They are more active, group cooperation has also increased with the appropriate time allocation.
Meeting III	Students begin to get used to doing activities with their groups. Confusion about filling out LKPD 3 has decreased and learners already understand and answer questions on LKPD 3. Learners have started seen an increase in his metacognitive skills, namely in working on questions in practice, and analyzing story questions

The results of the student response questionnaire to the LKPD can be seen in table 4:

Table 4. Results of the Response Questionnaire to LKPD on Small Group Evaluation

Rated aspect	Average	Percentage Practicality (%)	Category
Presentation	3.46	86.54	Very Practical
Ease of Use	3.34	83.55	Practical
Legibility	3.4	85	Very Practical
Time Allocation	3.5	87.5	Very Practical
Average	**3,425**	**85.64**	**Very Practical**

Source: the results of the response questionnaire in the small group

Based on Table 4, it can be seen that the student worksheets (LKPD) based on Inquiry Based Learning (IBL) for each aspect of the assessment are in the very practical and practical category, and the percentage of practicality based learning instruction is obtained, namely 85.64%. Based on the results of interviews conducted with students, it was found that participants were greatly helped by the presentation of LKPD that linked things close to them. The existing worksheets are not too difficult to understand and help them understand the learning material. Students are also very happy and enthusiastic about learning to use LKPD. Because LKPD is easy for students to read so that students can understand the subject matter easily.

For the results of the effectiveness of Inquiry Based Learning (IBL)-based mathematics learning intruction in an effort to improve students' metacognition skills, seen from the results of the small group carried out in the development method used, the results can be seen in table 5.

Table 5. Results of Metacognition Skills Test on Small Group Evaluation for Pythagorean Theorem material

Name of Student	KKM	Test Results	Information
NF	75	**76**	**Graduated**
R	75	**86**	**Graduated**
HA	75	**90**	**Graduated**
AI	75	**71**	**TL**
KLD	75	**81**	**Graduated**
US	75	**76**	**Graduated**
Completeness Percentage		**80.16%**	

Based on Table 5, with the effective criteria being >75% of students completed in solving mathematical problems, it can be seen that the level of effectiveness of students with an achievement of 80.16% is categorized as effective.

IV. CONCLUSION

Based on the results of the development process that has been carried out, the results obtained are mathematics learning instruction with the Inquiry Based Learning (IBL) model to improve the metacognitive skills of students of class VIII MTs/SMP in the form of effective RPP and LKPD. Based on the research that the authors have done, the authors provide suggestions for developing IBL-based RPP and LKPD on other mathematics materials

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