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THE DEVELOPMENT OF TEACHING MATERIALS BASED ON STUDENT WORKSHEET ORIENTED TO INQUIRY METHODS TO IMPROVE STUDENT LEARNING OUTCOMES

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ABSTRACT

This study aim to determine the feasibility of materials and teaching materials based on student worksheets on inquiry method. In addition, it is also to determine the development of teaching materials based on student worksheets oriented to inquiry method to improve student learning outcomes. This research used 4-D model development model research. Data analysis techniques are the feasibility analysis of teaching materials, analysis of observation sheets. The result of this research is the feasibility of teaching materials based on student worksheets oriented to the inquiry method categorized as good percentage 70.21%. Furthermore, student responses to teaching materials based on student worksheets oriented to the inquiry method were 74.90% in good category. And finally the percentage of the teacher's ability to manage learning using teaching materials based on student worksheets is 79.63% with good category.

INTRODUCTION

Mathematics is a tool to develop students' mathematical abilities, for example the ability to think logically, creatively, critically, carefully, effectively, problem solving, representation, connection, communication, and so on. Mathematics can be interpreted as a means of solving problems both in

everyday life and in work life. Hizmi (2013) argued that mathematics needs to be taught to students because (1) it is always used in all aspects of life; (2) all fields of study require appropriate mathematics; (3) is a strong means of communication; (4) can be used to present information in a variety of ways; (5) improve logical thinking skills, accuracy, and spatial awareness; and (6) provide satisfaction with the effort to solve challenging problems.

Several surveys were also carried out both at the regional and global levels to determine the extent of student success in mathematics. The following data shows the irony of mathematics in Indonesia at the national and international levels:

1. Based on 2016 Indonesian National Assessment Program year of 2016 from the Education Assessment Center of the Ministry of Education and Culture's Balitbang, national data shows 77.13 percent of primary school students have very low mathematical abilities. Only 20.58 percent and only 2.29 have high proficiency.

2. Data from Indonesian National Assessment Program year of 2017 student assessment for seventh grade junior high school students in DKI Jakarta and Yogyakarta, the results of mathematics literacy competency are only 27.51 from a scale of 0-100 so they fall into the very bad category.

Nurul Hakim islamic junior high school is only one of the formal schools in Deli Serdang Regency, North Sumatra Province which has experienced the same thing, where mathematics is one of the most problematic subjects. Mathematics is a subject that is always a topic of conversation among teachers, the average score of mathematics is always in the lowest order compared to other subjects.

From the results of interviews with several students, it was found that 1) students often complain that mathematics only makes students dizzy and is considered a frightening specter, 2) students view mathematics as a subject that is very boring, creepy and scary 3) many students skip school avoid mathematics, 4) the teacher's teaching is very boring. Based on the results of the interview, it is evident that the heavy responsibilities and degrees carried by mathematics raise concerns in students which eventually lead to a feeling of boredom, making students lazy to learn, if this is allowed it will have an impact on student learning outcomes.

Referring to the facts above, it can not be denied that the low of student learning outcomes are caused by several factors, namely internal student factors and external factors. Internal factors come from the students themselves, namely the assumption of mathematics students as a scary subject, difficult, difficult, boring subjects, so that it causes students to be lazy to learn mathematics. Meanwhile, one of the external factors is the teacher. Teachers have an important role in student success. Suryosubroto (2009) stated that the duties and roles of teachers as professional educators are actually very complex, not limited to when educational interactions take place in the classroom, which is commonly called the teaching and learning process.

Learning methods and teaching materials are the most important obstacles in hindering learning success. In fact, most teachers use methods that do not vary, are monotonous and only teacher-centered. Slameto (2013) argued that poor teacher teaching methods will affect student learning that is not good either. Poor teaching methods can occur, for example, because the teacher lacks of preparing and mastering of the subject matter so that the teacher presents unclear or the teacher's attitude towards students and / or the subject itself is not good, so that students are less happy with the lesson or the teacher. As a result, students are lazy to learn.

Referring to this statement, the researcher need to make changes to the negative stigma of students towards mathematics, especially teacher teaching methods. One solution to the negative stigma of students towards the teacher's method is the inquiry method, while to overcome the stigma of students towards mathematics as a scary, boring subject is to develop teaching materials in the form of student worksheets oriented to the inquiry method.

LITERATURE REVIEW

In Indonesian dictionary, development is a process, a way, an act of developing. Development focuses not only on needs analysis, but also on broad issues of start-to-end analysis, such as contextual analysis. Development aims to produce a product based on field test findings. In essence, development is an educational effort, both formal and non-formal which is carried out consciously, planned, directed, regularly and responsibly in order to introduce, grow, guide, develop a balanced, intact, harmonious, knowledge, skill base personality. desire and abilities, as a provision for one's own initiative to add, improve, develop oneself towards the achievement of dignity, quality and optimal human capabilities as well as an independent person (Iskandar, 2013). Teaching materials are all forms of material used to assist teachers or instructors in carrying out the learning process in the classroom (Prastowo, 2011). According to Lestari (2013) teaching materials are a set of learning tools or tools that contain learning materials, methods, limitations, and ways of evaluating which are designed systematically and attractively in order to achieve the expected goals, namely achieving competence or sub-competence with all its complexity. From some of the opinions of the experts above, it can be concluded that teaching materials are all materials (both information, tools and texts) that are systematically arranged and used in the learning process. There are several categories for the types of teaching materials. Several criteria are used as a reference in making the classification based on its shape, namely:

Printed teaching materials, a number of materials that are prepared on paper that can function for learning purposes. For example, handouts, books, modules, student worksheets.

- Teaching materials audio or audio programs such as cassettes, radios, LPs and audio compact disks.

- Audiovisual teaching materials for example, video compact disks and films.

- Interactive teaching materials, which is a combination of two or more media (audio, text, graphics, images, animation and video), for example, compact disk interactive (Prastowo, 2011).

Teaching materials have a function in learning and affect the educational process. Teaching materials can affect the quality of learning including the quality of learning outcomes. Therefore, teaching materials have a function in learning and play a very strategic role and help determine the achievement of educational goals. According to Hamdani (2011) in his book, it is stated that teaching materials function as:

- Guidelines for teachers who will direct all activities in the learning process, as well as the substance of competencies that should be taught to students.

- Guidelines for students who will direct all their activities in the learning process, as well as the substance of competencies that should be learned or mastered.

- Tool to evaluate the achievement or assignment of learning outcomes.

Teaching materials are arranged in accordance with predetermined principles, so that teaching materials that prepared can become effective teaching materials. According to (Widodo and Jasmadi 2008) teaching materials must be developed in accordance with the principles for developing teaching materials. The signs that must be obeyed in making teaching materials are:

- Teaching materials must be adapted to students who are following the teaching and learning process.

- Teaching materials are expected to be able to change the behavior of students. The teaching materials developed must be in accordance with students needs and characteristics.

- Teaching and learning program that will be held.

- In teaching material, it includes specific learning activity objectives.

- In order to support the achievement of goals, teaching materials must contain detailed learning material, both for activities and exercises.

- There is evaluation as feedback and a tool to measure the level of success of students.

Inquiry is a learning model that guides students to obtain and obtain information and seek answers or solve problems to formulated questions. In this learning model, students are mentally and physically involved in solving a problem given by the teacher. Kardi (2003) defines inquiry as a learning model designed to guide students how to research problems and questions based on facts. The inquiry model emphasizes the process of searching and finding, the role of students in this model is to seek and find their own solutions to problems in a subject matter. Meanwhile, the teacher acts as a facilitator and guide for students to learn. In general, inquiry is a varied process and includes observing activities, formulating relevant questions, critically evaluating books and other sources of information. Inquiry models also plan investigations, review what is known, carry out experiments or experiments using tools to obtain data, analyze and interpret data, and make predictions and communicate the results (Ibrahim, 2007). Inquiry is one of the strategies used in process-oriented classrooms, inquiry is a student-centered teaching strategy, which encourages students to investigate problems and find information (Putrayasa, 2009). Furthermore, Sagala (2006) stated that there are five stages in implementing the inquiry model, namely:

- Formulation of problems that students solve.
- Set a temporary answer.
- Students are looking for information, factual data needed to answer problems.
- Draw conclusions about answers or generalizations.
- Applying conclusions or generalizations in new situations.

RESEARCH METHODOLOGY

Location and Time

The research will be carried out at Nurul Hakim Islamic junior high school Tembung, atM. Yakub Lubis stereet number 5o. 50 Tembung, Percut Sei Tuan District, Deli Serdang Regency. The research was carried in seventh grade of 2019/2020 academic year at Nurul Hakim Islamic junior high school.

Type of research

The research method used by the researcher is the method of research and development (Research and Development). This research is a research that is used to produce certain products and test the effectiveness of these products (Sugiyono, 2015). One of the models used is the development of a 4-D model. The 4-D development model is a learning device development model.

Data Analysis Techniques

Data analysis techniques were in the form of feasibility analysis of teaching materials based on student worksheets and observation sheet analysis.

a. Feasibility Analysis of Student Worksheets Based Teaching Materials

The results of the assessment from expert lecturers in the form of product quality are coded with a Likert scale. Data analysis techniques for the feasibility of teaching materials through validation sheets are carried out in the following steps:

$\bar{X} = \frac{\sum x}{N}$ (adapted from Eka, 2013).

To find out the quality of teaching materials based on the development results of student worksheets, the reference for changing the score to a scale of four can be seen in the following table:

Table 1: References to Changing the Score to a Scale of Four

No	Score Range	Value	Category
1	$\bar{X} \geq M_i + 1.5\,SB_i$	A	Very good
2	$M_i + 0.5\,SB_i < \bar{X} \leq M_i + 1.5\,SB_i$	B	Good
3	$M_i - 0.5\,SB_i < \bar{X} \leq M_i + 0.5\,SB_i$	C	Enough
4	$M_i - 1.5\,SB_i < \bar{X} \leq M_i - 0.5\,SB_i$	D	Low
5	$X \leq M_i - 1.5\,SB_i$	E	Very low

The results of the percentage of ideal assessment category criteria can be seen in the following table:

Table 2: Ideal Percentage of Ideal Assessment Criteria

No	Quantitative Score Range	Qualitative Category
1	$\bar{P} > 80\%$	Very good
2	$66{,}67\% < \bar{P} \leq 80\%$	Good
3	$53{,}33\% < \bar{P} \leq 66{,}67\%$	Enough
4	$40\% < \bar{P} \leq 53{,}33\%$	Low
5	$\bar{P} \leq 40\%$	Very low

Observation Sheet Analysis

The observation sheet analysis related to the observation data of the teacher's ability to manage learning using teaching materials based on student activity sheets oriented to the inquiry method, and student response questionnaires. The data can be calculated using a percentage (Eka, 2013) as follow:

$$P = \frac{S}{N} x100\%$$

From the percentage the numbers have been obtained then converted to the criteria table below (Sudjana, 2005).

RESULTS

Data Analysis of the Feasibility of Teaching Materials Based on Student Worksheets

Based on the results of the material aspect validation, it can be seen that the quality of the teaching materials based on the student worksheets developed. The validation carried out aims to determine the feasibility of the material needed for students. The recapitulation of validation calculations by experts is as follows:

Table 3: Results of Component Assessment by Validators

No	Evaluator	Hasil Penilaian Komponen Component Assessment Results			Total
		Content	Language	Presentation	
1	Validator 1	67	40	25	132
2	Validator 2	63	44	25	132
Total		130	84	50	264
Mean		98,5	42	25	132
Percentage of idealism		70,65%	70%	69,44%	70,21%
Category		Good	Good	Good	Good

From the table above, it can be concluded that the results of the component assessment according to validators 1 and 2, namely based on the feasibility of the content, the average rating is 98.5 with 70.65% ideal percentage, good category. Based on linguistic feasibility, it was obtained that the average rating was 42 with an idealized percentage of 70% in good category. Based on the feasibility of presentation, it was obtained that the average rating was 25 with an ideal percentage of 69.44% in good category While overall the average score obtained was 132 with idealized percentage of 70.21% in good category. Assessment recommendations in general in terms of teaching materials based on student worksheets are good and can be used with slight revisions. Thus, it can be concluded that student activity institution-based teaching materials can be used with a few revisions.

Observation Sheet Analysis

a. Analysis of learning management ability using teaching materials based on student worksheets oriented to the inquiry method.
   Data from observer observations on teacher's ability to manage learning using teaching materials based on student worksheets oriented to the inquiry method were analyzed qualitatively using percentages and categories. The recapitulation of the analysis is as follows:

Table 4: Recapitulation of observations of worksheet based teaching materials

No	Meeting Observer	Score	Persentage	Criteria
1	Meeting 1	116	80,55%	Good
2	Meeting 2	113	78,47%	Good
3	Meeting 3	115	79,86%	Good
TOTAL		114,67	79,63%	Good

b. Response questionnaire analysis

After students are given a test of learning outcomes, students also given a questionnaire to mathematics learning. The response questionnaire has 3 components, namely the response to the contents of student worksheet, the response to learning device, student's response to teaching materials and learning methods. The number of respondents was 35 students. The descriptions of the results of student response questionnaire for three components as follows:

Table 5: Recapitulation of Respondents of Teaching Materials

Respondent	Component 1	Component 2	Component 3
R-1	7	3	11
R-2	2	2	11
R-3	5	3	10
R-4	4	4	10
R-5	4	1	10
R-6	5	4	8
R-7	3	2	11
R-8	5	3	8
R-9	5	3	8
R-1	4	3	10
R-11	5	1	10
R-12	4	4	8
R-13	4	1	9
R-14	6	3	10
R-15	5	2	10
R-16	4	3	7
R-17	5	4	9
R-18	6	2	11
R-19	5	4	8
R-20	3	3	8
R-21	5	3	11
R-22	4	4	10
R-23	6	2	10
R-24	4	2	9
R-25	6	3	7
R-26	2	3	11
R-27	7	4	9
R-28	5	2	11
R-29	4	3	11
R-30	6	4	8
R-31	6	3	10
R-32	4	3	10
R-33	6	3	9
R-34	4	3	11
R-35	6	4	12
Total Score	166	101	336
Percentage	67,76%	72,14%	80%
Criteria	Good enough	Good	Very good
Overall			603
Overall percentage			74,90%
Criteria			Good

From the table above it can be seen that the response of students to teaching materials and methods used in terms of component 1, namely the response to the contents of the student worksheets is 67.76% with fairly good category, in

terms of component 2, namely the response to learning tools of 72.14% with good category, in terms of component 3, namely the response to the learning method by 80% with very good category. While overall the student response was 74.90% in good category. This means that students respond good to the use of teaching materials based on student worksheets oriented to the inquiry method with a magnitude of 74.90%.

CONCLUSION

From the results of the research that has been done, the conclusions that can be described in this study are:

1. Teaching materials developed with teaching materials based on student worksheets oriented to the inquiry method have met valid criteria including aspects of the feasibility of content, language, presentation is categorized as good percentage 70.21%
2. Student responses to teaching materials based on student worksheets oriented to the inquiry method were 74.90% in good category.

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