DEVELOPMENT OF STRAIGHT LINE EQUATION MODULE BASED ON GUIDED INQUIRY LEARNING TO IMPROVE THE MATHEMATICAL CONNECTION ABILITY OF MIDDLE SCHOOL STUDENTS

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Abstrack

Seeing students' mathematical connection ability is low, indicating that students' ability to study mathematics is also low. The media that fits this condition is the learning module. The research problem formulation is whether the development of guided inquiry based straight line equation learning can improve the mathematical connection ability of class VIII students?. The purpose of this research is to know module learning development equation-based guided inquiry straight line can improve the ability of class VIII student of mathematical connections. This research is through the Research and Development (R and D) research process. The subject of this research is the State Middle School students 3 Unggul Ingin Jaya as many as 20 students. The analysis in this study uses a questionnaire for students, the feasibility of a learning module that is an assessment by an expert (validator) using a questionnaire validity of material experts, student learning outcomes, student responses to the learning module. The results of the validator's assessment state an average of 3.45 in the valid category, while the average value of 3,25 in the category is quite effective. The average N-gain value of the experimental class is 0,36 compared to the N-gain average of the control class 0.33. The conclusions in this study are the development of a module of straight line equations with an inquiry approach can improve the mathematical connection ability of class VIII students of Middle School.

Keywords: Module development, straight line-equation, connection matematics, Inquiry

PRELIMINARY

We know that mathematics is very important so students should be able competent in math lessons well. But in reality students have difficulty in learning mathematics. In a study conducted by Ruspiani (2000) and Yuniawati (2001) says that the student's ability to connect a math problem into daily life or vice versa, or we often call the students' mathematical connection abilities classified as low. The difficulties encountered by the students was caused by: (1) the inability of students to understand the underlying mathematical concepts of the trial, (2) the inability of students connect observations with the theory put forward in mathematics, and (3) the inability of students connect mathematical concepts owned by the results of his observations

in daily reality (Dahar, 1994). When students are unable to make mathematical connections properly, cause more students remember and repeat the previous subject matter which is a prerequisite, so the learning process is not as planned.

There are several opinions of educational leaders about mathematical connection skills. According Coxford (1995), mathematical connection ability is the ability of students to associate conceptual knowledge with procedural abilities, using a mathematical process on another discussion, relating math lessons to the side of life related activities, knowing relationship between materials in mathematics. Wahyudin (2008) said that if a student is able to connect between mathematical ideas in a capability, the

ability of students will be better and will be able to remember for a long time. Students are able to see the links between mathematical influences with each other other math topics. Then besides ability students in understanding mathematical connections, effort in supporting or motivating students to grow and develop good attitudes or dispositions in mathematics is very necessary (Wahyudin; 2008).

From the results of research conducted by previous researchers above shows us that students' ability to connect between mathematical concepts is very influential on the learning outcomes of students mathematics education. Then in theory we can say that students' mathematical connection abilities play a role on learning achievement in mathematics education. Teachers as facilitators of students mathematics education are advised to help students develop and foster student interest and motivation during the learning process of mathematics. So therefore, it is fitting s sa teacher find a solution that is able to solve the problems faced by the students. To overcome the problem in on learning and learning tools are needed in accordance with mathematical material to improve students' mathematical connection skills. Several types of learning methods and approaches are currently being developed and applied in the world of education that are in accordance with the demands of the 2013 curriculum formulated by the government, one of the recommendations is the inquiry approach.

Approach inquiry is a student centered teaching and learning approach. Group formed by several students faced with a problem or find a solution from the problems given by the teacher with learning

procedures that have been planned systematically and clearly (Trowbridge & Bybee, 1990). This learning process enables gave right opportunity for students to learn science ability then construct cooperation with each study group. During the learning process using the inquiry approach can help students to harmonize between mathematical concepts that they already knew before with the events they observed in their lives. The learning process with the inquiry approach can also change mis understanding of the mathematical concepts experienced by students becomes a scientific concept in accordance with the facts. Learning to teach using inquiry approach is expected to be able to make students more creative, innovating, so that their learning outcomes become better and students' mathematics learning outcomes improve well. This could be due to the learning process of inquiry approach to seeking mental processes that level the better, for example, to formulate the problem, designing the experiment, to experiment, collect and analyze is data, draw conclusions. And it is expected that the disposition of students has objective characteristics, desire to be curious, honest, and open. The other side that has an impact on the application ofteaching and learning processes with the inquiry approach is: (1) students will mis understand the mathematical concepts they understand before learning, (2) there is an increase in students ability to harmonize the form of his knowledge in his experiments with the construction of knowledge in everyday life (Suastra, 2009).

Student expected to improve ability mathematical connection through learning inquiry supported module accordingly, because in the process of inquiry approach creates several different situations so students will be

more involved in the learning process so that gives a lot of time for students to take on a role as a scientist or inventor, so that it will lead to pride in students by knowing the findings of understanding the learning objectives that must be achieved, inviting other students to be more active learning, making learning outcomes more meaningful which results in better learning outcomes. The process in learning that uses direct learning or what is called *"Direct Intructional"* is a process in teaching and learning system that is both *teacher center,* and process makes teachers be the best role model that should be followed by students (Kardi, 2003). The model is designed specifically by experts to develop students' knowledge of procedural and declarative well andcan be learned step by step. At this time of study requires very careful implementation
and planning by the lesson teacher. Inquiry approach is a learning process involves the entire ability of students to find and analyze on problems that are systematic, logical, analytical, so that with the guidance of student teachers able to formulate his own invention with full confidence (Gulo: 2008).

Guided inquiry-based modules are modules that cover material and assignments that facilitate students to find concepts based on problems. Therefore, to facilitate independent learning and to help students solve problems and develop new concepts through scientific discovery and thinking, it is necessary to conduct research " Development of Straight Line Equation Modules to Improve Students' Mathematical Connection Ability through Middle School Inquiry Learning. In addition, this guided inquiry based module is presented with a summary of the are used as learning media. While the test data in the N-gain test to see the

material and learning activity sheets done by students guided by the guiding questions. And in it students are given the opportunity to work on formulating hypotheses, designing and experimenting, collecting, and analyzing data, and drawing conclusions. This module is implemented so students are free to develop the concepts they are learning. So that through this module the process of straight-line equation learning not only understands the concepts of straight-line equations, but also invites students to think constructively. This guided inquiry based straight line learning module is expected to be able to bring students to interesting, fun learning activities while challenging students to think and reason. So that using this guided inquiry based module improves student learning outcomes.

RESEARCH METHODS

This research is development research (R and D) Borg and Gall (1983: 772). Development research through processes and research steps that can be accounted for. The development procedure was carried out referring to the research and development model of Borg and Gall (Sugiyono, 2009). The steps of research and development of learning modules are: 1) Potential and problems, 2) data collection, 3) Product design, 4) Design validation, 5) Revision of Design, 6) Product testing, 7) Product revision, 8) Test of product use, 9) Product revisions, and 10) Production

Data Analysis Technique

After receiving data the next step is to analyze the data. Data about the suitability questionnaire of design and learning content/material products obtained from design experts and experts in learning content/material through design validation tests. Data obtained from the results of this study

increase in mathematical connection ability of class VIII junior middle school students.

RESEARCH RESULT
Result of design validation
Validation of product development is done using a questionnaire. This questionnaire is one of the lecturers at Abulyatama University, two of the lecturers at Serambi Mekkah University and a teacher at Unggul below.

Ingin Jaya Middle School. The data presented is data from the validation module. In addition to giving consideration, the validator also provides criticisms and suggestions for product development at the end of the questionnaire. After the data from the validation results are obtained, the data analysis is based on Chapter III. Is a summary of the results of thorough validation in Table 1

Table 1. Data on Module Validation Results According to the Validator

Number	Aspect		Statement	avarage	Information
1	Fill in the module	1	The suitability of the module with the inquiry approach with students	3.33	Valid
		2	Conformity with steps with inquiry agreement	3.33	Valid
		3	The steps in inquiry learning are outlinedclearly	3.00	Valid enough
		4	Conformity with competency standards	3.00	Valid enough
		5	Conformity with basic competencies	3.00	Valid enough
		6	Sequence in material presentation	3.33	Valid
		7	Activities presented in accordance with students' cognitive development	3.33	Valid
		8	Activities are presented allowing students to make guesses that lead to a concept	3.00	Valid enough
		9	The material presented starts from a simple concept	3.33	Valid
		10	The material presented allows students to use cognitive strategies to understand problems	3.33	Valid
		11	The material presented allows students to use cognitive strategies to solve problems	3.33	Valid
2	Question sexercise	12	Practice questions support the concepts being studied	3.67	Valid
		13	Practice questions allow students to construct mathematics them selves	3.33	Valid
		14	Organizing good practice questions	3.33	Valid
		15	The level of difficulty of the questions in the module is balanced	3.00	Valid enough
3	Language and Display	16	The language used is quite attractive for students	3.67	Valid
		17	The terms and symbols that are used correctly and reliably	3.33	Valid
		18	Ease of understanding sentences	3.00	Valid enough
		19	Sentences that have multiple meanings	2.67	Valid enough
		20	The language used increases students' motivation, interest and curiosity	3.00	Valid enough
		21	Modules can provide motivation to students to be actively involved	3.67	Valid
		22	This module can help students and teachers in learning activities	3.67	Valid
		23	This module can be used by students independently	3.00	Valid enough
		24	Clarity of chart shape	3.00	Valid enough
		25	Font type	3.33	Valid

26	Font size	3.67	Valid
27	Provision of answer space	3.67	Valid
28	Design of module compilation	3.67	Valid
29	Typing error	3.30	valid
30	The neatness of compiling student modules	3.33	Valid
	Average Total	**3.45**	**valid**

Design revision

Based on the results of the Likert average questionnaire scale by three mathematics lecturers and one junior high school mathematics teacher. In accordance with table 1, the mathematical module obtains a total yield of 3,45 with criteria that are quite valid (small revisions). But researchers must also pay attention to responses, criticisms, and suggestions from the validator. Recommendaions, criticism and suggestion will be used to make some revisions.

Test the product

To approve data validity or feasibility, the assessment module is a effectiveness module for students. The trial was conducted with seven students. summary of validation results of overall effectiveness in the following Table 2:

Table 2. Data on Student Assessment Results

number	Description	Average	effectiveness
1	I easily understand the information contained in this module	3.67	Effective
2	I easily understand the questions contained in this module	3.33	Effective
3	This module contains interesting learning activities	3.00	Effective
4	The learning module makes me more active in learning	3.30	Effective
5	Learning activities on this module provides an opportunity for me to solve problems with my own strategy	3.00	Effective
6	The activities in this module m reflected on the opportunity for me to say with my own language	3.33	Effective
7	Learning activities in this module encourages me to work with friends	3.33	Effective
8	Learning activities in this module encourage me to make conclusions conclusively	3.00	Effective
9	This module has an attractive appearance	4.00	Very effective
10	I am easily understand the sentence used in this module	3.67	Effective
	total	**3.25**	**Effective**

This assessment is carried out by giving a questionnaire provided by the researcher. This assessment is done after the research process ends. In the table above, about the effectiveness of the questionnaire that has been provided, the results obtained are 3.25 with effective criteria (no need to be revised).

Product Revision

Based on the questionnaire from the results of a limited trial the researcher revised the module again. Module Researchers must also pay attention to short comings. Starting from the design, grammar and more. After the revision stage and stated that the development product is feasible to be used with valid criteria, then the application of products in the field.

Test usage

Field trials were conducted in SMP Negeri 3 Unggul Ingin Jaya. This research was conducted in one class that is class VIII A. To find out whether the learning module that has been designed was in accordance with the needs in accordance with the objectives of the 2013 curriculum learning. In the end, the process was given a questionnaire to 20 students. Summary of data about the results of validation of effectiveness so that it can be seen in the Table 3 as follows:

Table 3. Data on Student Assessment Results

Num	Description	Total value of class A	Total value	Persent	Effectiveness
1	I am easily understand the information contained in this module	83	100	83%	Effective
2	I am easily understand the questions contained in this module	86	100	86%	Effective
3	This module contains interesting learning activities	95	100	95%	Very Effective
4	Learning module make me active in learning	87	100	87%	Effective
5	Learning activities on this module gives me the opportunity to solve problems using my own strategy	89	100	89%	Effective
6	The activities in this module reflected on the opportunity to air my opinions with my own language	87	100	87%	Effective
7	Learning activities in this module encouraged me to work with friends	90	100	90%	Very Effective
8	Learning activities in this module encourage me to make conclusions conslusively	89	100	89%	Effective
9	This module has an attractive appearance	90	100	90%	Very effective
10	I am easily understand the sentence used in this module	87	100	87%	Effective
	total	883	1000	88.30%	Effective

This assessment is carried out by giving a questionnaire provided by the researcher. Assessments were carried out after the research process was completed after they worked on the Post Test. The effectiveness of the questionnaire was 88,30% with effective criteria (no need to be revised). The effectiveness of the criteria in table 5, the straight-line equation module that is approved for effectiveness and does not need to be revised.

Increased mathematical connection capabilities

The results of the analysis of increasing mathematical connection abilities of students in the experimental class and control class were processed by analyzing normalized gain values (N-gain). Average N-gain is normalized reveals a mathematical connection capacity building of students after participating in learning, either follow the learning by using modules (experimental class) or those who take part in learning without modules (control class). Before determining value N-gain, first presented the postest value of the mathematical connection ability of the experimental class students and the control class. Analysis of N-gain data is intended to base analysis increasing mathematical connection skills of students before and after learning in the matter of straight line equations. Based on the data analysis requirements of

the pretest and posttest, then for the analyst is the N-gain data the

experimental and control classes are obtained as follows:

Table 4. N-Gain Data Normalized Mathematical connection ability of students Control class

Student	Pretest	Postes	Post-Pre	Ideal score	Ideal-Pre	N-Gain
A	70	75	5	100	30	0.30
B	70	70	0	100	30	0.30
C	65	65	0	100	35	0.35
D	65	70	5	100	35	0.35
E	65	70	5	100	35	0.35
F	70	75	5	100	30	0.30
G	70	70	0	100	30	0.30
H	65	70	5	100	35	0.35
I	65	65	0	100	35	0.35
J	70	70	0	100	30	0.30
K	70	70	0	100	30	0.30
L	70	70	0	100	30	0.30
M	75	70	-5	100	25	0.25
N	65	60	-5	100	35	0.35
O	65	60	0	100	40	0,35
P	65	70	5	100	35	0.35
Q	70	75	5	100	30	0.30
R	65	70	5	100	35	0.35
S	70	70	0	100	30	0.30
T	65	70	5	100	35	0.35
N-gain average						**0.33**

Table 5. N-Gain Data Normalized Student's mathematical connection ability Experimental class

Student	Pretest	Postest	Post-Pre	Score Ideal	Ideal-Pre	N-Gain
S1	70	75	5	100	30	0.30
S2	75	90	15	100	25	0.25
S3	60	75	15	100	40	0.40
S4	65	90	25	100	35	0.35
S5	65	75	10	100	35	0.35
S6	65	80	15	100	35	0.35
S7	70	75	5	100	30	0.30
S8	60	75	15	100	40	0.40
S9	70	80	10	100	30	0.30
S10	70	75	5	100	30	0.30
S11	65	80	15	100	35	0.35
S12	70	90	20	100	30	0.30
S13	70	80	10	100	30	0.30
S14	65	90	25	100	35	0.35
S15	65	70	5	100	35	0.35
S16	65	90	25	100	35	0.35
S17	65	80	15	100	35	0.35
S18	70	80	10	100	30	0.30
S19	70	85	15	100	30	0.30
S20	65	80	15	100	35	0.35
N-gain average						**0.36**

From Table 4 and Table 5 shows that the average value of the increase in n-gain experimental

class is better than the control class. We can see from the average N-gain value of the experimental class at

0,36 compared with the average N-gain of the control class at 0,33.

Discussion

The improvement of students' mathematical connection skills can be seen from both classes, namely the control class with the learning process without using modules (conventional books) and the experimental class with learning using a module of straight line equations with the inquiry approach. The results of the analysis explain that the N-gain average of the experimental class is better than the average of the control class. The findings of the research that have been conducted, according to the research conducted by Herawati (2010) and Irwan (2011), concluded that using the inquiry approach module can improve the connection matematics inability to students in the subject matter straight line equation, well capability as a whole and the ability of individual students. Another study also in accordance with what is disclosed by Noer (2009) which says that the connection capability matemati s students can be improved by using modules innovative approach to inquiry in the matter equation of a straight line, which requires students to learn more varied, more active and skilled in better teaching. Differences capacity of connection matematics students are taught by a straight line equation module and the student is taught without modules for different learning characteristics, learning modules inquiry approach makes students more actively involved than students without modules. Students who study with modules have better activities. Students are required to be more active in thinking and reasoning to solve problems. This situation is very possible to change students 'thinking patterns and can improve students' mathematical connection skills. It was also stated by Krulik and Rudnick

(Fachrurazi, 2011) that what is meant by the inquiry approach in mathematics is to link problems, solutions, evaluate all the problems in one situation.

The results of the study indicate that the module of straight line equations with the inquiry approach is more able to improve students' mathematical connection skills. Students better understand the material being taught because they are trained to learn to extract their abilities by connecting material learned with the everyday environment.

Research Conclusion

Data and discussion based on the results of the study, there are several conclusions, namely;

1. Based on module development criteria, namely validity, practicality and effectiveness, researchers consider mathematical modules that have been developed to meet the module's minimum quality standards. The validity module in the material aspect gets a percentage of 88,7 % means that quality and effectiveness are valid so that effective modules for learning mathematics can be used to improve students' mathematical connections.

2. Based on the results of the analysis between the classes given the module (experimental class) and the control class showed that there was a significant increase in the mathematical connection ability of the experimental class students whoused the inquiry module. the average N-gain value of the experimental class at 0,36 compared to the N-gain average of the control class at 0,33. This proves that increasing the mathematical connection ability of the experimental class students provides a module of straight line equations with an inquiry approach.

Suggestion

In order for module products to develop students' mathematical connection skills with the inquiry approach, the researcher gives advice to several module users as follows:

1. For students
   This math module needs to be used to get mathematics learning and facilitate students in understanding concepts, also to guide students to self study well without teacher guidance. If students understand the material being studied, studentswill be able to understand the material being studied.
2. For the teacher
   The teacher needs to adjust the module to the subject matter being taught, so that the material is delivered appropriately and in accordance with the material being taught.
3. For other researchers
   For researchers who will conduct further research, this module can be used as a reference to develop other appropriate teaching materials. If you want to do research, give a better picture or design.

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