Development of mathematical based constructivism learning tool to improve students' mathematical reasoning abilities

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Abstract. The research that has been overshadowed in which teaching materials used by students are not all of the material in accordance with the KD. So that the material presented elusive student and as a result students awaiting an explanation by the teacher. Therefore, to create students who are active in learning, students can build their own thoughts or develop his own knowledge is to improve students' reasoning skills learning concept. To improve reasoning skills students need learning tools that make the students can learn and be independent in constructing ideas. And with the development of mathematical learning prangkat based constructivist approach, students can become more active, independent and able to build the knowledge gained.

1. Introduction

Education has an important role in producing the Human Resources (HR) quality and able to compete dieraglobalisasi. Developments in science and technology today demand an increase in the quality of education. Various efforts have been made by the Government to improve the quality of education, one of them by issuing regulations on the National Education Standards. Regulation of the Minister of National Education (game) number 41 of 2007 on Standards Process requires teachers to develop lesson plan (RPP). One element of the RPP is a source of learning. Therefore, teaching materials are part of a learning resource, then the teacher is expected to develop teaching materials as needed.

Within the Unit Level Curriculum[1] stated that the purpose of mathematics courses at the school for elementary and secondary education are:

1) Students are able to understand mathematical concepts, explain the link between concept and apply the concept or logarithm, is flexible, accurate, efficient, and precise in troubleshooting.

2) Using the reasoning in the patterns and nature, perform mathematical manipulation in making generalizations, compile evidence, or explain mathematical ideas and statements.

3) Solve problems which include the ability to understand the problem, devised a mathematical model, complete model, and interpret solutions diperboleh

4) Communicate ideas with symbols, tables, diagrams or other media to clarify the situation or problem,

Based on the purpose of learning mathematics one school mathematics courses that use reasoning on patterns and properties, perform mathematical manipulation to make or explain mathematical ideas and statements. This proves that mathematical reasoning is the foundation for mathematical knowledge. Thus teachers should develop students' mathematical reasoning abilities in mathematics.
Based on observations in mind that the reference book used in mathematics are textbooks and teaching materials LKS. Students do not use other reference books for learning. The contents of text books tend to be more detailed than the present concept conceptual understanding through student activities. Here also appears that most students are less able to explore her abilities in learning. Students looked confused when they solve problems are a little different from the example set by the teacher. The condition is caused by the habit patterns of learning more to give the concept without the involvement of students in finding itself on the concept. Students are not guided how to find the concept, this affects students' ability to resolve a problem in the matter and the lack of reasoning ability of students in solving mathematical problems. most students in solving the confusion. This is not in line, the purpose of learning itself in the content standards issued by the National Education Standards Agency (BSNP) that mastery of mathematics is not only a mastery of math facts and procedures as well as the understanding of the concept, but also of the ability of students' mathematics learning process. So this will make students master math well. learning objectives itself in the content standards issued by the National Education Standards Agency (BSNP) that mastery of mathematics is not only a mastery of math facts and procedures as well as the understanding of the concept, but also of the ability of students’ mathematics learning process. So this will make students master math well.

Based on the conditions that have been disclosed, one of the strategies that can be used by the teacher is learning that can make students find the concept itself and explain mathematical ideas and statements. And needed a good planning by the teacher to make students active in aligning the material in everyday life. Students can construct their own knowledge in his mind either individually or in groups in an effort to develop students' mathematical reasoning. With careful lesson planning students are expected to master each competency to be achieved, especially in the study of mathematics reasoning.

In mathematics students must construct their own knowledge, as proposed by [2]. In mathematics students must construct their own knowledge, as have been suggested by [2] that students must construct knowledge in their own mind. It is also supported by Glaserfeld (in Yevdokimov, 1999) that learning is a process of construction in the which the students Themselves have to be the primary actors[3]. It is also supported by Anthony (1999) that:

- "Learning is a process of knowledge construction, not of knowledge recording or absorption;
- learning is knowledge-dependent; people use current knowledge to construct new knowledge;
- the learner is aware of the processes of cognition and can control and regulate them ".

2. Materials and Methods

According to Horsley [4]learning based on constructivism learning theory there are four stages, namely: 1) persesi stage (to encourage learners to express initial knowledge of the concepts to be discussed); 2) an exploration stage (providing opportunities for learners to investigate and find the concept by collecting, organizing, and penginterpretasi data in an activity designed by the teacher.); 3) the stage of discussion and explanation of the concept (give learners the opportunity to think about and discuss solutions based on the discussion on the observation of learners); and 4) development and application of concepts.

According to Piaget in [4] with constructivist theory states that every learner brings understanding and prior knowledge he already has into the learning process, which must be added, modified, updated, revised and modified by new information encountered in the learning process.

The ability of learners to improve reasoning in learning that need to be mengkontruk (build) knowledge. Because it can improve learning outcomes and understanding of the concept. Setiadi, et al stated that the reasoning can directly improve the learning outcomes of students, ie if the learners are given the opportunity to use their skills in performing estimating bernalarnya-estimation based on his
own experience, so that learners will be easier to understand the concept of [5]. Therefore, the necessity of learning approaches that could make students more able to be independent in the learning process and increase reasoning using constructivism approach.

Procedure development of learning tools are used to modify the model 4-D (Four D models) on Thiagarajan (1974: 5-9), which consists of three stages: a) the definition (define), b) design (design) and c) development (develop).

3. Results and Discussion
Preliminary investigation at this stage is to obtain information about the existing problems and the possible need of improvement and innovation. Other than that, identification or analysis required for the development of devices based learning Constructivist approach. This phase is done by analyzing the objectives within the limits of the subject matter that will be developed. The basic steps to do a needs analysis, curriculum analysis, concept analysis, analysis of student characteristics, and analysis of the learning device.

3.1. analysis of needs
This analysis aims to find out the problems faced in the learning of mathematics. In the first analysis of this need we see the results of an observational analysis, from observations made visible in mathematics learning students are still less active and still passive in solving a given problem. As a result, students' reasoning ability is still low seen from the initial tests conducted by the researchers. In further needs analysis can be viewed on a learning tool used by teachers and students. Based on observations of the teachers and students, it can be seen that students still use the book as instructional material in the learning activities. Reference books used in mathematics are textbooks and teaching materials LKS. Students do not use other reference books for learning. The contents of text books tend to be more detailed than the present concept conceptual understanding through student activities.

3.2. analysis curriculum
Analyses were also conducted to see KD sequence that eventually resulted in the achievement indicators of students in learning. Based on the analysis, teaching materials used are not all of the material in accordance with the KD.

3.3. analysis of the concept
Teaching materials is really important in achieving indicators of competence. The results of the analysis of the concept also describes the mapping concept and material.

4. Conclusion
This research is a development to produce devices based learning constructivism improve learners' reasoning. Based on an analysis of previous preliminary research, it can be concluded that students are involved in activities less or less build their ideas to be able to build or construct a concept that they can be against math. Most of the student activities focused on the teacher's explanation, copying the teacher writing on the blackboard, and memorizing formulas. In effect, students tend to be more passive and less meaningful learning because students find it difficult to understand the material given by the teacher to learn. Preliminary test indicates that the low student mathematical reasoning abilities

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