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THE HIGH SCHOOL STUDENTS' VIEW OF TRIGONOMETRY PROBLEMS TO DEVELOP THEIR MATHEMATICS REASONING

¹Intan Kemala Sari, ²Ahmad Nasriadi, ³Fati Ariska

^{1,2} STKIP Bina Bangsa Getsempena, Banda Aceh, Indonesia

intankemalasari00@gmail.com

ABSTRACT

Many people do not like learning Mathematics because it requires highly analytical skills to solve for only one problem. It also same in mastering the field of algebra, it's already difficult, moreover to learn trigonometry which involves many calculations of formulas in the form of corners in the triangle. It's really not easy because it allows the combination between algebra and geometry. Though, the universe of the world is full of models of trigonometry measurements, then by studying trigonometry means that we have applied much different knowledge. The student difficulties in understanding trigonometry material are seen when students are faced with trigonometry problems that require reasoning based from real life. Students have lack of opportunities to solve the problems with this type of reasoning is a factor that limits the opportunities and positive perceptions of students in learning mathematics. Based on research, by the development of trigonometry problems that are relevant to real life, it is found that students enjoy learning mathematics because it can solve real life problems and they have more idea to solve it. Therefore, as educators, teachers and observers of education should be creative in using the problem as a bridge to build the formal concept of students.

Key Words: trygonometry, reasoning, development research.

INTRODUCTION

Mathematics as one of the important knowledge that have been studied by each individual as the goal of learning mathematics is to make people to thinking logical, theoretical, rational and confident as a means to solve problems in everyday life, so that they are able to compete from all demands of globalization era which is technologically advanced now and the future. Mathematics is one of the subjects that exist in every level of education, either primary, secondary or college education. The role of mathematics is very important in supporting the development of education, for students mastery of mathematics will be a powerful tool as a supporter to study other subjects.

In most knowledge, mathematical knowledge is a knowledge that plays an important role. This is in line with the Nasution's opinion (1982: 82) that Mathematics is the core development of other sciences, Mathematics can be said that first grow from all existing knowledge. In line with that arises physics and astronomy that fill each other with mathematics. Then mathematics infiltrated the development of chemistry, earth science and life sciences, finally to the mathematical thinking that infiltrated into social science.

Studying mathematics is not solely to achieve Core Competence and Basic Competence only in Indonesia curriculum. Many of the competencies that should be achieved by students in learning mathematics are showing such as a logical, critical, analytical, meticulous, responsive, responsive, not giving up in solving problems, having the ability to communicate a mathematical idea clearly, able to identify patterns and use the pattern to give Prediction of completion, as well as using symbols in modeling, identifying information, and using other strategies when unsuccessful (Depdikbud, 2013). The reality in the field shows that most students are less interested in mathematics because of the tendency that is displayed to students is a series of abstract formulas that make students feel bored and tired to learn and study the material. Susanto (2013) points out, "interest will have an impact on one's activities. In relation to learning activities, certain interests may have an effect on student learning outcomes, this is due to the interest of students to something in the learning activities themselves.

Many trigonometry applications in the real life civilization such as civil construction, engineering planning, astronomy fields, and so on. It gives the importance of using trigonometry in the present and the future, the understanding in the field of trigonometry and mastering competence is very important. But studying trigonometry is not as easy as one might imagine. Based on previous research; (Agninditya, Sunandar, Purwati (2014), Rusdi Dkk (2013), BSNP (2012), Al-Krismanto, (2008)) stated that the teaching material of trigonometry is categorized as difficult for students especially in the form of story problem and contextual problem.

Giving the problem that relate to the real context will be more stimulating students' thinking and will arouse students' curiosity in solving the problem. So the students are more eager in solving the problems and get the benefits of learning mathematics in real context. In the opinion of Nurhadi (2004: 13) states that contextual learning is "a learning concept that helps teachers combine learning content with the real world, and motivates students to connect knowledge with its application in their lives as members of family and society". If the problems given in school are still ordinary or do not require reasoning and are related to real life, it will be difficult for students to find problems that require reasoning and are related to real life. One sign that a person has learned is a change of behavior within himself. These behavioral changes concern both cognitive and skill changes (psychomotor), as well as values and attitudes (affective).

Basically every problem solving mathematics requires reasoning ability. But there are also the usual problems without the need for reasoning. Through reasoning, students are expected to see that mathematics is a logical or logical study. Thus students feel that mathematics can be understood, thought, proved, and can be evaluated. The reasoning abilities are not only required when students learn mathematics or other lessons but it is needed every human solve the problem or while determining the problem. Therefore, the provision of contextual questions and questions that require reasoning is very important given to students, let alone students at senior high school level. This will be a support for them in facing the situation when they want to continue to college and other activities outside school.

In this case, it is necessary to develop test questions indispensable to familiarize students in solving the problem, whether the problem is fixed on the theory and the problems that require reasoning. As stated by Arikunto (2009: 53) namely: "The test is a tool or procedure used to know or measure something in the atmosphere, the way and the rules that have been determined". As the initial stage to get a good test problem needs to be analyzed form the question. In general, the level of difficulty can be interpreted as the ability of students to answer questions posed correctly. Arikunto (2009: 207) argues that: "A good question is a matter that is not too easy or not too difficult. Problems that are too easy doing not stimulate students to enhance the business solve it. Conversely, the problem is too difficult will cause students to be discouraged and do not have the spirit to try again because it is out of reach ". Based on the above description, it is necessary to develop a problem that can measure students' reasoning abilities, in this case done through the development of test questions on Trigonometry materials.

METHODS

This research use descriptive qualitative approach. This research prefers to the process rather than results. This is in accordance with the statement of Arikunto (2010: 15), namely "Qualitative research has inductive properties and prioritizes the process of the outcome". This research is a type of research development or development research. According Sugiyono (2010: 297) states that: "R & D is a research method used to produce a particular product and test the activity of the product". According to Sujadi (2003: 164) Research and Development or Research and Development (R & D) is a process or steps to develop a new product, or refine an existing product, which can be accounted for.

While the development of problems carried out in this study was conducted by using formative evaluation by Tessmer (1993). Formative evaluation consist of many stages, such as: (1) formative evaluation, (2) expert review, (3) one to one, (4) small group, and (5) field test. This stage conducted to develop the problems, do the experiment, and find the effect of the problems to the students' understanding in solving trigonometry problems.

RESULTS AND DISCUSSION

The high school students' view the problem of trigonometry using the usual problem of the strict rules and standards in accordance with the formulas taught in a conventional way. This involves standardized triangular concepts so that students are fixated on a single point of view corresponding to what the teacher did. But when the question is changed in the form of events or everyday life including real problem solving that exist in the student environment, this becomes a significant constraint, so that students difficult in solving problems.

Another case when teaching the concept of trigonometry by using a real example that related to electrical power problem issues, the length of time required to cross a stream of streams, determine the height of the building to make the appropriate stairs of health standards, and other problems.

Based on the problems given by prioritizing problems that can develop students 'reasoning abilities, it is known that the problem in the learning process is enough to give effect in improving students' reasoning ability. It can be seen that by using a particular problem, students can develop problem-solving plans based on linking real-life situations with raw concepts using aids such as images, simple analysis, and reasoning. If there are any errors, this happens on a miscalculation or use of number manipulation. These results can be seen from the following answers





Suwangsih (2006: 3) provides an explanation that mathematics emphasizes more activity in the world of rationality (reasoning), rather than simply emphasizing the results of experiments or observations. From this opinion it can be understood that studying mathematical objects desperately needs a thought process. Mathematics is formed because of human thoughts associated with ideas, processes, and reasoning.

Based on the above explanation it can be concluded that the developed problem has been able to measure the ability of students, this is seen from the student answer sheet where students solve problems in different ways but still lead to the goal of the correct answer. However, in this study only measure the students' reasoning not to assess the results of student answers true or false. As for the problems that are still considered difficult by students it is in accordance with the basic competencies that exist, so the difficulties experienced by students due to lack of knowledge of students to the material trigonometry itself.

CONCLUSION

This development research uses formative evaluation type, such as self-evaluation, expert review and one-to-one, small group, and field test so as to generate 5 test questions on trigonometric material to measure students' validity and practical reasoning ability so that Can be used in the learning process as well as for additional literacy lessons. The validity of the question comes from comments and suggestions from validators. While the practicality of the matter seen from the analysis of comments and answers of students in one-to-one and small group and the results of observations and brief discussion with students when one-to-one and small group took place. The problem has also been tested on field tests to measure the practicality of questions that include readability and clarity of problems on a wider subject and a more heterogeneous ability. So from the results of student answers can be seen that the 5 test questions developed have been able to measure the ability of students.

Based on the results of the study and the conclusion above then here are some suggestions for students, teachers, and other researchers. (1) For math teacher, in order to use mathematics problem device on trigonometric material that can measure students 'reasoning ability in learning to train students' mathematical literacy skills. Teachers are expected to familiarize students with questions that require students to give opinions and argue in mathematics such as contextual math problems that have been developed so that students are accustomed to communicate and express opinions in mathematics. Teachers are also expected to teach materials about trigonometry to students well, (2) For other researchers, this tool can be used as an input to examine more in depth about the development of math problems to measure students' ability in subsequent research in order to Get better results. It is expected in the long run to continue to develop other problems that can train students 'reasoning skills for the better development of Indonesian education and can train students' reasoning skills.

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