The Improving of Mathematical Understanding Ability and Positive Attitudes of Unimed FMIPA Students by Using the Contextual Teaching Learning (CTL) Approach

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Abstract. The active involvement of students in learning must be supported by providing special activities that are student-centered so that they can do "doing math" to find and build mathematics facilitated by lecturers. One aspect of "doing math" is to improve mathematical communication skills. The existence of communication skills will certainly bring students to a deep mathematical understanding of mathematical concepts. In addition to mathematical communication skills, an attitude that must be possessed by students is needed, including appreciating the beauty of mathematics, having high curiosity and learning mathematics. With such an attitude, students are expected to develop mathematical abilities, use mathematics to solve problems faced in their lives, and can develop mathematical dispositions. This research conducted on students of FMIPA with the aim of: (1) knowing students' mathematical communication skills taught by using the problem based learning model and talking learning model; (2) knowing the differences in students' mathematical disposition abilities taught using Problem Based Learning model and talking learning model; (3) produce a mathematical learning device in the form of an appropriate LAS used to improve students' mathematical communication; (4) produce teaching materials in the form of textbooks with appropriate problem-based learning model used to improve students' mathematical communication.

1. Introduction

The Efforts to improve the quality of education continue to be done both conventionally and innovatively. But the quality of education has not shown the results as expected reality. This can be seen from the learning outcomes obtained by students is still very low, especially in mathematics. With the fact that this will greatly affect the learning outcomes of these students when he enters the world of higher education. In education at the tertiary level, especially students who enter the faculty of Mathematics and Natural Sciences will get a basic course, Mathematics (calculus). However, complaints about the low mathematics learning outcomes of students from the lowest level of primary school education to college never disappear.

Among the students' mathematical abilities that are very important to develop is the ability to understand concepts in mathematics, because if students have an understanding of the concept at least they will be further interested in learning mathematics. So it is expected that it will be able to improve students' positive attitudes towards mathematics.

But the reality shows that mathematics is considered as a difficult, complicated, boring, unattractive, unpleasant subject, and mathematics is considered as a scary subject for most students. It can be seen from the mathematical abilities of students especially the ability of understanding students
have not shown satisfactory results, it can even be said to be very far from satisfying and very worrying results, so that it leads to negative attitudes of students towards mathematics.

Contextual learning approach puts students as learning subjects, students who play an active role in the learning process by finding and exploring their own understanding of the subject matter. The teacher / lecturer facilitates students to lift objects in real life into mathematical concepts, through question-answer, discussion, inquiry, so students can construct the knowledge in their minds. Mathematics grows and develops not through notification, but through inquiry, construction, questions and answers, and it starts from observations on real life that are experienced in real life. This learning pattern will greatly affect the ability of students' understanding of mathematics.

Based on the writer's observation and experience, many students said that mathematics is difficult, complicated, boring, unattractive, and not fun. They also said they disliked mathematics or in other words many of them were negative towards mathematics. After the authors investigate why they think as mentioned above, the main cause of that is they do not understand what is informed by the lecturer, then the learning applied still relies on conventional learning. So they really do not understand what is being learned, which in the end they assume as above and be negative towards mathematics.

Based on the results of Purba's research, Glory (2018) which states that the mathematics learning process in the Calculus course tends to achieve the target material and is oriented towards meeting the graduation target [1]. So that the learning process does not emphasize the understanding of the material being studied. Students do not build their own knowledge of mathematical concepts without knowing the meaning contained in these concepts. Some of the above points lead to the need for a learning approach that empowers students more, which does not require them to memorize facts, but approaches that encourage students construct knowledge in their own minds so that the influence that is not good for the development of mathematical abilities does not continue to a negative attitude towards mathematics. To achieve this, an appropriate, suitable and relevant learning approach is needed. One approach that is considered appropriate is the Contextual Mathematics Learning approach (CTL)

From the experience and observations of the authors of learning in class shows that the learning process carried out is dominated by lecturers and the focus of learning is about low level skills. It just emphasize the practice of working on the problem or drill by repeating procedures and using more specific formulas or algorithms. The learning process also only emphasizes the demands of curriculum achievement and is more oriented towards student learning outcomes in the form of values. Student involvement in the process of learning mathematics is still very minimal, so there is no opportunity to develop and improve students' understanding and positive attitude towards mathematics. Based on the description above, it is felt necessary to improve students' mathematical understanding abilities and enhance students' positive attitudes towards mathematics by applying CTL approach. These reasons make the researcher interested to focus on differences in students' understanding and attitude toward mathematics by using CTL approach.

2. Review of Literature
2.1. Understanding in Mathematics
Understanding is one aspect of the cognitive realm in Bloom's Taxonomy put forward by Benyamin S Bloom. Understanding is interpreted as the absorption of the meaning of the subject matter being studied. There are three aspects to understanding, namely the ability to recognize, the ability to explain, and draw conclusions. According to Walle (2017: 26) “understanding can be defined as a measure of the quality and quantity of the relationship of an idea with an existing idea” [2]. The level of understanding varies, understanding depends on the appropriate ideas that you already have and depends on making new connections between ideas. Meanwhile according to Nurhadi (2016: 124) that: There are 3 types of understanding: translation, interpretation, and extrapolation [3]. In mathematics, for example being able to translate word problems into symbols and vice versa, being able to interpret similarities, being able to estimate (extrapolate) a tendency from diagrams.
In learning mathematics, translational understanding relates to the ability of students to attach or represent, translate sentences in problems or problems into other forms, for example, can mention or write down the variables that are known and asked. Understanding interpretation related to students' ability to determine the right concepts to be used in solving problems or problems encountered. Extrapolation understanding relates to the ability of students to apply concepts in mathematical calculations to solve problems or problems.

Basically students who learn by understanding, will first make a total observation of the object being studied. Then students analyze things that are interesting in what is observed, and then synthesized again. The process of understanding above is in line with what has been developed by Piaget (in Nurhadi, 2016: 133) states that: "the process of a child learning through experience" [3].

From the explanation above, it can be concluded that the understanding in this study is the ability to recognize, explain, and draw conclusions from a situation or action. Or in other words, understanding in mathematics includes understanding translation, interpretation, and understanding extrapolation. These are the indicators of the ability of understanding to be measured in this study.

2.2. Attitudes Towards Mathematics

Attitude is one aspect of the affective domain in Bloom's Taxonomy put forward by Benjamin S Bloom, which is a person's tendency to respond positively or negatively to an object, a concept, or a group of individuals. According to Slameto (2015: 188) "attitude is another factor that influences learning outcomes, attitudes always concern an object, and attitudes towards these objects are accompanied by positive or negative feelings" [4]. Attitude refers to the properties and beliefs that students have about mathematics. Students' beliefs about their ability to do mathematics and understand mathematical properties that have an important influence on how students approach problems and ultimately how students succeed in solving problems.

Students' attitudes (likes, dislikes, and pleasures) about mathematics are as important as their beliefs. The joys and joys of students towards mathematics are reflected in their positive attitude towards mathematics, according to what Walle (2017: 60) states that: "Children who are happy and satisfied if they can solve a problem or are happy to overcome a confusing problem will be more persistent to try the second or third time, and even looking for new problems. Negative attitudes have the opposite effect ".[1]

Attitudes are at least classified into three types, positive attitudes, neutral attitudes, and negative attitudes. For students who have a positive attitude towards mathematics have characteristics including liking mathematics, being seen to be serious in learning mathematics, paying attention to the teacher in explaining mathematical material, and being active in discussions. Positive attitudes or negative attitudes towards mathematics do not come or appear by themselves, but arise through the process. Related to this, Sanjaya (2016: 277) argues that: "the process of forming that attitude occurs because of two things, namely the pattern of habituation and approaching" [5]. In the process of learning mathematics, whether consciously or not, the teacher can instill certain attitudes to students through the process of habituation. Students who often receive unpleasant treatment from the teacher, for example mocking behavior or behavior that offends a child, breaking a child's question or answer, and so on, over time the child will feel hatred. And slowly the child will transfer the negative attitude not only to the teacher, but also to the subjects they care for.

2.3. Contextual Mathematics Learning Approach

The learning approach is a way taken by the teacher or students to achieve the goals set. The approach can be divided into two, namely the material approach and the learning approach. Material approach is the process of explaining certain mathematical topics using other mathematical material, for example explaining the topic of congruence of two triangles using transformation. While the learning approach is the process of delivering or presenting certain mathematical topics to make it easier for students to understand them.
Contextual learning or Contextual Teaching and Learning (CTL) is a conception that helps teachers link subject content with real-world situations and motivate students to make connections between knowledge and its application in their lives. It was also stated by Sanjaya (2016: 255) that: "CTL is learning that emphasizes the process of full student involvement to be able to find the material being studied and relate it to real life situations so that it encourages students to be able to apply it in their lives". Therefore, Contextual learning occurs when students apply and experience what is being taught with reference to real-world problems related to their roles and responsibilities.

Related to this, there are three things that must be understood. First, CTL emphasizes the process of student involvement to find material, meaning that the learning process is oriented to the process of direct experience. The learning process in the context of CTL does not expect that students only receive lessons, but the process of finding and finding their own subject matter. Second, CTL encourages students to find relationships between the material being studied and real-life situations, meaning students are required to be able to capture the relationship between learning experiences in school and real life. Third, CTL encourages students to be able to apply it in life, meaning that CTL not only expects students to understand the material being learned, but how the subject matter can color their behavior in everyday life. In this connection, there are five important characteristics in the learning process that use the CTL approach.

- In CTL, learning is the process of activating existing knowledge (activiting knowledge), meaning that what will be learned is inseparable from the knowledge that has been learned, thus the knowledge to be obtained by students is intact knowledge that is related to one another.
- Contextual learning is learning in order to acquire and instill new knowledge (acquiring knowledge). New knowledge is obtained by deductive, meaning that learning begins with learning as a whole, then paying attention to the details.
- Understanding of knowledge (understanding knowledge), meaning that the knowledge acquired is not to be memorized but to be understood and believed, for example by asking for responses from others about the knowledge acquired and based on these responses new knowledge is developed.
- Practicing the knowledge and experience (applying knowledge), meaning that the knowledge and experience gained must be applicable in the lives of students, so that changes in student behavior appear.
- Reflecting (reflecting knowledge) on knowledge development strategies. This is done as feedback for the improvement and refinement process.

2.4. Expository Learning

Expository learning is a part of conventional learning. This learning departs from the view that classroom behavior and the dissemination of knowledge are controlled and determined by the teacher. The nature of teaching according to this view is to convey knowledge to students. Arikunto (2016: 179) argues that: "conventional learning is learning that emphasizes the process of delivering material verbally from a teacher to a group of students with the intention that students can master the subject matter optimally".

In this learning subject matter is delivered directly by the teacher, students are not required to find the material. This learning places the teacher as the center of learning (teacher centered approach), because the teacher is more active in providing information, explaining a concept, demonstrating skills in obtaining patterns, rules, propositions, giving examples of problems and their solutions, giving students the opportunity to ask questions, and other teacher activities in learning.

There are several characteristics of expository learning, first: this approach is done by conveying subject matter verbally, that is, speaking verbally is the main tool in conducting this learning, therefore people often identify it with lectures. Second: usually the subject matter delivered is ready-made subject matter, such as data or facts, certain concepts that must be memorized so that they do not require students to rethink. Third: the main goal of learning is the mastery of the subject matter itself.
This means that after the learning process ends students are expected to understand it correctly by being able to re-express the material that has been described.

Related to the explanation above, it can be said that expository learning in this study is learning that places the teacher as the center of learning, because the teacher is more active in providing information about the subject matter, gives students the opportunity to ask questions, students do exercises, the teacher and students discuss the questions.

3. Methods

This study was a quasi experiment, that was a research means to know whether or not a result of something that is important to students, in other words, the experiment research was trying to search whether or not the causal relation. Its implementation involves two groups of experiments, i.e. classes that are taught by using Contextual Teaching Learning approach was referred to as experimental class and class being taught by using expository learning approach called as control class. The design of the research using Pretest-Postest Control Group Design. The sample that has been taken was grouped by two group experiment i.e. the first group as experimental class and second group as control class. Both sample class give the pretest to find out the ability or students understanding about the material that will be taught before we do the learning and to retrieve the homogenous sample.

4. Research Procedure

4.1. Preparation Stage

In the preparation stage, the activities carried out are as follows:

- Determine the place and arrange a research implementation schedule that is adjusted to the schedule in the school.
- Determine population and research sample.
- Develop Student Worksheets
- Prepare data collection tools, in the form of pretest and posttest.

4.2. Implementation Phase

At the implementation stage, the activities carried out are as follows:

- Validating the research instrument questions then tested the validity of the test, reliability of the test, the level of difficulty of the problem.
- Giving pretest to both classes to measure students' initial ability to the material to be taught in both classes and to obtain a homogeneous sample.
- Conduct learning in two classes with the same material and time, only different learning models.
- Provide the posttest to both classes to measure the level of mastery of the material that has been taught. The time and duration of the posttest implementation in both classes are the same.

4.3. Final stage

In the final stage, the activities carried out are as follows:

- Calculate the difference between the results of the pretest and the results of the posttest for each class.
- Compare these differences by assessing and reviewing the process of answers.
- Test hypotheses of students' mathematical understanding and positive attitude use t statistics to determine whether the score difference is significant or not.

5. Relevant Research

In connection with the improvement of the learning process through the use of Contextual Teaching Learning approach that aim to improve students' understanding and positive attitude toward mathematics, it has been carried out through several preliminary studies by the research team. Among them: Research with the CTL learning approach has been studied by Umar, (2016: 6) who said that:
“the results of the analysis of learning completeness showed that classical completeness in the CTL class was 87%, whereas in the conventional class it was 79%”[7]. This means that the application of learning with the CTL approach can improve student mathematics learning achievement. Descriptive data analysis showed that students’ attitudes towards mathematics for the CTL class were in the good category while for the conventional class in the category it was quite good.

From Asikin research (2016) revealed that: students who get learning through contextual learning approaches have increased ability to apply mathematical concepts better than students who learn through conventional learning. Students also show a positive attitude towards the contextual learning approach that is applied to them [8]. Likewise in Darhim’s Dissertation (2015), in his research in grade II elementary school revealed that learning with Contextual Mathematics Learning had a better effect on learning outcomes and attitudes of elementary school students [9].

Purba (2017) has also conducted research related to innovative learning approaches, which revealed that: there was an increase in the reasoning abilities of students who were taught with a multimedia-assisted Discovery Learning approach [1]. In addition, in Purba (2018) the authors also conducted research related to the same thing using the Problem Based Learning approach where the results obtained were differences in communication abilities and mathematical disposition between groups of students learning by using the Problem Based Learning learning approach compared to students who learning with a lecture (expository) approach [10]. There is a sufficient positive correlation between communication skills and student mathematical disposition.

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