

Implementation of CTL Approach to Increase Understanding of the Concept of Operation of Addition and Subtraction of Integers by Using Learning Tools

IhsanFuadi

Post Graduate Program, State University of Medan, Medan, Indonesia

Abstract.

This study aims to determine students' difficulties in understanding the concept of operations of addition and subtraction of integers as well as to determine whether there is an increased understanding of the concept of students on the material using tools through CTL approach. The subjects were 19 students of the fifth grade of Primary School of 060851 Medan. From the post test, it was obtained that the number of students who achieve learning completeness was 5.26% with an average grade of 40.5. After granting an action, interview and observation, the concept understanding test was conducted. It turned out that an increasing of 78.95% with learning completeness of 84.21% with an average grade 71.57.

Keywords: CTL approach, Concept Understanding of Operation of Addition and Subtraction of Integer, Learning Tools.

1. Introduction

The problem of education is a problem that is always interesting to discuss and talk about both among education experts, parents and even the government. One of the problems in education today is the low of student learning outcomes and aversion to mathematics, especially at the high school level so that mathematics is one reason for students not to pass the National Exam.

One of the reasons of low mathematics learning outcomes is the fear of students to the Math lesson itself due to the assumption that mathematics is memorized lesson. It is supported by Kenny and Silver (1997) who state that one of the two students thinks that learning mathematics is essentially memorize.

Furthermore, the problem in mathematics is the basis of low ability students in Math itself. Because of lack of students' basic capabilities, then students will have difficulty in continuing material linked to the basic skills. It is appropriate with statement by Sihombing (2009: 4), that is

The math teacher in Junior and Senior High School complained about providing the learning material, which the reason is the basic ability of the students is very low. This is extremely obvious, because mastery of concept B must be underpinned by the mastery of concept A or mastery of concepts X_j must first master the concepts X_i ($X_i X_j$ where the underlying mathematics teaching material hierarchical).

One subject of the mathematics involved in this issue is quadratic equations and algebraic operations. In order to master the material of quadratic equations and algebraic operations, the student must know the material of integer arithmetic operations. Based on the writer's observation during teaching, the difficulties faced by students, especially in factoring quadratic equations and algebraic operations in solving problems were due to the lack of students' knowledge of integer operations, particularly the addition and subtraction of integers. Though this material has been studied since the fourth grade. According to Sihombing (2009: 12) one reason is the abstractness of mathematical object and teachers are not trying to teach mathematics using tools or props.

Based on the explanation above, the one effort that can be done to increase students' understanding on the concept of operations of addition and subtraction of integers, especially at the primary level is a teacher should be able to use tools or props mathematics as effective as possible in order to explain the mathematical abstraction. This is in accordance with what is disclosed Ghazali (in Wibowo, 2009: 3) that "to make the students easy to remember, communicate and implement something (lessons) ever observed (experienced) in the classroom, such things need to be supported with concrete role-modeling (media teaching). Furthermore Bruner (in Lubis, 2006: 30) states that "for children aged 7 s.d. 12 years to get the grasp and absorbency that includes memory, understanding and application still requires the eyes and hands". Based on this statement that it is increasingly clear that the use of concrete objects is required in mathematics to children aged 7 s.d 12 years or at the primary level, especially on the lessons operations of addition and subtraction of integers.

In this issue, the most appropriate learning approach associated with the use of tools is an approach CTL (Contextual Teaching and Learning). This is due to the CTL, the teacher is able to connect the content of subject matter to the real world situation, especially by using tools that are often encountered students in life. It is as described by Blanchard (in Trianto, 2008: 10), that is:

Contextual Teaching and Learning (CTL) is a concept that helps teachers to connect content teaching materials with real world situations and motivate students to make connections between

knowledge and practice into their life as family members, citizens, and labor. In other words, CTL is a learning that occurs in close association with the actual experience ".
That is why the writer was interested in conducting this research.

2. Research Methods

This study is a classroom action research, since this study aimed to uncover the obstacles and difficulties experienced by students in understanding the operation concept of addition and subtraction of integers and explain the efforts being made to improve the ability of students to understand the concept of operations of addition and subtraction of integers. The place of this study is in Primary School of 060 851 Medan and its implementation in the first semester of the Academic Year 2009 / 2010. Subjects of this study were students of the fifth grade of Primary School of 060 851 Medan. The object of this study was the application of CTL approach to increase the understanding of the concept of operations of addition and subtraction of integers using learning tools in the Fifth Grade of Primary School 060 851 of academic year 2009/2010.

This study used three types of data collection instruments, they are:

• Ability Test

According to Tanuwijaya (2005: 170), a test is a set of stimuli which is given to someone with the intent to get an answer that can be used as the basis for scoring points. In this study, researcher will provide a post test as many as 5 questions before treatment is taken. From the post test, it will be seen where the difficulty lies so that it can be arranged an action planning to be implemented in the class. The results of the post tests will be used as guidelines to form a discussion group of students. To see if there is an increasing in the ability of students to understand the concept of operations of addition and subtraction of integers, then they will be given the test questions in the student worksheet in each meeting which is conducted in groups and individual tasks as homework. From the tests carried out will also be created guidelines to see if there are difficulties faced by students in further work on the problems and interviews can be made for students who have trouble learning and provide solutions to overcome these difficulties. For the final test, each student was given a post test to the provided subject problem.

• Observation

Observation is conducting a direct observation to the object of study to look the activities undertaken closely. According to Tanuwijaya (2005: 158), observation is defined as the systematic observation and recording of the symptoms seen in the research object systematically.

Observations carried out is an observation of all activities and changes that occur at the time of the action undertaken. In this case a student and a classroom teacher act as observers (observer) whose job is to observe the researcher (who act as teachers) during the learning activities.

• Interview

Interview is conducted to reveal completely the conceptual knowledge and reasoning of students in more depth.

Before conducting the study, the researcher conducted observations in the concerned school, particularly on the implementation of learning. After obtaining the required data, the researcher arranged the implementation of the study as follows:

❖ Problems

To find out the existing problems, the post test was carried out.

❖ Planning Phase Treatment

The planning stage of the action was carried out after the post test given. The post tests were conducted aimed to determine students' initial ability. The test results are then used as a reference in dividing the students into groups to learn as well as a reference for teachers to overcome these difficulties. In the planning stage of this treatment, things to do are:

- a. Develop learning scenario which contains steps in the learning activities using CTL approach by using learning tools.
- b. Prepare a learning support tools that support the implementation of the treatment, they are: (1) the student activity sheet, (2) the book for researchers that contains learning scenarios (3) teaching aids required.
- c. Prepare research instruments, namely: (1) a test to see how the students' ability to understand the concept of operations of addition and subtraction of integers, (2) conduct interviews to students who experience difficulties / obstacles in completing the test, (3) the observation sheet to observe the activities of teaching and learning process.

❖ Implementation of Treatment

After the treatment plan was drawn up well, the next step is the implementation of the treatment, as follows:

- a. Conduct the learning with CTL approach by using learning tools based on learning scenarios prepared by the researcher. Where thr researcher acted as teachers, while one student and teacher of the fifth grade of Primary School 060851 Medan served as observers who will provide input for ongoing

learning.

- b. At the end of the treatment, the students were given the test's ability to understand the concept of operations of addition and subtraction of integers done individually, to see if there is the increasing in the ability of students' understanding of concepts through CTL approach by using learning tools.
- c. Provide opportunities for students to perform asking question about a given problem and material that is not understood.

❖ Observations

In this activity, the class teacher of the fifth grade of Primary School 060851 Medan observed the student acting as teacher in order to determine whether the conditions of teaching and learning has been implemented in accordance with the teaching programs have been prepared and the students observed the activities of the students during the learning process.

❖ Data Analysis

Data obtained from the data collection tool were analyzed in the form of a table, after the calculation to obtain the results of the test the ability of understanding the concept of operations of addition and subtraction of integer students.

❖ Reflection

In this phase, the researcher looked whether the results of student learning has been completed or not. Had not been completed, the researchers would have examined the obstacles or problems during the learning process, which then become a reference for improvement for the researchers and the researcher will conduct the research on different samples based on the results of the reflection obtained from the first study.

Analysis of the data in this study was carried out in several stages of data reduction, data display, and conclusion.

3. Research Result

Based on data analysis of descriptive data, obtained the following results:

a) From the post test results showed that the students' ability to solve problems is still very low, of the test gained only 1 student in 19 people (5.26%) who have achieved learning completeness (values ≥ 65), while 18 others (94, 74%) have not been completed. From the 19 students were obtained 1 students received score between 65-79 categorized as students with the moderate ability, 6 students received score between 55-64 categorized as students with low ability, while 12 other students received score ≤ 54 categorized as very low ability. The average score obtained from the class of 19 students at the beginning of the test are 40, 53.

It can happen because the students still have difficulties as follows:

- The students do not understand the concept of operations of addition and subtraction of integers.
- The students are less careful in doing arithmetic operations.
- There are still some students' who have difficulties in completing operations of addition and subtraction of whole number.

b) Based on the problems obtained after the post test, the researcher hold CTL learning approach by using learning tools.

c) After giving the treatment, interviews and observations conducted, it turned out a significant improvement on students' concept understanding on the material of operations of addition and subtraction of integers at the amount 78.95%. This can happen due to 84.21% of the total number of students (16 of 19 students) had mastered the operations of addition and subtraction of whole number so that the researcher can more easily to give the students understanding about the concept of the operations of addition and subtraction of integers using CTL approach and learning tools. While the remaining 15.79% (3 students) is not complete because students are still difficult to understand the operation of addition and subtraction of whole number and still less conscientious in solving a given problem.

From giving the final test showed that the ability of students to understand the concept of operations of addition and subtraction of integers is good enough. The results obtained from 16 of 19 (84.21%) have achieved learning completeness (score ≥ 65) while three other students (15.79%) have not been completed. From the 19 students there are 4 students received gscore ≥ 90 categorized as students with very high ability, five students received score between 80-89 categorized as students with high ability, seven students received score between 65-79 categorized as students with the moderate ability, and 3 students received score ≤ 54 categorized students with very low ability. The average score obtained is 71.58.

Based on observation result, from the observation of the teacher's performance (researcher), it is obtained teacher's ability to manage learning process only by 75% with the average for the ten aspects of 3.0, while the observation on the activities of students obtained percentage of 66.17% and the average to sixth aspects of 2.65.

d) Based on the results, the CTL approach by using learning tools can enhance students' understanding of the concept of the operations of addition and subtraction of integers.

4. Discussion of Research

Application of CTL approach by using learning tools can improve students' understanding of the concept on the operation of addition and subtraction of integers. Based on the results of the study, the average score of the post test before being given the treatment is 40.53 with classical completeness rate of 5.26%. After being given an action using CTL approach by using learning tools the average test scores of the understanding of the concept of operations of addition and subtraction of integers increased to 71.58 with classical completeness rate of 84.21%. This means that there is the increasing of 78.95% from the post tests given.

After doing research, it is known if learning with CTL approach by using learning tools for students of the fifth grade of Primary School 060851 Medan 060851 academic year 2009 / 2010 can improve students' understanding of the concept of the operations of addition and subtraction of integers. The results also showed improving student learning outcomes are excellent viewed from the increasing in the average and the number of classical learning completeness reached. The use of learning tools can also provide a new atmosphere, interest in studying mathematics, the motivation to learn and help students overcome difficulties in understanding the concept of operations of addition and subtraction of integers. This learning theory in accordance with the opinion of Bruner (in Lubis, 2006: 40) states that: "The theory of teaching should elaborate the experience that motivates various types of students to learn, that is learning in general and subject-specific learning".

The interest of students to learn the concept of the operations of addition and subtraction of integers can be accomplished when using a way of learning to manipulate the presentation of concrete from the concept, as stated Dienes (in Lubis, 2006: 41) says: "Mathematics material should be arranged so that the students manipulate concrete presentation of the concept in the form games (games) before going on to the presentation of more abstract ". To be able to convey the concept of properly, it can be helped by a learning tool. Active learning in a rich environment and use concrete objects or tools for children is very important.

The benefit of tools in learning mathematics is the students understand the concept of operations of addition and subtraction of integers, especially in negative numbers, can be improved. The relationship between abstract mathematical concepts with surrounding objects will also be able to understand, for example: learning with storytelling / illustrate the operating concept of addition and subtraction of integers in everyday life. Various weaknesses were also found when the study was conducted, one of which is a limitation of the available tools. The efficiency of the time spent is very difficult, because learning by using tools require a relatively long time.

Therefore, it can be concluded that learning with CTL approach by using an excellent learning tool is very good to improve students' understanding of the concept of the operations of addition and subtraction of integers. The weaknesses in this study still needs to be developed in order to obtain better results.

5. Conclusion

Based on the results of the study are presented in Chapter IV can be concluded that:

- With the implementation of CTL by using learning tools can improve students' understanding of the concept of the operations of addition and subtraction of integers.
- The number of students who achieve learning completeness of the post test is one of 19 students (5.26%) with an average score 40.53. The results of the data analysis after the action, interviews and observations conducted turned out a significant improvement to the understanding of the concept of students at the material of operations of addition and subtraction of integers at the amount 78.95% with the percentage of classical completeness at the amount 84.21% and the average grade 71.57 so it is categorized in the moderate ability. This can happen due to 84.21% of the total number of students (16 of 19 students) had mastered the operations of addition and subtraction of whole number so that the researcher can more easily to give the students understanding of the concept of the operations of addition and subtraction of integers using CTL approach and learning tools. While the remaining 15.79% (3 students) is not complete because students are still difficult to understand the operation of addition and subtraction of whole number and still less conscientious in solving a given problem. Based on classical learning completeness criteria, this study has reached the target of classical learning completeness
- Learning through CTL approach by using good learning tools is a basic mastery of the operations of addition and subtraction of whole number, filing problems in LAS, using appropriate and effective learning tools, the formation of groups based on the student's ability to be balanced and representative group presenting the results of discussions appointed by lottery in which the previous group discussions results are collected in advance. In addition, the approaches can make students more active in the learning process. Giving a quiz at the end of the lesson is good enough to make the students to moaster and always remember learning that has been done.

6. Suggestions

The suggestions put forward are as follows:

- For the students the fifth grade of Primary School 060851 Medan academic year 2009/2010 which has not reached learning completeness should have more training in understanding the operation concept of addition and subtraction of integers with increasing the understanding of the operations of addition and subtraction of whole number as well as more thorough in solving a given problem in advance. For students who have completed to always remember the lessons that have been given and practiced harder and more creatively to find new ideas.
- For teachers especially the mathematics teacher the fifth grade of Primary School 060851 Medan should always try to improve students' understanding of mathematical concepts and consider implementation of CTL approach to learning tools in providing Maths lessons at school.
- For Primary School Principal 060851 Medan should be able to coordinate the implementation of CTL approach with learning tool to improve the understanding of Maths concepts students along with math teachers at the school.
- For advanced researchers, this study can be consideration to do the same research with the same and other research subjects.

7. References

- Kenny, P. and Silver, E., 1997, Result from the Sixth Mathematics Assessment of the National Assessment of Educational Progress. Reston (VA) : NCTM
- Lubis, Asrin, (2006), Strategi Belajar Mengajar Matematika, FMIPA Unimed, medan.
- Margono, S, (2005), Metode Penelitian Pendidikan, PT. Rineka Cipta, Jakarta.
- Sihombing, W.L., (2009), Bahan Ajar Kapita Selekta Matematika 2, FMIPA-Unimed, Medan.
- Trianto, (2008), Mendesain Pembelajaran Kontekstual (Contextual Teaching and Learning) di Kelas, Cerdas Pustaka, Jakarta.
- Wibowo, Eko, (2009), Upaya Membantu Siwa Dalam Memahami Konsep Operasi Pecahan Dengan Menggunakan Alat Peraga Di Kelas V SD Negeri 091575 Dolok Sinumbah T.A.2008/2009, Skripsi, FMIPA Unimed, Medan.