Enhancing students activity and problem solving skill through CTL-based local wisdom approach

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Abstract. Contextual teaching and learning-based local wisdom approach is an approach that can be used in 21st century classes to develop student skill problems. Enhancing problem solving skills is the focus of the objectives in this study. Classroom action research follows the Kemmis & McTaggart action model. The research subjects were 28 students in class VIIa of SMP Negeri 1 Manokwari. Data collected using observation sheet and test. The analysis found that the average of student activity in the first cycle was 66% (adequate category), and increased in the second cycle with an average of 80% (good category). The increase is 14%. The average problem solving skills of students in the first cycle were 14% (very poor category), and increased in the second cycle by 62% (enough category). It can be concluded that CTL-based local wisdom approach can enhance student activity and problem solving skills of junior high school students. Future research can use other local wisdom based learning to develop problem solving skills for better.

1. Introduction

Teachers at the school identify their students, and they find that students abilities in the mathematics subject are lower than other subjects [1]. Students are less interested in learning mathematics because of the lack of variation in learning used by teachers, limiting their creativity and expressing their ideas, so that students do not understand what the importance of mathematics in solving problems in everyday life [2]. For several decades, problem solving has become an important problem for learning achievement, especially in mathematics field [3–5]. Teachers can use the right learning to improve their students' problem solving skills, when they plan learning [6].

The component of constructivism can develop students' problem solving skills [7]. One approach that contains constructivism is contextual teaching and learning (CTL). Applying CTL in learning can accelerate students’ problem-solving skill [8]. In addition, students can be motivated, boosted their problem solving activity, and enthusiastic in doing task which given by their teacher [9]. CTL approach makes students involved in learning that brings them to the real world. Real life situation can be integrated by giving a problem in a class. Teachers can give a contextual story that connected to real life in order to make their students get in-depth understanding [10]. The gap between real-world practice and abstract concept in mathematics subject can be fulfilled by CTL learning [11]. Through their experience in the real world, they can handle problems in the real world well. To overcome problems properly, students must be taught how they solve a problem, especially with related to problems in their
daily lives. To respond and solve problems actively against natural phenomena that occur around them, students must actively involve themselves and be motivated in participating in learning [12]. The teacher must practice problem solving skills to understand this. Mose et. al suggested that teachers in the junior high school must be able to develop basic mathematical abilities [13]. To evaluate students is expected through problem solving [14].

Problem solving skills help students solve problems in their daily lives easily [15]. There are four problem solving processes, namely understanding the problem, planning problem solving, implementing solutions and re-examining [16]. Van laar in his review study express that 7 core skills in the 21st century must be developed, one of them is problem solving skills [17]. In the 21st century, students will have good communication if they have problem solving skills [18]. Problem solving is an ability of basic mathematics in which have to be existed in Mathematics curriculum [19]. A research which handled by Ijirana and Supardi, (2018) found that when students be asked to do problem solving activity, there were some of students who could not complete it [20]. They said that students who could not do problem solving activity caused by misunderstanding the problem. It can be proved that the problem-solving skill is strongly needed to help students to solve the problem, especially the problem that will be faced in the future [21]

In terms of increasing problem solving ability and associated with authentic problems, it relates to local wisdom. Local wisdom becomes something that empowers and enhances the mastery of the material taught [22,23], associated with the conservation environment on problem solving skills [24], enhancing student abilities [25], and soft skills [26]. Local wisdom becomes a learning approach that makes students better at everything, because it relates to their daily habits.

When viewed from several previous studies, connecting learning with local wisdom is very good and needs to be done. Recommendations for further research, the participation of organizations such as education must be able to promote local wisdom [27], and become a culture-based education communicant in learning [28]. The incorporation of CTL and local wisdom to improve problem solving skills is the focus of this research objectives. Development of problem solving skills in mathematics learning using CTL-based local wisdom approach with a real-life, for example is the habit of consuming pinang nut (Makan Pinang) from the people of Papua, will be discussed.

2. Methods
The study was conducted in class VIIa of SMP Negeri 1 Manokwari in odd semester 2018-2019. Research subjects were 28 students. The type of research is classroom action research (CAR), wherein the way the teacher in managing, coordinating the conditions of their learning and learning from the experience of the student. This type of classroom action consists of two cycles in which each cycle consists of four stages: planning, implementing, observing, and reflecting. The CAR model used followed the PTK Kemmis & McTaggart model [29].

The instrument used in this study is a test of mathematical problem solving skills and observation sheets of learning implementation. Mathematical problem solving ability tests are given before and after the action in each cycle, while the learning implementation observation sheet consists of student activity observation sheets filled by observers. The data analysis technique used is descriptive analysis to describe students' mathematical problem solving activities and abilities. Interpreting student learning activities using the percentage of achievement 85 - 100 is excellent, 70 - 84 is good, 55 - 69 is sufficient, 40 - 54 is lacking, and <40 is very lacking [30], and interpreting the problem solving skill of student using criteria The following: 80 - 100 are excellent, 70-79 are good, 60 - 69 are sufficient, 40 - 59 are lacking, and <40 is very lacking [31].

3. Result and Discussion
Based on the results of classroom action research that has been carried out using a local wisdom approach to algebraic operations material in class VIIa of SMP Negeri 1 Manokwari, students' problem solving abilities increase and student activities and responses are in good category. This is evidenced by an
increase in students' problem solving abilities in each cycle. The following is a description of the results of classroom action research that has been carried out.

Figure 1 shows a graph of student activity in CTL-based local wisdom approach. The graph illustrates the following:

- **1st Cycle**
  - Constructivism: 79%
  - Inquiry: 64%
  - Questioning: 54%
  - Learning community: 50%
  - Modeling: 68%
  - Reflection: 82%
  - Authentic assessment: 80%

- **2nd Cycle**
  - Constructivism: 64%
  - Inquiry: 75%
  - Questioning: 71%
  - Learning community: 64%
  - Modeling: 50%
  - Reflection: 50%
  - Authentic assessment: 71%

**Figure 1.** Graph of student activity in CTL-based local wisdom approach: (1) Constructivism, (2) Inquiry, (3) Questioning, (4) Learning community, (5) Modeling, (6) Reflection, and (7) Authentic assessment

In the implementation of the second cycle, the author found that of the 7 aspects assessed, the whole have increased. There are 3 activities of students who achieve very good categories, namely constructivism, reflection, and authentic assessment, 3 student activities achieve good categories namely inquiry, questioning and modeling, while 1 student activity reaches a sufficient category namely learning community. In cycle II, there were no more student activities that reached the less category, but in this cycle there was still one aspect that reached the category enough. When viewed from the results of the first cycle, the activity of community learning students has increased which initially only had 50% who achieved it, but in the second cycle it reached 60% or experienced an increase of 10%.

If averaged, the activity in cycle I is 66% in the sufficient category, while activity in cycle II is 80%. An increase means that there is an improvement in the learning process by using CTL-based local wisdom approach. CTL-based local wisdom approach makes students interested in learning, students become active, construct their knowledge by linking material content, and it is relationship with aspects of local culture, raising problems faced in various cultural activities that involve mathematical concepts and they find solutions to these problems, students are stimulated through asking questions about the relevance of local cultural activities to the content of the material being studied, making them interact actively in the classroom. The emergence of ideas from within students to solve problems both individually and in groups, engage in local cultural activities to simulate problem solving involving mathematical concepts in the classroom, engage in feedback activities and make conclusions about the application of mathematical concepts in the activities of local wisdom, and can make authentic observations.

Students' activity accelerate in learning, they emerge positive response to CTL, and teacher performs an excellent ability in managing learning activity [32]. When viewed from the results obtained, the teacher can manage the class well, because the student's activity changes for the better or experiences an increase over time. The use of the CTL-based local wisdom approach makes students interested to learn and does not complicate them, because they can easily use the use of mathematics in...
life and their habits related to local culture. CTL hold the principle that either example or task which be given by teacher have to be something that can be finished by students [33].

Figure 2. Graph of student problem solving in CTL-based local wisdom approach: (1) Problem understanding, (2) Problem solving planning, (3) Resolving the problem, (4) Re-examine

Figure 2 shows a graph of increasing problem solving skills of students. The 4 skill problems that were measured at the end of cycle II, understanding problems reached excellent categories, problem solving planning reached an adequate category, resolving the problem and re-examining reached a less category. If averaged over the achievement of the 4 aspects measured, then in the pre-cycle the problem of students' skills only reached 14%, namely the very poor category, in the first cycle it reached 39%, namely the poor category and 62% in the second cycle, namely the sufficient category.

Achievement of problem solving skills of students who started very poorly reaching enough categories at the end of the cycle, it proved that the CTL approach based on local culture made students' problem solving skills better. Managing learning activity in classroom determine either high or low of students' ability of problem solving [8]. Contextual local wisdom presented in learning is in the form of using questions that use the local culture of Papua, namely pinang and sirih. These two materials are contextual problems and also as the culture of the people of Papua. Students are more interested in learning and easy to remember, because almost every day these two ingredients are purchased at the merchant for consumption.

Figure 3. Answers of one student in the problem solving process

In Figure 3 and 4 students do understand the problem by writing down what is known and what is being asked. In the planning phase of completion, students also right in choosing a completion plan that divides 85 by 5 to get the number of pinang piles. But at the time of the implementation of student planning it looked less thorough by writing 27/5 students should divide 27 by 3, because in the matter of one stack of pinang as much as 3 pieces. This causes the results to be wrong. According to Abdullah as quoted by Rohmah & Sutiaso, (2018) the cause of student error is called Negligence or Carelessness.
of Students or students are not careful in solving problem process, both when writing formulas or when calculating [2]. The trial and error process continues until the problem is solved [34].

Students continue their work to answer questions, he multiplies the number of stacks by Rp. 5,000. at this stage it was seen that the students' reasoning was actually used well because he rounded up 5.4 to 5 with the reason that the remaining pinang was not enough 1 stack, so that the Rp 110,000.00 was obtained. But because the steps to carry out the completion of students are less thorough, the conclusions obtained are wrong.

The results of the study are in line with those found by Parwati et. al. learning that emphasizes solving and local wisdom improves mathematical problem-solving skills [35]. In the learning that has been carried out in this study, students seem enthusiastic about solving the problems given because they have experienced problems. The teacher gives students the opportunity to ask things that are not yet known and activate group discussion in solving the problems given. Local content prepares students' skills, so students have the skills to be ready to adapt to the environment in which students are located [28]. Contextual problems given in the form of learning to calculate buying and selling "Pinang" and "Siri" make students' skill problems become quite good. In the future, when students have to face either complicated or bad problems, they will solve those problems due to their experience of have been taught by their teacher how to solve the problem, especially problems which intergrated to their life.

4. Conclusion
According to the results obtained that CTL-based local wisdom approach can improve student activity well and problem solving students' skills become quite good. Students' interest in learning makes them motivated and does not feel significant difficulties in learning. Future research can use other learning with local wisdom based to be able to further improve problem solving skills.

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