

Improving the Quality of Learning to Optimize the Use of Math Tools

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Abstract—This is a classroom action research which aims at creating teacher's creativity in teaching math concepts through designing mathematics teaching tools. The research was conducted at SMP Negeri 26 Makassar. The subjects of this research were the math teachers and students. There were three cycles to implement this classroom action research of four steps (planning, implementing, observing, and reflecting). The data were obtained through observation and tests and analyzed by the descriptive analysis of narrative. The results obtained are: 1) the teachers are motivated in making mathematics teaching tools, 2) an improvement in the learning process as the teachers optimize the use of mathematics teaching tools, 3) the students agree that learning by using mathematics teaching tools is better than learning without any, 4) the subjects can reduce the level of abstraction of its math subject matter, and 5) the teachers can develop students' thinking ability.

IndexTerms—Quality of learning, optimizing, math concept

I. INTRODUCTION

Mathematics has an abstract object in the form of facts, concepts, and operational principle. The abstract objects in mathematics education are intended to be easily understood by students. One attempt to do by the teacher is using the concrete objects, including illustrations to represent the abstract objects. Therefore, teachers must be competent as educators. Memnun, Hart and Akkaya (2012) stated that students have negative thoughts about the necessity of learning mathematics. The researchers believe that the mathematics is a process of remembering the directives of the teacher and this tasks due to the low student motivation on mathematics.[1]

Our understanding of how to train or teach others to innovate remains nascent especially about useful teaching models and curricula. The understand the situational processes that can lead the creation of innovative ideas to solve complex issues [2]. The teachers have a crucial role in developing students' beliefs as well as supportive behavior of learning situations. Student motivation develops in line with the special support of parents. Such support contributes to the development of students' mathematical interests and achievements. The teacher's knowledge of the content considered as critical success factor of learning. Also, the factors that determine the success of learning is the pedagogical knowledge/competence. The combination of both knowledges serves the basis of pedagogical content knowledge. Learning is more efficient if students master component skills first and subsequently receive scaffolding on how to integrate them into more complex tasks. The achievement is viewed mainly as the competence of a person have in an area of content. This competence is the result of many intellectual and nonintellectual variables, although in this paper we concentrate exclusively on the former.[3]

Facilitating the study of mathematics, the teacher should use the concrete objects including illustrations to show or to represent those abstract objects. Furthermore, teachers have experienced the fact that it is hard to pour knowledge into the students' brains, without mastering teaching skills that will be used to develop the science.

The parts of the skills mentioned above are related to each other, but in this study, the teachers know what efforts can be used to develop a mathematical concept using mathematics teaching tools to help students understand the concept. Teaching-centered learning method are appropriate to improve the systematic knowledge of students or materials that require many steps. Stages of elaborate procedures are difficult for students to understand.[4].

II. PROBLEM RESEARCH

Based on the background described above, the issues examined are; 1) are the mathematics teaching tools are available enough in schools?; 2) how intense is the use of mathematics teaching tools in school?; 3) which are the mathematical concepts with a certain level of abstraction that make students challenging to understand? 4) what are the teachers' difficulties in installing the idea of mathematics? moreover,; 5) are there teachers' complaints about the subjects that are difficult to be taught with math teaching tools?

III. RESEARCH METHODS

This research was a classroom action research conducted in SMP Negeri 26 Makassar academic year 2015/2016 with three cycles. There are four stages: planning, implementing, observing, and reflecting that could be shown in the following chart.

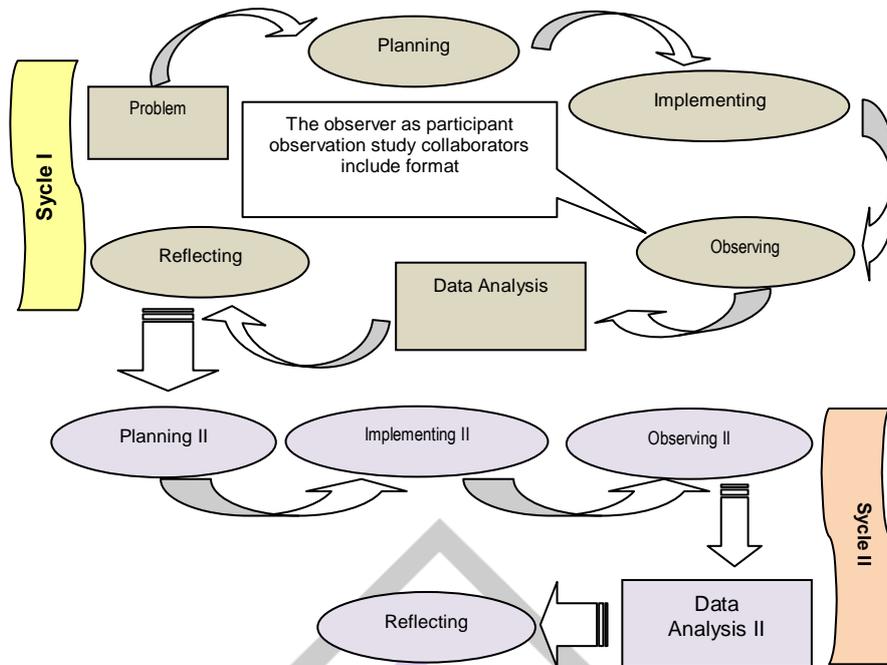


Figure 1. Class action research process

In general, the change between cycle would measure the teacher's ability to use the teaching tools. Ngure (2015) stated that defining visual aids as any picture, model, object or device provide tangible visual experience to the learner purposely for introducing, building up and enriching ideas.

Teaching tools helped students to think logically and systematically so that they finally had the proper mindset in studying mathematics. The intensity of the use of teaching tools was done from low, medium and high. It was also said that in the first cycle, the level of use of teaching tools was still not adequate. It means that the abstraction level of subject matter was still very high, then in the medium and the last cycle with the low effort level of abstraction.

There were some steps taken in this classroom action research as follows;

First cycle

The researcher carrying out preliminary observations at the schools where the research will be conducted. After the observation, the socialization plan and research purposes were held to maximize the results and the involvement of teacher friends. Next stages in the first cycle is identifying the primary capability in using mathematics media in the learning process. The creating or modifying teaching tools based on the observation result. Preparation of learning tools using mathematical material.

After using the learning tools in mathematics subject, the stages was continued to carry out the tests to see the ability of students to understand mathematical concepts that have been taught to use the teaching tools (with low intensity). The teacher was continuing the learning process by using the teaching tools and putting these activities between (a) strict monitoring of the use of teaching tools (with low intensity) during the learning process, (b) asking the students' suggestions for improvement in the use of teaching tools, and (c) test implementation. The reflection process were conducting qualitatively and discuss the result.

Second cycle

The procedures assisted in the second cycle would be repeated systematically in this cycle after obtaining a reflection on the first cycle. In this cycle, the teaching tools were designed then conducting it with moderate intensity. Further, it would be developed and modified the stages that exist in the first cycle. At the end of the cycle, the test would be conducted.

The results obtained by the students would be further discussed with a team of researchers before reflecting on teachers and students. At this reflection stage, the team of researchers and teachers would discuss the matters that were considered as factors that causing the low ability students' understanding of mathematical concepts and key constraints in making and using the teaching tools for teachers.

Third cycle

The initial step in this cycle was to study the results of the reflection on the second cycle, to plan the actions, to design and to enhance the use of teaching tools (with high intensity) both quantitatively and qualitatively. The results of discussions on the third cycle would be applied again on the stage of the first cycle. The data of teachers' ability regarding planning, making and using the mathematics teaching tools would be collected by using a checklist and observation sheet and taken after the subject was completed. The data on students' ability to understand math concepts at each cycle would be obtained by the test instruments.

The data collected would be analyzed qualitatively and quantitatively. Data on prior knowledge and the process of improving the teachers' ability would be analyzed qualitatively, while data on the students' ability in understanding material that had been given by using teaching tools would be analyzed quantitatively. From the results of the analysis, it would be known about the influence the intensity and quality of the use of teaching tools.

IV. RESULTS

The analysis of quantitative data was the prior knowledge average scores of the test results, learning outcomes on the first cycle, the second cycle, and the third cycle, respectively: 5.0, 6.19, 7.5, and 8.5 with a standard deviation consecutive.

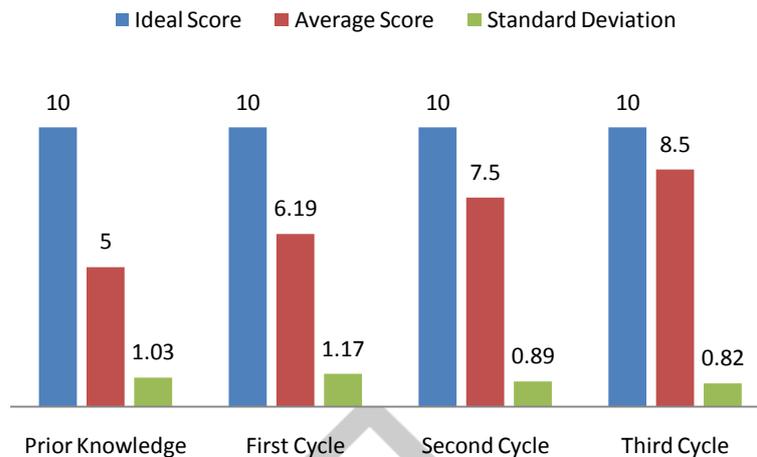


Figure 2. Student Test Results for Each Cycle

Figure 2 shows that there was a problem of the math score of student with the prior knowledge only 5.0. There is an improvement in each cycle and these changes are caused by learning using the teaching tools. The increasing of average scores in the first cycle is 1.19 and the second cycle is 1.31. The last cycle, the increasing is 1.00. The changes of learning activity is indicated by the decreasing of standard deviation. The first cycle resulted standard deviation is 1.17 and decreased to 0.89 in the second cycle, while in third cycle the value was 0.82. The smaller standard deviation indicates that the smaller difference value between the maximum and minimum. Therefore, it can be said that there is an improvement of learning mathematics by the teachers through the use of mathematics teaching tools. It also affected the students' result which shows an increase in the number of students who got a high mark in the test. The increasing learning outcomes due to the increasing of student motivation. The condition were found with changes in the intensity of different learning materials at each cycle. The results of reflection on the first cycle require the teacher to pay more attention to some of the more systematic material. By the second cycle, the teacher repeats the systematic task completion. Similarly, the teachers problem were in the third cycle..

V. CONCLUSION

Based on the description of mathematics learning process through using the teaching tools, it can be concluded as follows there is an improvement of learning mathematics by the teachers through the use of mathematics teaching tools; it can be seen by the students' enthusiasm and involvement in the classroom. Learning by using teaching tools in high intensity can improve the math's learning outcomes of the students. It can be seen from the first cycle to the third cycle. Learning approach by recycling those three cycles by using the teaching tools is an effective way to the improvement of the math learning process. In general, students think that learning mathematics by using teaching tools is more effective than learning without any. Thus, the results of students' mathematics learning on geometry can be improved through the use of mathematics teaching tools.

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