

Advantages And Challenges Of The Flipped Classroom Application – Based Learning In Enhancing 10th Grade Senior High School Students' Reasoning Ability

RidiaFedistia, Edwin Musdi, Yerizon

Abstract— Mathematical reasoning ability need to be trained during mathematics learning process at school. Based on the field observations at school, it was found that students' mathematical reasoning abilities were still low. This was due to the hours limitation during teaching and learning process in the classroom, so learning process only focused on explaining the materials without much discussing the exercises that required reasoning ability in its accomplishment. The Flipped Classroom – Based Learning Model could be an alternative to overcome this problem, because the students could learn at home by using online and offline videos. Thus, the students could prepare themselves first before discussing the reasoning exercises in the classroom. The purpose of this study is to review the advantages and challenges in applying a learning model based on Flipped Classroom. This research is a development research. The method used is a quantitative method to observe improvement in student learning outcomes and qualitative method to review the advantages and challenges of the Flipped Classroom model. The instruments in this study were final tests of mathematical reasoning abilities, questionnaires, interview guidelines, and observation sheets. Research revealed that the advantages obtained: 1) Increased learning outcomes of students; 2) Time efficiency; 3) Student involvement and satisfaction; 4) Increasing student interaction; 5) Overcoming the problem of students' self-confidence, while the challenges in this model are 1) Lack of students' preparation; 2) Familiarize the model; 3) Limitations of self-help learning; 4) Need a lot of time and work; 5) Access to technology.

Keyword— Advantages and Challenges, Flipped Classroom, Flipped Classroom Application, Students' Reasoning Ability

1 INTRODUCTION

MATHEMATICS is a field of science which is a tool of thought, communication, and a tool for solving practical problems [1].

Therefore mathematics is a subject that has an important role in the progress of science and technology, so students should have an active role in learning mathematics. Active learning will make students involved in meaningful learning activities [2]. One of the ways is by create learning conditions that provide space for students to train various abilities by utilizing technology. One of the abilities that students need to have is reasoning ability. Reasoning ability is the ability of students to make and investigate allegations and express arguments based on facts (prior understanding) to prove that they can solve mathematical problems. The fact is that the mathematical reasoning abilities of students are still low. It was seen from the post-test which was given to students, students still had difficulty in working out the problems of mathematical reasoning abilities.

Based on the results of observations in the classroom, it showed that learning process has not involved students actively. Students still have difficulty in developing concepts independently to solve the problems given. Students are accustomed to only receiving material and doing exercises according to the sample questions given by the educator. One of the reasons is the limited time in the classroom so that educators cannot provide questions related to reasoning abilities for students to do in the classroom. The solution to overcome this problem is to provide reasoning questions as a task at home. However, many of the students had difficulties in solving the problem and there were no sources for asking questions or friends to discuss the problem. Therefore we need a learning model that can help students to be facilitated to develop mathematical reasoning abilities.

An alternative that can be used is by applying a learning model based on Flipped Classroom. Different with conventional teacher-centered learning, where students are treated like empty ships that passively absorb information [3], Flipped Classroom is focused on students [4]. Flipped Class is a reverse learning model, where activities traditionally carried out in the classroom (for example, giving material) become home activities, and activities that are usually homework become class activities [4]. In Flipped Classroom the delivery of material is done with the help of learning videos that use internet technology to be accessed at home by students. Many researchers agree that learner-centered learning can be fully utilized in learning based on Flipped Classroom [5]. In Flipped Classrooms

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education is tasked with helping students (not only convey information), while students are responsible for solving the problem of reasoning given on the sheet work of students together with their group partners. Time in class is not only used to send knowledge to students, but educators can be involved through other learning activities such as discussions, problem solving proposed by students, and guidance. In Flipped Classroom based learning students are changed from passive listeners to active learners [6], so that Flipped Classroom is suitable to be used to train students' mathematical reasoning skills.

Flipped Classroom has attracted scientific attention mainly because of the inclusion of improved technology [6]. Therefore, research on Flipped Classroom has increased in the last few years. However, until now only a few studies have been examined the strengths and weakness of this model. It is important to find out the strengths and weaknesses of this model, so it can be a provision for other researchers who want to apply a Flipped Classroom-based learning model. The strengths of Flipped Classroom are then seen as advantages, while their weaknesses are seen as challenges in its implementation.

Based on the description above, the purpose of this study is to find out the advantages and challenges that are obtained in the application of Flipped Classroom based learning models to mathematical reasoning abilities of students in class X Senior High school.

2 METHOD

This research is research and development (R & D). Development research is a process and steps for developing a product or perfecting an existing product [7].

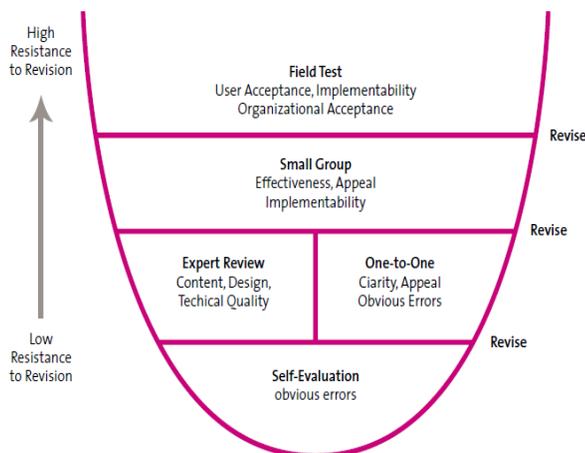


Figure 1. Formative Evaluation Layer
Source: Tessmer in Plomp [8]

The development model used is the Plomp model. However, in this case it will more focus on the advantages and challenges that are obtained during the implementation of the learning model based on Flipped Classroom. So the method in this study is a quantitative method to see an increase in mathematical reasoning abilities and descriptive qualitative methods to review the advantages and challenges in implementing the Flipped

Classroom model. The subjects of this study were mathematics educator and students in class X of SMAN 2 Padang. The data collection instrument used was in the form of a final test of mathematical reasoning ability, questionnaire sheet, interview guideline sheet, and observation sheet. Data collection techniques by means of documentation, analysis of the results observations of the implementation in learning process, analysis of interview results, and analysis of questionnaire data.

3 RESULTS AND DISCUSSION

Flipped Classroom is a strategy that can be given by educators by minimizing the number of direct instructions in teaching practice by educators and maximizing the interaction of students with each other by utilizing technology that provides learning videos that support learning materials for students that can be accessed online. It can free up class time that was previously used for learning. Flipped Classroom based learning is implemented with cooperative activities where students interact directly with their group colleagues, while educators are only facilitators to help them solve problems that are considered difficult.

Based on the research had done, there are some advantages and challenges by implementing Flipped Classroom based learning to the mathematical reasoning ability of high school class X as follows

3.1 Advantages

Advantages in the application of Flipped Classroom-based learning to the mathematical reasoning abilities of high school class X students obtained as follows.

3.1.1 Learning Outcomes of Students

Based on the research had done, the results of the final test of mathematical reasoning abilities of students showed that 86.56% of students had obtained a score above the specified KKM of 80. This is in line with the statement that the most significant advantage of this model is to help improve learning performance, which is one of the key elements of quality learning [9].

3.1.2 Time efficiency

Class time can be used more efficiently than conventional classes. In the conventional class the time needed to convey information is ± 40 minutes, then the rest is used to discuss examples of questions and exercises, while in Flipped Classroom all learning time in school is used for student-centered learning activities such as problem solving, discussion, and presentation, because students are given material as homework in the form of learning videos. This confirms the statement that Flipped Classroom is the ability to use class time more efficiently [10].

3.1.3 Level of Student Engagement and Satisfaction

Student involvement and satisfaction are important elements in the educational environment [10]. Based on the research had done on how to deliver the material in the

learning video, the duration of the learning video, as well as the clarity of the questions given to the Student Worksheet (LKPD) must be carefully designed to increase the level of involvement and satisfaction of students. The results of interviews with 10 students in the class applied to the Flipped Classroom model stated that students felt happy for following this Flipped Classroom learning, because through learning videos, students can replay learning videos in parts that they have not been understood and also can save the learning video so it can be played at any time needed. Because Flipped Classroom learning uses online material delivered before the class starts, students can theoretically learn anywhere and anytime. The flexibility of this model allows students to learn at their own pace. Students can pause, rewind, and review material with available technology. Based on the results of interviews, this flexibility is the main reason for student satisfaction using Flipped Classroom learning. In line with the statement that the obstacle that is often faced by educators in teaching mathematics is the difficulty of delivering learning material. Because the ability of students here is very varied, high-ability students often feel bored because certain material is often repeated [11].

3.1.4 Student Interactions

Students get full attention from educators when experiencing difficulties in understanding the concept and in working on the LKPD. It caused by in the classroom, educators only discuss material that according to students is difficult. Educators can also ask students who already understand the material to help their friends who don't understand. Thus, Flipped Classroom learning can increase interaction between students and students also students and educators.

3.1.5 Overcoming Self-Trust Problems

Based on preliminary observations, some low-ability students who did not understand the material explanation from educators felt unconfident to ask questions in class. As a result it will affect students in receiving advanced material, so that it will affect the learning outcomes of students. In Flipped Classroom students can repeat the learning video if there is material that has not been understood. In the class, low-ability students will be assisted by their group partners to be able to solve problems in the LKPD, because the study-group is divided into high, medium, and low-ability students. Based on interviews with several low-ability students in the class, they revealed that it was greatly helped by the existence of this learning video, because they were not afraid to feel left behind from other friends when they had difficulty in understanding the information conveyed by educators.

3.2 Challenges

Although Flipped Classroom offers many advantages in the educational environment, this model also presents several challenges. The following are some of the challenges found in the implementation of Flipped Classroom based learning to the mathematical reasoning abilities of high school class X students.

3.2.1 Less Preparation

A very obvious problem is the lack of preparation of students before class time. If students do not prepare themselves by understanding the material through learning videos at home, the performance in the classroom will not work well, and it will reduce the benefits of Flipped Classroom learning. The things that can be done by educators is to give punishment to students so they don't repeat it. For example, by recording names and reducing student points and asking students to watch a learning video about 15 minutes then explaining their understanding to their friends in front of the class, thus giving a deterrent effect for students not to repeat it. Evidently during the first day's research almost half of the students in the class did not watch the learning videos at home, on the second day the number decreased to five people, the third day reduced to two people, until the next day all students watched the learning video at home first. Involving students in independent learning at home is one of the key factors to create the learning process run well [12].

3.2.2 Habit of the Model

The students are familiar with conventional methods commonly applied in schools. The results of the analysis found that students were not used to reading and did not want to present their work. Students are rarely involved in solving problems given by the educators [13]. If it continues to be allowed it will not have a good impact on students. Therefore, it is necessary to familiarize students to be actively involved during the learning process. At Flipped Classroom students will learn actively because students will learn at home using learning videos, then in school students will learn actively in problem solving with their group mates, then present their answers in front of the class. However, it takes time to familiarize students with this model. Because students are not familiar with this model, they will lose their direction a bit like not knowing what to do in this Flipped Classroom. To avoid this situation, they need clear guidance on how to use time and subject matter before starting class lessons.

3.2.3 Lack of assistance while studying at home

Another challenge is the inability of students to get help or feedback directly while studying at home. To overcome this problem during the research, researchers asked students who needed help during activities outside the classroom to take notes, write questions, wait for discussions in the classroom, or researchers also provide online discussion rooms with the WhatsApp application.

3.2.4 Need a lot of time and work

For some students in interviews conducted, preparation for Flipped Classrooms requires more time and work than conventional classes. It caused by this model encourages students to see learning material for better class participation at each meeting. Students assume that learning outside the classroom is a burden on extra time. It caused by students are used to passive learning in conventional classes, where learning requires a little time

and work. To overcome this problem, students only need to get used to how to work this Flipped Classroom and feel the benefits obtained from the process they do.

This also applies to educators, educators need more time and workload such as recording learning videos and preparing material for Flipped Classroom models. The time needed for preparation for Flipped Classroom learning is more than the time needed for conventional learning, so it is feared that this will be an obstacle for educators to be able to apply this model in the future.

3.2.5 Technology Access

Flipped Classroom requires students to have access to technology, whether provided by school or at home [14], because accessibility of technology is very important in Flipped Classroom. During the study, the researchers found several reasons why students did not watch learning videos at home due to the lack of internet access at home. To overcome this problem, in the next meeting, the researchers asked students who did not have internet access at home to download the learning videos using internet access first provided by the school.

4 CONCLUSION

In this study, researchers conducted a review based on research that has been done in the development of learning tools based on Flipped Classroom on the reasoning abilities of students in class X high school. During the implementation of this model, some advantages are obtained. 1) Increased learning outcomes of students; 2) Time efficiency; 3) Student involvement and satisfaction; 4) Increasing student interaction; 5) Overcoming students' self-confidence problems, while the challenges in this model are 1) Lack of students' preparation; 2) Familiarize the model; 3) Limitations of self-help learning; 4) Need a lot of time and work; 5) Access to technology. The advantages and challenges in Flipped Classroom are useful for researchers in the future so they can prepare themselves more optimally if they want to apply Flipped Classroom based learning model.

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