

IMPLEMENTATION OF THE FLIPPED CLASSROOM LEARNING MODEL ON STUDENTS' MATHEMATICAL PROBLEM-SOLVING

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Abstract: *The purpose of this study was to determine the problem solving ability of students who received the flipped classroom learning model better than the class that received the conventional learning model. The population in this study were students of class XI SMK N 1 Kudus. Sampling using simple random sampling with samples taken two classes, namely the experimental class and the control class. Data collection methods used are tests and documentation. Data analysis used two-way ANOVA test, post ANOVA test with Scheffe method, and one-party proportion test. The conclusions are as follows: (1) the problem solving skills of students who get the flipped classroom learning model are better than the conventional learning model and (2) the problem solving abilities of students who use the blended learning and flipped classroom learning models achieve the Minimum Completeness Criteria.*

Key Words: Flipped classroom; Learning model; Problem solving ability

Introduction

Learning mathematics during a pandemic has a very big change. Changes occur in the implementation of learning from face-to-face to online learning. Therefore an educator needs to understand well in using platforms for online learning (Irfan, 2020). Mathematics learning in schools can be carried out well if a teacher can have a good approach or media, design skills and learning management (Amir, 2021). The learning management system has a contribution in improving student learning outcomes so there is a need for an appropriate online-based learning model (Elfeky, 2020). Online-based learning can minimize the transmission of the Covid-19 virus. Online learning is a learning model with internet technology media that can be accessed anywhere, research that has been done shows that 83% of positive perceptions of the implementation of online learning (Inditi, 2022; Sanoto, 2021). Mathematics education is in dire need of a new innovation in the use of technology for the provision of learning infrastructure (Rahmawati, 2022).

One alternative learning model that is able to minimize face-to-face is the flipped classroom. This model invites students to study the material first before meeting the teacher. This can be done by watching learning videos and then completing practice questions. So that students are actively involved in the learning process (Smallhorn, 2017). The flipped classroom has made an important impact through the digital revolution in learning and has different characteristics compared to the past (Cevikbas, 2017). Research conducted by Akçayır (2018) states that the flipped classroom learning model can improve student learning performance but there are obstacles in student readiness related to inadequate facilities. Meanwhile, according to Awidi (2019), the flipped classroom is like a pre-recorded lecture,

then students can learn it on their own so that it can improve the student's learning experience.

The implementation of learning in vocational schools during the pandemic is still limited to giving assignments and collecting assignments at school. So that online learning is not optimal. Students have difficulty in understanding the material presented and have difficulty in solving the problems given. According to Peranginangin (2017) stated that problem solving is one of the main aspects in the mathematics curriculum that requires students to apply and integrate many mathematical concepts and skills as well as decision making.. So it is necessary to have an appropriate learning model while minimizing face-to-face. Therefore, the writer wants to research: (1) whether the problem solving ability of students who get the flipped classroom learning model is better than the conventional learning model and (2) whether the problem solving abilities of students who use the flipped classroom learning model reach the KKM.

Method

This research is a quasi-experimental research. The population in this study were all class XI students of SMK N 1 Kudus in the academic year 2020/2021 and the sampling technique used was simple random sampling technique. The instrument used in this study is a learning style questionnaire and student learning outcomes tests. The procedure for collecting data uses questionnaires, tests and documentation. Data analysis was carried out using two-way ANOVA test, Schefee test and one-party proportion test.

Results and Discussion

Based on the results of data analysis through the schefee test obtained $F_{table} = 3.09$ and $F_{count} = 5.781$. Because $F_{count} > F_{table}$ then H_0 is rejected, meaning that the problem-solving ability that gets the flipped classroom learning model is better than the class that gets the conventional learning model. This is supported by research conducted by Mok (2014) which concluded that the flipped classroom can enable students to gain learning experiences and increase student involvement in effective learning processes. Research conducted by A Prasetyo (2018), Prihatiningtyas (2019) showed that 93% of students became more motivated to learn and 89% of students had passed the minimum standardization criteria.

Individual learning mastery of each student is said to be complete if the test results obtained with a value ≥ 72 below are presented with individual learning mastery in the experimental class.

Tabel 1. Individual learning completeness

Class	Number of Students Completed	Number of Uncompleted Students	Total students
Experiment Class (model flipped classroom)	32	4	36

In the experimental class, students who have a value ≥ 72 are 32 students and students who have a value of <72 are 4 students. Based on class calculations for the experimental class the value $t_{hitung} = 3.089$ while $t_{tabel} = 1.691$ to $3.089 > 1.691$ it can be concluded that the average problem-solving ability of the experimental class is more than 72.

A class is said to be complete in learning if 80% of the existing students reach the minimum completeness criteria targeted at the class. The proportion test is used to determine a classically complete class. The hypotheses used are $H_0: p \geq 80\%$ (classical mastery learning is achieved) and $H_0: p < 80\%$ (classical mastery learning is not achieved). Based on the calculation of classical completeness in the experimental class $Z_{count} = 4.046$ while $Z_{table} = 0.174$ means $Z_{hitung} \geq Z_{tabel}$, the problem solving ability in the experimental class has reached learning mastery.

Supporting the implementation of the flipped classroom in this study is relevant to research conducted by Indiati (2021), that online learning based on android applications can help teachers and students in teaching and learning activities.

Conclusion

The conclusions are as follows: (1) the problem solving skills of students who get the flipped classroom learning model are better than the conventional learning model and (2) the problem solving abilities of students who use the blended learning and flipped classroom learning models achieve the Minimum Completeness Criteria.

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