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Student's Mathematics Understanding and Learning Outcomes trough Cooperative Learning Model

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Abstract

This study aims to determine the student's mathematic understanding and learning outcomes through the use of cooperative learning models. The method used in this research is literature study through literature review from various sources to strengthen the analysis results. The study of literature in this writing is the basis for the formation of writing as well as a source of writing data based on published journals related to students' mathematics understanding and learning outcomes through cooperative learning models. The results obtained after the analysis showed that there were differences in student's mathematics understanding and learning outcomes through the use of cooperative learning models. The application of the cooperative learning model can affect the student's mathematics understanding and learning outcomes by paying attention to the number of students and the material being studied so that the learning process can run effectively. In addition, the use of the cooperative model can stimulate interaction and cooperation between students during the learning process. Suggestions from this research are that further research is needed to determine the effectiveness of the use of cooperative learning models and the comparison of student's mathematics understanding and learning outcomes using other models.

Keywords:

Cooperative Learning Model, Learning Outcome, Mathematics Understanding.

1. Background

Education is a series of learning experiences in school and out of school both formally, non-formally, and informally that lasts a lifetime. The purpose of education is to optimize the ability of individuals to be able to run life appropriately and preserve cultural values. Inayah *et al* in (Septian & Ramadhanty, 2020) menyebutkan bahwa mutu pendidikan di Indonesia rendah dan terjadi bukan secara tiba-tiba, hal ini bisa saja disebabkan oleh kurangnya pemahaman siswa terhadap konsep dalam pembelajaran, salah satunya adalah pembelajaran matematika. stated that the quality of education in Indonesia is low and occurs not suddenly, this could be caused by students' lack of understanding of concepts in learning, one of which is mathematics learning. In the process of learning mathematics, problems are often found, some of which are low student activity in learning and students often only memorize formulas so that it is difficult to solve problems that are contextual. The problem results in students becoming less understanding of the material being studied which results in low student mathematics learning achievement (Masjudin, 2016).

Furthermore, in today's era of globalization, technology and science are increasingly developing and easily accessible using the internet. This progress resulted in the fourth generation of the industrial revolution. The industrial revolution 4.0 occurred around the 2010s through the internet of things and intelligence engineering as the fulcrum of human and machine movement and connectivity (Trisyanti & Prasetyo, 2018). In line with these developments, challenges, problems, and opportunities also arise. One of them is in the field of education. Students are required to have 21st century skills, or called 4C, namely creative thinking, critical thinking and problem solving, communication, and collaboration. This requires educators to create learning that can improve or grow these abilities in students so that students have a number of skills needed to live life in the 21st century.

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Based on these problems, teachers can apply innovative learning so that learning does not run monotonously. One of them is by using a cooperative learning model. Cooperative learning is widely recognized as a pedagogical practice that promotes socialization and learning among students. This learning model involves students working together to achieve common goals or completing group tasks - goals and tasks that they cannot solve on their own (Gillies, 2016). This corresponds to the 21st century skills that must be possessed by students and have been mentioned earlier, namely collaboration and communication. Therefore, this study aims to determine the understanding of mathematics and student learning outcomes through a cooperative learning model.

2. Discussion

2.1. *Cooperative Learning Model*

The learning model is a guide for teachers to plan and implement learning activities. The learning model serves as a basic framework in organizing learning activities to achieve learning objectives. For this reason, teachers must understand the abilities and characteristics of students and determine the right learning model so that good learning outcomes are achieved.

Cooperative learning is a learning model with a collaborative learning system where students work in small groups so as to increase student interest in learning. According to Johnson & Johnson in (Tran, 2013) cooperative learning is a collection of methods in which students work together in small groups and help each other to achieve learning objectives. There are variations of cooperative learning models, some of which are circles of learning, jigsaw, student teams-achievement divisions (STAD), teams-games-tournaments, and group investigation.

Basically, each model has its own characteristics. As for Hamdani in (Pipin et al., 2019) the characteristics of the cooperative learning model are:

- Each member has a role.
- There is a direct interaction between students.
- Each member of the group is responsible for the way he learns as well as his group mates.
- The teacher helps develop group interpersonal skills.
- The teacher only interacts with the group when needed.

2.2. *Mathematical Understanding*

Understanding is the process of absorbing the meaning of a material being studied. While the concept is an abstract design or idea that allows someone to classify an object. So that understanding the concept has a definition of the absorption of the pattern or design of the material being studied (Novitasari, 2016). As for Sulaiman in (Pipin et al., 2019), concept understanding is an individual's ability to understand a certain concept. A student has an understanding of the concept if the student has captured the meaning or meaning of a concept. Thus, it can be concluded that the mathematical understanding shows the extent to which students understand mathematics and utilize what has been understood in learning activities.

2.3. *Mathematics Learning Outcomes*

From the learning process, someone will get learning outcomes. Learning outcomes can be in the form of changes and developments in aspects of understanding, skills, and knowledge. Mathematics learning outcomes are patterns of changes in a person's behavior which include cognitive, affective, and psychomotor aspects after taking mathematics teaching and learning activities whose quality level is largely determined by the factors that exist in students and the social environment that influences them (Lestari, 2013).

2.4. *Student's Mathematics Understanding and Learning Outcomes trough Cooperative Learning Model*

There are several studies conducted related to students' mathematical understanding and learning outcomes through cooperative learning models.

The research was conducted on the circle material using a cooperative learning model for class VIII students. The results showed that the average student learning outcomes before using the cooperative learning model was 68.6 with a percentage of 75% completeness of the learning outcomes test. After using the cooperative learning model, the average student learning outcomes became 92%. Thus, it can be concluded that there is an increase in student learning outcomes using the cooperative learning model with a percentage increase of 17% (Harefa et al., 2020). By using the cooperative learning model,

students are required to actively convey their ideas and ideas. Students also actively listen to the opinions of others. This can improve student learning outcomes.

In another study, it was stated that learning with cooperative models could improve students' understanding of mathematical concepts. The increase in learning activities can be seen from the results of observations of each cycle that has increased and students who have a positive attitude in learning mathematics using the cooperative learning model (Septian & Ramadhanty, 2020). The increase in student understanding is also supported by a learning process that goes well, active students, and test results that meet the criteria for success and students who have a positive response to cooperative learning. (Masjudin, 2016).

Another study was also conducted on seventh-grade students. The results showed that the use of cooperative learning models can improve learning outcomes in the material square and rectangle in a circle. Before using the cooperative learning model, the results of the pre-test showed that only 4 students were able to understand the material (12.5%) and 28 students were not able to understand the material well (87.5%). While the post-test results showed that 13 students were able to understand the material well (40.63%) and 19 students did not understand the material well. The use of cooperative learning models can improve student learning outcomes effectively with a percentage of 87.5% (Nasution & Surya, 2017). In addition, research conducted in 2021 regarding the use of cooperative learning models on student learning outcomes also shows that learning outcomes using cooperative models are better than using ordinary learning models. (Methkal et al., 2021). The results also show that there is a positive effect of the use of cooperative learning models on students' understanding of mathematics (Ferdiana & Mulyatna, 2020). By using the cooperative learning model, students think and actively work together so as to increase student motivation and understanding of mathematics. Thus, the cooperative learning model can improve student learning outcomes. Hence, from several studies that have been mentioned, it is found that there were differences in student's mathematics understanding and learning outcomes through the use of cooperative learning models.

3. Conclusion

The results obtained after the analysis showed that there were differences in student's mathematics understanding and learning outcomes through the use of cooperative learning models. The application of the cooperative learning model can affect the student's mathematics understanding and learning outcomes by paying attention to the number of students and the material being studied so that the learning process can run effectively. In addition, the use of the cooperative model can stimulate interaction and cooperation between students during the learning process. Suggestions from this research are that further research is needed to determine the effectiveness of the use of cooperative learning models and the comparison of student's mathematics understanding and learning outcomes using other models.

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