Increasing Student's Learning Activity on Trigonometry Material through a Contextual-Based Group Investigation Learning Model

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Abstract: Mathematics is the least preferred and most difficult subject for most students, especially when it comes to trigonometry. This is reflected in student learning outcomes and students' daily test results, which are always lower than other majors, and a maximum of 40% of students graduate. One of the causes is a lack of interest in teaching and learning in the classroom. Therefore, it is necessary to carry out learning activities with a learning model that is expected to make learning conditions or environments more comfortable for students. The process consists of two cycles using the group investigation learning model. At the end of the study, the following results were obtained: In Cycle I, the average student achievement was 31,6 percent; in Cycle II, it rose to 70,3 percent. Mastery of subjects also increased, which increased the average student achievement from 63,5% in cycle I to 64,9% in cycle II.

Keywords: Application, ICT, Instruction, New Paradigm, Teacher

A. Introduction

The quality of education is determined by the qualifications of graduates, which are influenced by the quality of the educational process and content. Quality is seen as a result, but it is also a picture of the learning that takes place in the classroom. Low-quality graduates can be different. Causes of problems: inability to continue studies; inability to complete secondary education. The 2006 Progressive First Level Education Curriculum, which is the current reference, states, among other things, that pedagogical education uses various learning approaches, strategies, methods, and techniques that creatively process and organize learning materials according to what is chosen. approach and function for students (Fitrah, 2017).

Quality is a comprehensive description and characteristic of goods or services that show their ability to satisfy the needs determined by customers. In the educational context, the meaning of quality can be seen starting from input, process, and output. According to Nana (1995), quality is conformance to requirements, namely according to what is required or standardized. A product has quality if it complies with

predetermined quality standards. These quality standards include raw materials, production processes, and finished processes (Dacholfany, 2017).

This lesson starts with concrete things and then moves on to abstract things. Learning is oriented in such a way that it is firm about mathematics and its uses in life, which focuses on the ability to think logically, analytically, systematically, critically, and creatively (Ananda et al., 2015). This expectation is not in accordance with the learning situation and conditions in mathematics classes. Deep learning is traditional learning, where students only receive what is added by the teacher, taking care that the material varies from abstract to concrete, in contrast to students' lower cognitive development (Juniawan et al., 2023). Mathematical features are abstract objects. This abstract nature is what causes many students to struggle with mathematics (Azka, 2019). Student achievement in mathematics has not been encouraging, either at the national or international level. The low success in learning mathematics is caused by student factors, namely students who have problems in mathematics in whole or in part. Apart from that, mathematics learning is still not meaningful, so students' understanding of concepts is very weak (Sinambella, 2019).

According to student surveys or in consultation with teachers, trigonometry in general and central tendencies and data distributions in particular are difficult mathematics. In the field of trigonometry, students' learning achievements are generally still weak. Because students do not understand trigonometry concepts well, they have difficulty solving application problems about important trends and data distribution (Indrastuti et al., 2019). Trigonometry material is one of the mathematics materials taught in class X, MIPA 2, semester 2. This material is, of course, related to the previous material. Sometimes teachers only convey material about the properties and formulas of integer trigonometry orally. Students don't get a chance to find out where they got it. Students experience difficulty solving trigonometry story problems (Magdalena, 2020).

Researchers conducted observations on class X MIPA 2 mathematics teachers at SMAN 1 and Payaraman, which showed that trigonometry learning was still weak. You want to create a learning atmosphere that is more fun and interesting so that students understand that trigonometry will be useful in life. In fact, in reality, many teachers cannot allow students to find trigonometry concepts for themselves. Students have difficulty just memorizing the formulas taught. In this case, operational capabilities and processes are not properly disclosed. Involving students in discovering good ways to obtain abstract mathematical concepts (Nasution, 1982).

Student activity makes learning run according to the learning plan that has been prepared by the teacher. The form of student activity can be in the form of an activity on their own or an activity in a group (Putri et al., 2019). Student activity in the learning process will lead to high levels of interaction between teachers and students

or with the students themselves. Student activity in learning is all physical and non-physical activities of students in the process of optimal teaching and learning activities so as to create a conducive classroom atmosphere (Gagnel et al., 1978). Students' activeness in learning activities is nothing other than constructing their own knowledge. They actively build understanding of the problems or things they face in the learning process (Baro'ah, 2023)

In order to use contextual methods to. learn trigonometry material that students consider boring, a more creative learning model is needed so that students can play an active role in learning in class, know how to use their knowledge to build new knowledge, as well as guide students in building their own knowledge. Knowledge to keep students interested and entertained.

B. Methods

Good learning outcomes will require more innovative learning strategies through improvements or learning models used to improve learning outcomes. Students now tend to prefer to carry out group discussions, so this research uses a contextual collaborative group research method. One of the learning models designed for students is cooperative learning. In cooperative learning, there is positive interdependence between students to achieve learning goals. Every student has the same opportunity to succeed. School activities are carried out in mutual cooperation and support problem solving. Thanks to effective learning interactions, students are more motivated, more confident, able to use more advanced thinking strategies, and able to build relationships.

This method requires good communication and teamwork skills from students. Teachers with group survey methods usually divide the class into several groups consisting of 5 to 6 students with similar characteristics. Group members can also be based on friendly friendships or a good interest in a particular topic. Students choose the topic they want to study, carry out in-depth research on the selected sub-topic, then write a report and show it to eight classes (Hisyam et al., 2007).

C. Results and Discussion

This research was carried out at SMAN 1 Payaraman, Ogan Ilir Regency, Mathematics Department. The research subject is in the 2022/2023 academic year, Class X MIPA 2, which is attended by 36 students, consisting of 16 boys and 20 girls. The level of student performance in this class is very good.

Cycle I sells from August 4th to August 6, 2022.
1. In the first study of Cycle I, researchers took advantage of the surrounding environment to develop their understanding of right-angled triangles so that

their insight became broader. Apart from that, the teacher divides the students into several groups, each consisting of 4-5 students. Each group is asked to calculate the length of the side of an unknown right triangle. Researchers lead students in group discussions and ask representatives from several groups to show the results of their group work. At the end of the lesson, the researcher asked the students to come to an agreement.

2. At the second meeting, each group was asked to bring their respective form templates based on the form they chose. Students are asked to discuss calculating the length of the sides of a right triangle using the rules of sine, cosine, and tangel. After that, each group was asked to show the results of their group's work. Don't forget: At the end of the lesson, the teacher instructs students to summarize their learning results and distribute homework. In the first and second lessons, researchers monitor student activity throughout the learning process. Observers complete the observation form that has been prepared by ticking ($\sqrt{}$) in the description that appears.

In the third study, the researcher conducted a question-description cycle, which I tested with the aim of seeing how successful the actions carried out in my cycle were. Observation results and test results are displayed in the table.

Table 1. Analysis of activity observation results and student test results in cycle I

Student Activities			Average score of test results
Meeting I	Meeting II	Average	
24,5 %	38,7 %	31,6 %	63,5

From the table above, learning in Cycle I shows that the average student learning achievement in the first lesson is 24,5% – 38,7% in the second lesson. Student achievement has increased but is still very low and has not yet been successful or worthy of success. Therefore, the research continued in the second cycle. The failures and failures of cycle I are as follows:

1. At the beginning of cycle 1, the implementation did not go according to plan because some of the students were not yet used to learning in groups, and some of the groups had not yet understood the stages of group learning, so the teacher had a learning attitude. regarding prerequisites for students in groups that prohibit group work and group learning phases.
2. Educators have not yet been able to organize a learning atmosphere that is conducive to group learning.
3. Some groups have not yet completed the task according to the time allotted.
4. There are groups who don't understand, so they haven't collected the results of the discussion (Mujis & Relynolds, 2008).

To improve weaknesses and maintain the results obtained in Cycle I, planning will be carried out in the implementation of Cycle II as follows:

1. Motivate the group to study more actively.
2. Teachers are more adept at leading groups experiencing difficulties.
3. Give prizes to groups that succeed in cheering up other groups.

Cycle II took place from the 18th to the 18th. August 22, 2022
1. In the first lesson, Part II is the same as Part I. Students are divided into several groups according to the previous study. Students are asked in discussion to find the length of the unknown side of a right triangle. The teacher leads the group through discussion, and then the groups are asked to show the results of the work of their respective groups and other groups that are interesting. The atmosphere of this scientific learning is starting to shift towards group learning, and students also feel encouraged to learn and respond to presentations from other groups. At the end of the lesson, the teacher guides the students to understand the lesson .
2. In the second session of Part II, the same thing applies to the first session. Students are asked to discuss the rules of sine, cosine, and tangel to find the length of the side of a right triangle. The learning atmosphere is improved and based on group research. Several students participated in their groups and actively asked questions and responded to the presentations of other groups.
3. In cycle II, the third session, the activities carried out by students were the same as in the first and second sessions. Students are asked to discuss problems related to calculating the side lengths of right-angled triangles using the rules of sine, cosine, and tangel. The expected learning atmosphere is created. Most of the students begin to be active and participate in groups. Responses can be generated by asking questions and will be answered by the group that is currently presenting the material. In the first, second, and third observations, the researchers filled in the observation form that had been prepared by placing a check mark (√) in the description that was visible (Russelffelndi, 1988) .
4. d. In the fourth session, the researcher completed a written test, the aim of which was to promote the success of the Cycle II procedures. The results of operational observations based on the test results are shown in Table 2.

Table 2. Analysis of Student Activity Observation Results and Test Results in Cycle II

Student Activities				Average score of test results	
Meeting I	Meeting II	Meeting III	Average	Cycle I	Cycle II
57,4%	69,2%	84,3%	70,3%	63,5	64,9

Based on the table above, there was an increase in average student activity, namely from 31,6% in cycle I to 70,3% in cycle II. The average student test results also increased, from 63,5 in cycle I to 64,9 in cycle II. With an increase in both average student activity and student test results, and the requirements for student success have also been met, the research objectives have been achieved in cycle II.

After being reflected in this second cycle, the results obtained in this second cycle are as follows:
a. Student activities in the learning and teaching process have led to group investigation learning. Students are able to build cooperation in groups to understand the tasks given by the teacher. The teacher has participated in group activities, and students are starting to be able to present the results of their group work. This can be seen from student activity, which increased from 31,6% in cycle I to 70,3% in cycle II.
b. The average student test score increased from 63,5 in cycle I to 64,9 in cycle II after using group investigation learning.

The increase in student activity is supported by the increase in teacher activity in directing students in group investigation learning. Teachers are more intelligent in guiding students in conducting group discussions.

The results obtained in cycle II can be seen in the following table.

**Table 3. Recapitulation of Student Activities and Test Results
in Cycle I and Cycle II**

Cycle	Meeting	Student Activity Percentage	Average Activity	Average Test Results
I	1	24,5%	31,6%	63,5
	2	38,7%		
II	1	57,4%	70,3%	64,9
	2	69,2%		
	3	84,3%		

D. Conclusions

Based on the results of the class performance survey, it can be interpreted as follows:
1. Implementing the group investigation learning model can improve student learning achievements. The results of observations showed that student performance in Cycle I experienced an increase in average, namely H, from 31,6% to 70,3% in Cycle II.

2. Students' mastery of subjects also increases. This shows that the average student learning outcomes went from 63,5 in Cycle I to 64,9 in Cycle II after using the group investigation learning model.
3. By using the group investigation learning model, students develop their own knowledge and determine the steps that must be taken to solve the material that they need to master.

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