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The Use of the Think-Pair-Share on Senior High School Students' Mathematics Learning Achievement on Integral Concept

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Abstract

This study aimed to improve the ability of class XI high school students to understand the explanations of resource persons in mathematics by applying the Think Pair Share (TPS) learning model so that learning mathematics becomes more fun and creates creativity. The problem faced by the teacher is the need for students' ability to understand the speaker's explanation material, such as students' ability to understand definite integrals, calculate definite integrals and simple algebraic functions, and use integrals to calculate areas. This classroom action research was conducted in class XI in a school in Serang City, Banten. Activities carried out as many as two cycles of action. In general, the procedures in each action are (1) planning, (2) implementing, (3) observing, (4) reflecting on the results of action research, and the results show that based on data analysis during the cycle I and cycle II, it can be concluded that the application of the Think Pair learning model Share (TPS) in learning mathematics on integral material has increased both qualitatively and quantitatively, namely: The learning outcomes obtained by students in learning mathematics are: Initial results (pretest) show an average score: 46.75; The results in cycle I rose to an average score of: 77.25; The results in cycle II rose to an average score of 79.25. Student activity in carrying out mathematics learning activities shows: In cycle I, it shows an average of 60% (good enough), and in cycle II, it goes up and shows an average of 88% (very good). The results of the research and discussion above show that the action hypothesis is proven, namely, the use of the TPS model can improve mathematics learning outcomes for class XI high school students.

Keywords: Mathematics learning outcomes, Think Pair Share (TPS), High school students, Cooperative Learning

INTRODUCTION

Education is an effort to develop quality human resources capable of developing science and technology. One of the government's efforts to improve the quality of education is by imposing the 2006 curriculum, better known as Educational Unit Level Curriculum. This curriculum aims to lay the foundation for intelligence, knowledge, personality, noble character, and skills to live independently and participate in further education where science and technology are growing (Zaini, 2015).

Mathematics is a highly developed scientific discipline. Mathematics is inseparable from other fields of science and technological developments (Ernes, 2015). In the development of modern civilization, mathematics plays an important role because, with the help of mathematics, all knowledge becomes perfect. "Mathematics is an efficient tool that is needed by all sciences; without the help of mathematics, everything will not get very significant progress.

The development of mathematics is also inseparable from its relation to education, especially in the quality of education (Jaworski, 1998). In the process of teaching and

learning, some problems develop along with the development of education, which is a problem for many people; parents of students, teachers, and students themselves. It is hoped that students will obtain better learning outcomes through teaching and learning activities. The learning outcomes achieved are benchmarks that describe the high and low levels of student success in learning.

To overcome this problem, especially the problem of low student learning outcomes in mathematics, it is necessary to examine the factors that influence it. In this regard, Russeffendi 1991 stated, "There are several factors that influence student success in teaching, including the child's intelligence, child talent, child's will, and learning models."

Teaching mathematics must activate students because the teaching and learning process is an interaction between teachers and students. Students are required to study actively so that students have experience learning mathematics and that there is an interaction between students and the subject matter they are studying.

To teach mathematics material, an appropriate model is needed under the objectives of the mathematics material to be taught, so that students can learn actively and teach mathematics to be meaningful. The teaching model is a presentation technique that the teacher masters to teach or present lesson material to students in class, either individually or in groups/classical so that the lesson can be absorbed, understood, and utilized by students properly. The ability to understand concepts plays an important role in learning mathematics. Because without understanding, students do not have skills (mathematics skills) and will not be able to solve math problems. So, students feel difficulties which results in students being afraid of mathematics.

Recognizing the importance of understanding the concept of mathematics, mathematics lessons must be designed to improve students' understanding of mathematical concepts (Suh et al., 2021). The reality is that mathematics learning, applied in some schools, still adheres to the transfer of knowledge paradigm. Meanwhile, learning strategies in mathematics tend to be dominated by a strategy in which the teacher as a source of information and students as recipients of "what the teacher said" cannot do much. The expository method is still the main strategy in learning which assumes that students are objects of learning, and the teacher dominates the learning process. Demands in the world of education have changed a lot and can no longer maintain the old paradigm. Theory, research, and implementation of learning activities prove that teachers must change the teaching paradigm. The most widely used strategy to activate students is a strategy that involves students in discussions with the whole class. However, this strategy is ineffective even though the teacher has tried and encouraged

students to participate. Most students are glued to spectators while a handful controls the classroom area.

The classroom atmosphere needs to be planned in such a way that students get the opportunity to interact with each other. In this interaction, students will form communication that allows them to love the learning process and one another.

In terms of educational psychology, the success or achievement of students in studying certain subjects, such as mathematics, can be influenced by two factors, namely internal factors and external factors. Internal factors are contained in the students themselves, for example, student intelligence, abilities, and interests. While external factors come from outside the student, one of the external factors is the teacher, for example, in the learning model.

According to Joyce and Weil (1986), the learning model describes the learning environment that describes curriculum planning, courses, lesson and learning unit design, learning equipment, textbooks, workbooks, multimedia programs, and study assistance through computer programs. In reality, the learning model used to convey information differs from how it is used for all students to master knowledge, skills, and attitudes. Thus, general knowledge regarding the nature of various learning models must be mastered by the teacher. A teacher becomes easier to determine the model because the learning model used must be able to motivate students' enthusiasm and interest in learning, can stimulate students in self-study techniques, and ways of acquiring knowledge through personal effort.

One learning model that allows students to interact with each other is the cooperative learning model (Li and Lam, 2013). The cooperative learning model can motivate students, utilize all students' social energy, and take responsibility for each other. The cooperative learning model assists students in every subject, from basic skills to complex problem-solving. Ironically, the cooperative learning model has yet to be widely applied in education, even though Indonesians pride themselves on the nature of cooperation in social life.

The cooperative learning model has several types. One cooperative learning model that can build student confidence and encourage their class participation is the Think Pair Share (TPS) model. The Think Pair Share model helps students interpret their ideas together and improve understanding. The Think Pair Share learning model is suitable for high school.

Based on the observations, the learning process at one of the schools in Indonesia has never used the Think Pair Share type of cooperative learning model and seen from the level of ability of one class and another class; it is relatively the same. This will make it easier for

the writer to research so that there will be differences in student learning outcomes using the Think Pair Share model.

METHOD

This type of research is action research conducted in two cycles (Arikunto, 2021). This study aimed to determine the effectiveness of learning in class XI at one of the high schools in Indonesia. Observations were made of the teacher's learning activities and interviews with both teachers and students (Jamshed, 2014). Through this activity, deliberations can be held between teachers and observers to determine the most appropriate actions to increase the effectiveness of learning in class XI.

The results of class teacher interviews, the most appropriate step is to increase student activity and participation in the learning process by training and developing students' intellectual skills.

Based on these initial reflections, the procedure for implementing this classroom action research includes (1) planning, (2) implementation, (3) observer, and (4) reflection in each cycle (Copriady, 2013).

Cycle I

a. Action Planning Stage

In the action planning stage in the first cycle are: we compiled a syllabus related to "integral" service material. After that, we designed learning scenarios that can activate students in the learning process activities in large groups. The last in this step is designing a data collection tool in the form of a test and used to determine student motivation and interest in learning.

b. Action Implementation Stage

Students are given a general explanation about the purpose of classroom action research according to the plans prepared regarding data collection and other activities. This classroom action research activity includes: (a) Providing a general explanation of the subject being taught using active learning strategies with techniques to stimulate students' curiosity; (b) Encouraging students who have not been active to be active in participating in learning; (c) Observe and record students who participate actively in learning; (d) Collecting test results obtained by students in doing assignments; (e) Analyzing the results of the tests given after the students were taught using the stimulating technique in large groups. We teach according to the classical learning scenario that has been designed and records the activities carried out by each student. We provide evaluations to students to determine motivation, interest and awareness of students in participating in learning activities at school.

c. Action Observation Stage

We observed and recorded all activities that occurred when students took part in mathematics learning on students who were less active in learning and about the difficulties it faces.

d. Reflection Stage

We analyzed the results of student work and the results of observations made by students to determine the next step. We make student groupings based on the results obtained by students in the evaluation carried out.

Cycle II

a. Action Planning Stage

In this stage we prepared of learning process plans according to the findings of the first cycle, then compile simplified teaching materials, increased teaching materials, and improved the problem instrument so that it is easy to understand.

b. Action Implementation Stage

We divided student study groups into six groups. After that, we implemented the metacognitive learning model according to the lesson plan. Each student gets teaching materials or service materials.

c. Action Observation Stage

We record the results obtained by students in working on problems related to the teaching materials provided. We also record mistakes made by students in solving problems in the teaching materials provided.

Data Collection Techniques

This class action research instrument consists of:

a. Written Test

Written tests are used to collect data about students' ability to master the material being taught. The researcher designed this written test following the objectives stated in the question grid.

b. Observation

Observation techniques to obtain data about a complete understanding of student behavior sequences include: class situation and the behavior of each when participating in learning in the classroom. This technique is used only to collect data and not to interpret data.

RESULTS AND DISCUSSION

In learning mathematics in one of the high schools in Indonesia the mathematics teacher experienced a problem, namely the lack of student activity when the teacher delivered

the mathematics subject. Based on the documentation results, the average pretest value was 46.75. Based on this background, there is a gap in which students should pay attention to the teacher's explanation, but some students need to be more active in learning. Student activity is felt lacking, and so far, the teacher has taken several ways to increase student activity, including reminding less active students, asking questions to motivate, and asking students to summarize all the explanations that the teacher has conveyed. Of all the ways that have been done to increase activity, the teacher feels that there has been no change and the results are still the same and not as expected. Efforts were made to increase the activity of students in mathematics in class XI by providing cooperative learning strategies of the think pair share (TPS) type.

Mathematics learning activities on integral material in class XI at a high school in Serang City, Indonesia in this class action research were carried out in 2 cycles, each cycle consisting of preliminary studies, planning, action, observation, and Reflection on the activities carried out. At the beginning of learning, the teacher provides the motivation that guides students to be more enthusiastic about learning at school. The teacher motivates students to participate in the learning process and informs them about the formulation of competencies in learning mathematics about the material mentioned above that must be mastered, using a Think Pair Share (TPS).

Cycle I

Research in this cycle was carried out: a) identification of problems regarding the service material delivered and learning strategies that are commonly used. In this cycle, using a conventional approach, b) presenting "integral" material, c) making observations using observation and photography, d) measuring the impact of the conventional approach using a list of student activities.

a. Preliminary studies

The activities used generally use conventional learning models, with lecture methods, questions and answers, and giving assignments. In the learning process in class XI at a high school in Indonesia, the teacher is still the center of attention (teacher-centered). The learning process becomes less meaningful because the teacher needs to emphasize the meaning of the learning material to students. Teachers do not give strong motivation, so students are less active in the learning process.

b. planning

We collaborated with other teachers in preparing research plans, which included: 1) learning objectives, 2) competencies and learning materials, 3) learning strategies in the form

of models and media used, as well as learning resources, and 4) evaluation of learning outcomes.

c. Action

Pre-teaching and learning activities consists of pray and student absences, provide reference learning materials, connect past material with present material. Introducing learning models and giving motivation, the last preparation of learning media.

The Learning process uses the TPS model, as follows: the teacher divides the group into 5 groups with 8 members; the teacher gives directions that students are responsible for everything in their group, as if it were their own; students must see that all members in the group have the same goal; students must share the same tasks and responsibilities among group members; students will be subject to evaluation or given prizes or awards, which will also be applied to all group members; students share leadership, and they need skills to learn together throughout the learning process; students will be asked to account for material handled in cooperative groups individually. The teacher advises students to think critically, be fully involved in seeking an effective learning process, take responsibility for the occurrence of an effective learning process, and bring their respective schemata into the learning process. The teacher gives a brief explanation and concludes and then the teacher gives an evaluation.

d. Observation

At the beginning of learning, observations were made of the teacher opening lessons, such as discussing the material and motivating students. In the first cycle, the teacher's performance observer for the preliminary activities was considered quite good on average as much as 52%.

e. Reflection

During the process of this learning activity, more detail can be seen in Tables 2.

Table 2. Observation Results in Learning Mathematics Cycle I

No.	Aspects Assessed	Analysis of Results Achieved				
		1	2	3	4	5
1.	Asking questions		√			
2.	Answer questions			√		
3.	Expressing opinion			√		
4.	Paying attention actively			√		
5.	Work and study activel				√	
	Total	15				
	Average	15 : 5 = 3 = Enough 15 : 25 x 100% = 60%				

Table 2 shows that the performance of students in the learning process activities assessed by the observer was quite good.

Cycle II

Research in cycle II was carried out by a) identifying problems regarding the learning materials used and learning strategies that are commonly used, b) presenting integral service material, and c) making observations using observation and photography as learning evaluations.

a. Preliminary studies

The teacher explains the integral follow-up material and responds to the report's contents in class XI at a high school in Indonesia.

b. Planning

We collaborated with other teachers in preparing research plans, which included: 1) learning objectives, 2) competencies and learning materials, 3) learning strategies in the form of methods and media used and learning resources, and 4) evaluation of learning outcomes.

c. Class Action

The steps used in this cycle are the teacher carrying out learning activities per lesson plan, which includes preliminary, core, and closing activities like in Cycle II.

d. Observation

Observation results that students' attention to mathematics subjects with their activities responds to the learning process on integral material. The courage of students to appear to read and understand the contents of the reading and answer problems. Answers given by students to questions given by the teacher. Ability and ability of students to ask questions or problems. The ability and carefulness of students to avoid mistakes in answering questions. Attention, the ability and ability of students to solve the assigned difficult/not difficult questions. The number of students who asked questions, responses, comments, suggestions, criticisms, or gave answers in writing.

e. Reflection

The teacher carries out the learning process in presenting integral material that students understand because they train and answer questions repeatedly that have been distributed by the teacher.

The teacher's performance in teaching and learning activities is considered very good by the observer as much as 94%. Table 3 shows that the performance of students in the learning process activities is assessed by observers as very good.

Table 3. Observation Results in Learning Mathematics Cycle II

No.	Aspects Assessed	Analysis of Results Achieved				
		1	2	3	4	5
1.	Asking questions				√	
2.	Answer questions				√	
3.	Expressing opinion				√	
4.	Paying attention actively					√
5.	Work and study activel					√
Total		22				
Average		22 : 5 = 4,4 = Very Good 22 : 25 x 100% = 88%				

After completing the actions of each cycle, there is a change in learning outcomes, namely student learning outcomes increase from one cycle I to cycle II, which is quite significant.

1. Acquisition of Student Learning Outcomes in Cycle I and Cycle II

From the mathematics learning activities on integral material by applying the Think Pair Share (TPS) model in class XI at a high school in Serang City, Indonesia, student learning outcomes have increased in each cycle. The level of attainment of mastery of mathematics learning material increased at the beginning before there was an average class action of 46.75 in the first cycle. After the class action, research reached an average of 77.25 and in the second cycle experienced a significant increase reaching an average of 79, 25.

2. Obtain the results of group study evaluations in cycles I and II

Discussion group learning in the process of improving learning, after an evaluation was carried out obtained a result or finding, also experienced an increase. The evaluation results for each cycle can be seen in Table 3.

Table 3. Group Study Evaluation Scores in Cycles I and II

No.	Group	Score		Note
		Cycle I	Cycle II	
1.	I	70	80	Increase
2.	II	70	90	Increase
3.	III	70	80	Increase
4.	IV	70	80	Increase
5.	V	70	90	Increase
Total		350	420	
Average		70	84	

Table 3 shows that the evaluation of group work in discussing integral material in cycle I obtained an average of 70, and in cycle II it rose to 84. From the data from the results of the discussion of student learning outcomes in learning mathematics on integral material in

detail, it can be stated as follows: 1) Preliminary results show an average score: of 46.75, 2) The results in the first cycle increased to an average score of 77.25, and 3) The results in cycle II rose to an average score of 79.25. Thus the increasing value of the results of the evaluation of mathematics learning on integral material in each cycle means that the student's understanding of class XI towards this material shows a significant increase. This can be seen in Figure 1.

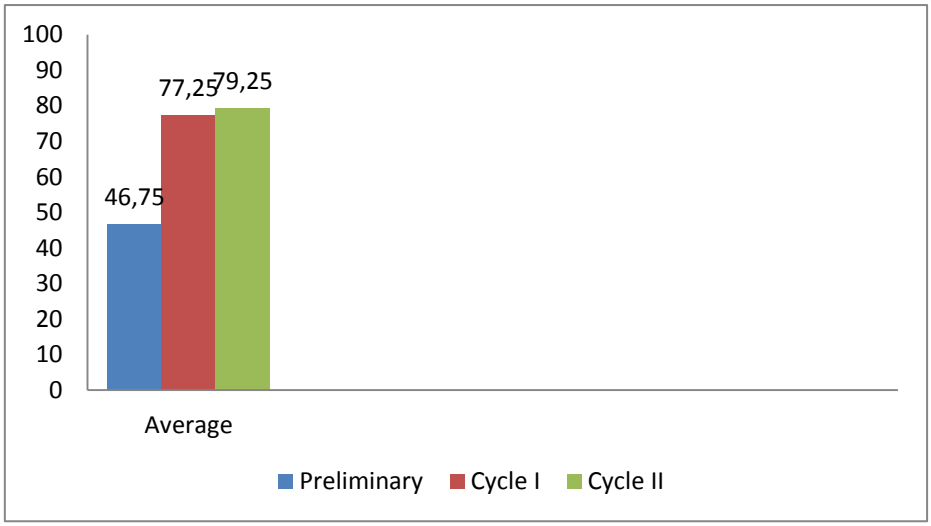

Figure 1. Graph of Improvement in Mathematics Learning Outcomes for Class XI Students at a High School in Serang City, Indonesia

During the process of improving the process of learning mathematics on integral material in class XI at a high school in Indonesia, each cycle has increased. Students who can answer questions or problems increase. Students who express opinions increase. Students who pay attention actively increase. Students who ask questions or express problems are increasing enough. Students who work and study actively. From the results of the research and discussion above, it shows that the action hypothesis is proven, namely by applying the Think Pair Share (TPS) model can increase understanding of mathematics learning material and learning outcomes for class XI students in a high school in Indonesia.

CONCLUSION

We can conclude that using the Think Pair Share approach can improve student learning outcomes in mathematics in integral concepts for class XI students in one of the high schools in Indonesia. Implementation of the Think Pair Share approach can increase learning activities for students in mathematics. The average value of mathematics learning achievement increased from 46.75 in the pretest to 79.25 after cycle II. Using the Think Pair Share strategy will increase student activity and motivate students to study seriously.

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