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The Effect Of The Think Pair Share (TPS) Type Cooperative Learning Model On Students' Mathematical Problem-Solving Abilities In The Material Of Integer Numbers In Grade VII

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Abstract

This study aims to determine whether the Think Pair Share (TPS) Cooperative Learning Model used in class VII influences students' mathematical problem-solving abilities in integer material. This study is a Quasi Experiment using cluster sampling techniques. The samples collected for this study were class VII-A as the experimental class, and class VII-B as the control class. The tool used was a test. The results of the calculation of mathematical problem-solving abilities showed that the Sig. (2-tailed) value was 0.000 <0.05 at a significance level of 5%. The average value for the experimental class' mathematical problem-solving abilities was 84.115, while the average value for the control class was 58.470. Then from the results of the N-Gain test, the average score for the experimental class was 0.84 (high criteria) and the control class score was 0.46 (medium criteria). So it can be concluded that the Think Pair Share (TPS) Cooperative Learning Model on Students' Mathematical Problem Solving Ability in Integer Material for Class VII SMP NEGERI 1 STABAT TA 2024/2025.

Keywords *: Think Pair Share (TPS) Type, Influence, mathematical problem solving*

INTRODUCTION

Education plays a key role in all progress and quality development. Through education, individuals are able to actualize their potential, both as individuals and as members of society (Lestari, Erwandi, & Gusti Satria, 2020) . Therefore, to become a multi-competent human being, the educational process through learning is a crucial stage. Therefore, the learning process is crucial for developing skills and shaping individual character, which ultimately will create a high-quality education. The main goal of education is to create individuals with quality and character, who can look forward to achieving their desired goals and adapt quickly and appropriately to various environments. Education itself is a source of motivation for us to improve in all aspects of life (Baro'ah, 2020) .

In recent years, many education experts have taken various steps to improve student learning outcomes. They have attempted to implement various learning models, approaches, methods, strategies, and techniques designed to enhance student competency.

Education is the perfect tool for developing high-quality human resources. Education is the only place that can be considered and should function as a tool for developing high-quality human resources (Purnamaningsih & Purbangkara, 2022) .

According to the 1945 Constitution and Law Number 20 of 2003 concerning the national education system, education is a basic and planned effort to create a learning atmosphere and learning process so that students actively develop their abilities. Education is also an environmental influence on individuals to produce permanent changes in behavioral habits, thoughts and attitudes. In Law No. 20 of 2003 CHAPTER II article 3 it is also stated that, "National education functions to develop abilities and shape the character and civilization of a dignified nation." NAINGGOLAN (2020) said that to achieve the goals of national education, the government has implemented improvements to improve the quality of education at various types and levels. However, the facts on the ground have not shown satisfactory results.

This aligns with the opinion (ANNA, 2024) that optimally achieving educational goals requires media or tools that serve as aids in the process. In this context, mathematics learning can be understood as an educational activity that utilizes mathematics not only as material but also as a tool or vehicle for achieving competencies outlined in the curriculum.

Mathematics is a fundamental science that plays a significant role in student education. Furthermore, it serves as a tool for developing scientific thinking, which is essential for students to develop their logical abilities. Mathematics plays a crucial role in the advancement of science and technology. In mathematics learning, students are expected to apply critical and rigorous thinking to process information and solve problems. These skills are useful not only in everyday life but also as a language that supports the development of science and technology.

The Minister of National Education Regulation Number 22 of 2006 concerning content standards for primary and secondary education units states that mathematical problem solving is an important goal in mathematics learning. By solving mathematical problems, students will be able to understand mathematics lessons. This aligns with Ardiansyah's (2023) opinion that Problem solving refers to efforts to find solutions to difficult situations or challenges with the aim of achieving results that cannot be achieved immediately (Fardiansyah, Purwadi, & Mudzanatun, 2019) .

According to Harahap & Surya (2020) it is a high-level cognitive activity that involves students' efforts in using mathematical concepts and strategies to solve various types of problems - both in mathematics itself, other disciplines, and aspects of everyday life -. This ability includes the process of understanding problems, making plans, implementing strategies systematically, and evaluating the results of the solution critically. In line with Ruseffendi's opinion (in Sembiring, 2019), problem-solving skills are very important in the field of mathematics, not only for those who apply it in other disciplines, but also in everyday life.

One of the objectives of mathematics subjects at the Junior High School (SMP) level in the 2013 Curriculum Content Standards (K-13) is for students to have problem-solving skills that include the ability to understand problems, design mathematical models, solve models, and interpret the solutions obtained. Viewed from this objective, problem solving is a part of the mathematics curriculum that is quite important in the mathematics learning process.

However, the reality on the ground has not fully met expectations. In mathematics learning, there is still a frequent tendency to minimize student participation, so that the learning process is dominated by the teacher's role. This causes students to tend to be passive and wait more for information from the teacher, without actively trying to solve problems in mathematics learning. According to Yuni et al., (2024) , the difficulties students encounter in learning mathematics are often caused by an inadequate understanding of concepts (Wakijo & Puri, 2019) . As a result, students are less able to connect problem instructions with relevant mathematical knowledge, resulting in low mathematical problem-solving abilities.

Students often tend to memorize mathematical concepts presented by teachers or found in textbooks without truly understanding their meaning. This essentially ignores the importance of a deep understanding of the mathematical concepts being studied. The impact is that students' problem-solving abilities are limited. According to Zaahidah, n.d. (2019:12-13) , low mathematics learning outcomes in students often occur because they are unable to adapt to educational technology. Students who are not accustomed to using digital media (such as Powtoon, PowerPoint, GeoGebra) tend to have difficulty updating their learning methods, developing their potential, and demonstrating creativity in solving mathematical problems.

In a learning approach that uses a direct model, the focus is on the teacher's role as the center of information, and students tend to passively receive material, often in an abstract form. However, students' ability to solve math problems still has several weaknesses, namely:

1. Most students are only able to memorize concepts but have difficulty applying these concepts in real life situations.
2. Many of them are only able to solve the same types of problems as those taught by their teachers. They have difficulty handling new types of problems that differ from the examples taught by their teachers.
3. Students often struggle to solve non-routine problems because the majority of questions teachers assign are routine. As a result, their problem-solving skills are not yet at their optimal level.

According to Octavia (2021) , in the teaching process, teachers often encourage students to learn, but rarely provide instruction on effective learning methods. Furthermore, teachers often emphasize students' problem-solving skills, but provide little instruction on how students should actually solve problems effectively. To address this, an appropriate approach is needed to help students overcome the problems they face, and one way is through the application of an appropriate learning model. In the context of teaching and learning interactions, learning models are important for improving certain skills and attitudes in students. A learning model can be defined as a conceptual framework that describes systematic steps in organizing learning experiences to achieve specific learning objectives.

According to Nainggolan & Surya (2024), the *Think-Pair-Share (TPS)* learning model serves as a strategic framework for teachers and learning designers in designing teaching and learning activities. This model consists of three main stages: *Think, Pair, and Share,* which are designed to stimulate active student interaction. In the *Think stage* , students are asked to think independently to answer the teacher's questions. The *Pair stage* is followed by a pair

discussion to deepen their thinking. Finally, in the *Share stage* , the discussion results are shared with the class. This structure has been proven effective in improving students' mathematical problem-solving abilities in both story problems and conceptual contexts (WATI, 2019) .

Other research results by Fransiska et al., (2023:45) shows that the application of TPS in mathematics learning significantly improves the mathematical problem-solving abilities of class XI SMAN students. 4 Bengkulu (Ardiyani, Gunarhadi, & Riyadi, 2019) . The average -pretest score increased from around 45 to 76 in the post-test, with a *normalized gain value* of 0.55 indicating moderate to high effectiveness. This increase is closely related to the *think* , *pair* , and *share stages* that facilitate Polya's steps for systematic problem solving. So, the learning model that is expected to help students in solving problems in mathematics lessons is a learning model that is able to empower students, where learning does not require students to memorize, but is able to encourage students to construct knowledge in their own minds and be able to apply that knowledge to solve problems in everyday life because learning to solve problems is a basic principle in learning mathematics (Nwaukwa & Okolocha, 2020) .

Based on the background of the problem above, the researcher plans to conduct research with the title: "The Effect of *the Think Pair Share (TPS) Learning Model on Students' Mathematical Problem Solving on* Integer Material in Class VII of SMP Negeri 1 Stabat in the 2024/2025 Academic Year".

METHOD

This research was conducted at SMP Negeri 1 Stabat in the odd semester of the 2024/2025 academic year. This research will use a quantitative experimental research type. According to (Jayantika, 2018) experimental research includes determining the impact of actions and treatments commonly referred to as *treatments* on student behavior during the educational process, and testing hypotheses about the effectiveness or ineffectiveness of certain actions by comparing them with normal actions. The purpose of this type of experiment is to determine the impact of the use of the *Think Pair Share* (TPS) learning model on students' mathematical problem-solving abilities.

This study uses a quasi-experimental method, because this method is part of a quantitative method that has its own characteristics, in this method there are two classes, namely the experimental class and the control class. According to Sugiyono (2018: 73) states that experimental research designs are divided into four forms, namely *pre-experimental design* , *true experimental design, factorial design, and quasi-experimental design.* In this study, the author will use *a quasi-experimental design* (semi-experimental) with the form of *Non-equivalent Control Group Design* because in reality this study cannot fully control external variables that affect the implementation of the experiment (Schjøler, 2019) .

According to Arikunto (2018:130), the population is the entire research subject. Another opinion states that the population is the entire object to be studied. The population used includes all seventh-grade students of SMP Negeri 1 Stabat in the 2023/2024 academic year, consisting of 7 classes with a total of 281 students. Meanwhile, Arikunto (2018) states that the sample is a portion or representative of the research population. This research sample used a *cluster sampling technique,* namely by drawing lots from 7 classes that had been written on paper, rolled up, and put into a container. The first draw was used as the

control class and the second draw was used as the experimental class. Thus, class VII-A was obtained as the experimental class and class VII-B as the control class (Sari, Sembiring, & Wau, 2022) .

Variables are research objects that become the focus of the research and from which conclusions are drawn. In this study, the variables measured were mathematical problem-solving skills using the *Think Pair Share* (TPS) learning model. The data collection tool used in this study was a test. D. Sugiyono (2018) states that a research instrument is a tool used to measure the natural or social phenomena being studied. This study used a descriptive test of students' mathematical literacy skills, consisting of a grid, question structure, and validation.

RESULTS AND DISCUSSION

The research was conducted at SMPN 1 Stabat located at Jl. Zainul Arifin No. 10 Kwala Bingai, Stabat District, Langkat Regency, North Sumatra 20811. This research was conducted in class VII of SMPN 1 Stabat in the 2023/2024 academic year. From the total of 10 classes, 2 classes were taken as samples consisting of 63 students, where the experimental class was class VII-A consisting of 31 students and the control class was class VII-B consisting of 32 students.

Instrument Trial

Prior to conducting this research, the researcher first administered a test to 34 students in class VIII-A of SMPN 1 Stabat in the 2023/2024 academic year. The goal was to determine test validity, reliability, item discrimination, and difficulty level. The results of the test trial yielded the following data:

Test Validity Test

Calculation of test validity for the validity coefficient of each question item. The results of the trial questions given to class VIII-A with 34 students, all questions are said to be valid if $r_{h\ itung} > r_{tabel}$ is said to be valid with a significance level of $\alpha = 5\%$. This means that 7 questions are suitable for use as instruments in research.

Calculating Normalized N-Gain

The N-Gain calculation was conducted to determine the effectiveness of students' mathematical problem-solving abilities from *the pretest* and *posttest results* of the experimental and control classes. In this case, the N-Gain score calculation aims to determine whether the TPS learning model treatment has an effect on the effectiveness of mathematical problem-solving abilities. The N-Gain calculation in the study using SPSS 22.00 *for Windows* in (appendix 15) can be seen in more detail. Based on the calculation results, the following results were obtained:

Table 1. N-Gain results of the Experimental class and the Control class

No	Group	N-Gain Score	Criteria
1	Experiment	0.84	Tall
2	Control	0.46	Currently

Based on the results of the normalized Gain test above, it can be seen that the average N-Gain score of the experimental class is 0.84 with a high category, while the control class

obtained a score of 0.46 with a medium category. Thus, it can be concluded that the *Think Pair Share* (TPS) Cooperative Learning Model is effective in improving students' mathematical problem-solving abilities in integer material.

Hypothesis Testing

If the requirements are met, namely normality and homogeneity tests with normally distributed and homogeneous data results, then the hypothesis test is carried out.

Determining the Research Hypothesis

$H\ 0 : \mu_1 = \mu_2$: There is no influence of the *Think Pair Share* (TPS) Cooperative Learning Model on improving the mathematical problem-solving abilities of class VII SMPN 1 Stabat on the material of integers.

$H\ 0 : \mu_1 \neq \mu_2$: There is no influence of the *Think Pair Share* (TPS) Cooperative Learning Model on improving the mathematical problem-solving abilities of class VII SMPN 1 Stabat on the material of integers.

This research hypothesis will be tested using a t-test, which aims to determine whether there is an effect of the *Think Pair Share* (TPS) type of cooperative learning media on mathematical problem-solving abilities between the treated and untreated classes. The following is the statistical hypothesis for the t-test on differences in mathematical problem-solving abilities:

H_0 : There is no influence between the Cooperative learning model

Think Pair Share (TPS) type on mathematical problem solving ability H_a : There is an influence between the Cooperative learning model (Suryani, 2018)

Think Pair Share (TPS) type on mathematical problem solving ability.

The decision-making criteria for the t-test are:

Accept H_0 if the significance value > 0.05

Accept H_a if the significance value < 0.05

t-test

To see whether there is an influence between learning models between the Cooperative Learning Model of *Think Pair Share* (TPS) Type on mathematical problem solving abilities on integer material in class VII of SMPN 1 Stabat (attachment 20), the table shows the results of the t-test calculations as follows (Handayani & Yanti, 2017) :

Table 2. T-Test Results

	Levene's Test for Equality of Variances		**t-test for Equality of Means**						
								95% Confidence Interval of the Difference	
	F	**Sig.**	**t**	**df**	**Sig. (2-tailed)**	**Mean Difference**	**Standard Error Difference**	**Lower**	**Upper**

Learning outcomes	Equal variances assumed	2,268	,137	16,166	61	,000	34,30948	2.12234	30.06560	38.55335
	Equal variances not assumed			16,258	55,247	,000	34,30948	2,11028	30.08080	38,53816

After the calculation using the t-test, the calculated t was $_{16.666}$. For α = 0.05 and df = 63-2 = 61, the t $_{\text{table was obtained}}$ = 0.05 x 61 = 3.05. By comparing the $_{\text{calculated t value}}$ and the t $_{\text{table}}$, the calculated t > t $_{\text{table}}$, this means rejecting H $_0$ and accepting Ha $_{\text{with}}$ the help of SPSS 22.0 windows showed the output of the sig. (2-tailed) value from the independent sample t-test of 0.00. Because the significance is <0.05, it can be concluded that "reject H $_0$ " means that there is an influence of *the Think Pair Share (TPS)* Cooperative Learning Model on mathematical problem solving abilities between the average posttest of experimental class and control class students. Where the influence is caused by the treatment of the Cooperative learning model of *the Think Pair Share* (TPS) type and conventional learning, it is concluded that the Cooperative learning model of *the Think Pair Share* (TPS) type has an effect on students' mathematical problem-solving abilities on integer material in class VII of SMPN 1 Stabat. (Zulfah, 2017) .

Discussion of Research Results

In this study, the focus is to determine the influence of the *Think Pair Share* (TPS) Cooperative learning model on the mathematical problem-solving abilities of class VII students of SMPN 1 Stabat. This study was conducted in 4 meetings for classes VII-A and VII-B on September 2-17, 2024, odd semester of the 2024/2025 academic year, against 2 groups of students, namely the experimental class totaling 31 and the control class totaling 32. The material used by the researcher is integers (Editia, 2020) . To determine the mathematical problem-solving abilities, a pretest and posttest consisting of 7 essay-shaped questions were given. After the pretest was carried out, the researcher gave treatment to each sample where class VII-A (experimental class) received treatment on the *Think Pair Share* (TPS) Cooperative learning model while Class VII-B (control class) used conventional learning. So the average score for the experimental class was 88.90, while the control class obtained an average score of 54.59 (Apriyanti & Ayu, 2020) .

CONCLUSION

Based on the formulation of the problem and the proposed research hypothesis as well as the results of the research that have been analyzed, the conclusion in this study is that there is an Influence of the *Think Pair Share* (TPS) Type Cooperative Learning Model on Students' Mathematical Problem Solving Ability in Integer Material for Class VII of SMP NEGERI 1 STABAT in the 2023/2024 Academic Year.

Suggestion

Based on the conclusions obtained from this research, the researcher provides several suggestions as follows:

1. Teachers can choose the *Think Pair Share* (TPS) type of cooperative learning model for students' mathematical problem-solving abilities.
2. Teachers must recognize each student's abilities, so that they are able to make good plans in learning to be able to overcome problems faced by students both in terms of time allocation and learning models for each material that will be presented.
3. There are limitations in carrying out this research, so it is recommended that there be further research on the cooperative learning model of *the Think Pair Share* (TPS) type on other topics or aspects.

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