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The Effect of the Think Pair Share for Elementary School Students in Learning Changes in Matter

Halimatusy Sya'diyah[1*], Petra Kristi Mulyani[1]

[1]Elementary Education, Universitas Negeri Semarang, Semarang, Indonesia.

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Corresponding Author:
Halimatusy Sya'diyah
Hi@students.unnes.ac.id

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Abstract: This research was a quantitative research conducted in a fourth grade elementary school. The study aimed to determine the effect of the Think Pair Share (TPS) learning model on students' activeness and learning outcomes in fourth grade subject of changes in matter on the natural science subjects. Data collection techniques were observation and questionnaire. Data analysis in this study to finded the validity, reliability, hypothesis, and N-Gain Score tests. The hypothesis of was tested using t-test to find the influence of variables X1 to Y and X2 to Y. The results showed the t-test coefficient of the TPS learning model on learning outcomes obtained a significance value of 0.000 < 0.05, meaning that there is an influence of the TPS learning model on learning outcomes. N-Gain results was 61.40, the meaning that the application of the TPS learning model improved students learning outcomes in the category of moderately effective. The result of TPS learning model on students' activeness obtained a value of 1972 in the very active category. It was showed the TPS learning model was very influential on increase student activeness.

Keywords: Activeness; Learning models; Learning outcomes; Think pair share

Introduction

Education is a human need because it can help humans prepare themselves to determine the direction of their lives and develop their potential to adapt to the changes that occur (Jupri et al., 2024). Education is created with an effective learning atmosphere so that a person can have skills in terms of religious spirituality and good character so that it has a good impact on society, nation, and state (UU RI Number 20 of 2003 concerning the National Education System Article 1 Paragraph 1). Therefore, education is the main thing in life that can help humans in shaping character and can educate the nation's life (Pradana, 2020). Education has a planned process that aims to prepare humans to face future life with its various changes through teaching, training, or research (Amadi et al., 2023).

To achieve the goals of education, the quality of the education system must be considered and improved by continuously monitoring the education quality index to suit future needs (Syafii et al., 2023). According to Triana et al. (2022), the strategy for implementing programs to improve education quality is focused on applying school management to achieve optimal learning outcomes. One of the tools to measure the quality index of the education system is student activity and learning outcomes because of its objective (Ningsih & Farida, 2023).

Learning activeness is one of the main elements that is very crucial in the learning process (Haslan et al., 2023). This opinion is supported by the opinion of Prasetyo & Abduh (2021) which states that learning activeness is a student's effort to explore their potential through a series of learning activities, both in the context of direct learning and online learning with the aim of achieving the desired learning outcomes. Student

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activeness has an impact on the achievement of student learning outcomes (Maharani et al., 2023).

A learning model is a structured set of procedures for implementing learning activities (Tabrani et al., 2024). Learning models are divided into several types including conventional and cooperative learning models. Conventional learning models tend to place the teacher as the main focus, such as in lecture activities or the use of PowerPoint which causes students to be less active because they are less directly involved and more focused on their personal activities (Gunawan et al., 2019). Meanwhile, the cooperative learning model is more focused on students because in this learning the teacher encourages students to work together and discuss, while the teacher only assists the learning process (Handayani et al., 2024).

According to Setiawan & Alimah (2019), one of the problems that often occurs in the world of education is the selection of learning models that are not right for students. The learning model is related to several aspects including learning objectives, learning approaches, stages in learning activities, learning media, and teaching aids (Setiawati et al., 2023). The selection of an inappropriate learning model will make students less interested in teaching and learning activities (Murtini, 2022). It causes students to be less active and have low learning outcomes.

According to Wardana et al. (2023), the application of an interesting learning model can make students active in the learning process. It can encourage student involvement, both individually and in groups which aims to improve student learning outcomes through activeness (Kharisma, 2020). So, the teacher must sort out a suitable learning model that is applied according to the situation and conditions of the students (Nurmayani et al., 2018).

Think Pair Share is one of the interesting and fun learning models (Wardana et al., 2023). Think Pair Share is a learning model that emphasizes the active role of students in the learning process by discussing to solving problems (Rukmini, 2020). According to Ray et al. (2024), the think pair share learning model is a cooperative learning model where students are grouped in pairs to create interaction between students to train communication skills. Besides, TPS learning model is one of the simple learning models because the steps of the TPS learning model are thinking, pairing, and sharing. In the thinking step, the teacher gives problems to students, and students individually analyze the problem, in the pairing step students discuss the results in pairs of their analysis to get the right answer, and in the sharing stage students convey the answers from the discussion results in front of the class (Meilana et al., 2021).

Implementation of the Think Pair Share (TPS) learning model in Rachmawati & Erwin (2022), makes students no longer feel bored because it only focuses on reciting material, but students are more actively involved in learning because they feel more enthusiastic and interested in participating in lessons so that students become easier to understand the material which results in improved learning outcomes. This is supported by research showing that, the application of the Think Pair Share learning model can increase student involvement in the learning process because it gives students the opportunity to think further, respond, and help each other (Naibaho et al., 2023). Another study shows that learning with the Think Pair Share model makes students work together, respect each other among group members, and increase students' enthusiasm in participating in learning (Jannah & Mudjiran, 2019). Furthermore, Ekawati (2022) showed that the TPS learning model can improve learning outcomes and student activeness. The increase in learning outcomes is seen from the increase in student scores that occurred in cycle 1 and cycle 2. Meanwhile, the increase in student activeness can be seen based on the percentage of students who listen intently and are active in question and answer activities, discussing, and expressing opinions.

This background is the basis for researcher to do experimental research with the title "The Effect of Think Pair Share for Elementary School Students in Learning Changes in Matter". In this study, researchers combined the TPS learning model with the demonstration method. The demonstration method makes students more interested in participating in learning. Because the demonstration method spurs students' thinking related to the things discussed in more depth, students become more active in asking questions.

Method

Pre-research in elementary schools used observation and interview data collection techniques. The results of the pre-study, although already using teaching aids, the level of student activeness at school is still relatively low. This is evident from the many students who are brave to express an opinion and ask questions. In addition to the low level of student activeness, student learning outcomes in the natural science subjects are still relatively low because they have not reached the Learning Objective Achievement Criteria value. This is due to the monotonous learning model and more use of conventional methods, namely lectures rather than the use of props. In addition, there was no group discussion in the learning process. This

causes students to be less active during learning activities.

In solving these problems, researchers choose quantitative research. Quantitative methods are research methods that tend to be more systematic in their implementation from start to finish with a more complex level of variation because they involve a larger sample (Sahir, 2022). According to Sugiyono (2016), quantitative research is a study based on positive principles used to investigate samples or certain populations using research instruments and analyze data with statistical approaches to test hypotheses that have been formulated. Experimental research refers to the preparation to examine the causal relationship related to special properties between treated and untreated groups (Abdullah, 2015). This is a research design according to Sugiyono (2016).

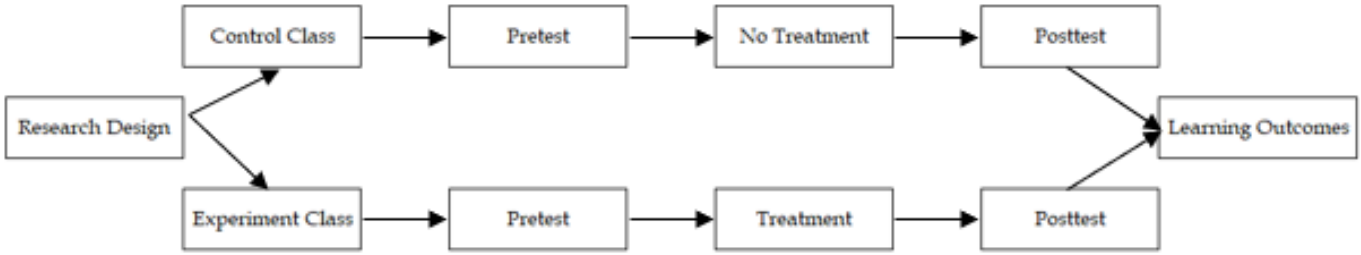

Figure 1. Research plan

This research was conducted in the first semester of the 2024/2025 academic year located in Klaten, Central Java. The population in this study were grade IV elementary school students. The sampling technique used was nonprobability sampling with a saturated sampling technique. In this saturated sampling technique, the sample used is all members in population. Thus, the many sample in this study are 56 samples consisting of 28 samples in the control class and 28 samples in the experimental class. The subjects in this study were fourth grade students in the first grade as the experimental group and students in the second grade as the control group.

The learning activities carried out in this study were 3 meetings in both the experimental and control classes. The activities carried out at the first meeting in both classes were pretest and an introduction to the material. Then the second meeting, the delivery of material using the lecture method for the control class and in the experimental class applying the Think Pair Share learning model. The third meeting, material deepening, and posttest. This research uses Quasi Experimental Design in the form of Nonequivalent Group Pretest Posttest Design. This design is almost the same as the Pretest-posttest control group design. The difference between the Nonequivalent Group Pretest Posttest Design and Pretest-posttest Control Group design is in determining the experimental group and control group. In the Nonequivalent Group Pretest Posttest Design, the experimental and control groups are not randomly selected (Sugiyono, 2016).

In this design, the pretest was given to the experimental and control groups. Furthermore, implemented learning process. The treatment was given to the experimental class, while the control class was not. Then, students are given a posttest with the same test at the time of the pretest that has been tested. Then, the results of the pretest and posttest in each group were compared.

Table 1. Nonequivalent group pretest posttest design

Class	Pre-test	Treatment	Post-test
Experiment	Y_1	X	Y_2
Control	Y_3	-	Y_4

Description:
Y1: pre-test in experiment class
Y2: post-test in experiment class
Y3: pre-test in control class
Y4: post-test in control class
X: treatment of TPS learning model

Tests and non-test are the data collection techniques used in this study. In this study, the test technique was used to determine student learning outcomes, namely pretest and posttest with a total of 25 multiple choice questions, score 1 for correct answer and 0 for wrong answer. Meanwhile, non-test techniques are carried out through observation to determine the level of student activeness and documentation.

Before obtaining 25 items for the pretest and posttest, the researcher made 40 items which were then tested. The results of the trial were then tested for validity and reliability.

Validity Test

Validity is the ability of the instrument to measure the conformity between the actual data and the data obtained by the researcher (Sugiyono, 2016). The validity test in this study serves to determine the validity of each item made by researchers in examining student learning outcomes (Yufrinalis & Nogo, 2021). Pearson product moment formula used to test this research.

Reliability Test

Reliability is the stability of a measuring instrument which shows that the tool is reliable or gives consistent results (Rosita et al., 2021). The reliability test in this study serves to determine the consistency of the questions when used in measuring learning outcomes. Researchers use the Cronbach's Alpha method in measuring reliability. The following is a table of question reliability test categories.

Table 2. Reliability test category

Interval coefitage	Criterion
$0.80 < r_{11} \leq 1.00$	Very high
$0.60 < r_{11} \leq 0.80$	High
$0.40 < r_{11} \leq 0.60$	Moderate
$0.20 < r_{11} \leq 0.40$	Low
$0.00 < r_{11} \leq 0.20$	Very low

Normality Test

The normality test is used to determine whether the distribution of data approaches a normal distribution (Sintia et al., 2022). The normality test in this study is to determine whether the data is normally distributed or not. H0 (normally distributed data) is rejected if D count ≥ D table. Researchers use the Liliefors test by looking at the significant values in the Kolmogorov-Smirnov column in this study.

H0: data is normally distributed

H1: data is not normally distributed

Homogeneity Test

The homogeneity test proves that the data to be processed is homogeneous, producing a true picture uninfluenced by the variations contained in the data to be processed (Kaswari et al., 2023). This study determines whether the data variants used are homogeneous or not. The calculation of homogeneity in this study uses the Levence test.

Table 3. Homogeneity test categories

Significance score	Criteria
(SIG) > 0.05	Homogeneous data
(SIG) ≤ 0.05	Data is not homogeneous

Hypothesis Test

Hypothesis testing is carried out to make a decision on the hypothesis that have been proposed (Suliyani et al., 2024). The principle of the hypothesis is to make a comparison between the sample value (experimental results) and the hypothesized value (population) in the learning outcome variable. The hypothesis test carried out in this study is a parametric statistical test.

Table 4. Hypothesis test categories

Significance number	Criteria
(Sig.) < α	H0 is rejected
(Sig.) > α	H0 accepted

N-gain Test

The N-gain test used in this study aims to determine the increase in creative thinking skills and learning outcomes after being given different treatments in both classes. Thus, in this study, it is used to determine the effectiveness of the learning model that has been implemented in the learning process. The following is a table of N-gain criteria.

Table 5. Normalized gain (N-gain) acquisition criteria

Normalized gain value	Criteria
$0.70 \leq g \leq 1.00$	High
$0.30 \leq g \leq 0.70$	Medium
$0.00 \leq g \leq 0.30$	Low

Table 6. Categories of interpretation of effectiveness of normalized gain (N-gain)

Normalized gain value	Criteria
40	Not effective
40 – 55	Less effective
56 – 75	Moderately effective
> 76	Effective

Activeness

Rating scale is a measurement method where respondents choose answers in the form of numbers that have meaning (Sugiyono, 2016). In this study, researchers used a rating scale to test the level of student activeness.

Total criterion score = highest score x number of questions x number of respondents.

Assessment criteria interval = number of scores of data collection results: number of criterion scores.

Result and Discussion

Based on the results of the research that has been conducted, student learning outcomes in the form of cognitive, affective, and psychomotor learning

outcomes are obtained from test scores and observations. The following is the learning outcome data.

Validity Test

This study uses a validity test when managing data in order to obtain valid data. In this research, validity testing was carried out on the TPS Learning Model variables (X), activities (Y1) and learning outcomes (Y2). By using SPSS, a significance level of 5%, N = 14 then r_{table} = 0.532, Criteria: $r_{count} > r_{table}$ so valid, $r_{count} < r_{table}$ so invalid.

Based on the validity test table data using SPSS on the TPS Learning Model variable (X), the results of 40 questionnaires showed 13 invalid questions with a percentage of 32.5% and 27 valid questions with a percentage of 67.5%. This shows that 27 of these questions have validity or are suitable for use in conducting research because they have a calculated r_{value} of more than the r_{table}. Meanwhile, 13 other questions are not suitable for research because the r_{value} is less than the r_{table}.

Reliability Test

A reliability test is a test or test in order to determine the accuracy or inaccuracy of the test, meaning that each time the test is carried out it will give the same or relatively the same results (Sugiarta et al., 2023). This study uses a reliability test using SPSS to obtain reliable data. The following are the reliability criteria for a variable. A variable is reliable, if r-alpha is positive and more than r-table and the Cronbach's alpha value > 0.6. Not reliable if r-alpha is negative and smaller than r-table and the Cronbach's Alpha value is > 0.6 then it is reliable.

Table 7. Results of the reliability test

Cronbach's alpha	N of items
0.924	40

Based on Table 7, the results of the reliability test analysis with the help of SPSS version 25 show that the Cronbach's Alpha value is 0.924. This means that the Cronbach's Alpha value is more than 0.6. It shows that the test instrument used in the study is reliable (consistent) with a very high category.

Normality Test

The normality test in this study used One Sample Kolmogorov - Smirnov with Liliefors test assisted by SPSS version 20 as shown in Table 8.

Table 8. Normality test results

	Kolmogorov - smirnov			Shapiro-wilk		
	Statistic	df	Sig.	Statistic	Df	Sig.
Experiment pre-test	0.15	28	0.08	0.92	28	0.04
Experiment post-Test	0.15	28	0.11	0.96	28	0.43
Control pre-test	0.16	28	0.05	0.89	28	0.01
Control post-test	0.14	28	0.14	0.94	28	0.09

From the data above, it shows that the pretest value, a probability (sig.) of 0.08. While the posttest value, a probability (sig.) of 0.11. This means that pretest and posttest scores have a probability (sig) value of more than 0.05 significance level. So, the data obtained is normally distributed.

Homogeneity Test

The homogeneity test is carried out to determine whether there is the same variance in the pretest and posttest (Usmadi, 2020). If the data has the same variance, it can be assumed to be homogeneous. To find out the similarity, it is necessary to do Levene's homogeneity test with the help of SPSS software version 25. The homogeneity test results are shown in Table 9.

Table 9. Homogeneity test results

Result	Levene statistic	df1	df2	Sig.
Based on mean	2.13	3	107	0.10
Based on median	1.79	3	107	0.15
Based on median and with adjusted df	1.79	3	90.19	0.15
Based on trimmed mean	2.110	3	107	0.103

Table 9 shows the value of the Levene Statistic Based on the Mean, which obtained a significance of 0.101. This means that the significance value is more than 0.05, so it can be concluded that the data of the two classes are homogeneous or the variants of the research population are uniform or come from the same variant.

Hypothesis Test

In this study, the T-test was conducted to test the hypothesis. The T-test test was used to analyze the impact of the think pair share model on student learning outcomes. The following are the results of hypothesis testing with the help of SPSS version 25.

Table 10. Hypothesis test results

Class	N	Mean	Sig.
Experiment post-test	28	82.71	0.00
Control post-test	28	51.43	0.00

Based on Table 10, a significance value of 0.000 was obtained. It shows that the significance value is less than 0.05, meaning that Ho is rejected and Ha is accepted. Significant changes occurred between the posttest of the experimental class and the control class as evidenced by the student learning outcomes in the experimental class using the Think Pair Share (TPS) learning model in the experimental class compared to the control class using the conventional model.

N-Gain Test

The N-Gain test was conducted to determine the effect of the learning model on student learning outcomes. This test was conducted with the help of SPSS version 25, resulting in the values in Table 11.

Implementing the Think Pair Share (TPS) learning model improves student learning outcomes, because the average post-test score in the experimental class is higher. Based on Table 11, the posttest value of the experimental class has an average of 82.71, while the average posttest value of the control class is 51.43. It can be said that student learning outcomes in the experimental class showed a significant increase. In addition, it can be seen from the results of the N-Gain score of 61.40, which is included in the moderately effective category. It can inferred that the implementation of the Think Pair Share (TPS) learning model can improve the learning outcomes of elementary school students, especially on natural science material.

Table 11. Gain score results

Component	Experiment Class		Control Class	
	Pretest	Posttest	Pretest	Posttest
Average score	53.86	82.71	43.14	51.43
Gain score		41.40		14.84
Category	Effective enough			Not

Activeness

Researchers made observations during learning activities and then processed the data to determine the level of student activeness. The results of data processing show, the number of criterion scores in both classes is 2240 with four criteria that have an interval of 560.

In the control class, the level of student activeness was classified as less active because it showed a result of 886. This is because students feel less excited about participating in learning due to the conventional learning model. So that students are active only when completing individual tasks and rarely interact with the teacher or other students. Whereas in the experimental class, the level of student activeness was included in the very active criteria with a score of 1972. The application of the TPS learning model is able to make students interact with teachers or students because it requires students to discuss and make students interested in learning. This means that the application of the TPS learning model is very influential in increasing student activeness.

Student activeness and learning outcomes have increased significantly after being given treatment, namely the application of the Think Pair Share (TPS) learning model. According to Shoimin (2014) in Murti & Reinita (2020) TPS has advantages in supporting increased student activeness and better learning outcomes. This is because the Think Pair Share (TPS) learning model provides an occasion for students to think, answer, and help each other in learning, and can improve students' social skills during the learning process such as asking questions, the ability to work together in groups, convey ideas or opinions, be a good listener and an effective method to create variety in the classroom discussion atmosphere.

Studying with the Think Pair Share model has its own appeal and can motivate students to learn science (Sukadana, 2022). Students are more active in participating in the learning process, and among fellow students can learn and convey their ideas or opinions. According to Rukmini (2020), Think Pair Share is a method in cooperative learning designed to influence the interaction patterns of students, using this method can change monotonous learning to be more effective and fun. So. learning the self-adjustment of living things by using the Think Pair Share learning model greatly affects student learning outcomes.

Conclusion

The results of this study indicate that the TPS learning model can significantly improve student activeness and learning outcomes compared to conventional methods. This can be seen from the comparison of the level of activeness and student learning outcomes in the control class using the conventional learning model and the experimental class using the TPS learning model in the study process. According on the observation results, the level of activeness in the control class fell into the less active category. Whereas in the experimental class, it is included in the very active category. The average value of student learning outcomes in the control class during the pretest was 43.14, increasing to 51.43 during the posttest. The average value of student learning outcomes in the experimental class was 53.86. However, after applying the TPS learning model, the average posttest score was 82.71. From the results of the average pretest and posttest scores, the N-Gain score was 61.40. This proves that the application of the TPS learning

model can improve student learning outcomes with a fairly effective category. The results of hypothesis testing using the Independent Sample T-test method show that the TPS learning model has an effect on learning with a significance of 0.00. It shows that the significance value is less than 0.05, meaning that Ho is rejected and Ha is accepted. then there is a significant difference between the post-test of the experimental class and the control class. So it can be concluded that the implementation of the TPS learning model can improve the activeness and learning outcomes of elementary school students.

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Conceptualization, writing—review and editing, visualization, H.S. and P.K.M.; methodology, formal analysis, investigation, resources, data curation, writing—original draft preparation, project administration, funding acquisition, H.S.; validation, supervision, P.K.M. All authors have read and agreed to the published version of the manuscript.

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The authors declare no conflict of interest.

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