Alifmatika: Jurnal Pendidikan dan Pembelajaran Matematika
e-ISSN: 2715-6109 | p-ISSN: 2715-6095 Vol. 4, No. 1, June 2022
https://journal.ibrahimy.ac.id/index.php/Alifmatika **DOI:** 10.35316/alifmatika.2022.v4i1.52-64

IMPROVING LEARNING MATHEMATICS ACTIVITY WITH THE THINK PAIR SHARE LEARNING MODEL

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Received: May 15, 2022 *Revised: June 3, 2022* *Accepted: June 11, 2022*

Abstract:
Students are required to be actively involved during the learning process in accordance with the development of 21st-century learning. Student learning activities can occur through expressing opinions, solving problems, and discussing materials during the learning process. Learning models should always implement the stimulation of these abilities. Thus, this study is to analyze the influence of the Think Pair Share learning model on students' learning activities. This study was an experimental study with a pretest-posttest control group design. The population in this study was all class 8 as many as 192 students in one of the junior high schools in Yogyakarta, Indonesia. Students belonging to class VIIIA (32 students) were the experimental students' group, and students in VIIIC (32 students) were the control group. Data was collected based on 15 items of students' activeness in learning mathematics. The results demonstrated that the application of the Think Pair Share learning model had an impact on the activeness of student learning. In addition, Think Pair method can improve the activeness of learning mathematics students, higher than in classes that implemented conventional learning models (25.31 > 15.78). This is because the application of the Think Pair share learning model provides opportunities for students to think, respond, and present problems provided by teachers so that students are fully involved during the mathematics learning process. The recommendations for further research can be carried out in several schools not just one school, student learning activity can also be increased by using other cooperative models, and can be further improved whether there are other competences that can boost the model's usage.

Keywords: Cooperative model, Think Pair Share, Student learning activeness.

How to Cite: Marhaeni, N.H., & Nuryadi. (2022). Improving Learning Mathematics Activity with The Think Pair Share Learning Model. *Alifmatika: Jurnal Pendidikan dan Pembelajaran Matematika*, 4(1), 52-64. https//doi.org/10.35316/alifmatika.2022.v4i1.52-64

INTRODUCTION

The rapid development of technology affects all aspects of human life (Yulianti & Wulandari, 2021). This is well-known as the twenty-first century or the era of the fourth industrial revolution, the changes of which will continue and are difficult to predict (Widodo et al., 2019). This change has been heavily influenced on the world of education. As a result, learning that was originally centered on teachers that modified into a teacher-student center by actively involving students during the learning process (Rafiqoh, 2020). This means that teachers must apply learning methods that can stimulate students' learning activeness so that two-way communication can take place properly (Prijanto & Kock, 2021). One of the subjects expected to implement a student-centered learning system is mathematics.

Mathematics is the scientific foundation that is critical to the advancement of modern technology because it can advance human thinking (Panjaitan, 2018). However, students think mathematics is a difficult, boring, and complicated subject (Aprilia & Fitriana, 2022; Maswar, 2019). Some of the students have low motivation to learn mathematics (Gunawan, 2018; Suriani et al., 2021). Motivation is defined as the drive, desire and willingness to activate, direct, and maintain certain habits (Putri et al., 2017). Another reason for mathematic learning limitation is the lack of active role of students during the learning process (Bali, 2020). An interview with a mathematics teacher at one of Yogyakarta's junior high schools revealed a similar statement which stated that when the teacher allowed students to ask questions, of the 32 students there were only 5-7 students who initiate or participate in the discussion about the subject. On the other hand, other students were passive due to a lack of curiosity. Even the reality on the field also shows that the teaching methods implemented make teachers more active than students (Sulistiawati et al., 2015).

Active learning is when students are actively involved by expressing opinions, solving problems, and discussing materials during the learning process (Nurfatimah et al., 2020). This means that students are required to be optimally involved in all aspects of both intellectual, physicalal, and emotional during the learning process (Ramlah et al., 2014). The activeness of student learning can be seen from the visual, aural, listening, writing, drawing, and mental activities aspects. However, these six essential aspects are still lacking. To accomplish this, teachers must implement a learning model that can stimulate students' learning activeness. Students need to be cooperative during learning sessions (Sugiarto & Sumarsono, 2014). The cooperative model has been demonstrated to improve student learning activeness (Fariyani, 2019; Ratieh & Fachrurrozie, 2014; Sofyan & Agustang, 2018; Suparsawan, 2021). Cooperative learning methods include Numbered Heads Together (NHT), Think Pair Share Thinking (TGT), Student Teams-Achievement Divisions (STAD), Jigsaw (Expert Team Model), and others. In addition, other types of cooperative learning models are Inside Outside-Circle, Two Stay Two Strays, Snowball Throwing, Role Playing, Talking Stick, and Make-A Match (Tamrin, 2013). In this study, the learning model implemented is Think Pair Share (TPS).

The selection of the Think Pair Share model is based on a certain problem, which requires a student-focused system to improve students' activity (Faqih, 2019). Students have the opportunity to use the Think Pair Share learning model to think, respond, and present the problems provided by the teacher (Wicaksono et al., 2017). Furthermore, the application of Think Pair Shares allows students to think individually, interact with other students and share information with other students and teachers (Azlina, 2010). There are 3 phases of learning Think Pair Share: 1) the Initiation phase starts with questions submission from the teacher related to the learning material, 2) Students are required to think about the answer to the question independently (Thinking), 3) Teaches commands the students to discuss in a student's group to share their opinion (Pairing), and 4) The last phase is that each student pair shares the results of his thoughts alternately (Sharing)

(Sumbung, 2020). The phases of this Think Pair Share learning method were implemented to further analyze the application of this model. We reported that Think Pair Share has been demonstrated to improve the activeness and learning outcomes of student mathematics (Asrika et al., 2020; Ismah & Justine, 2015). Other studies have also shown that using the Think-Pair-Share can increase the active involvement of students and improve their speaking skills (Syafii, 2018). The study has no satisfying conclusion specifically on the activeness of student learning implemented to the material of the Pythagorean Theorem. This research is intended as an additional reference from previous research related to the application of the Think Pair Share learning model to increase student learning activities.

This study will specifically discuss the latest developments still whether or not the application of the Think Pair Share learning model affects or does not affect the learning of mathematics of the Pythagorean theorem material. The urgency of this research is because in the school that is the subject of the study, it is known that student learning activity tends to be low. With this focus, this study has the potential to find, apply, and develop new ideas in education science application. Therefore, the purpose of this study is to reveal the influence of Think Pair Share learning models on student learning activeness. The comparison will be used in an experimental class. This study used the analysis of the paired sample t-test to identify the effect of applying the Think Pair Share learning model on the activeness of students' mathematics learning. Followed by the analysis of the independent sample t-test to find out which learning models are more influential on the activeness of learning mathematics students.

RESEARCH METHODS

This type of study was an experimental study with pretest posttest control group design. The study was conducted on two-sample classes: experimental class and control class. Students in the experimental class were learning using the Think Pair Share model, while students in the control class using conventional learning models. The population in this study was all class 8 as many as 192 students in one of the junior high schools in Yogyakarta, Indonesia. Sample selection was carried out by purposive sampling. Based on that purposive sampling, this study gathered 32 students belonging to the experimental class and 32 students belonging to the control class. For data collection techniques, we evaluate 15 aspects as the indicators of the activeness of learning mathematics students. The instrument was valid and reliable before it was used for the study. The validity test was calculated using Pearson correlation's Product Moment formula. The validity results of each questionnaire item are presented in Table 1.

Table 1. Results of the Student Learning Activity Questionnaire Validity Test

Aspect	Items	R Count
Visual activities (reading, paying attention)	1	0.669
	2	0.526
Oral activities (expressing opinions, discussions)	3	0.906
	4	0.846
	5	0.975
	6	0.591
Listening activities (listening)	7	0.720
	8	0.756
	9	0.825
Writing activities (taking notes)	10	0.523
	11	0.488
Drawing activities (drawing patterns)	12	0.632
Mental activities (solving problems, analyzing)	13	0.610
	14	0.975
	15	0.807

Based on the results of the test of the validity of the trial class that was calculated using SPSS 20 software and 15 items obtained for all grades, the student's learning activeness instrument was reported to be statistically valid. Furthermore, the reliability test was carried out with Cronbach's Alpha test. Based on the results of the trial class reliability test calculated using SPSS 20, obtained the value of r Cronbach's Alpha (is 0.775, while the value of the r table with a significance of 0.05 and $df = N - 2 = 15 - 2 = 13$ is 0.3494. Because then the data was reliable, the student learning activeness instruments can be further used for the study.

To compare the impact of the Think Pair Share learning method, the activeness of learning mathematics students at the beginning and end were then analyzed and compared. The analysis of the data used in this study initiated with the analysis Prerequisite test to determine the normality and homogeneity of the data, then followed by paired sample t-tests, and independent t-test tests. Testing with paired sample t-tests was used to determine if there is statistical effect of applying learning models in control class and experiments on the activeness of student learning. Testing with an independent sample t-test was used to analyze which learning model was more influential on the activeness of student learning.

RESEARCH RESULTS

The study's findings were achieved by employing the instrument of the activeness of studying mathematics students on the content of Pythagoras' theorem. Students were invited to complete a questionnaire on the learning activity. According to statistical analysis, the Think Pair Share learning approach outperformed traditional learning models. It has the potential to increase the activeness of student mathematics learning. Prerequisite tests and hypothesis tests are statistical tests used to assess their impact.

1. Analysis Prerequisite Test

Hypothesis testing will be performed only if data match the criteria of the analysis requirements. It is important to statistically calculate the influence of the Think Pair Share learning model on the activeness of student learning, namely the data on the activeness of learning mathematics students in control class and experimental class must meet two assumptions, namely normal and homogeneous.

a. Normality Test

The data distribution was determined using a normality test. The normality test analyzes the activeness of students' learning before and after being given treatment, both in experimental and control classes. The data was analyzed using the help of SPSS 20 for Windows software with Kolmogorov Smirnov's normality test. Table 2 shows the results of the normality test.

Table 2. Normality Test Results

Valuation	Sig.	Test
The activeness of studying experimental class (early)	0,338	Normal
The activeness of learning control class (beginning)	0,255	Normal
The activeness of studying experimental class (end)	0,334	Normal
The activeness of control class learning (end)	0,271	Normal

Table 2 shows that all significance scores for the student's mathematics learning activeness questionnaire in the experimental class and control class are normally distributed (significance > 0.05). As a result, the conditions of the initial analysis are satisfied.

b. Homogeneity Test

Another assumption for prerequisites of analysis is that the data must be homogeneous. As for processed using the homogeneity test are student learning activity data before and after treatment, both in the control and experimental classes. The data was analyzed using the box's M homogeneity test assisted by SPSS 20 for the Windows software program. Table 3 shows the results of the homogeneity test.

Table 3. Results of the Homogeneity Test of Learning Activity Questionnaire

Aspect	Box's M	F	Sig.
Early learning activeness	5,686	1,829	0,139
The activeness of the final learning	3,408	1,096	0,349

Based on Table 3, it was revealed that the data of the initial learning activeness questionnaire (before treatment) has a Box's M value of 5,686 with a significance of 0.139. Therefore, the data on the activeness of learning mathematics of early students in experimental class and control class was homogeneous. Table 2 also shows that the final learning activeness questionnaire data (after treatment) obtained a Box's M value of 3,408 with a significance of 0.349. Therefore, the data on the activeness of learning mathematics of the final students in the experimental class and control class is homogeneous. Based on the prerequisite test analysis that has been carried out, where all data has been distributed normally and homogeneously, the data analysis can proceed to the hypothesis test.

2. Paired Sample t-Test

The paired sample t-Test test was performed to calculate if there was no influence on the application of Think Pair Share learning models in experimental class and traditional/conventional learning models in control class on the activeness of student learning. This test takes into account the average math learning activeness data in the control class and experimental class. Paired sample t-test testing was analyzed using SPSS 20 software for windows.

a. The effect of the Think Pair Share model on students' learning activeness

This test was conducted using data on the activeness of learning mathematics before and after the application of the Think Pair Share learning model in the experimental class. The hypotheses used in this test are:

H_0: The use of the Think Pair Share learning models has no effect on the activeness of student learning.
Ha: The use of the Think Pair Share learning models has an effect on the activeness of student learning.

The condition of the hypothesis test is if it is sig. 2 tailed > 0.05 then H0 is accepted and if it is sig. 2 tailed < 0.05 then H_0 is rejected.

The results of the statistical analysis obtained a sig value. 2 tailed (0.000< 0.005) and t count > t table (15.225 > 2.040), meaning that H_0 is rejected. This means that there is a difference of the student activity average grade before treatment and after treatment in the experimental class. The average score of student activity before treatment is 52.13 while the average value of student activity after treatment is 77.44. This shows an increase from before treatment until after treatment with the Think Pair Share learning model of 25.31. This concluded that the application of the cooperative Think Pair Share model affects the activeness of student learning.

b. The influence of conventional learning models on student learning activeness

This test was conducted using math learning activeness data before and after the application of conventional learning models in the control class. The hypotheses used in this test are:

H_0: The use of conventional models has no effect on the activeness of student learning.
Ha: The use of conventional models has an effect on the activeness of student learning.

The condition of the hypothesis test is if it is sig. 2 tailed > 0.05 then H0 is accepted and if it is sig. 2 tailed < 0.05 then H_0 is rejected.

The results obtained a sig value. 2 tailed (0.000< 0.005) and t count > t table (11.897 > 2.040), meaning H_0 is rejected. This means that there is a difference of the student activity average grade before treatment and after treatment in the control group. The average score of student learning activity before treatment is 49.00 while the average score of student learning liveliness after treatment is 64.78. This shows an increase from before the treatment until after the treatment with the conventional learning model is 15.78. Thus it can be concluded that the application of conventional models affects the activeness of student learning.

Based on the paired sample t-test, it is revealed that both learning models affect the activeness of student learning. For this reason, further statistical analysis was continued to find out which learning models are more influential on the activeness of student learning. This test is followed by an independent sample t-test.

3. Independent Sample t-Test

Independent sample t-Test testing is a continuation of the paired sample t-test in the previous section. This test was used to determine learning models that was more influential on student learning liveliness, between the application of the Think Pair Share cooperative model and conventional learning models. The test was conducted using an independent sample t-Test test with the help of SPSS 20 for windows software. The hypotheses in this test are:

H_0: There was no difference in the mean value activeness of the final student's learning in the experimental class and control class.

Ha: There is a difference in the mean value activeness of the final student's learning in experimental class and control class.

The hypothesis test criterion is that if it is sig. 2 tailed > 0.05, H_0 is accepted, and if it is sig. 2 tailed 0.05, H_0 is rejected. The data tested are the results of the distribution of mathematics learning triggered surveys following the treatment of the cooperative Think Pair Share model and the conventional learning model. The results show that the t value > t table score (3,766 > 1,998) with a significance value (0.001 < 0.05) then H_0 is rejected. This means that there is a difference in the mean value activeness of students' learning in the experimental class and control class. Therefore, the class that implemented the cooperative Think Pair Share model was more influential than the class with conventional learning models in the activeness of learning mathematics students.

Based on the hypothesis test, it was discovered that the application of the cooperative Think Pair Share model affects the activeness of student learning. In addition, the application of the cooperative model is also more influential than conventional learning models on the activeness of student learning.

DISCUSSION

This study applies the Think Pair Share learning model and the conventional model to learn mathematics under a theme Pythagorean Theorem in fourth grade. The things investigated in this study include the influence of the Think Pair Share model and the conventional model on the activeness of learning mathematics students and determining which model is more influential on the activeness of learning mathematics.

Based on the results of the statistical analysis, it concluded that there were significant differences in the activeness of mathematics learning using Think Pair Share learning models and conventional learning models. From the results of further tests reported that learning with the Think Pair Share model had more effect on the activeness of learning mathematics in the Pythagoras Theorem material.

Learning mathematics with the Think Pair Share model is also analyzing the active aspect of learning mathematics that is analyzed from questionnaire of 15 questions. The questionnaire distributed to students to study all aspects of student learning activeness. The aspects are: visual activities (2 items) that indicated by students enthusiasm to pay attention to the explanations by teachers and other students; oral activities (4 items) that indicated by students' eagerness of expressing opinions, asking questions, advising, and discussing each other to solve problems delivered by teachers; listening activities (3 items) that indicated by students' willingness to listen teacher's or other students' opinions during discussion and presentation; and writing activities (2 items) that indicated by the quality of submitted writing assignment of the students, writing discussion results, and writing learning materials submitted by teachers; and drawing activities (1 item) that indicated by students' ability to describe patterns according to instructions on the question, and mental activities (3 items) that indicated by of students' willingness to solve problems, deliver a presentation, and discuss with other students. The difference results of student learning activity based on the questionnaire before and after treatment in control class and experiments is presented in Figure 1.

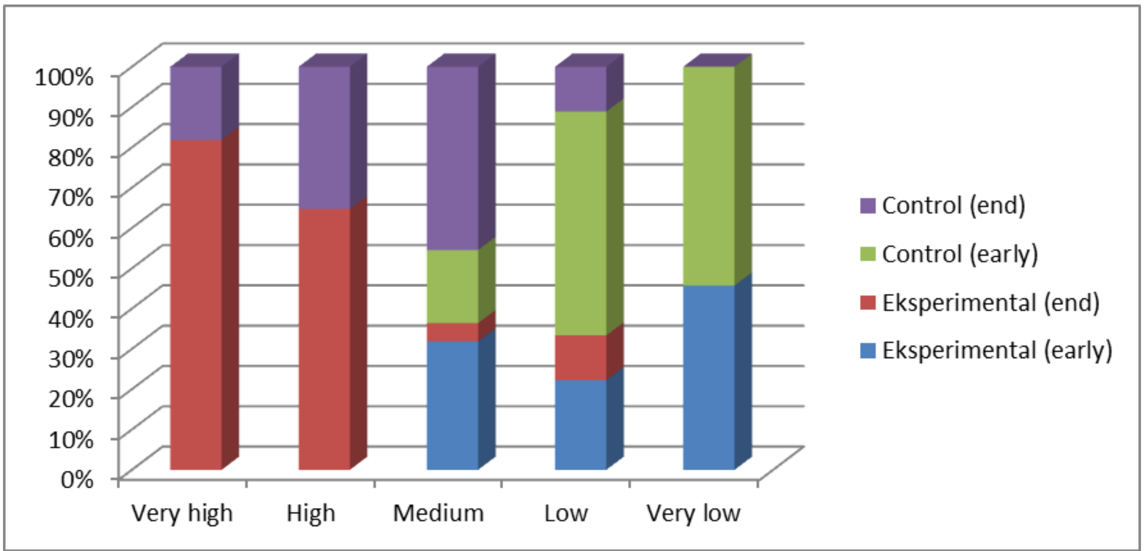

Figure 1. Comparison of Student Learning Activeness

Figure 1 reported that in the experimental class, the number of students who increased their learning activeness after being learned using the Think Pair Share was more than in the control class that used conventional models.

Then the results of the individual student's thoughts are discussed in pairs with tablemates (pairs). Furthermore, the results of the paired discussion were delivered as presentation (share) to other students in front of the class. At the time of this the presentation, other students can ask or express their opinions if the answer is different from the group of students who are presenting in front of them. The result of this discussion then becomes their capital in solving other problems individually.

In this study, the use of Think Pair Share learning models is known to have a significant effect on improving students' learning liveliness. This has been demonstrated from the result that the number of students in the experimental class was significantly increased after the implementation of Think Pair Share. This is because the application of the Think Pair Share learning model provides opportunities for students to think deeply and be able to help each other. In addition, Think Pair Share is a cooperative learning model that has explicit procedures and gives students more time to think deeply about what is explained or experienced (thinking, answering, and helping each other) (Ajhar et al., 2020; Nur, 2017; Widati, 2016). Furthermore, the statistical analysis of the Think Pair Share model was lead us to the following results:

1. Differences in the influence of the Think Pair Share learning model

The differences in the influence of Think Pair Share models and conventional models on mathematics learning are analyzed with the paired sample t-Test test. The findings revealed an increase in the activeness element of learning mathematics before and after the deployment of Think Pair Share learning models and conventional learning models. The rise in activity of learning mathematics in the classroom implemented by the Think Pair Share model, on the other hand, is more than in the class implemented by the conventional model. This indicates the influence of the Think Pair Share model on the activeness of learning mathematics.

2. More influential learning models

According to the findings of an independent sample t-Test analysis, the activeness of student learning in Think Pair Share learning models and conventional learning models differed considerably. The findings also revealed that learning mathematics using the Think Pair Share learning model had a greater impact on the activeness of mathematics learning than traditional learning models. The use of the Think Pair Share learning model was found to be more influential on the activeness of mathematics learning than standard learning methods.

Think pair share is used to implement the cooperative learning model was successfully increase student learning motivation. Several other studies have also reported the significant differences before and after the application of the model to student learning motivation (Abdi & Hasanuddin, 2018; Puspitasari et al., 2016; Tembang et al., 2017; Wahyuning et al., 2019). The study conducted is a reinforcement of the results of a previous study related to the influence of the Think Pair Share learning model implemented in mathematics learning on the activeness of students' learning.

CONCLUSIONS AND SUGGESTIONS

The hypothesis of the Think Pair Share model affects the activeness of student learning is accepted. In addition, the application of the cooperative model is also more influential than conventional learning models to improve the activeness of the students. This is because the implementation of the cooperative Think Pair Share model provides opportunities for students to think, respond, and delivered their opinion using presentations about the mathematics problems so that students are fully involved during the mathematics learning process. Because the purpose of this study is to determine the increase in student learning activity using the think pair share learning model at one of Yogyakarta's public junior high schools, the findings cannot be extended to all Yogyakarta junior high school students. As a result, recommendations for more study might be carried out at many schools. Student learning activity can be boosted by employing different cooperative models, not only one school, and can be further improved if there are additional competences that can increase the usage of the model.

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