

The Effect Of The Think Pair Share Learning Model On Mathematics Learning Outcomes

Yunita Hariyani¹, Nur Cahyani Putri², Irfan Mujahidin³

¹STKIP PGRI Bangkalan, Indonesia; yunita@stkip PGRI-bkl.ac.id (Corresponden)

²STKIP PGRI Bangkalan, Indonesia; nurcahyani Putri662@gmail.com;

³STAI Publisistik Thawalib Jakarta, Indonesia; irfanmujahidin86@gmail.com

ABSTRACT

Background	Teachers do not demonstrate sufficient creativity in designing Mathematics problems, resulting in limited variation of questions given to students. The lecture method reduces students' motivation, causing them to become quickly bored and disengaged. Even during explanations, some students do not pay serious attention to the lesson and instead engage in conversations with their peers. Due to boredom, students eventually focus on their own activities and ignore the teacher. Therefore, a learning method that can enhance student achievement and maximize learning outcomes is needed.
Purpose	This study aims to determine the effect of the Think-Pair-Share learning model on the learning outcomes of sixth-grade students in Mathematics at SDN Sanggra'agung 1.
Research Methodology	This research is a quantitative study using a one-group pretest-posttest design. Data were collected using test instruments, specifically in the form of comprehension questions.
Result	The results of the study indicate that the paired sample t-test analysis yielded a significance value of $0.000 < 0.05$, which leads to the conclusion that the Think-Pair-Share learning model has a significant effect on student learning outcomes. The analysis of the effect of the Think-Pair-Share learning model on Mathematics learning outcomes of sixth-grade students at SDN Sanggra'agung 1 shows that there is a significant effect. The paired sample t-test revealed a significance value (2-tailed) of $0.000 < 0.05$, indicating that the Think-Pair-Share model positively influences student learning outcomes.
Conclusion	The Think-Pair-Share learning model significantly affects sixth-grade students' Mathematics learning outcomes at SDN Sanggra'agung 1 based on the t-test results analysis.
Keywords	Learning Model, Think-Pair-Share, Learning Outcomes, Mathematics



This Work Is licensed under a Creative Commons Attribution 4.0 International License

INTRODUCTION

A learning model serves as a conceptual framework that provides a structured depiction of the steps involved in planning and organizing instruction, thereby creating a learning experience that enables students to achieve desired learning outcomes. A model acts as a guideline for designing educational programs and implementing instructional planning and execution, illustrating how the learning process should be conducted. The Think-Pair-Share (TPS) learning model allows students extended time to think critically and creatively as they solve problems individually and collaboratively, taking responsibility for their learning. This approach fosters an engaging and non-monotonous learning environment. Students are not only given opportunities to assist each other academically but also to develop social skills, enabling group members to motivate one another and enhance learning outcomes (Sumarsya & Ahmad, 2020). By presenting the results of their discussions to peers, TPS encourages collaboration, idea sharing, and confidence in diverse learning situations.

Mathematics serves as a foundation and driving force behind the development of modern technology and scientific advancement due to its universal applicability in everyday life (Islam et al., 2021). Mastery of fundamental mathematical concepts from early education is crucial for understanding more complex topics in secondary and higher education (Pambudi, 2022). Early mathematics learning also supports the development of essential cognitive skills, including problem-solving, logical reasoning, and independent learning, which contribute not only to mathematics achievement but also to overall academic growth (Najoan et al., 2024). By understanding numerical concepts, basic arithmetic operations, and developing number sense, students can better prepare for future academic success. Effective instructional media and appropriate teaching approaches can significantly enhance these foundational skills, making learning more meaningful and optimizing outcomes (Anggo et al., 2025).

Furthermore, innovative teaching methods such as Cooperative Learning, Outdoor Learning, and Realistic Problem-Based Learning (R-PBL) have been shown to improve student motivation, engagement, and achievement in mathematics (Anugraheni et al., 2025). The integration of technology and digital learning resources can further enrich the learning experience and deepen understanding, for example through virtual learning environments and digital game-based learning (Chen et al., 2015). The effectiveness of mathematics instruction heavily relies on teacher preparedness, including professional development and in-depth content knowledge (Cardetti & Truxaw, 2014). Early mathematics learning also facilitates the timely identification of learning difficulties, allowing for targeted interventions that maximize student potential (Benitez et al., 2022). This approach makes mathematics learning more relevant, interactive, and supportive of students' cognitive and academic development.

Based on classroom observations at SDN Sanggra'agung 1, students' learning achievements were found to be relatively low, with an average score of only 60.8. Out of the students observed, only six exceeded the Minimum Competency Criteria (KKM), while nine had not yet reached the standard. Traditional lecture-based methods have proven insufficient for helping students fully understand the material, often making lessons monotonous and less engaging, thereby reducing learning effectiveness. The TPS model, however, offers an alternative that encourages students to think critically and creatively and to collaborate effectively in groups, potentially improving mathematics learning outcomes.

The Think-Pair-Share (TPS) learning model has been widely recognized as an effective cooperative learning strategy in improving students' mathematics learning outcomes. TPS encourages students to think independently, discuss ideas with peers, and share their understanding with the whole class, creating an active and collaborative learning environment. Previous studies revealed that TPS significantly improves students' mathematical understanding, communication skills, and classroom participation. The TPS model positively affected mathematics learning achievement in elementary schools (Ardiyani et al., 2019). Students taught using

TPS obtained better learning outcomes compared to those taught through conventional methods (Ningsih, 2019). TPS also supports active interaction in mathematics instruction and increases students' participation during classroom learning activities (Tanujaya & Mumu, 2019). Furthermore, TPS improved students' mathematics performance and engagement during learning activities (Akanmu, 2019).

The effectiveness of the Think-Pair-Share model is also supported by research highlighting its influence on students' confidence, self-efficacy, and mathematical communication skills. TPS contributes positively to students' self-efficacy in mathematics learning because students are actively involved in discussing and solving problems collaboratively (Nugraha et al., 2018). TPS also enhances mathematical communication skills through structured peer interaction and class discussions (Irma et al., 2020). Combining TPS with a problem-solving approach significantly improved students' mathematical communication abilities (Samsuriadi & Imron, 2019). In addition, TPS produced better mathematics learning outcomes among elementary school students compared to the Numbered Heads Together learning model (Baskoro, 2020). These findings indicate that TPS is an innovative and effective learning model for improving the quality of mathematics education.

The study titled "The Effect of Think-Pair-Share on Elementary School Students' Learning Outcomes" was an initial investigation conducted by Laylatus Sholichah, Ery Rahmawati, and Galuh Kartika Dewi. This study aimed to examine student learning activities and the effect of implementing the TPS learning model on sixth-grade students' academic performance in elementary school. The research employed a quantitative experimental design with pre-test and post-test measurements, allowing comparison of student learning outcomes before and after TPS implementation. The study is expected to provide insights into how TPS can enhance student engagement, critical thinking skills, and conceptual understanding of mathematics. Additionally, it aims to offer practical solutions to challenges in the mathematics learning process. Focusing on sixth-grade students at SDN Sanggra'agung 1, the results are anticipated to serve as a reference for teachers to effectively implement the TPS model in mathematics instruction, thereby significantly improving student learning outcomes.

RESEARCH METHODOLOGY

This study employed a quantitative approach, where data were collected and analyzed in numerical form. The primary focus of the research was not to compare variables within a single sample, but rather to examine the relationship between variables. The objective of the study was to determine the extent to which the Think-Pair-Share (TPS) learning model influences the learning outcomes of sixth-grade students at SDN Sanggra'agung 1. Therefore, the research was conducted using an experimental design. Specifically, a one-group pre-test and post-test design was employed to collect essential information. The study began with a pre-test conducted before students received instruction using the TPS technique and concluded with a post-test after the completion of the learning process. The research was conducted at SDN Sanggra'agung 1, located on Jln Muragung, Meragung Village, Sanggra'agung Hamlet, Socah District, Bangkalan Regency, East Java Province. The population consisted of all sixth-grade students at SDN Sanggra'agung 1, totaling 15 students in a single class. The sample included the entire population, making it a saturated (census) sample, where every member of the population was included in the study. Therefore, the analysis focused on all 15 sixth-grade students at SDN Sanggra'agung 1.

Before using the instruments, it was essential to conduct a pretest to assess the validity, reliability, and normality of the test items. Validity ensures that a test measures what it is intended to measure, reflecting the accuracy of the instrument (Padang & Sumatera, 2019). Each item in the pre-test and post-test, as well as the criteria for any subsequent scoring, was evaluated as part of the validity assessment. Reliability reflects the degree of confidence in the results obtained using the instrument. It is indicated by the consistency of scores

achieved by the same subjects when measured with the same or similar instruments under different conditions. The researchers used SPSS to assess the reliability of the data, with Cronbach's Alpha (α) > 0.05 considered acceptable.

Normality testing was conducted to determine whether the data followed a normal distribution. In other words, normality testing aims to evaluate whether the field data conforms to a specific theoretical distribution (Haniah, 2013). The paired sample t-test was used as the statistical method to determine whether there were significant differences between the pre-test and post-test scores. This test aimed to examine whether the implementation of the TPS learning model significantly affected the mathematics abilities of sixth-grade students at SDN Sanggra'agung 1.

RESULT AND DISCUSSION

The participants in this study were 15 sixth-grade students from SDN Sanggra'agung 1, who took part in a single instructional session. The research data were analyzed using IBM SPSS for Windows version 21.0 through several procedures, including validity testing, reliability testing, normality testing, and the paired sample t-test. These analyses were conducted to answer the research questions and provide empirical evidence for the hypotheses. The main objective was to determine the effect of the Think-Pair-Share (TPS) learning model on the mathematics learning outcomes of sixth-grade students at SDN Sanggra'agung 1. To assess the validity of the instrument, a pretest comprising 22 items was administered to 17 sixth-grade students at SDN Parseh 3. The analysis was performed using IBM SPSS for Windows version 21.0. The results indicated that 11 items were valid, while 11 items were invalid. An item was considered valid if the calculated correlation coefficient (r_{count}) exceeded the critical value (r_{table}).

Table 1. Reliability Test Results

Reliability Statistics

Cronbach's Alpha	N of Items
,925	10

Following the validity test, reliability testing was conducted to assess the consistency of the instrument. The instrument was considered reliable if Cronbach's Alpha (α) exceeded the critical value. The reliability test yielded a Cronbach's Alpha of 0.925, which is greater than the r_{table} value of 0.514. Therefore, according to the reliability criteria, the learning comprehension test was deemed reliable. Based on the validity and reliability tests, 10 items were selected for use in the study. Normality testing was conducted to determine whether the measurement instrument exhibited a normal distribution. The normality test yielded a significance value of 0.468, which is greater than 0.05, indicating that the data were normally distributed. The paired sample t-test was then conducted using IBM SPSS version 21.0 to determine whether there was a significant difference between pre-test and post-test scores. The results indicated a significant difference in students' learning comprehension, with a significance value of 0.000, which is less than 0.05. Therefore, it can be concluded that the TPS learning model has a significant effect on the mathematics learning outcomes of sixth-grade students at SDN Sanggra'agung 1.

Table 2. Paired Sample T-Test Results

		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference		t	df	Sig. (2-tailed)
					Paired Differences				
					Lower	Upper			
Pair 1	PRE TEST - POST TEST	-35,33333	23,86470	6,16184	-48,54916	-22,11750	-5,734	14	,000

Think-Pair-Share (TPS) is an active learning strategy designed to enhance student engagement and understanding through a structured process that involves individual thinking, paired discussion, and class-wide sharing. This strategy encourages students to reflect on their knowledge, collaborate with peers, and participate in broader classroom discussions (Deore & Arora, 2022). TPS has also been shown to be effective in improving problem-solving skills in technical mathematics courses (Alsmadi et al., 2023). Positive student perceptions of TPS have been documented through surveys and focus group discussions, where students reported increased conceptual understanding and classroom participation (Mundelsee & Jurkowski, 2021). Additionally, various TPS modifications have been developed to address specific educational needs, such as Think-Write-Pair-Share (TWPS), which has proven effective in enhancing ESL students' writing skills (Naim et al., 2020), and Think-Pair-Four-Share (T24S), which has shown efficacy in addressing complex problems in computer science courses (Dol, 2021). These adaptations highlight TPS's flexibility as an approach to enhance student interaction and learning outcomes.

The Think-Pair-Share (TPS) learning model has been empirically shown to significantly improve student learning outcomes across various subjects, including civic education (PPKn), mathematics, and computer science. TPS encourages students to think individually (think), discuss in pairs (pair), and share the results of their discussions with the class (share), thereby creating an interactive and participatory learning process. Research in civic education indicates that TPS implementation significantly enhances students' understanding and academic performance (Wuryandani & Herwin, 2021). Moreover, TPS has been demonstrated to improve problem-solving skills in technical mathematics courses, where students analyze problems, discuss solutions, and collaboratively find answers (Alsmadi et al., 2023). The model also enhances communication skills, as students are given structured opportunities to discuss and present their ideas. In studies involving prospective primary school teachers, TPS significantly increased student participation and communication skills (Nurulaeni & Ismaniati, 2019), making it an effective method for supporting academic achievement and the development of soft skills.

TPS is highly flexible and can be adapted to various classroom conditions and group sizes. For example, modifying TPS from pairs to groups of three has been shown to be practical while maintaining effectiveness in increasing student participation (Maisyura et al., 2018). Technology integration further strengthens TPS's effectiveness; for instance, the use of platforms such as Nearpod can enhance student engagement and facilitate instructional delivery and feedback (Mufassaroh et al., 2025). The success of TPS also relies on careful planning and activity design. Questions posed must stimulate critical thinking and provoke discussion, while clear logistics and instructions are essential for the smooth execution of each phase (think, pair, share). Continuous assessment through observation and feedback allows teachers to evaluate TPS effectiveness and make necessary adjustments (Prah, 2017). Consequently, TPS not only improves academic learning outcomes but also fosters the comprehensive development of students' social, communication, and critical thinking skills.

CONCLUSION

Based on the results of the research and hypothesis testing regarding the effect of the Think-Pair-Share (TPS) learning model on the mathematics learning outcomes of Grade VI students at SDN Sanggra'agung 1, several key findings were obtained. Data analysis indicates that the implementation of the TPS learning model has a positive impact on students' mathematics learning outcomes. This is evidenced by the paired sample t-test, in which the significance value (2-tailed) was 0.000, which is less than 0.05. This result demonstrates a significant effect of the TPS learning model on the improvement of students' learning outcomes. The TPS learning model encourages students to first think individually (think), then discuss with a partner (pair), and finally share the discussion results with the entire class (share). This process allows students to develop critical thinking skills, enhance conceptual understanding, and build confidence in presenting their answers. Moreover, the model creates an interactive and collaborative learning environment, thereby increasing students' motivation and participation in mathematics learning. These findings align with cooperative learning theories that emphasize the importance of student interaction in deepening content understanding. Thus, the use of the Think-Pair-Share model has been proven effective in improving the mathematics learning outcomes of Grade VI students. Therefore, teachers are recommended to implement this learning model routinely as a strategy capable of enhancing both learning quality and students' critical thinking skills. This conclusion provides a foundation for the development of more interactive and student-centered learning methods.

This study contributes to the development of interactive and student-centered learning strategies by proving that the Think-Pair-Share (TPS) learning model effectively improves mathematics learning outcomes and students' critical thinking skills in elementary education. The findings highlight the importance of collaborative learning activities that encourage active participation, confidence, and conceptual understanding among students. However, this research was limited to one class and one school, using a one-group pretest-posttest design without a control group, so the generalization of the findings remains limited. Future studies are recommended to involve larger samples, different educational levels, and experimental designs with control groups to obtain more comprehensive results. In conclusion, the TPS learning model can be considered an effective and innovative approach for improving mathematics learning outcomes and creating more meaningful classroom learning experiences.

ACKNOWLEDGEMENT

I would like to express my utmost gratitude to God Almighty for His blessings and grace, which have allowed this research to be completed successfully. I sincerely thank all parties who have provided support, assistance, and guidance throughout this research process. My gratitude goes to the principal and all teachers of SDN Sanggra'agung 1 for granting permission and providing facilities for the research, enabling it to run smoothly. I also extend my thanks to the Grade VI students who willingly participated as research respondents with dedication, ensuring complete and valid data. I am especially grateful to my academic supervisor for their invaluable guidance, suggestions, and motivation during the preparation of this research. Their mentorship greatly enhanced the quality of this study and my understanding of the researched material. Additionally, I thank my family and friends for their moral support, encouragement, and prayers, which helped me complete this research successfully. Finally, I acknowledge that this study is not without limitations, and I welcome constructive criticism and suggestions from readers to improve future research endeavors.

AUTHORS' CONTRIBUTION

Author 1 : Contributed to the research implementation, data collection process, preparation of research instruments, and initial drafting of the manuscript

- Author 2 : Contributed to the research design, methodological supervision, data analysis, interpretation of findings, and manuscript revision as the corresponding author.
- Author 3 : Contributed to the theoretical framework development, validation of research instruments, discussion of results, and final editing of the manuscript.

REFERENCE

- Akanmu, M. A. (2019). Effects of think-pair-share on senior school students' performance in mathematics in Ilorin, Nigeria. *African Journal of Educational Studies in Mathematics and Sciences*, 15(2), 107-116.
- Alsmadi, M. A., Tabieh, A. A. S., Alsaifi, R. M., & Al-Nawaiseh, S. J. (2023). The effect of the collaborative discussion strategy think-pair-share on developing students' skills in solving engineering mathematical problems. *European Journal of Educational Research*, 12(2), 1123–1135. <https://doi.org/10.12973/eujer.12.2.1123>
- Anggo, M., Kurniasari, M., & Kansil, Y. E. Y. (2025). Development of mathematics learning media for number sense learning of elementary school students. *AIP Conference Proceedings*, 3038(1), 020024. <https://doi.org/10.1063/5.0254504>
- Anugraheni, I., Gufron, A., & Purnomo, Y. W. (2025). The impact of realistic problem-based learning on mathematical connection abilities: Evidence from elementary schools in Indonesia. *Cogent Education*, 12(1), 2523078. <https://doi.org/10.1080/2331186X.2025.2523078>
- Ardiyani, S. M., Gunarhadi, G., & Riyadi, R. (2019). The impact of think pair share model on mathematics learning in elementary schools. *Journal of Education and Learning (EduLearn)*, 13(1), 93-97. <https://doi.org/10.11591/edulearn.v13i1.8427>
- Baskoro, R. A. (2021). The Comparison of Numbered Head Together Learning Models and Think Pair Share in terms of Elementary School Mathematics Learning Outcomes. *International Journal of Elementary Education*, 4(4), 549–557. <https://doi.org/10.23887/ijee.v4i4.32568>
- Benítez, Y. R., Ruiz, F. B., Vanega, S. A., Morales, R. M. J., & Monteagudo, B. B. (2022). Basic numerical abilities and their influence on early grade school arithmetic skills. *Universidad y Sociedad*, 14(4), 612–622.
- Cardetti, F., & Truxaw, M. P. (2014). Toward improving the mathematics preparation of elementary preservice teachers. *School Science and Mathematics*, 114(1), 1–9. <https://doi.org/10.1111/ssm.12047>
- Chen, H.-R., Liao, K.-C., & Chang, J.-J. (2015). Design of digital game-based learning system for elementary mathematics problem solving. In *2015 8th International Conference on Ubi-Media Computing, UMEDIA 2015 – Conference Proceedings* (pp. 303–307). IEEE. <https://doi.org/10.1109/UMEDIA.2015.7297475>
- Deore, M., & Arora, S. (2022). Effective Think-Pair-Share pedagogical strategy to improve inferential statistics concept understanding. *Journal of Engineering Education Transformations*, 36(Special Issue 1), 25–32.
- Dol, S. M. (2021). T24S vs TPS. *Journal of Engineering Education Transformations*, 34(Special Issue), 725–732. <https://doi.org/10.16920/jeet/2021/v34i0/157173>
- Haniah, N. (2013). Uji normalitas dengan metode Liliefors. *Statistika Pendidikan*, 1, 1–17.
- Irma, A., Juandi, D., Dahlan, J. A., & Nirawati, R. (2020). The effect of think-pair-share cooperative learning on student mathematical communication skills. *Journal of Physics: Conference Series*, 1521(3), 032033. <https://doi.org/10.1088/1742-6596/1521/3/032033>

- Islam, U., Sunan, N., & Yogyakarta, K. (2021). Pembelajaran daring pada mata pelajaran matematika sekolah dasar. 5(1), 141–155.
- Maisyura, Zubainur, C. M., & Abidin, T. F. (2018). The quality of mathematics learning material using a modification of Think Pair Share (TPS) model. *Journal of Physics: Conference Series*, 1088, 012097. <https://doi.org/10.1088/1742-6596/1088/1/012097>
- Mufassaroh, M. L., Joyoatmojo, S., & Noviani, L. (2025). Does the integration of think-pair-share and Nearpod affect student participation and learning outcomes in senior high school? *Multidisciplinary Science Journal*, 7(11), e2025606. <https://doi.org/10.31893/multiscience.2025606>
- Mundelsee, L., & Jurkowski, S. (2021). Think and pair before share: Effects of collaboration on students' in-class participation. *Learning and Individual Differences*, 88, 102015. <https://doi.org/10.1016/j.lindif.2021.102015>
- Naim, I. A. M., Luqman, N. M. A. N., & Matmin, J. (2020). Enhancing students' writing performance in higher learning through Think-Write-Pair-Share: An experimental study. *Asian Journal of University Education*, 16(3), 255–264. <https://doi.org/10.24191/ajue.v16i3.8396>
- Najoan, R. A. O., Kumolontang, D. F., Ester, K., Tarusu, D. T., Setiawan, B., & Iasha, V. (2024). Impact of the team-assisted individualization learning model on mathematical problem-solving, communication, and self-regulated learning. *International Journal of Innovative Research and Scientific Studies*, 7(2), 409–419. <https://doi.org/10.53894/ijirss.v7i2.2645>
- Ningsih, Y. (2019, November). The Use of Cooperative Learning Models Think Pair Share in Mathematics Learning. In *Journal of Physics: Conference Series* (Vol. 1387, No. 1, p. 012144). IOP Publishing. <https://doi.org/10.1088/1742-6596/1387/1/012144>
- Nugraha, D. Y., Ikram, A., Anhar, F. N., Ningsi Sam, I. S., Putri, I. N., Akbar, M., & Ridfah, A. (2018). The influence of cooperative learning model type think pair share in improving self efficacy of students junior high school on mathematics subjects. *Journal of Physics: Conference Series*, 1028(1), 012142. <https://doi.org/10.1088/1742-6596/1028/1/012142>
- Nurulaeni, F., & Ismaniati, C. (2019). Think-Pair-Share model: Improving activeness and communication skills of prospective elementary school teachers. *Journal of Physics: Conference Series*, 1233, 012081. <https://doi.org/10.1088/1742-6596/1233/1/012081>
- Padang, U. N., & Sumatera, W. (2019). Validitas dan reliabilitas alat ukur, 1–11.
- Pambudi, D. S. (2022). The effect of outdoor learning method on elementary students motivation and achievement in geometry. *International Journal of Instruction*, 15(1), 747–764. <https://doi.org/10.29333/iji.2022.15143a>
- Prahl, K. (2017). Best practices for the think-pair-share active-learning technique. *The American Biology Teacher*, 79(1), 3–8. <https://doi.org/10.1525/abt.2017.79.1.3>
- Samsuriadi, S., & Imron, M. A. (2019). The effect of think pair share (TPS) learning model with problem solving approach on the student's math communication in MA DA Jarowaru. *Malikussaleh Journal of Mathematics Learning (MJML)*, 2(1), 9-12. <https://doi.org/10.29103/mjml.v2i1.2125>
- Sumarsya, C. V., & Ahmad, S. (2020). Think Pair Share sebagai model untuk meningkatkan motivasi peserta didik dalam pembelajaran. 4, 1374–1387.
- Tanujaya, B., & Mumu, J. (2019). Implementation of think-pair-share to mathematics instruction. *Journal of Education and Learning (EduLearn)*, 13(4), 510-517. <https://doi.org/10.11591/edulearn.v13i4.14353>

Wuryandani, W., & Herwin. (2021). The effect of the think–pair–share model on learning outcomes of civics in elementary school students. *Cypriot Journal of Educational Sciences*, 16(2), 627–640. <https://doi.org/10.18844/CJES.V16I2.5640>