

The Effect of the Think-Pair-Share (TPS) Learning Model on the Mathematical Problem-Solving Ability of Grade VII Students

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Abstract

The low achievement of students' mathematical problem-solving abilities is frequently caused by the perception that mathematics is an abstract and difficult subject, particularly regarding seventh-grade algebraic material. Conventional learning processes tend to make students passive in constructing their own understanding. Therefore, an instructional model is required that can stimulate student independence, collaboration, and critical thinking skills through systematic problem-solving stages. This study aims to determine whether or not there is a significant influence of implementing the Think-Pair-Share (TPS) learning model on the mathematical problem-solving ability of seventh-grade students on algebraic material. This study used a quantitative approach with a Quasi-Experimental research type, utilizing the Nonequivalent Control Group Design. The data collection instrument consisted of mathematical problem-solving essay tests designed based on Polya's stages. The final data analysis technique used for hypothesis testing was the non-parametric statistical Mann-Whitney U Test. Based on the results of data analysis, it can be concluded that the implementation of the Think-Pair-Share (TPS) learning model shows a significant influence on the mathematical problem-solving ability of seventh-grade students on algebraic material.

Keywords

Think-Pair-Share (TPS); Mathematical Problem-Solving; Algebra



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INTRODUCTION

Mathematics is a fundamental science crucial for developing logical, critical, and systematic thinking. However, many students perceive it as difficult, leading to low engagement. This study investigates the effectiveness of the Think-Pair-Share (TPS) model in addressing these challenges, specifically in algebra. TPS is a cooperative learning model that facilitates active participation through thinking, pairing, and sharing (Lyman, 1981). Unlike conventional methods, TPS encourages students to construct their understanding collaboratively. This study aims to

determine if TPS significantly impacts the mathematical problem-solving abilities of Grade VII students.

METHODS

This research utilized a Quasi-Experimental design (Nonequivalent Control Group Design). The population comprised Grade VII students at MTs Syafiiyah. Purposive sampling was used to select two classes: one experimental class (n=25) and one control class (n=26). Data were collected through validated pre-test and post-test essay instruments based on Polya's problem-solving stages. Data were analyzed using the Mann-Whitney U Test due to the non-normal distribution of scores.

FINDINGS AND DISCUSSION

Table 1 displays the descriptive statistics for the post-test results of both classes.

Group	N	Mean Score	Std. Deviation
Experimental (TPS)	25	66,40	12,50
Control (Conventional)	26	43,08	10,20

Table 2 presents the results of the Mann-Whitney U Test for hypothesis verification.

Test Statistic	Value	Asymp. Sig. (2-tailed)
Mann-Whitney U	35,50	<.001

The experimental class, taught using the TPS model, achieved a higher post-test mean score (66.40) compared to the control class (43.08). The Mann-Whitney U Test resulted in an Asymp. Sig. (2-tailed) of <.001, indicating that the difference is statistically significant. The structure of the TPS model—Think, Pair, Share—was found to be effective. The "Think" phase encourages individual reflection and problem understanding, the "Pair" phase facilitates collaborative plan development, and the "Share" phase supports critical reflection. This model contrasts with teacher-centered conventional methods, confirming findings from similar studies (Fatmawati & Idayatuloh, 2021; Lestari, 2022).

The primary focus of this study is to scientifically examine the effect of implementing the Think-Pair-Share (TPS) cooperative learning model on the mathematical problem-solving abilities of seventh-grade students regarding the topic of algebra. Based on the results of descriptive and inferential statistical analyses, there is strong evidence of a significant difference in performance between the class taught using the TPS model (experimental class) and the class taught using the conventional model (control class).

Based on the descriptive analysis of learning outcomes (post-test), empirical findings show that the mean score for the experimental class was 66.40. This figure is significantly higher than that of the control class, which recorded a mean score of only 43.08. This disparity in mean scores indicates a positive intervention effect resulting from the applied learning model. Test results show an Asymp. Sig. (2-tailed) value of 0.000. When compared to the significance level of $\alpha = 0.05$, the value 0.000 is less than 0.05. Consequently, the null hypothesis (H_0) is rejected, and the alternative hypothesis (H_a) is accepted. These findings indicate that the implementation of the Think-Pair-Share (TPS) cooperative learning model significantly influences students' mathematical problem-solving abilities, thereby demonstrating the model's greater effectiveness in enhancing students' proficiency in solving mathematical problems.

The superior achievement in mathematical problem-solving skills observed in this experimental class is attributable to the operational characteristics of the Think-Pair-Share learning model itself. The TPS model is designed with a structured framework that progressively guides students in exercising independent cognitive thinking through three crucial phases: Think (individual reflection), Pair (working in pairs), and Share (sharing results).

In the first phase—the "Think" phase (individual thinking)—students are required to read and contemplate the algebraic problem independently using a problem-based worksheet. This phase provides what cognitive psychology terms "wait time." This wait time is crucial as it allows students' cognitive structures to organize information—specifically, identifying the "knowns" and the "unknowns" (what is being asked) within the algebraic problem. This stage of independent thinking directly fosters the first indicator of problem-solving according to George Polya's theory: understanding the problem. Unlike conventional classrooms, where teachers tend to dominate and immediately dictate solution methods, the "Think" phase in the experimental class compels students to actively construct their own understanding from the very beginning.

Entering the second phase—the "Pair" stage—students are directed to form pairs with their seatmates to discuss the ideas they formulated during the initial phase. This small-scale social interaction is highly effective in alleviating the math anxiety often experienced by seventh-grade students when grappling with abstract concepts such as algebra. Within these pairs, a process of negotiating meaning and exchanging ideas takes place. Students who encounter difficulties in devising a solution plan or performing operations with algebraic variables can benefit from

explanations provided by their partners. This collaboration facilitates peer scaffolding, thereby boosting students' confidence as they proceed to carry out their problem-solving plans.

In the final phase—"Share" (sharing results)—representatives from each pair are asked to present their ideas and the outcomes of their discussions to the class. This phase provides an opportunity for students to collectively validate their answers. When a pair presents their mathematical arguments regarding the solution to an algebraic problem, students from other groups can respond, offer corrections, or suggest alternative answers. This process of mutual confirmation and reflection is crucial for cultivating the highest-level problem-solving skill: reviewing the obtained results (or "looking back"). Through this phase, students learn to go beyond merely finding a numerical final answer; they also come to understand the logical processes behind deriving formulas or performing algebraic manipulations.

In contrast, a different situation was observed in the control class, which utilized a conventional teaching model. The learning process in this class remained dominated by one-way explanations from the teacher (a teacher-centered approach). Consequently, the students' cognitive engagement with the subject matter was largely passive; they tended to simply memorize algebraic solution procedures demonstrated by the teacher without truly grasping the underlying concepts. When presented with problem-solving tasks that were slightly modified or differed from the examples, the majority of students in the control class became confused, as they were unaccustomed to independently working through the steps of problem-solving.

Overall, the findings of this thesis reinforce the results of relevant prior research. For instance, a study by Fatmawati & Idayatuloh (2021) concluded that the TPS (Think-Pair-Share) cooperative learning model has a significant positive impact on students' mathematical problem-solving skills by integrating independence and collaboration. Similarly, a literature review by Khaesarani & Hasibuan (2021) and research by Lestari (2022) confirm that instruction using the TPS model fosters a more active classroom environment, ultimately leading to improved learning outcomes and enhanced mathematical strategic abilities among students.

Thus, based on the empirical data and theoretical analysis presented above, it is evident that the implementation of the Think-Pair-Share (TPS) learning model yields a significant positive impact. This model has proven effective in addressing the learning needs of seventh-grade students at MTs Syafiiyah—specifically by making abstract algebraic concepts easier to comprehend through a structured and collaborative sequence of cognitive activities

CONCLUSION

Based on the results of the inferential statistical analysis, hypothesis testing, and the discussion presented in the previous chapter, it can be concluded that the mathematical problem-solving ability of Grade VII students taught using the conventional learning model in the control class was relatively low, as reflected by an average post-test score of 43.08. In contrast, students who were taught using the Think-Pair-Share (TPS) cooperative learning model in the experimental class achieved substantially better performance, obtaining a higher average post-test score of 66.40. Furthermore, the findings indicate that the implementation of the Think-Pair-Share (TPS) cooperative learning model has a statistically significant positive effect on students' mathematical problem-solving ability on the topic of algebra at MTs Syafiiyah. This conclusion is supported by the results of the Mann-Whitney U test, which produced a Sig. (2-tailed) value of 0.000, lower than the significance level of 0.05, leading to the rejection of the null hypothesis (H_0) and the acceptance of the alternative hypothesis (H_1). These results confirm that the TPS cooperative learning model is more effective than the conventional learning model in improving students' mathematical problem-solving skills.

REFERENCES

- Arifin, Ahmad. (2023). "Pengaruh Model Pembelajaran Kooperatif Tipe Think Pair Share (TPS) terhadap Hasil Belajar Matematika Siswa SMP". *Jurnal Pendidikan Matematika Valid*, 5(1): 45-56.
- Cahaya, Nilam, dkk. (2024). "Manajemen Guru Dalam Mengembangkan Karakter Siswa". *Jurnal Ilmiah Multidisiplin*, 3(1): 1-8.
- Elisa, Edi. (2021). "Fungsi Model Pembelajaran". *EduChannel Indonesia*, 1(1): 1-10.
- Fatmawati & Idayatuloh. (2021). "Pengaruh Model Pembelajaran Kooperatif Tipe Think Pair Share Terhadap Kemampuan Pemecahan Masalah Matematika". *TULIP (Tulisan Ilmiah Pendidikan)*, 10(1): 1-9.
- Firdaus, Andi Mulawakkan. (2023). "Keefektifan Model Kooperatif Tipe Think Pair Share (TPS) Dengan Pendekatan Kontekstual". *Kognitif: Jurnal Riset HOTS Pendidikan Matematika*, 3(1): 1-9.
- Hasan, M. (2021). "Pola Interaksi Sosial-Kognitif Siswa melalui Pembelajaran Kooperatif". *Jurnal Dialektika Pendidikan Matematika*, 8(2): 112-125.
- Hidayat, Rahman. (2020). "Meta-Analisis: Model Pembelajaran Kooperatif Tipe TPS dan Hasil Belajar Kognitif Matematika". *Jurnal Riset Pendidikan Nasional*, 7(1): 28-40.

- Isjoni. (2016). *Cooperative Learning: Efektivitas Pembelajaran Kelompok*. Alfabeta.
- Kamil, Firmanilah. (2023). "Faktor-Faktor Yang Mempengaruhi Penguasaan Matematika Dasar Pada Mahasiswa Baru Teknik Sipil Dan Pertambangan: Peran Latar Belakang Pendidikan Menengah". *Jurnal Inovasi Pendidikan Sains dan Terapan (INTERN)*, 2(2): 1-10.
- Khaesarani, Inayah Rizki, & Eka Khairani Hasibuan. (2021). "Studi Kepustakaan Tentang Model Pembelajaran Think Pair Share (TPS) Dalam Meningkatkan Hasil Belajar Matematika Siswa". *Jurnal Matematika, Sains, Dan Pembelajarannya*, 15(3): 1-12.
- Lestari, Dwi. (2022). "Implementasi Model TPS untuk Meningkatkan Aktivitas dan Hasil Belajar Matematika Siswa Kelas VII". *Jurnal Edukasi dan Riset Matematika*, 10(2): 109-120.
- Liska, L., & others. (2023). "Pengembangan Perangkat Pembelajaran Berbasis Blended Learning di Sekolah Menengah". *Jurnal Inovasi Pendidikan*, 11(2): 45–56.
- Lyman, F. (1981). "The Responsive Classroom Discussion: The Inclusion of All Students". *Mainstreaming in the Classroom*, 11(1): 109-113.
- Malikah, Siti, dkk. (2022). "Manajemen Pembelajaran Matematika Pada Kurikulum Merdeka". *Edukatif : Jurnal Ilmu Pendidikan*, 4(4): 1-11.
- Matondang, Z., dkk. (2020). *Evaluasi Pembelajaran*. Medan: Yayasan Kita Menulis.
- Noor, N. A., & I. Munandar. (2019). "Pengaruh Model Pembelajaran Kooperatif (Tipe Tai Dan Tps) Dan Aktivitas Belajar Terhadap Hasil Belajar Matematika". *Jurnal Ilmu Pendidikan (JIP) STKIP Kusuma Negara*, 11(1): 1-8.
- Polya, George. (2022). *How to Solve It: A New Aspect of Mathematical Method*. Princeton: Princeton University Press.
- Pratama, Loviga Denny, & Wahyu Lestari. (2020). "Pengaruh Pelatihan Terhadap Kompetensi Pedagogik Guru Matematika". *Jurnal Cendekia : Jurnal Pendidikan Matematika*, 4(1): 1-9.
- Puspitasari, D., & S. Febrinita. (2022). "Penggunaan Skala Likert dalam Validasi Instrumen Non-Tes Penelitian Pendidikan Matematika". *Jurnal Riset Pembelajaran Matematika*, 4(1): 12–21.
- Restiani, Hayu, & Euis Mawaddah Sariniwati. (2022). "Implementasi Model Pembelajaran Kooperatif Tipe Think Pair Share (TPS) Dengan Pendekatan Saintifik Terhadap Hasil Belajar Siswa". *Integrated Science Education Journal*, 3(3): 1-8.
- Ridha, M. R., M. Zuhdi, & S. Ayub. (2022). "Pengembangan Perangkat Pembelajaran

- PjBL berbasis STEM dalam Meningkatkan Kreativitas Fisika Peserta Didik". *Jurnal Ilmiah Profesi Pendidikan*, 7(1): 223–228.
- Santoso, Budi. (2021). "Perbandingan Hasil Belajar Matematika Antara Model TPS dan Pembelajaran Langsung pada Siswa Kelas VII". *Jurnal Inovasi Pembelajaran Matematika*, 8(1): 65-74.
- Schunk, D. H. (2012). *Learning Theories: An Educational Perspective* (6th ed.). Boston, MA: Pearson.
- Setiawan Nial, M., Y. N. Kandowangko, & F. Yusuf M. (2021). "Validitas perangkat pembelajaran pada materi keanekaragaman hayati di kelas X SMA". *Jurnal Normalita*, 9(6): 166–174.
- Sholehah, Mar'atus, Endah Tri Wisudaningsih, & Wahyu Lestari. (2022). "Analisis Kesulitan Siswa Sma Dalam Menyelesaikan Soal Asesmen Kompetensi Minimum Numerasi Berdasarkan Teori Polya". *Jurnal Pendidikan Dan Konseling*, 4: 1-10.
- Sugiyono. (2016). *Metode Penelitian Pendidikan (Pendekatan Kuantitatif, Kualitatif, dan R&D)*. Alfabeta.
- Trianto. (2011). *Mendesain Model Pembelajaran Inovatif-Progresif: Konsep, Landasan, dan Implementasinya pada Kurikulum Tingkat Satuan Pendidikan (KTSP)*. Kencana Prenada Media Group.
- Vygotsky, L. S. (1978). *Mind in Society: The Development of Higher Psychological Processes*. Cambridge, MA: Harvard University Press.
- Wahyuni, S., & Zulyusri. (2021). "Analisis Validitas dan Praktikalitas Instrumen Penilaian Pembelajaran Menggunakan Teknik Deskriptif Persentase". *Jurnal Edukasi Sains dan Biologi*, 10(3): 201–210.
- Wulandari, Indah. (2024). "Think-Pair-Share (TPS) Berbantuan Geogebra untuk Meningkatkan Hasil Belajar Siswa Kelas VII pada Materi Geometri". *Jurnal Matematika Kreatif*, 12(2): 153-162.
- Zulyanty, Marni. (2022). "Kemampuan Literasi Matematika Mahasiswa Dalam Menyelesaikan Soal". *Jurnal Pendidikan Matematika (JPM)*, 8(1): 1-9.