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Understanding the Role of Think-Pair-Share Strategy in Mathematics Classroom

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ABSTRAK

Low student engagement in mathematics learning remains a serious challenge in various schools and universities in Banten Province. Although the Think-Pair-Share (TPS) strategy is recognised as effective in promoting active participation and conceptual understanding, its implementation in the field is uneven and lacks contextual evidence. This study aims to analyse the perceptions of mathematics teachers and lecturers regarding the implementation of TPS, specifically in terms of anticipated benefits, obstacles experienced, and opportunities for classroom implementation. Using a quantitative descriptive approach, data were collected through a survey of 26 respondents who offered to participate in the study. The instrument was a closed questionnaire with five Likert scales with 45 statement points covering nine indicators of TPS implementation. Data were analysed using descriptive statistics, which involved calculating the average score for each indicator and creating a frequency distribution. The results showed that respondents generally had a positive perception of TPS, particularly in fair students' understanding of mathematical concepts and communication skills. However, the main obstacles involved limited implementation time and diversity in student participation. Some respondents also mentioned the lack of practical training and the difficulty in adapting strategies to the characteristics of the class. Although the sample size is limited, this study makes an initial contribution to understanding the dynamics of TPS implementation in the local context. It is recommended that teacher training focus on the technical aspects of TPS implementation and be accompanied by flexible and context-based guidance to support the effectiveness of cooperative learning in mathematics classes.

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Introduction

In mathematics education, active learning strategies are crucial. According to Vale & Barbosa (2023), active learning strategies are very influential in mathematics education because they can increase cognitive and social engagement, encourage collaboration, and strengthen mathematical communication. According to Hetmanenko (2024), active learning in mathematics education can increase students' interests and skills through discussions, projects, and cases in everyday life while fostering critical thinking and creativity. Therefore, active learning is crucial in mathematics education because it can increase students' interest, skills, and overall engagement.

The Think-Pair-Share (TPS) strategy provides space for thinking, discussing, and sharing. The Think-Pair-Share (TPS) strategy, as noted by Deore & Arora (2022), can effectively establish a structured learning environment that fosters independent thinking, discussion, and idea management among students, thereby enhancing their learning experience. In addition, as stated by Arlina et al. (2023), the TPS strategy is an effective learning method because it enables students to think independently, discuss in pairs, and share their ideas. By progressing through these stages, students can develop critical thinking and communication skills while also fostering collaborative learning. TPS is an effective learning strategy that encourages students to think critically, participate in class discussions, and share their ideas. Ultimately, this leads to a more engaging learning process, creating a practical and interactive learning experience (Belleantari, 2025). Therefore, the TPS strategy is a practical approach to fostering active learning, enhancing cognitive and social skills, and enhancing students' academic performance.

Previous studies have shown that TPS can improve conceptual understanding in mathematics. As stated by Asria (2019), research conducted with 42 high school students in Pekanbaru showed that the TPS approach was more effective than direct learning in improving their understanding of mathematical concepts. The quasi-experimental design and T-test analysis proposed by Siswanto & Susetyawati (2024) prove that students who use TPS get better learning outcomes. This finding confirms that TPS is a collaborative learning strategy that can improve students' conceptual understanding of mathematics, as demonstrated by research conducted at Dr. Wahidin Mlati Middle School in the 2023/2024 academic year. Based on these two studies, the Think-Pair-Share strategy has been proven effective in enhancing students' understanding of mathematical concepts at various educational levels through a collaborative and interactive approach, supported by strong empirical data. However, despite these positive findings, there is still limited research investigating how mathematics teachers and lecturers understand and implement each phase of TPS in everyday classroom practice, especially in Indonesia. Addressing this gap is important to ensure that TPS is effectively adapted to local educational realities and to identify specific challenges or supports needed for successful implementation.

TPS is identified as a strategy that builds conceptual understanding through structured interaction. The TPS strategy can help develop students' conceptual considerations through individual thinking, pair discussions, and in-class sharing (Nasir, 2018). TPS learning helps students develop math communication skills through purposeful interaction. This approach provides students with space to think independently while working together, thereby strengthening their understanding of mathematical concepts in the classroom (Khairunisa & Basuki, 2021). The TPS strategy encourages students' active and collaborative participation through stages of independent thinking, discussing with partners, and sharing ideas to strengthen conceptual understanding (Hidayatullah et al., 2024). Therefore, the TPS strategy can deepen students' conceptual understanding through interactive stages that encourage collaboration and active participation in mathematics learning.

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This study explores the extent to which the TPS strategy is implemented in mathematics learning based on the views of teachers and lecturers. The primary objective of this study is to identify factors that support and hinder its implementation, specifically at the secondary and higher education levels in Indonesia. This study examines how instructors and lecturers perceive and implement the three main components of the TPS strategy, individual thinking, pair discussion, and idea sharing in mathematics classrooms, building on earlier findings that demonstrate the efficacy of TPS in promoting active participation, critical thinking, collaboration, and mathematical communication. This study also examines how each stage of the strategy is implemented and observed in everyday mathematics learning practices, highlighting common issues and areas that require improvement. This dual focus enables the study to inform both classroom practice and theoretical development in collaborative mathematics instruction. The findings of this study are expected to contribute to the formulation of future education policies and teacher training programs, as well as encourage the implementation of structured active learning methods, especially in Indonesian classrooms. Understanding what teachers think is important is crucial because it helps create better training programs, makes policies more effective, and ensures that active learning methods, such as TPS, are correctly implemented in classrooms across Indonesia. This study is based on constructivist learning theory, which posits that knowledge is constructed through social interaction, rather than solely through personal experience. Learning, rather than solely focusing on the zone of proximal development, where working together helps people understand better and improve their thinking skills (Muniyappan & Sivakumar, 2018), aligns with the steps of the TPS strategy. Ultimately, the findings of this study provide insights into enhancing math education by employing more effective and well-organized active learning methods.

Method

Research Type

This study employed a descriptive quantitative design using a survey method, which was deemed appropriate for capturing trends and variations in teachers' and lecturers' perceptions regarding the implementation of the TPS strategy across different educational settings without manipulating any variables. The design follows Sugiyono (2017) descriptive research model, which systematically and factually examines real-life educational phenomena through numerical data.

Population and Sample

The population of this study was mathematics teachers and lecturers in Banten Province. A total of 30 respondents were targeted for the study, but only 26 valid responses were collected due to time constraints. The sample of this study consisted of 17 teachers and nine lecturers who were all actively teaching mathematics at the time the study was conducted. The sampling technique used was voluntary sampling, namely, participants who chose to be involved. The profile of the study participants revealed that their average teaching experience was at least one semester, with educational qualifications ranging from undergraduate to postgraduate levels. Because people with stronger ideas or more time are more likely to reply, voluntary sampling may introduce sampling bias, even when it offers more opportunities for participation.

Instrument

As an instrument in this study, a structured and closed questionnaire consisting of 45 statements, arranged into nine indicators, was used and measured using a 5-point Likert scale. This format was chosen to ensure consistency in quantitative analysis and facilitate direct interpretation of response patterns. The 45 statements were grouped into nine indicators: conceptual understanding, classroom implementation, perceived benefits, learning outcomes, implementation challenges, alignment with mathematical approaches, motivational impact, integration with technology, and strategies for improvement. All of these indicators were carefully developed based on previous literature and expert consultation to ensure comprehensive coverage of the research focus's important aspects. The instrument underwent an expert validation process involving a one-on-one review by an educational expert with relevant experience in mathematics learning strategies. Although content validation should be conducted by two experts, time and access constraints necessitated that one qualified expert conduct this process. Each item was reviewed for clarity, relevance, and fit with the theoretical framework. The final version of the questionnaire was declared valid and suitable for use in data collection. However, the validity judgment may be limited due to the involvement of only one expert. The reliability of the questionnaire was tested using Cronbach's Alpha to assess internal consistency. The results showed an alpha value of 0.91, indicating that the instrument has excellent internal consistency and is highly reliable for use in this study. The details of the reliability test are presented in Table 1.

Table 1. Reliability Test Result of the Questionnaire Instrument

Reability Statistics	
Cronbach's Alpha	N of Items
0.908300745	45

Data Collection

Data collection was conducted in April 2025 using an online survey via Google Forms. The survey link was distributed via social media and shared directly with participants to expand the reach to the mathematics educator community. Participants provided digital consent and received an explanation of the study's purpose before completing the survey. The opportunity to withdraw at any time, confidentiality, and voluntary participation were guaranteed as ethical characteristics. Participants had seven days to complete the survey at their own pace.

Data Analysis

The data collected from the questionnaire were analyzed using descriptive quantitative methods. The analysis process involves calculating the average and standard deviation to determine the pattern and level of differences in respondents' perceptions of the TPS strategy in the mathematics learning process. The average value of each indicator was classified into five categories of tendency based on the Likert scale as follows: very high (4.20–5.00), high (3.40–4.19), moderate (2.60–3.39), low (1.80–2.59), and very low (1.00–1.79). This classification aims to facilitate the interpretation of the level of acceptance and respondents' views towards the implementation of the TPS strategy.

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Research Results

The results of this study were obtained by distributing closed questionnaires to 26 respondents consisting of mathematics teachers and lecturers in Banten Province. The instrument consisted of 45 Likert scale-based statements covering various aspects of the TPS strategy in mathematics learning. The following research results cover these aspects according to respondents' perceptions:

Table. 2 Average of understanding and belief in Think-Pair-Share

No.	Statement	Average (Scale 1-5)	Standard Deviation	Category
1.	I understand the concept of Think-Pair-Share as a cooperative learning strategy.	4.12	0.59	High
2.	I believe that Think-Pair-Share can increase interaction between students in learning mathematics.	4.12	0.52	High
3.	I believe that Think-Pair-Share can help students understand math concepts better.	4.04	0.53	High
4.	I see that Think-Pair-Share is aligned with the zone of proximal development (ZPD) theory.	3.58	0.58	High
5.	I believe that Think-Pair-Share can increase student engagement in math learning.	4.08	0.39	High
	Overall Average	3.98	0.52	High

Based on the results of the data analysis above, it can be concluded that the respondents' perception of the TPS learning strategy is in the high category, with an overall average of 3.98 and a standard deviation of 0.52. This suggests that respondents generally understand the concept of TPS and accept that this strategy is effective in enhancing student interaction, promoting involvement in learning, and fostering an understanding of mathematical concepts. However, the level of knowledge about the relationship between TPS and the Zone of Proximal Development (ZPD) theory is slightly lower than that of other statements, although it is still in the high category. This shows the need to strengthen the understanding of supporting theories in implementing the TPS strategy in the classroom.

Table. 3 Average implementation of Think-Pair-Share in the math classroom

No.	Statement	Average (Scale 1-5)	Standard Deviation	Category
1.	I often use the Think-Pair-Share strategy in learning math.	3.46	0.65	High
2.	I allow enough time for students to think before discussing with peers.	4.19	0.49	High
3.	I facilitate effective discussion during the "Pair" stage of Think-Pair-Share.	3.96	0.53	High
4.	I give feedback after students share their answers.	4.19	0.63	High
5.	I observed that students were more confident when using Think-Pair-Share in solving math problems. students in math learning.	3.88	0.65	High
	Overall Average	3.94	0.59	High

Based on the Table 3, the average results of respondents' responses to five statements related to the implementation of the TPS strategy in mathematics learning, obtained an overall average score of 3.94 with a standard deviation of 0.59 which is included in the high category. The statement with the highest score is on the aspect of providing sufficient conditional thinking time for students and offering feedback after they share their answers, each with a score of 4.19. This suggests that teachers have completely implemented the basic

principles of TPS, particularly in respecting students' thinking time and responding to the outcomes of their discussions. The lowest score is on the statement about the frequency of using the TPS strategy, which is 3.46, although it remains in the high category. This indicates that, although teachers have a positive perception of TPS and have implemented its stages effectively, the use of TPS in daily learning practices is still not fully optimal or consistent.

In general, the data results indicate that teachers already understand and are quite capable of implementing the TPS strategy, particularly in terms of allowing students time to think, encouraging brief discussions, and providing responses to ideas or opinions expressed. However, the use of this strategy can still be improved, particularly in terms of its consistency of application in mathematics learning.

Table. 4 Average of the benefits of Think-Pair-Share for students

No.	Statement	Average (Scale 1-5)	Standard Deviation	Category
1.	Think-Pair-Share helps students develop communication skills in math.	3.92	0.56	High
2.	This strategy improves students' understanding of mathematical concepts.	3.96	0.45	High
3.	Students are more active in class when using Think-Pair-Share.	3.81	0.57	High
4.	Think-Pair-Share helps shy students to speak up more.	3.81	0.40	High
5.	Students find it easier to understand story problems in math after discussing with friends.	3.92	0.56	High
	Overall Average	3.88	0.51	High

Based on the results above, the respondents' responses regarding the impact of the TPS strategy on students' learning mathematics yielded an overall average of 3.88 with a standard deviation of 0.51, which falls within the high category. The highest value was achieved in the statement that TPS improves students' understanding of mathematical concepts (3.96), which indicates that this strategy is considered effective in supporting conceptual understanding. Followed by the statement that TPS helps students understand story problems after discussing with friends and develops communication skills in mathematics, each of which received a value of 3.92. Meanwhile, the statement that received the lowest value (although still high) was that TPS makes students more active and helps shy students become more courageous in speaking, each of which received a value of 3.81. This shows that although the TPS strategy encourages participation, its impact on students who tend to be passive can still be improved.

Overall, these data indicate that the TPS strategy is considered highly beneficial for students, particularly in enhancing conceptual understanding, communication skills, and ease in solving math problems, including story problems. However, there is an opportunity to further optimize the role of TPS in building the confidence and participation of students who are shy or less active.

Table. 5 Average of the impact of Think-Pair-Share on learning outcomes

No.	Statement	Average (Scale 1-5)	Standard Deviation	Category
1.	I saw an improvement in student learning outcomes after implementing Think-Pair-Share.	3.69	0.47	High
2.	Students who learn with Think-Pair-Share are better at solving exam questions.	3.58	0.70	High
3.	This strategy helps students remember math concepts longer.	3.46	0.71	High
4.	Students can identify their mistakes faster by discussing with friends.	3.92	0.56	High

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5.	Students are more confident in solving problems after sharing answers with their partners.	3.92	0.56	High
	Overall Average	3.72	0.60	High

Based on the results of the data analysis, it can be concluded that the respondents' perception of the influence of the TPS learning strategy on student learning outcomes is in the high category, with an overall average of 3.72 and a standard deviation of 0.60. This suggests that respondents perceive TPS as an effective strategy for enhancing learning outcomes, problem-solving skills, and students' self-confidence in mathematics. However, the lowest score was recorded for the statement that TPS helps students remember mathematical concepts longer, which indicates that students' long-term memory still needs to be strengthened through other approaches or more consistent application of TPS. This finding suggests that although TPS has a positive impact in general, the aspect of concept retention remains an area for improvement in its implementation.

Table. 6 Average of challenges in implementing Think-Pair-Share

No.	Statement	Average (Scale 1-5)	Standard Deviation	Category
1.	Some students were less active in discussing during the "Pair" stage.	3.50	0.65	High
2.	The time available in class is sometimes not enough to implement Think-Pair-Share.	3.73	0.87	High
3.	Some students tend to dominate the discussion, while others are passive.	3.73	1.04	High
4.	Think-Pair-Share is difficult to implement in very large classes.	3.50	0.91	High
5.	I had difficulty in assessing students' individual contributions in Think-Pair-Share.	3.27	0.83	Medium
	Overall Average	3.55	0.86	High

Based on the data results above, the respondents' perception of the challenges in implementing the TPS strategy is in the high category, with an overall average of 3.55 and a standard deviation of 0.86. This indicates that, although TPS is considered positive, respondents perceive some obstacles to implementing it in the classroom. The main challenges identified include limited time in class, students' dominant passiveness in discussions, and the difficulty of implementing TPS in large classes, each with a score of 3.73. Meanwhile, the lowest score (3.27, in the medium category) appeared on the statement regarding the difficulty in assessing individual student contributions, indicating that the assessment aspect remains a weakness in TPS practice. Overall, although the TPS strategy is considered valid, technical aspects such as time, group dynamics, and individual assessments need more attention so that its implementation can run more optimally in various classroom conditions.

Table. 7 Average of alignment of Think-Pair-Share with mathematical approaches

No.	Statement	Average (Scale 1-5)	Standard Deviation	Category
1.	This strategy is in line with the constructivist approach to mathematics learning.	3.54	0.58	High
2.	Think-Pair-Share improves students' critical thinking skills in mathematics.	3.92	0.63	High
3.	This method is effective for explaining abstract concepts in mathematics.	3.50	0.76	High
4.	Think-Pair-Share helps students solve problems collaboratively.	4.04	0.60	High

5.	Discussion in Think-Pair-Share strengthens students' understanding of difficult math concepts.	3.69	0.68	High
	Overall Average	3.74	0.65	High

Based on the results of the data analysis, it can be concluded that the respondents' perception of the relevance of the TPS strategy to the mathematics learning approach is in the high category, with an overall average of 3.74 and a standard deviation of 0.65. The statement with the highest score, 4.04, indicates that the TPS strategy is considered very helpful for students in solving problems collaboratively. This demonstrates that this approach is highly effective in promoting collaboration and critical thinking with students. On the other hand, the statement with the lowest score, which is 3.50, is related to the effectiveness of TPS in explaining abstract mathematical concepts. However, this value is still classified as high. Overall, the TPS strategy aligns with the constructivist approach to learning. This strategy has been proven to enhance students' understanding of complex concepts, foster active engagement, and promote interaction and collaboration among them. Even so, the role of TPS in helping students understand abstract concepts can still be improved to achieve more optimal results.

Table. 8 Average of the effect of Think-Pair-Share on learning motivation

No.	Statement	Average (Scale 1-5)	Standard Deviation	Category
1.	This strategy makes students more interested in learning math.	3.69	0.62	High
2.	Think-Pair-Share increases students' confidence in answering math questions.	3.88	0.52	High
3.	Students are more motivated to actively participate in class with Think-Pair-Share.	3.69	0.47	High
4.	Think-Pair-Share helps reduce math anxiety in students.	3.65	0.56	High
5.	This strategy increases students' independence in learning math.	3.81	0.63	High
	Overall Average	3.75	0.56	High

Based on the results of the study above, it can be concluded that the respondents' perception of the influence of the TPS strategy on students' motivation and attitudes in learning mathematics is in the high category, with an overall average of 3.75 and a standard deviation of 0.56. The highest score of 3.88 is found in the statement that TPS increases students' confidence in answering math problems. In contrast, the lowest score of 3.65 appears in the statement that TPS helps reduce mathematics anxiety. Overall, the TPS strategy has a positive contribution in building interest, motivation, independence, and self-confidence in students. However, its effect on reducing math anxiety can still be improved.

Table. 9 Average alignment of Think-Pair-Share with mathematical approaches

No.	Statement	Average (Scale 1-5)	Standard Deviation	Category
1.	I use technology (e.g., Google Docs, Zoom) to support Think-Pair-Share.	3.65	0.85	High
2.	Think-Pair-Share can be implemented online using digital learning platforms.	3.65	0.63	High
3.	I observed that Think-Pair-Share discussions are more effective with the help of technology.	3.73	0.53	High
4.	The use of digital media increases the effectiveness of Think-Pair-Share in math learning.	3.77	0.59	High
5.	Technology can help document the results of Think-Pair-Share discussions.	3.96	0.60	High

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	Overall Average	3.75	0.64	High

Based on the data results above, the respondents' perceptions of the use of technology in supporting the Think-Pair-Share (TPS) strategy are in the high category, with an overall average of 3.75 and a standard deviation of 0.64. The highest score of 3.96 was found in the statement that technology can help document the results of TPS discussions. On the other hand, the lowest score of 3.65 was found in two statements, namely the use of technology to support TPS and the implementation of online TPS. Overall, these data indicate that technology is considered capable of increasing the effectiveness of TPS implementation, both in face-to-face and online learning, particularly in facilitating discussion, collaboration, and documenting learning outcomes.

Table. 10 Average of the evaluation of the effectiveness of Think-Pair-Share

No.	Statement	Average (Scale 1-5)	Standard Deviation	Category
1.	I periodically assess the effectiveness of Think-Pair-Share in my classroom.	3.58	0.70	High
2.	I use formative assessments to evaluate students' discussion results in Think-Pair-Share.	3.96	0.60	High
3.	I ask for feedback from students regarding their experience with Think-Pair-Share.	3.92	0.69	High
4.	I customized the Think-Pair-Share strategy based on students' needs.	4.04	0.66	High
5.	I saw an improvement in my problem-solving skills after implementing Think-Pair-Share.	3.85	0.61	High
	Overall Average	3.87	0.65	High

Based on the results of the data analysis, it can be concluded that the respondents' perceptions of the reflection and evaluation of the implementation of the TPS strategy fall into the high category, with an overall average of 3.87 and a standard deviation of 0.65. The highest score of 4.04 was found in the statement that TPS is adjusted to students' needs, indicating that teachers have actively adapted the strategy. Meanwhile, the lowest score of 3.58 was found in the aspect of periodic evaluation of TPS effectiveness. Overall, these data reflect that respondents involve reflection, adjustment, and formative evaluation in the implementation of TPS, and feel a positive impact on improving problem-solving skills. However, periodic assessment of the strategy's effectiveness can still be improved.

Discussion

The results of this study indicate that mathematics teachers and lecturers in Banten Province generally have a positive understanding and view of the Think-Pair-Share (TPS) learning strategy, especially in terms of student interaction and providing thinking time. This is reflected in the high average scores, especially 4.12 for the perception of the TPS approach and 4.19 for the application of reasoning and feedback. The results of this study align with those of Arlina et al. (2023) and Nurlaika et al. (2024), which suggest that the TPS strategy can raise fairness in the learning communication process and foster the development of systematic and creative thinking patterns in students. However, the results of observations in the Banten region indicate a tendency for teachers and lecturers to focus more on implementing the "Think" and "Pair" stages. At the same time, the "Share" aspect tends to be neglected. This finding appears to belie Sampsel's (2013) research in the United States, which emphasizes the importance of the "Share" stage in unstable communication skills. This suggests that, in the local context, teachers may still encounter challenges in encouraging students to speak openly in front of the

class, which can be attributed to a learning culture that still centers on teachers as the primary source of information.

In addition, the challenges of TPS implementation identified in this study, such as difficulties in assessing individual contributions (average 3.27) and inequality in student participation (average 3.73), are notable findings that have not been highlighted in depth in other TPS studies in Indonesia. Most previous studies, such as Laela et al. (2024) and Firdaus & Satriawan (2025), emphasize the benefits of TPS in improving learning outcomes, but do not highlight the individual evaluation aspect in cooperative learning. As stated by (Johnson & Johnson, 2009), individual assessment is a critical component to ensure that each student has personal responsibility in the group learning process.

Another significant contribution of this study is highlighting the need for objective and contextual assessment tools to evaluate individual activeness in discussions, especially in the Pair and Share phases. In the Indonesian education culture, which tends to assess students collectively through group work, the existence of an individual assessment mechanism remains a challenge in itself. Therefore, these results provide direct implications for classroom learning policies—namely, the need to strengthen teacher training in aspects of evaluation and reflection based on discussion activities. Interestingly, teachers and lecturers in Banten appear quite adaptive in integrating technology in the implementation of TPS (average 3.96). This suggests significant potential to support the success of TPS through digital media, which can be used to document and assess student discussions, in line with Rhee & Shin's (2024) view on the importance of documentation and reflection in collaborative learning.

The positive correlation between the implementation of TPS and students' emotional responses, such as increased self-confidence (average 3.96), also indicates that this strategy has a dual impact: not only on the cognitive aspect but also on the affective aspect. In the Indonesian context, where students often lack certainty in participating in classroom interactions, strategies such as TPS can be an effective way to frame trust and boost participation in the learning process. Overall, these citations confirm that TPS is not only an effective strategy theoretically but also in the local context. However, its success requires sensitive adaptation to the learning culture, assessment system, and teacher readiness to manage the dynamics of student participation. Therefore, this study provides new insights into the development of active learning strategies in Indonesia, particularly in addressing contextual challenges that have been less highlighted in the national literature to date.

Conclusion

This study examined how math teachers and lecturers in Banten Province perceive and utilize the Think-Pair-Share (TPS) strategy in their classrooms. The results show that most participants truly understand TPS as a method for students to learn together and believe it helps boost student interaction, confidence, and understanding of concepts. They mostly stick to the "Think" and "Feedback" parts of the strategy, which scored the highest on average (4.19). However, it seems that the "Share" part does not receive as much attention, likely due to cultural reasons that make students hesitant to speak up in class. Although the findings are generally positive and suggest that TPS could improve learning, some challenges also arose. The most significant issues include insufficient teaching time, some students not participating, and difficulty determining how healthy individuals are performing in group discussions. These challenges highlight areas where TPS can be improved, particularly in large classrooms or settings where learning is more passive in nature. A significant takeaway from this study is its emphasis on assessing individuals in group work, which is crucial for ensuring everyone contributes equally. Additionally, utilizing technology with TPS appears to be a good idea,

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particularly for tracking progress and assessments. However, this study had a small number of participants (only 26) and employed a single method for data collection (an online questionnaire). Future research should adopt a mixed-methods approach, expand the participant pool across various regions, and include classroom observations and interviews to provide a more comprehensive understanding of how TPS functions in diverse educational contexts.

Conflict of Interest

The authors declare no conflict of interest.

Author Contribution

As the author of the study, the first author, A.R., was responsible for compiling the abstract, research results, and discussion. The second author, M.K., helped compile the introduction, research methods, and conclusions. The third author, W., played a role in compiling the research instruments and discussion. The total percentage of contributions to the conceptualization, compilation, and correction of this article are as follows: A.R.: 40%, M.K.: 40%, and W.: 20%.

Data Availability Statement

The data supporting the results of this study are available as “supplementary files” on the Kognitif: HOTS Research Journal of Mathematics Education website.

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