Teachers' Classroom Practices and Senior Secondary School Students' Performance in Mathematics in Ekiti State, Nigeria: Effect of Teachers' Instructional Strategies

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ABSTRACT

The study examined the effect of teachers' classroom practice on senior secondary school students' Mathematics performance in Ekiti State, Nigeria. Specifically, it involved two innovative instructional strategies—Reflective Journal Writing (RJW) and Think-Pair-Share (TPS). Persistent underachievement in Mathematics, especially in WAEC examinations, is linked to conventional teacher-centred methods that fail to engage learners. Using a pre-test, post-test, three-group quasi-experimental design, 113 SS1 students in three intact classes in Ekiti South Senatorial District were assigned to RJW, TPS and Conventional method groups. Data were collected using a validated Performance Test in Mathematics (PTM; reliability = 0.76). After six weeks of instruction, post-test scores were analysed using ANCOVA and Multiple Classification Analysis at 0.05 significance level. Results revealed significant differences in post-test performance among groups ($F = 67.087$, $p < 0.05$). TPS students achieved the highest adjusted mean score (24.75), followed by RJW (21.33), while the Conventional group scored lowest (14.81). The treatment accounted for 56% of performance variance. Both RJW and TPS significantly outperformed the Conventional method, with TPS explaining 58% and RJW 44% of observed variance. Findings indicate that collaborative and metacognitive strategies enhance mathematical understanding, problem-solving and retention more effectively than traditional lectures. RJW and TPS are effective, low-cost interventions suitable for resource-constrained environments. The study recommends that Mathematics teachers adopt student-centred strategies like RJW and TPS to improve engagement and achievement. Longitudinal implementation and teacher training are suggested to sustain gains and institutionalize reform in secondary Mathematics education in Ekiti State.

KEYWORDS

Teacher Classroom Practice, Instructional Strategy, Students, Performance, Mathematics, Reflective Journal Writing, Think-Pair-Share

I. INTRODUCTION

Mathematics is the foundational subject for scientific, technological and economic advancement in any developing society. Being a core subject in the primary and secondary schools' curricula, its mastery is a critical prerequisite for the scientific and technological growth and overall development of any nation. Mathematics education in secondary schools

faces persistent challenges: cultivating and sustaining student interest, enhancing students' performance and solving physical problems. Consequently, secondary school students frequently struggle to achieve required proficiency levels. This chronic underachievement is heavily influenced by the persistence of traditional, teacher-cantered instructional paradigms that fail to engage students dynamically or cater to diverse learning styles. Educational researchers emphasize that a significant proportion of mathematics performance can be directly predicted from a student's attitude, their learning style, and the specific teaching strategies employed by educators. Consequently, there is an urgent need to explore and implement alternative, activity-based pedagogical methods that can remedy the prevalent poor performance in the subject.

In Ekiti State, Nigeria, the performance of secondary school students in mathematics in recent years most notably in external examinations conducted by the West African Examinations Council (WAEC) has experienced fluctuations, prompting educational researchers and the organization to closely examine the pedagogical environments cultivated within schools. For instance, the Chief Examiner's report of WAEC (2017) had while assessing students' performance in Mathematics, suggested that teachers give more worked problems during a class lesson and use interactive method of teaching. Following up on that, the Chief Examiner's report of WAEC (2018) and WAEC (2023) charged teachers to make teaching and learning of Mathematics much more interesting and practicable. The central thesis of contemporary educational reform postulates that student success is heavily predicated not merely on the curriculum, but on the efficacy of teacher's classroom practices. These practices dictate how complex mathematical theories are decoded, processed, and ultimately internalized by the adolescent learner. When students fail to grasp fundamental algebraic or geometric concepts, the root cause can frequently be traced back to disconnect in the instructional delivery mechanism rather than the innate cognitive limitations of the students themselves. Therefore, exploring the intricate dynamics of the modern mathematics classroom becomes an imperative endeavour for regional educational advancement.

To systematically analyse the educational ecosystem, it is pertinent to deconstruct teacher classroom practices into several distinct yet highly interrelated components. Instructional strategies represent the specific, actionable techniques that educators deploy to deliver content, such as collaborative learning exercises or independent writing tasks. Pedagogical approaches encompass the broader philosophical and theoretical frameworks guiding a teacher's mind set, dictating whether a classroom leans toward constructivism or rigid behaviourism. Classroom management refers to the structural organization of the learning environment, encompassing the enforcement of discipline, the arrangement of social configurations, and the maximization of instructional time. Assessment methods are the evaluative tools utilized to diagnose learning gaps and measure mastery, serving as vital checkpoints for both educators and learners. Finally, teacher-student interactions represent the socio-emotional and communicative exchanges that foster academic trust, dictate the nature of classroom feedback, and influence student motivation. However, this study focuses on a specific teacher classroom practice, teachers' instructional strategies and how they impact students' mathematics performance in Ekiti State.

Conventional method of teaching is a teacher-centred method of teaching where the students' major role is to listen and take notes in the classroom. It is not interactive, collaborative, nor participatory and may render the set objectives unachievable. Consequently, it fails to respect individual differences and learning characteristics. It is

therefore imperative to seek effort that will employ an approach or approaches that will enhance better academic performance of students in Mathematics. There are many innovative strategies such as peer modelling, goal setting strategy, think-pair-share method, journal writing method, co-operative method, project method among others, that could be used in order to improve students' academic performance in Mathematics but the study is interested in Reflective Journal Writing and Think-Pair-Share strategies.

Reflective Journal Writing is a strategy that encourages students to keep an invaluable record for their thoughts, feelings, experiences, personal values/abilities and beliefs/competencies in Mathematics. It is an incredibly flexible instructional tool that provides students with an opportunity to return to their experiences in an attempt to develop new perspectives that can guide their future actions in Mathematics. Through recording as well as describing students' experiences, feelings, and thoughts, they are able to re-create their experiences for more exploration. Writing journals in Mathematics will make students record their thoughts, understandings, and explanations about mathematical ideas or concepts. Consequently, students are able to use more precise mathematical language to express ideas. It encourages students to reflect on their own knowledge and their own ways to solve problems. Studies which had found positive effects of Reflective Journal Writing strategy include Hart (2015), Knox (2017), Aquino & Nool (2018) and Del-Rosario, Subla & Lopez (2018).

Think-Pair-Share is a collaborative teaching strategy that works better with small groups. It is used to keep all the students actively involved in class discussions and provides an opportunity for everyone to share an idea and answer to every question posed by the teacher. This is because students learn by participating in the attainment of knowledge gained while proffering solution to a given problem or task. It involves the teacher posing some of the questions to the class about what has been explained about an activity or an issue or a task. Then, the teacher allows the students to think for a minute about this question alone while preventing them from talking or walking around in the classroom at the time of thinking; then the teacher asks students to split up into pairs to discuss and think together about the question or posed activity for a period of five or so minutes. Finally, the teacher participates by displaying what has been reached of solutions and ideas about the question or activity. This strategy builds up connections among the students. Studies which had found positive effects of Think-Pair-Share strategy include Saley and Ibrahim (2015), Akanmu (2019) as well as Popoola and Olofinlae.

Research has consistently demonstrated that teachers’ classroom practices are a critical determinant of students’ performance in mathematics. Classroom practices encompass instructional strategies, pedagogical approaches, classroom management, assessment methods, and teacher–student interactions that occur during instruction.

Several studies have been conducted on enhancing students’ performance in Mathematics, these include usage of instructional strategies, pedagogical approaches and classroom management. Others include assessment method and teacher–student interactions, these studies have thrown more light on means of improving students’ engagement and ultimate performance in mathematics.

Despite decades of global educational research, existing approaches to improving secondary school mathematics performance remain fundamentally insufficient for several critical reasons. First, existing methodological frameworks often treat instructional strategies as universally applicable, largely ignoring the socio-cultural complexities and resource

constraints inherent to specific regions like Ekiti State, thereby rendering highly theoretical pedagogical interventions ineffective in practice. Second, there is a systemic failure in sustaining educational innovations; empirical evidence demonstrates that educators frequently abandon research-based instructional strategies when they do not receive continuous institutional support or specialized training, leading to high attrition rates in pedagogical reform. Third, traditional literature often isolates cognitive learning from social classroom dynamics, failing to account for how peer cooperation and specific structural network configurations distinctly impact the resolution of well-structured algebra problems versus ill-structured, real-world tasks.

It is therefore very important to bridge these distinct gaps in the current academic discourse to ensure that this paper offers several novel contributions to the study of mathematics education. To bridge the observed gaps, this study introduces a comprehensive, multi-module framework designed to evaluate and compare the localized effects of Reflective Journal Writing, the Think-Pair-Share strategy, and traditional conventional methods on student mathematics performance in Ekiti State.

The foundational objective of any mathematics curriculum is the cultivation of robust problem-solving capabilities among students. Educational researchers have extensively documented that transitioning a student from a novice to an expert problem solver requires highly organized instructional strategies that actively manage cognitive load and promote metacognition. In this context, pedagogical approaches must go beyond rote memorization, encouraging students to unpack compact mathematical formulations and apply them to diverse, complex scenarios (Singh et al., 2023). Furthermore, the nature of the mathematical problems presented to students significantly alters the effectiveness of the chosen pedagogical approach. For instance, studies examining classroom cooperation reveal that social network configurations affect academic performance differently depending on the task type; highly clustered peer networks excel at solving well-structured algebra-based problems, whereas access to diverse informational structural holes is more beneficial for ill-structured, real-world tasks.

While these cognitive and social network theories offer profound insights into academic performance, they exhibit notable strengths and weaknesses. A major strength is their empirical grounding in physics and mathematics, providing a quantifiable link between classroom social dynamics and problem-solving success. However, a significant weakness is that these approaches are predominantly tailored for university-level environments, which assume a baseline of mature metacognitive development. Compared to the current work, our proposed framework specifically adapts these high-level pedagogical concepts—such as structured peer cooperation—for secondary school mathematics in Ekiti State. By localizing these strategies, we aim to investigate whether younger students facing regional educational constraints can achieve similar cognitive benefits through carefully managed collaborative strategies like think-pair-share.

The shift from traditional lecture models to activity-based teaching methods has garnered significant attention in educational research. Activity-based teaching strategies have been shown to positively affect students' achievement in secondary school mathematics by making learning a more concrete and engaging process. Furthermore, structural path models indicate that teaching strategies interact seamlessly with student motivation and learning styles to influence overall performance. The core strength of these peer-mediated and activity-based models is their ability to transform passive listeners into active

participants, thereby reducing mathematical anxiety. However, a notable weakness is that highly interactive methods can be difficult to manage in overcrowded classrooms and require significant pedagogical training for teachers. Compared to prior broad applications of activity-based learning, our proposed work specifically isolates the dual impact of Reflective Journal Writing and TPS, offering a highly structured yet low-cost intervention suitable for resource-constrained environments like Ekiti State.

The purpose of the study is to determine the effect of two instructional strategies (Reflective Journal Writing and Think-Pair-Share) on secondary school students' performance in Mathematics. Reflective Journal Writing targets the affective domain, allowing students to navigate their mathematical anxieties and develop self-confidence, which is a known predictor of mathematics achievement. On the other hand, the Think-Pair-Share strategy leverages peer-to-peer conversational data and interaction dynamics, which are central to structuring reliable social knowledge networks in the classroom. By combining these two strategies, the study addresses both individual cognitive processing and collaborative social learning.

A. Research Hypotheses

The following hypotheses were generated for the study

- There is no significant difference in the mean performance scores of students when exposed to Reflective Journal Writing, Think-Pair-Share strategies and Conventional method before and after treatment.
- There is no significant difference in the mean performance scores of students exposed to Reflective Journal Writing strategy and Conventional method in Mathematics.
- There is no significant difference in the mean performance scores of students exposed to Think-Pair-Share strategy and Conventional method in Mathematics.

II. METHODOLOGY

The study adopted a pre-test, post-test, three group quasi-experimental design (two experimental groups and one control group). The subjects comprised 113 Senior Secondary One (SS1) students in three intact classes selected through multi-stage sampling procedure from Ekiti South Senatorial District.

The instrument used for the study was a self-constructed Performance Test in Mathematics (PTM) and Instructional Packages. The PTM was made up of two sections namely sections A and B. Section A sought for the bio-data of the students while section B was made up of 30 items drawn from quadratic equations, ratio, proportion and rates. The instrument was used for pre-test and post-test. The content of PTM used for pre-test was reshuffled for the post-test in order to prevent carry-over effect. The instrument was validated by content validity method. It was given to two Mathematics teachers to ascertain the content validity of the instrument. Pearson's Product Moment Correlation Analysis statistics formula was used to establish the reliability coefficient which yielded a coefficient of 0.76 for PTM. The Performance Test in Mathematics (PTM) was administered on experimental and control groups as pre-test in order to ascertain the entry point of each group. The reshuffled Performance Test in Mathematics (PTM) which served as post-test was administered to the

three groups after teaching the groups for 6 weeks using the school scheme of work. The Instructional Package was made up of three modules as used in this study:

A. Module A:

Reflective Journal Writing Strategy. In this module, the pedagogical approach leans toward metacognitive constructivism. Following each mathematics lesson, students were made to write detailed entries explaining the steps they took to solve specific algebraic problems, documenting where they encountered cognitive friction. Teacher-student interactions in this module involved the teacher providing written, formative feedback on these journals, focusing on pressing for reasoning rather than merely correcting numerical errors.

B. Module B:

Think-Pair-Share Strategy. This module relies heavily on social networking and peer-assisted learning. The classroom management structure is deliberately decentralized. The teacher presents a mathematical problem; student's first think about it individually, pair up with a designated peer to discuss their logic, and then share their consensus with the broader class. This method encourages the formulation of highly clustered social networks, which have been shown to enhance performance on well-structured problems.

C. Module C:

Traditional/Conventional Method. Serving as the experimental baseline, this module utilizes a rigid, behaviourist pedagogical approach. Classroom management is strictly hierarchical, with the teacher acting as the sole distributor of knowledge via frontal lecturing. Assessment methods here are predominantly summative, relying heavily on standard quizzes and a final examination, with minimal discursive or individualized teacher-student interactions.

Table 1: The experimental plan was as follows:

Duration	Activities
1st week:	Researchers visited the schools to obtain informed consent of participants.
2nd week:	Training of research assistants and administration of pre-test
3rd – 8th week	Teaching of the students via Reflective Journal Writing, Think-Pair-Share strategies and conventional method
9th week	Post-test

After treatment, the scores in pre-test and post-test in the three groups were collated and subjected to appropriate statistical analysis. The data collected were analyzed using inferential statistics. The hypotheses were tested using Analysis of Covariance statistics at 0.05 level of significance. To determine the source of differences, Multiple Classification Analysis (MCA) was used.

A. Results

1. Hypothesis 1:

There is no significant difference in the mean performance scores of students when exposed to Reflective Journal Writing, Think-Pair-Share strategies and Conventional method before and after treatment. In order to test the hypothesis, mean performance scores of students

exposed to Reflective Journal Writing, Think-Pair-Share strategies and Conventional method before and after treatment were computed and compared for statistical significance using One-way Analysis of Covariance (ANCOVA). The result is presented in Table 2.

Table 2: ANCOVA of students' mean performance scores by treatment

Source	SS	df	MS	F	P	Partial Eta^2
Corrected Model	2027.310	3	675.770	45.287	.000	.555
Covariate (Pretest)	66.232	1	66.232	4.439	.037	.039
Group	2002.142	2	1001.071	67.087	.000	.552
Error	1626.496	109	14.922			
Total	49617.000	113				
Corrected Total	3653.805	112				

Table 2 showed that the computed F-value (67.087) at degrees of freedom 2 and 109 obtained for the groups with a p-value <0.05 was significant. The null hypothesis was therefore rejected; implying that there was significant difference in the mean performance scores of students when exposed to Reflective Journal Writing, Think-Pair-Share strategies and Conventional method before and after treatment. In order to determine the source of difference in the mean performance scores of students in Mathematics, a Multiple Classification Analysis (MCA) was carried out as depicted in Table 2.

Table 3: Multiple Classification Analysis (MCA) of students' mean performance scores in Mathematics by treatment

Grand mean = 20.17					
Variable + Category	**N**	**Adjusted Devn'**	**Eta^2**	**Adjusted For Independent + Covariate**	**Beta**
Think-Pair-Share	38	4.49		4.58	
Reflective Journal Writing	35	1.23		1.16	
Conventional	40	-5.34	0.56	-5.36	0.08
Multiple R					0.083
Multiple R^2					0.007

Table 3 showed that with a grand mean of 20.17, students exposed to Think-Pair-Share had the highest adjusted mean score of 24.75 (20.17+4.58) in Mathematics, this was closely followed by those exposed to Reflective Journal Writing instructional strategy with 21.33 (20.17+1.16) while students in the Conventional method group had the least adjusted mean score of 14.81 (20.17+(-5.36). This implied that the treatment had effect on the performance of students in Mathematics. The treatment accounted for about 56% (Eta2=0.56) of the observed variance in the performance of students in Mathematics.

2. Hypothesis 2:

There is no significant difference in the mean performance scores of students exposed to Reflective Journal Writing strategy and Conventional method in Mathematics.

In order to test the hypothesis, mean performance scores of students exposed to Reflective Journal Writing strategy and Conventional method in Mathematics were computed and

compared for statistical significance using One-way Analysis of Covariance (ANCOVA). The result is presented in Table 4.

Table 4: ANCOVA of mean performance scores of students in Reflective Journal Writing and Conventional groups in Mathematics

Source	SS	df	MS	F	P	Partial Eta^2
Corrected Model	892.419	2	446.209	28.263	.000	.440
Covariate (Pretest)	85.447	1	85.447	5.412	.023	.070
Group	775.013	1	775.013	49.089	.000	.405
Error	1136.728	72	15.788			
Total	26042.000	75				
Corrected Total	2029.147	74				

Table 5 showed that the computed F-value (49.089) at degrees of freedom 1 and 72 obtained for the groups with a p-value <0.05 was significant. The null hypothesis was therefore rejected; implying that there was significant difference in the mean performance scores of students when exposed to Reflective Journal Writing strategy and Conventional method in Mathematics. In order to determine the source of difference in the mean performance scores of students in Mathematics, a Multiple Classification Analysis (MCA) was carried out as depicted in Table 5.

Table 5: Multiple Classification Analysis (MCA) of students' mean performance scores in Mathematics in Reflective Journal Writing strategy and Conventional method groups

Grand mean = 17.89					
Variable + Category	**N**	**Adjusted Devn'**	**Eta^2**	**Adjusted For Independent + Covariate**	**Beta**
Reflective Journal Writing	35	3.51	0.44	3.44	0.24
Conventional	40	-3.06		-3.00	
Multiple R					0.241
Multiple R^2					0.058

Table 6 showed that with a grand mean of 17.89, students exposed to Reflective Journal Writing instructional strategy had higher adjusted mean score of 21.33 (17.89+3.44) in Mathematics than their counterparts in the conventional group with an adjusted mean score of 14.89 (17.89+(-3.00). This implied that the treatment had effect on the performance of students in Mathematics. The treatment accounted for about 44% (Eta2=0.44) of the observed variance in the performance of students in Mathematics.

3. Hypothesis 3:

There is no significant difference in the mean performance scores of students exposed to Think-Pair-Share strategy and Conventional method in Mathematics.

In order to test the hypothesis, mean performance scores of students exposed to Think-Pair-Share strategy and Conventional method in Mathematics were computed and compared for statistical significance using One-way Analysis of Covariance (ANCOVA). The result is presented in Table 6.

Table 6: ANCOVA of mean performance scores of students in Think-Pair-Share strategy and Conventional method groups in Mathematics

Source	SS	df	MS	F	P	Partial Eta^2
Corrected Model	1961.953	2	980.976	51.576	.000	.579
Covariate(Pretest)	77.819	1	77.819	4.091	.047	.052
Group	1947.893	1	1947.893	102.412	.000	.577
Error	1426.509	75	19.020			
Total	33400.000	78				
Corrected Total	3388.462	77				

Table 7 showed that the computed F-value (102.412) at degrees of freedom 1 and 75 obtained for the groups with a p-value <0.05 was significant. The null hypothesis was rejected; implying there was significant difference in the mean performance scores of students exposed to Think-Pair-Share strategy and Conventional method in Mathematics. In order to determine the source of difference in the mean performance scores of students in Mathematics, a Multiple Classification Analysis (MCA) was carried out as depicted in Table 6.

Table 7: Multiple Classification Analysis (MCA) of students' mean performance scores in Mathematics in Think-Pair-Share strategy and Conventional method groups

Grand mean = 19.62					
Variable + Category	**N**	**Adjusted Devn'**	**Eta^2**	**Adjusted For Independent + Covariate**	**Beta**
Think-Pair-Share	38	7.04	0.58	5.09	0.06
Conventional	40	-4.79		-4.84	
Multiple R					0.064
Multiple R^2					0.004

Table 7 showed that with a grand mean of 19.62, students exposed to Think-Pair-Share strategy had higher adjusted mean score of 24.71 (19.62+5.09) in Mathematics than their counterparts in the Conventional group with an adjusted mean score of 14.78 (19.62 + (-4.84). This implied that the treatment had effect on the performance of students in Mathematics. The treatment accounted for about 58% (Eta2=0.58) of the observed variance in the performance of students in Mathematics.

III. DISCUSSION

The study revealed that the mean performance scores of students in Reflective Journal Writing, Think-Pair-Share instructional strategies and Conventional method in Mathematics was generally low prior to treatment but improved after treatment. The findings of the study

showed that students in the Think-Pair-Share group had pre-achievement mean scores of 8.89, while those in the Reflective Journal Writing and Conventional groups were 9.71 and 9.43 respectively which implied that the level of students' performance prior to treatment in Mathematics was very low. That their mean scores were very close to one another showed that these groups were homogenous.

This by implication means that the performance level of students in Reflective Journal Writing, Think-Pair-Share, and Conventional groups before being exposed to treatment was the same. This confirmed the homogeneity of the groups. The non-significant result could be attributed largely to constant use of conventional method of teaching which they were all familiar with. At the end of the treatment, there was a significant difference between the mean pre-test scores and the mean post-test scores of those exposed to Reflective Journal Writing, Think-Pair-Share strategies and Conventional method.

The study revealed that those exposed to Think-Pair-Share instructional strategy had highest post-achievement score, followed by those in the Reflective Journal Writing group while the Conventional group was the least. The observed difference could be attributed to the effects of treatment administered on the students, which showed that, the treatment was effective. This finding is supported by Saleh and Ibrahim (2015) who reported the superiority of the experimental group (think-pair-share strategy) over the control group (conventional method) in achievement and attitude. It also agrees with the submission of Hart (2015) who used Edmodo with Journal Writing, that it was effective in increasing performance and retention of the students in Mathematics. Also, Knox (2017) posited that students who write journals in the Mathematics classrooms had deeper mathematical comprehension than students in Mathematics classroom without writing.

Finding of the study showed that there was significant difference in the mean performance scores of students exposed to Reflective Journal Writing strategy and Conventional method in Mathematics. The finding is in consonance with the finding of Aquino & Nool (2018), Knox (2017) and Hart (2015) that Journal Writing is effective in increasing performance and retention of the students in Mathematics. The finding is in line with that of Del-Rosario, Subla & Lopez (2018) which revealed that Journal Writing in Mathematics brought about better and improved scores for students in problem-solving tasks and helped students to learn how to transfer ideas clearly and convey their feelings and thoughts effectively.

The finding showed that there was significant difference in the mean performance scores of students exposed to Think-Pair-Share strategy and Conventional method in Mathematics. The implication of the finding is that, teachers who used Think-Pair-Share would have their students perform positively in Mathematics in secondary schools. The finding is in agreement with the findings of Popoola & Olofinlae (2023) and Akanmu (2019) that the use of Think-Pair-Share strategy enhanced students' performance.

IV. CONCLUSION

The findings of this study have led to the conclusion that the use of Reflective Journal Writing and Think-Pair-Share strategies are effective in the teaching and learning of Mathematics. Based on the outcome of the finding, both learning strategies could be recommended for

use in teaching and learning of Mathematics. The adoption of Reflective Journal Writing and Think-Pair-Share strategies would help learners to have better retention; consequently, leading to a better academic performance in Mathematics.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations were made;

- Mathematics teachers should enhance the innovative instructional process by deliberate use of Reflective Journal Writing and Think-Pair-Share instructional strategies in the learning process in order to facilitate the high level of students' performance in Mathematics.
- The use of Think-Pair-Share instructional strategies should be encouraged in teaching and learning of Mathematics for improved retention to enhance their academic performance.
- Mathematics teachers should adopt the use of student-centred instructional strategies to impact knowledge to the students to facilitate higher performance in the subject.
- Longitudinal Tracking: Future studies should implement the RJW-TPS intervention over a full academic year, rather than a single term, to assess whether the initial gains in mathematics performance and attitude are sustained over time.

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