

# PSYCHOLOGICAL SAFETY ENVIRONMENT; EFFECTS ON PEER TUTORING STRATEGY ON THE ACHIEVEMENTS OF JUNIOR SECONDARY SCHOOL STUDENTS IN MATHEMATICS

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## **Abstract**

*Many mathematics teachers believe that there is no other method by which mathematics could be taught other than conventional method. Whereas, conventional method of teaching had become a threat to psychological safety environment students are supposed to enjoy. This study would therefore examine the psychological safety environment effects on peer tutoring strategy on the achievements of junior secondary school students in mathematics in Oyo metropolis. The study employed pre-test, post-test, control group quasi experimental design. The population consists of 1743 JSS students' in Oyo metropolis. 1537 students were randomly selected from secondary schools across the metropolis. The instruments used were Students Mathematics Anxiety Rating Scale (SMARS) ( $r=0.85$ ) Mathematics Achievement Test for Students' (MATs) ( $KR 20 = 0.97$ ), Mathematics Lesson Plan (MLP) and Mathematics Lesson Notes (MLN). Three hypotheses were postulated and tested. Data were analysed using ANCOVA. The results revealed significant main effect psychological safety environment on the treatment on students' achievement in mathematics ( $F(2, 23) = 12.94$ ;  $p < 0.05$ , partial  $\eta^2 = 0.65$ ). There was no significant main effect psychological safety environment on gender on students' achievement in mathematics ( $F(1, 24) = .03$ ;  $p > .05$ , partial  $\eta^2 = .002$ .  $\eta^2 = 0.03$ ). It was concluded that psychological safety environment has no effect on treatment, gender and anxiety on students' academic achievement. It was suggested that*

*psychological safety environment should be provided to enhance effective peer tutoring strategy in the teaching and learning of mathematics.*

**Keywords:** *Psychological safety environment, Peer Tutoring.*

## **Introduction**

The word mathematics is derived from an ancient Greek word "Manthenein" which means to learn (Malik, 2017). Mathematics is the process of learning which expresses human mind and upholding logical reasoning that give insight into critical thinking that stimulate intellectual curiosity in man. Mathematics is a subject that systematically form basis for logical preposition or assumption by which ideas and concepts of facts are convey (Malik, 2017). The fact that mathematics make life been one of mandatory core subjects that must be passed before any student can be offered admission degree courses at the higher institution in Nigeria.

As important as mathematics is, students' performance in the subject's is not encouraged. The persistent failure of students in mathematics was traced to inappropriate teaching strategies used by individual's mathematics teacher. Not only this, psychologically safety of students' classroom does guarantee nor support the strategy used by the teacher this in turn make it difficult for students to comprehend during teaching learning process. McClintock, Fainstad, Jauregui, and Joshua, (2021) see physical characteristics of learning environments as an enhancement of peer tutoring strategy, this teaching strategy influence students learning environment and the overall educational experience. Psychological safety environments can lead to better student engagement, learning outcomes, and overall educational experiences.

Many teachers are often left wondering whether they have wasted their time when, at the end of the lessons students refuse to ask questions. It may not be that students have not engaged with the teacher's lesson, but might be afraid that their indication of not understanding the concepts taught must let other see them as stupid (Younnes & Hemant, (2015). Teachers need to create a psychologically safety classroom environment to enhance positive learning outcome so that students would not be humiliated when asking questions or making a mistake. Psychologically safety environment enable teachers to use appropriate teaching strategies which in turn make students' demonstrate increased levels of self-confidence and creativity skills (Yara & Odebode, 2023).

Psychologically safety environment enhance teaching strategies an appropriate teaching strategies stimulate students' interest to learn (Ekwueme & Onaife, 2017). Julie (2015) says that students participation in the teaching and learning process is

encouraged if they were allow to interact and express their opinion among themselves after been guide by their teachers.

Peer tutoring is a simple instructional strategy that shows a great promise for meeting the complex academic and social need of pupils with diverse learning abilities in a regular class without really affecting other pupils in the class. This is true when pupils supplement teachers' efforts to assist low achievers in a large classroom typical of Nigeria situation. Peer tutoring is an approach in which students take turns in the role of teacher in their group. It is characterized by mutual help between the tutors with tutee in learning, it increased students learning outcomes by improving the understanding of students with mastery of concept. For peer tutoring to be effective it must be accomplished by active teaching-learning activities. Teaching learning activities are interesting when instructional materials are used effectively and efficiently in a classroom-teaching situation. Instructional materials help and encourage students for the better understanding of the subject matter. Peer tutoring instructional approach has the capability of resolving complex academic and social need of students who are struggling especially in Mathematics.

### **Statement of the Problem**

The poor performance in mathematics among secondary school students is gradually sliding to alarming state. The poor performance is due to poor method of teaching and unguaranteed psychological safety classroom environment. Mathematics teachers taught under threat and students were afraid to ask questions during teaching and learning process. Therefore, this study was embarked upon to investigate the extent at which psychological safety classroom environment enhance peer tutoring approach to improve secondary school students' achievement in Mathematics.

### **Hypotheses**

The following hypotheses was postulated and tested at 0.05 significant level.

Ho1: There is no significant influence of Psychological Safety Environment on Peer Tutoring Strategy on the Achievements of Junior Secondary School Students in Mathematics.

Ho2: There is no significant influence of Psychological Safety Environment on mean achievement scores of male and female students taught with peer tutoring strategy.

Ho3: There is no significant influence of Psychological Safety Environment on students' mathematics anxiety.

### **Methodology**

The study employed pre-test, post-test, control group quasi experimental design. The population consists of 1743 JSS students' in Oyo metropolis. 1537 students were randomly selected from secondary schools across the metropolis. The instruments used were Students Mathematics Anxiety Rating Scale (SMARS) ( $r=0.85$ ) Mathematics Achievement Test for Students' (MATS) ( $KR 20 = 0.97$ ), Mathematics Lesson Plan (MLP) and Mathematics Lesson Notes (MLN). The instruments were validated under the content, construct, and face validity. Data were analyzed using ANCOVA.

### Analysis of Data/ Results

Ho1: There is no significant influence of Psychological Safety Environment on Peer Tutoring Strategy on the Achievements of Junior Secondary School Students in Mathematics.

**Table 1: Analysis of Covariance (ANCOVA) showing main effect of treatment on Peer Tutoring Strategy on the Achievements of Junior Secondary School Students in Mathematics**

Source	Type III Sum of Square	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	292.141	10	29.214	5.692	.002	.803
Intercept	115.197	1	115.197	22.443	.000	.616
Pre achievement	94.941	1	94.941	18.497	.001	.569
Treatment	312.796	2	66.398	12.936	.001	.649
Gender	.132	1	.132	.026	.875	.002
Mathematics Anxiety	26.504	1	26.506	5.164	.039	.629
Treatment x Gender	1.182	2	.591	.115	.892	.016
Error	71.859	14	5.133			.000
Total Corrected	24080.000	25				
Total	364.000	24				

R. Squared = .80 (Adjusted R Squared = .66) Denotes significant  $p < .05$

Table1 revealed that there was a significant main effect of Psychological Safety Environment on treatment on students' achievement in mathematics ( $F(2, 23) = 12.936$ ;  $p < 0.05$ , partial  $\eta^2 = 0.649$ ). The indicated effect size of 65.0% means that 65.0% of the total 66.0% variation observed (Adjusted  $R^2 = .66$ ) in students' post-achievement scores in mathematics in this ANCOVA model was due to the significant main effect of the treatment. Therefore, hypothesis 1 was not accepted.

Ho2: There is no significant influence of Psychological Safety Environment on mean achievement scores of male and female students taught with peer tutoring strategy.

**Table 2: Analysis of Covariance (ANCOVA) showing main effect Psychological Safety on mean achievement scores of male and female students taught with peer tutoring strategy.**

Source	Type III Sum of Square	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	292.141	10	29.214	5.692	.002	.803
Intercept	115.197	1	115.197	22.443	.000	.616
Pre achievement	94.941	1	94.941	18.497	.001	.569
Treatment	312.796	2	66.398	12.936	.001	.649
Gender	.132	1	.132	.026	.875	.002
Mathematics Anxiety	26.504	1	26.506	5.164	.039	.629
Treatment x Gender	1.182	2	.591	.115	.892	.016
Error	71.859	14	5.133			.000
Total Corrected	24080.000	25				
Total	364.000	24				

R. Squared = .80 (Adjusted R Squared = .66) Denotes significant  $p < .05$   
 Source: *Fieldwork*,

Table 2 showed that there was no significant main effect of gender on students' achievement in mathematics ( $F(1, 24) = .026$ ;  $p > .05$ , partial  $\eta^2 = .002$ ). Therefore, hypothesis 2 was upheld. This means that Psychological Safety Environment had no effect on gender achievement in mathematics.

Ho3: There is no significant influence of Psychological Safety Environment on students' mathematics anxiety.

**Table 3: Analysis of Covariance (ANCOVA) showing main effect Psychological Safety on students' mathematics anxiety Level.**

Source	Type III Sum of Square	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	292.141	10	29.214	5.692	.002	.803
Intercept	115.197	1	115.197	22.443	.000	.616
Pre achievement	94.941	1	94.941	18.497	.001	.569
Treatment	312.796	2	66.398	12.936	.001	.649
Gender	.132	1	.132	.026	.875	.002
Mathematics Anxiety	26.504	1	26.506	5.164	.039	.629
Treatment x Gender	1.182	2	.591	.115	.892	.016
Error	71.859	14	5.133			.000
Total Corrected	24080.000	25				
Total	364.000	24				

R. Squared = .80 (Adjusted R Squared = .66) Denotes significant  $p < .05$   
 Source: *Fieldwork*,

Table 3 indicated that there was a significant main effect of Psychological Safety Environment effect on mathematics anxiety on students' achievement in geometry. ( $F(1, 24) = 5.164$ ;  $p < .05$ , partial  $\eta^2 = .629$ ). Hence, hypothesis 3 was rejected. This means that Psychological Safety Environment had effect on students' mathematics anxiety achievement in geometry. The table also revealed the effect of 62.9% which means that 62.9% of the variation in students' post-achievement scores in mathematics was caused by main effect of mathematics anxiety.

### Discussion of Findings

The finding of the study revealed a significant main effect of Psychological Safety Environment on treatment on students' achievement in mathematics. The result showed that peer tutoring was effective in improving students' achievement in mathematics, while conventional strategy (Control) was least effective. Peer tutoring is better than conventional strategy because learners relate together and solve problems together under the supervision of their teacher. These findings are in line with the study of Tiamiyu, Salman & Issau, (2016) that revealed that peer tutoring gives room for students of to transmit knowledge, skills and ideas on how to solve mathematics problems among themselves. Peer tutoring is an intervention strategy that paired students that is above average with students below average in order to improve their performance, it increase students' participation, and motivation and attendance rate (Malik & Salman, 2018). This is in agreement with

the study of Yara & Odebode (2023) and Fuentes, Myers, Swars , Smith & Smith, (2020) that students of the same age range interchange knowledge and ideas to complement what they were taught during teaching and learning process. The result also showed that students taught with peer tutoring achieved more than those taught by conventional strategy (Ching, 2017) contradicting the findings of Oragwam, (2006) that maintained that there was no significant effect of the peer tutoring strategy on students' achievement in science subjects. The contradiction might be due to disparity in the environment of the researcher which carried out the study among learners in one South Texas school district, in the United State of America.

The finding also revealed no significant difference between male and female students' achievement in mathematics contradicting the opinion of (Jacob & Linus, 2017) that shown that females achieved more than males in mathematics.

This finding also revealed that there was a significant main effect of Psychological Safety Environment on students' mathematics anxiety achievement in mathematics. The result of this study agree with the findings of (Peter, 2017) that reported the level of anxiety exhibited was related to the score obtained in a standardized Mathematics test (the high the anxiety level the less the score obtained. Ching (2017) reported a significant relationship between anxiety and achievement which contradicts the observation of Mahoney (2019) that said there is no significant difference between mathematics Anxiety and Mathematics performance.

Anxiety is seen as self-preoccupation with low self-esteem it leads to negative evaluation, lack of concentration, unpleasant physiological reactions, and low proficiency in test performance (Chapell & Mccann, 2017). The findings confirm the finding of (Campbell, Blanding, Takahashi, Silverstein, Newman, Gubi & Mccann, 2019) that mathematics anxiety plays a significant role in academic settings and prevent some students from realizing their fullest academic potentials. This is in agreement with the findings of Ezeudu (2018) that reported a negative significant relationship between mathematics anxiety and achievement.

## **Conclusion**

This study examined the psychological safety environment effects on peer tutoring strategy on the achievements of junior secondary school students in mathematics in Oyo metropolis. It was concluded that students performed better in mathematics under psychological safety classroom if peer tutoring strategy are used by mathematics teachers. This would enable students to improve and have remarkable academic achievement in mathematics.

## **Recommendations**

The following recommendations are made based on the findings:

- i. To improve Students achievement in mathematics, peer tutoring strategy should be adopted by mathematics teachers.
- ii. Teachers should ensure that students' attention were captured during teaching and learning process.
- iii. Mathematics teachers should endeavour to encourage students' participation in the teaching and learning in order to reduce or eradicate their fear for mathematics.

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