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IMPACT OF CLASS ATTENDANCE AND PARTICIPATION, AND MATHEMATICS TEST ANXIETY ON MATHEMATICS ACHIEVEMENT OF SECONDARY SCHOOL STUDENTS IN ONDO STATE, NIGERIA.

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ABSTRACT

This study examined the impact of class attendance and participation, and mathematics test anxiety on mathematics achievement among Senior Secondary School students in Ondo State, Nigeria. Underpinned by the Social Learning Theory (SLT), the Deficit theory, and the debilitating anxiety model, the study utilized the survey research design. The study's population consists of all senior secondary school students in the State, with a sample size of 100. Three research instruments were used for data collection: Mathematics Anxiety Rating Scale (α=0.78), Classroom Participation Questionnaire (α=0.75), and Mathematics Achievement Test (α=0.88). Data were analyzed with both descriptive and inferential statistics at a 0.05% level of significance. The study's findings indicate a high level of mathematics test anxiety among the sample, a positive but non-significant relationship between students' anxiety towards mathematics and mathematics achievement, and students' anxiety towards mathematics tests has a negative and non-significant relationship with students' class attendance and participation, and mathematics achievement. The study recommends that seminars/workshops on how to reduce mathematics test anxiety in students

should be taught to teachers and school owners; provision of books on mathematics and a conducive learning environment that could eliminate mathematics anxiety; test-wiseness training should be organised for both teachers and students; and incentivizing regular attendance and participation, among others.

Keywords: Class attendance and participation; Mathematics test anxiety; Mathematics achievement; Senior secondary school students.

Introduction

Mathematics, commonly referred to as the science of numbers, remains one of the most important subjects at all levels of education. Nations, including Nigeria, depend on it for economic, financial, and technological advancement. According to Reyes and Castillo (2015), mathematics is the foundation of knowledge from which critical and analytical skills are learned and developed. It also fosters logical thinking, which is essential to maximising the productive applications of science and technology. In both the arts and sciences, mathematics is acknowledged as the mother of all learning, from which other topics derive their conceptions (Reyes & Castillo, 2015). Despite its usefulness in real-world situations and a central part in the school curriculum, mathematics has always been seen as a challenging subject (Gopal, 2025). This has been referred to as mathematics anxiety (MA)(Commodore & La Rosa, 2021; Devine et al., 2012). Numerous research initiatives have been made to make learning the subject entertaining and lifelong (Alcover, 2024). It is therefore the intent of this current study to ascertain the level of mathematics anxiety and its relations with achievement among students in Ondo State secondary schools in Nigeria.

Students' future educational and professional prospects are significantly influenced by their academic performance, especially in science fields that require analytical skills, problem-solving ability, and cognitive strength (Hossain et al., 2025). A pass grade or mark in secondary and elementary education and a high Cumulative Grade Point Average (CGPA) in higher education are frequently employed as indicators of academic achievement (Hossain et al., 2025). However, psychological variables like anxiety have a major impact on students' academic performance, especially mathematics anxiety, which can impede performance in high-stakes academic contexts, impair cognitive functioning, and lower concentration (Doz et al., 2024).

Mathematics anxiety is an emerging issue in the field of education and educational psychology and has been acclaimed to be the result of the pedagogical approaches used in the teaching of mathematics to students, rather than being fundamentally connected to the intrinsic difficulty of the subject itself (Samuel & Warner, 2021). The concept of MA has drawn more attention recently to remove obstacles to learning this discipline, which is essential to daily tasks, given the growing significance of

mathematical reasoning in a range of educational and professional contexts (Dowker et al., 2016). Passolunghi et al. (2016) termed MA as "a feeling of tension and anxiety that interferes with the manipulation of numbers and the solving of mathematics problems in a wide variety of ordinary life and academic situations."

Foley et al. (2017) define MA as fear or apprehension of mathematics, frequently characterised by feelings of uneasiness, worry, or dread that hinder a person's performance on mathematical tasks. According to research, students' unproductive tension, timed exams, the possibility of shame in front of others, and unfavourable experiences at home and at school that result in a lack of mathematical comprehension are the causes of MA (Alcover, 2024; Yarkwah et al., 2024). According to Suren and Kandemir (2020), MA is frequently anticipated due to students' personal concerns about mathematics, which show themselves in a way that makes them extremely sensitive to the subject and raises their general anxiety levels in relation to mathematics.

When trying to learn about arithmetic or complete a math assignment, students who suffer from MA feel high amounts of negative emotion, including intrusive and distracting thoughts. As a result, MA is linked to maladaptive study techniques, including avoiding homework and test preparation, which significantly hinders students' ability to reach their full potential in the subject (Pizzie & Kraemer, 2023; Zhang et al., 2024). Strong negative affective reactions to mathematics have been well-documented in previous research and are frequently linked to MA (Smith et al., 2026). High levels of arithmetic anxiety are often associated with low math performance as well as a decline in students' self-esteem and drive for the subject.

Anxiety related to mathematics has been identified as a psychological obstacle that affects students' learning, problem-solving, and academic achievement (Kalwani & Tripathi, 2025). The study by Kalwani and Tripathi (2025) investigated the connection between secondary school students' academic success and mathematical anxiety. The findings showed that academic achievement and mathematical anxiety were significantly correlated negatively. Research indicates that poorer academic achievement is linked to higher levels of arithmetic anxiety. According to a study by Yarkwah et al. (2024) in Ghana, while noting that secondary school students have severe levels of mathematics anxiety, students' anxiety during mathematics assessments is greatly influenced by several factors, including misconceptions about mathematical ideas, exam preparation, fear of failure and embarrassment, and the quality of mathematics instruction. Additionally, their findings demonstrated a strong inverse relationship between academic achievement and anxiety levels. Wahid et al. (2014) assert that a significant percentage of students experience anxiety, which poses a significant risk to their academic performance and engagement. Additionally, empirical research has shown that anxiety negatively affects academic performance in primary,

secondary, and postsecondary educational settings.

There are different and contextual perspectives on what characterises or influences student engagement in the classroom (Osiesi et al., 2026). Class participation often refers to acts that students engage in while in class, such as asking questions, responding to others' questions, participating in discussions, providing feedback, assessing peers, and so on (Osiesi et al., 2026). A far broader definition of class participation, which includes activities that encourage students to engage in more active learning, has replaced the conventional definition, which was limited to verbal exchanges (Osiesi et al., 2026; Orwat et al., 2018). Higher class attendance and active participation positively correlate with improved mathematics achievement, as consistent engagement fosters better comprehension.

Conversely, high mathematics anxiety significantly lowers math performance by compromising working memory and causing avoidance behaviors (Yılmaz, 2022). High anxiety often leads to less engagement, creating a cycle of lower achievement (Yılmaz, 2022). Yılmaz's (2022) study affirms that class attendance and participation positively correlate with achievement. Schmidt and Raines (2019) examined the role of class attendance and student achievement in prescribed mathematics courses. Findings show that students' attendance in class affects their performance in mathematics courses. Similar findings have been reported by Foldnes (2017) and Smith (2025). Similarly, active class participation generally reduces mathematics anxiety and improves achievement, acting as a buffer against learning avoidance (Everingham et al., 2017). Highly anxious students tend to participate less, creating a negative feedback loop that lowers performance. Conversely, fostering a supportive environment that encourages participation boosts confidence and achievement.

Al-Atram's (2015) study investigated the relationship between anxiety and academic achievement. The study showed that students with high anxiety levels performed better on the non-stressful test. On the other hand, when exposed to the conventional condition, students with low anxiety levels performed better. According to a study by Daniel et al. (2020), some students may experience anxiety when forced to demonstrate their knowledge in ways that do not align with their preferred methods. When it comes to academic evaluations, it is important to remember that certain students could feel more anxious than others when they must finish written tests. Gonzalez-Saenz de Tejada et al. (2017) state that students may experience anxiety because of several types of assessments. The findings of the research show that anxiety negatively affects a person's ability to function.

Gopal's (2025) study used a correlational approach to investigate the degree of mathematics anxiety and how it affected secondary school students' learning outcomes. The results show that there is a moderate level of mathematical anxiety. Additionally, there is a strong

correlation between students' math anxiety and their academic success, suggesting that math anxiety influences students' academic success. Commodore and La Rosa (2021) investigated the connection between students' calculation skills, math anxiety, and general academic anxiety. The findings demonstrated a negative correlation between math anxiety and students' ability to complete calculations. More precisely, anxiety connected to studying math was adversely correlated with written calculation results, but anxiety related to math assessments was negatively correlated with numerical knowledge, calculation accuracy, and calculation speed.

The studies of Salahot (2022) and Bornaa et al. (2023) revealed that performance in mathematics declines as math anxiety rises. Song et al. (2023) investigated the role of after-school learning as well as the relationship between math anxiety and math achievement. The results demonstrated a negative correlation between students' math anxiety and math school grades and performance on standardised math achievement tests. Higher math anxiety was also linked to less frequent involvement in math-related extracurricular activities and more negative homework behaviours. Lastly, negative math homework behaviours and involvement in math extracurricular activities acted as a partial mediating factor in the relationship between math anxiety and math achievement.

Hamman (2025) investigated how secondary school students in Taraba State, Nigeria, assessed the effects of test anxiety on their mathematical performance. The results showed a strong correlation between students' mathematics achievement and test anxiety. The influence on achievement did not differ significantly by gender, despite descriptive data showing slightly greater anxiety levels among male students. Additionally, there was no discernible age-related variation in test anxiety on math performance. Suren and Kandemir (2020) investigated the effects of mathematics anxiety and motivation on students' mathematics achievement among Turkish students. Findings indicate a high mathematics anxiety level among the sample, and there was a positive and moderate relationship between mathematics anxiety and achievement, denoting that mathematics anxiety predicts achievement.

Theoretical Framework

This study is underpinned by the Social Learning Theory (SLT), the Deficit theory, and the debilitating anxiety model. In the 1960s, SLT gave rise to Social Cognitive Theory (SCT). According to this theory, learning takes place in a social setting where behaviour, the environment, and the individual interact dynamically and reciprocally (Alcover, 2024). The focus on social influence and both internal and outward social reinforcement is all subsumed in SCT. The theory considers an individual's prior experiences, which influence the likelihood that a behavioural action would take place (LaMorte, 2016). According to the deficit theory (Carey et

al., 2016), also known as the reduced competency account (Ramirez et al., 2018), there is a one-way association between mathematics anxiety and bad performance.

On the other hand, the debilitating anxiety hypothesis (Carey et al., 2016), also known as the disruption account (Ramirez et al., 2018), contends that poorer performance in mathematics is caused by higher levels of mathematics anxiety. Both theories suggest a connection between math performance and math anxiety, but they differ in the direction of causality. Given the evidence for both causal directions, one must also consider whether the relationship is reciprocal, meaning that math performance and math anxiety can affect one another (Smith et al., 2026). For this current study, we assume that students' attendance and participation in class (the social environment), their mathematics anxiety (deficit and debilitating model), account for their eventual performance in the subject.

Problem Statement

Mathematics is regarded as a fundamental field since it serves as the foundation for understanding and describing a wide range of occurrences in nature and society, as well as being used in a variety of sciences as a study of universal structures (Shimizu, 2025). Improving mathematical achievement has been acknowledged as a critical issue in education, with implications beyond mathematics instruction and learning (Shimizu, 2025). Mathematics anxiety has been a major research topic in the mathematics education field over the last five decades. Given its negative impact on mathematics teaching and learning, researchers have tried to identify its underlying causes, manifestations, and implications for both teachers and students (Mainali & Spalding, 2025).

Research continues to depict that students still perceive mathematics as a very difficult subject that is difficult to understand, and lack the time, interest, and concentration for the subject. There is limited knowledge on how students' class attendance and participation, as well as mathematics anxiety, affect their eventual achievement in the subject. This is the crux of this current study. Thus, the study investigates the impact of class attendance and participation, and mathematics test anxiety on students' achievement in mathematics in senior secondary schools in Ondo State, Nigeria.

Research Questions:

The following research question will guide the conduct of this research:

1. What is the level of mathematics test anxiety among students in Ondo State?
2. Is there a relationship between students' mathematics anxiety and their achievement in the subject?
3. Is there a relationship between students' class attendance, test anxiety, and achievement in mathematics?

Methodology

Research Design

The survey research design was adopted for this study. Survey research is defined as "the collection of information from a sample of individuals through their responses to questions" (Check & Schutt, 2012, p. 160). This method's capacity to gather a sizable amount of feedback from a diverse group of people remains one of its main advantages (Creswell & Creswell, 2018). Furthermore, the method offers a more realistic portrayal of historical events and attempts to clarify people's viewpoints and behaviours using empirical data collected at a certain point in time (Yarkwah et al., 2024).

Population, Sampling Techniques, and Sample

This study's population consists of all senior secondary school students in Ondo State, Nigeria. The multistage sampling procedure was employed in selecting samples for this study. Simple random sampling was used in selecting two (2) Local Government Areas (LGAs) (Akure North and Akure South) of the State. Simple random sampling was also used to select two schools in the LGAs. The purposive sampling technique was used to select Senior Secondary School One (SSS1) intact classes, while simple random sampling was used to select only students who voluntarily assented to participate in the study. In all, the sample was 100 students.

Instruments and Instrumentation

Three instruments were used for data collection in this study. First, we adapted the Abbreviated Maths Anxiety Scale (AMAS; developed by Hopko et al., 2003), designed for middle school students. The Maths Anxiety Rating Scale (MARS; Hopko, 2003) is the shortest valid MA scale with nine items (e.g., internal consistency: Cronbach's $\alpha = 0.90$; 2-week test-retest reliability: $r = 0.85$; convergent validity of AMAS and MARSR $r = 0.85$)(Passolunghi et al., 2016). Participants rate their level of anxiety (e.g., 1 = little anxiety; 5 = extreme anxiety) in several math-related scenarios using a 5-point Likert scale. In our adaptation of the instrument, we collapsed the 5-point Likert scale into a dichotomous scale of Yes (2) and No (1), for ease of comprehension and clarity by our sample. After the pilot testing with our sample, the instrument yielded a Cronbach's alpha of 0.78, which falls within the acceptable reliability range.

We also adapted the Classroom Participation Questionnaire (CPQ) developed by Osiesi et al. (2026). The questionnaire was placed on a 4-point Likert scale of Strongly Agree (4) to Strongly Disagree (1), with 17-items measuring students' class attendance and participation. The Cronbach alpha index for the instrument yielded 0.75. Furthermore, given the nature of the study context, we self-developed a Mathematics Achievement Test (MAT), with 20-items in all. The items were curated from the Senior Secondary School One (SS1) Mathematics Textbook, in topics we were sure had been covered by the teachers at the time of data collection. The Kuder-Richardson index for the MAT was 0.88.

It is worth noting that before the actual data collection with these instruments, they were subject to expert reviews by colleagues in Mathematics education, Educational Tests and Measurement in the researchers' faculty of education. Their inputs were used to improve the instruments.

Procedure for Data Collection

The research instruments for data collection for the study were personally administered to the respondents by the researchers and to research assistants who were teachers from the sampled schools. Permission was sought from the school authorities before data collection began. The respondents were given adequate time to complete the instruments and returned. Due to the strict monitoring of the data administration process, all administered instruments (100 of them) were filled out.

Method of Data Analysis

The data collected with the research instruments were analyzed using the descriptive and inferential statistics at a 0.05% level of significance.

Results

Respondents' Demographics

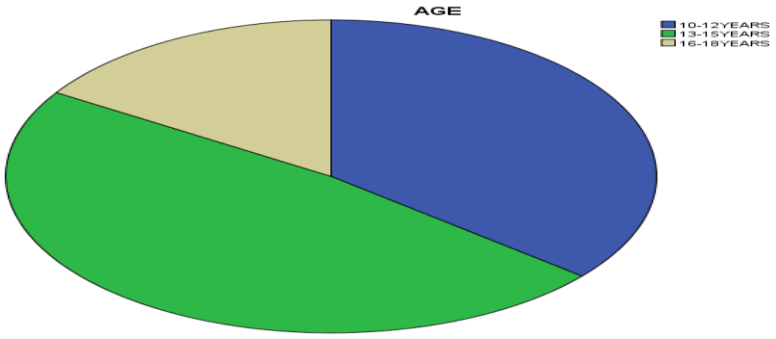


Figure 1 shows the age of respondents in the study. Respondents who were less than 12 years of age were 36 (35.6%), respondents aged 13-15 years old were 48 (47.5%), and respondents who were above 16 years of age were 16 (15.8%). Therefore, most of the respondents were between the ages of 13 and 15 years.

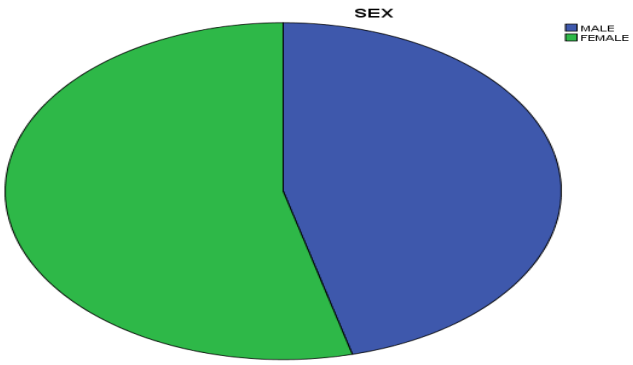


Figure 2 shows the gender of respondents in the study. There were 46 (45.5%) male respondents, and there were 54 (53.5%) female respondents, respectively. Therefore, females were the majority in the study.

RQ1: What is the level of mathematics test anxiety among the sampled students?

Table 1: What is the level of mathematics test anxiety among students

S/N	Items	Yes	No	Mean	SD
1.	I get tense when preparing for a mathematics test	45	35	1.35	.479
2.	I get nervous when writing mathematics exams	59	41	1.41	.494
3.	I worry a lot when I hear of mathematics.	55	45	1.45	.500
4.	I am confident that I will always score high grades in mathematics.	65	35	1.35	.479
5.	I fear my mathematics teacher	68	32	1.32	.469
6.	I feel tense when listening to the mathematics teacher in class	54	46	1.46	.501
7.	I am bitter when taught mathematics	54	46	1.46	.501
8.	I fear asking questions in mathematics class	42	58	1.58	.496
9.	Working on mathematics homework is fun for me	52	45	1.45	.500
10.	I shake with fear when a mathematics test is Approaching	58	42	1.42	.496
11.	I feel feverish anytime a mathematics test is Announced	39	61	1.61	.490
12.	I am always disturbed when I see my mathematics teacher	66	34	1.34	.476
13.	I run or hide each time I see a maths teacher	68	32	1.32	.469
14.	I wish mathematics were not one of my subjects.	53	47	1.47	.502
15.	I am being forced to know mathematics	62	38	1.38	.488
16.	Being called on to answer a maths question in class scares me	50	50	1.50	.503
17.	Mathematics assignment frustrates me a lot.	47	53	1.53	.502
18.	I don't sleep well at night if I am writing a mathematics test	56	44	1.44	.499
19.	I avoid my mathematics textbook	28	72	1.72	.451
20.	I don't think I can do well in mathematics	57	43	1.43	.498
	Cluster mean			**1.44**	**0.48**

Table 1 shows the results obtained for the level of mathematics test anxiety among students in the sampled schools. Given that the number of students who agreed to

statements denoting anxieties related to mathematics, it can be inferred that there exists a high level of mathematics anxiety among the sample.

RQ2: Is there a relationship between students' mathematics anxiety and their achievement in the subject?

Table 2: Responses on the relationship between students' mathematics anxiety and their achievement in the subject

CORRELATIONS		MATHEMATICS ACHIEVEMENT TEST	STUDENTS ANXIETY TOWARDS MATHEMATICS
MATHEMATICS ACHIEVEMENT TEST	Pearson Correlation	1	.178
	Sig. (2-tailed)		.077
	N	100	100
STUDENTS ANXIETY TOWARDS MATHEMATICS	Pearson Correlation	.178	1
	Sig. (2-tailed)	.077	
	N	100	100

***Significant at P<0.05.**

Table 2 shows the relationship between students' mathematics anxiety and their achievement in the subject. As shown in the table, there is a positive but non-significant relationship between mathematics achievement and students' anxiety towards mathematics (r = .178, p > 0.05). This implies that students with higher mathematics anxiety are likely to have better achievement in Mathematics.

RQ3: Is there a relationship between students' class attendance and participation, test anxiety, and achievement in mathematics?

Table 3: Responses on the relationship between students' class attendance, test anxiety, and achievement in mathematics

CORRELATIONS		STUDENTS' CLASS ATTENDANCE AND PARTICIPATION	STUDENTS ANXIETY TOWARDS MATHEMATICS	MATHEMATICS ACHIEVEMENT TEST
STUDENTS' CLASS ATTENDANCE AND PARTICIPATION	Pearson Correlation	1	-.009	-.061
	Sig. (2-tailed)		.928	.547
	N	100	100	100
STUDENTS ANXIETY TOWARDS MATHEMATICS	Pearson Correlation	-.009	1	.123
	Sig. (2-tailed)	.928		.224
	N	100	100	100
MATHEMATICS ACHIEVEMENT TEST	Pearson Correlation	-.061	.123	1
	Sig. (2-tailed)	.547	.224	
	N	100	100	100

***Significant at P<0.05.**

Table 3 shows the relationship between students' class attendance and participation, mathematics test anxiety and achievement in mathematics. As shown in the table, students' anxiety towards mathematics has a negative and non-significant relationship with students' attendance and participation ($r = -.009$, $p > 0.05$). Also, mathematics achievement has a negative and non-significant relationship with students' class attendance and participation ($r = -.061$, $p > 0.05$). Therefore, students' anxiety towards mathematics has a negative and non-significant relationship with students' attendance and participation. This also means that students attending and participating in class does not affect their achievement in mathematics.

Discussion

This study assessed the impact of class attendance and participation, and mathematics test anxiety on the mathematics achievement of students in secondary schools in Ondo State, Nigeria. The study has further buttressed the role of students' attendance and participation, and mathematics test anxiety on mathematics achievement. A finding of the study has indicated that the sampled students have a high level of mathematics test anxiety. This high anxiety may be a result of educational pressures and resource limitations common in schools within the context. High-stakes exams like WAEC, NECO, and JAMB create intense pressure among students, as mathematics is compulsory for university admission, amplifying the fear of failure. Similarly, traditional rote-learning teaching methods make the subject feel intimidating, while the lack of textbooks, mathematics labs, and qualified mathematics teachers hinders students' confidence in the subject. Other factors could include overcrowded classrooms and high student-teacher ratios in most schools in the State, which limit personalized instruction, fostering anxiety. From the parents' angle, there is the prevalence of authoritarian parenting styles and low emotional intelligence, which predict higher anxiety (Osiesi et al., 2023; Smith et al., 2026). This finding reiterates those of previous research (Al-Atram, 2015; Suren & Kandemir, 2020; Wahid et al., 2014; Yarkwah et al., 2024).

Another finding of this study indicates a positive but non-significant relationship between students' anxiety towards mathematics and mathematics achievement. Mathematics test anxiety can correlate positively with achievement by heightening alertness and motivation, channeling worry into focused effort on tasks. This aligns with the Yerkes-Dodson law, in which optimal anxiety levels boost performance on complex cognitive tasks such as math problem-solving. Among these students, anxiety activates arousal that narrows attention to relevant cues, improving working memory efficiency for motivated students during tests. In structured settings such as examination environments, mathematics test anxiety prompts better preparation and study strategy, correlating positively with scores without overwhelming cognitive resources. Low-anxiety students may underperform due to complacency, while extreme

anxiety impairs recall. This finding agrees with those of past studies (Kalwani & Tripathi, 2025; Yarkwah et al., 2024). The finding, however, contrasts with those of Wahid et al. (2014), who assert that mathematics anxiety negatively impacts students' mathematics achievement.

Furthermore, findings reveal that students' anxiety towards mathematics tests has a negative and non-significant relationship with students' attendance and participation, and mathematics achievement. This indicates a tendency for higher anxiety to reduce engagement and performance without reaching statistical reliability. This pattern emerges from weak effect sizes amid broader contextual confounders like resource scarcity and students' related factors. Anxious students often skip classes to avoid math-related distress or perceived failure, yet the effect is non-significant due to compulsory attendance policies in Nigerian public schools that force participation regardless of anxiety levels. High anxiety inhibits voluntary contributions like answering questions or group work, fostering passive behaviour, but non-significance arises from cultural norms emphasizing rote listening and overactive involvement in resource-poor settings. Similarly, anxiety impairs working memory during tests, correlating negatively with achievement. This finding aligns with studies conducted previously (Everingham et al., 2017; Foldnes, 2017; Schmidt & Raines, 2019; Smith, 2025; Yılmaz, 2022).

Conclusion and Recommendations

This study has further enriched the existing literature on the impact of class attendance and participation, and mathematics test anxiety on students' achievement in mathematics. A finding of the study has indicated that the sampled students have a high level of mathematics test anxiety. A positive but non-significant relationship exists between students' anxiety towards mathematics and mathematics achievement. Students' anxiety towards mathematics tests has a negative and non-significant relationship with students' attendance and participation, and mathematics achievement. Following these findings, this study recommends that:

i. Seminars/workshops on how to reduce mathematics test anxiety in students should be taught to teachers and school owners.
ii. Provision of books on mathematics and a conducive learning environment that could eliminate students' mathematics anxiety.
iii. Test-wiseness training should be organised for both teachers and students as it significantly reduces anxiety.
iv. Incentivize regular attendance and participation in class with rewards for consistent math class attendance.
v. Teach students deep breathing (e.g., 4-7-8 method) and progressive muscle relaxation before maths lessons and tests to lower physiological arousal, as these calm the fight-or-flight response without disrupting focus.

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