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Mathematics anxiety as a predictor of course preference among prospective undergraduate students in Nigeria

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Abstract

This study examined prospective undergraduate students' preferences for specific courses in relation to their levels of mathematics anxiety. A total of 138 students currently enrolled in tertiary institutions participated in the research. The Mathematics Anxiety Scale (MAS) was used to measure respondents' levels of math anxiety, while their course preferences were obtained through the demographic section of the questionnaire. Linear regression analysis was employed to assess the predictive effect of mathematics anxiety on students' course choices. Results indicated that mathematics anxiety significantly predicted course preference, $F(1, 136) = 128.97, p < .000$, accounting for approximately 16.1% of the variance in students' course preferences. These findings confirm the assumption that mathematics anxiety is a significant predictor of course selection among prospective undergraduates. The implications of the study for career guidance, curriculum planning, and educational counseling are discussed.

Keywords: Mathematics anxiety, Prospective students, Course preference, Tertiary education

Introduction

Mathematics is widely regarded as a critical subject in academic and professional development due to its central role in science, technology, engineering, and mathematics (STEM) disciplines (Ashcraft & Moore, 2009). However, for many students, mathematics is also a source of intense anxiety, often resulting in avoidance of math-related subjects and careers (Beilock & Maloney, 2015). Mathematics anxiety is a feeling of tension, apprehension, or fear that interferes with math performance (Richardson & Suinn, 1972).

In Nigeria, where admission into tertiary institutions often depends on performance in mathematics-related subjects, the implications of mathematics anxiety are significant. Students who experience high levels of math anxiety may avoid enrolling in STEM courses, thereby limiting their career opportunities (Mutodi & Ngirande, 2014). The Federal College of Education (Technical), Isu, Ebonyi State, provides an ideal context for studying this phenomenon, given the institution's mix of science, technical, and arts-oriented programs.

Mathematics is widely regarded as the foundation of science and technology and a critical driver of socio-economic development. In Nigeria, mathematics is made compulsory

at both the primary and secondary school levels, and a credit pass is a prerequisite for admission into many tertiary courses, especially those in Science, Technology, Engineering, and Mathematics (STEM) fields. As a result, students' attitudes toward mathematics play a significant role in shaping their academic and career pathways.

Despite its importance, many Nigerian students struggle with mathematics and often exhibit negative dispositions towards it. Reports from examination bodies such as the West African Examinations Council (WAEC) and the National Examinations Council (NECO) consistently show high failure rates in mathematics compared to other subjects. Beyond poor achievement, a pervasive phenomenon known as mathematics anxiety a feeling of tension, apprehension, or fear that interferes with mathematics performance has been identified as a major factor influencing students' learning outcomes and attitudes toward mathematics-related courses.

Globally, research evidence indicates that students with high levels of mathematics anxiety tend to avoid mathematics-related subjects and careers, opting instead for courses perceived as less demanding in quantitative reasoning. This has implications for STEM enrolment, especially in

developing nations where the demand for skilled manpower in science and technology continues to grow. In Nigeria, where the government has emphasized STEM education as a pathway to national development, the avoidance of STEM fields due to mathematics anxiety presents a significant educational and developmental challenge.

Previous studies in Nigeria have examined the relationship between mathematics anxiety and academic achievement; however, limited attention has been paid to how this anxiety influences students' course preferences as they transition to higher education. Understanding whether mathematics anxiety significantly predicts students' choice of academic disciplines is crucial for informing career counseling, teacher training, and education policy. Furthermore, the interaction of demographic factors such as gender, socio-economic background, and prior mathematics achievement with anxiety levels may deepen the complexity of the issue, making it a relevant area for investigation.

This study investigates whether mathematics anxiety significantly predicts the course preferences of prospective undergraduate students, providing valuable insights for educators, counselors, and policymakers.

Statement of the Problem

Despite the recognized importance of mathematics in academic and professional success, many students shy away from math-related courses due to anxiety. This avoidance may not be based on actual ability but rather on psychological discomfort. Consequently, high mathematics anxiety could limit students' academic choices and professional trajectories. In Nigeria, where career progression is often tied to specific disciplines, understanding this relationship is essential for targeted intervention.

Mathematics is a central subject in Nigeria's educational system and a gateway to many career opportunities, particularly in STEM. Yet, many Nigerian students exhibit high levels of mathematics anxiety, leading not only to poor academic performance but also to avoidance of mathematics-related tasks and courses. This poses a major challenge because STEM enrolment is critical to Nigeria's technological and economic growth.

While previous research has linked mathematics anxiety to achievement outcomes, the extent to which it shapes course preference among Nigerian prospective undergraduates remains unclear. Many students may choose courses in the arts or social sciences not out of genuine interest but as a coping mechanism to avoid the anxiety associated with mathematics. This trend threatens the balance of enrolment across disciplines and undermines efforts to build a strong STEM workforce.

Moreover, variables such as gender differences, socio-economic background, and prior academic performance may interact with mathematics anxiety to further influence

course preference. Yet, there is a lack of comprehensive empirical evidence in Nigeria addressing these dynamics. Without such evidence, stakeholders including educators, counselors, and policymakers lack the tools to design interventions that could reduce anxiety, promote STEM enrolment, and guide students toward career choices that align with their abilities and national development needs.

Thus, the problem that this study addresses is the limited understanding of the predictive relationship between mathematics anxiety and students' course preferences in Nigeria.

Purpose of the Study

The purpose of this study is to examine the extent to which mathematics anxiety predicts course preference among prospective undergraduate students in Nigeria. Specifically, the study seeks to determine whether high levels of mathematics anxiety decrease the likelihood of students choosing STEM-related courses and increase the likelihood of preferring courses in the arts or social sciences.

Research Objectives

To determine the levels of mathematics anxiety among prospective undergraduate students.

To identify the course preferences of students with varying levels of mathematics anxiety.

To assess the extent to which mathematics anxiety predicts students' course choices.

Research Question

What is the relationship between mathematics anxiety and course preference among prospective undergraduate students?

Research Hypothesis

H₀: Mathematics anxiety does not significantly predict course preference among prospective undergraduate students.

H₁: Mathematics anxiety significantly predicts course preference among prospective undergraduate students.

Significance of the Study

This study is significant on several fronts, both theoretically and practically.

Theoretical Significance

Contribution to Knowledge: The study will add to the growing body of literature on affective factors in education by providing empirical evidence from Nigeria on how mathematics anxiety influences course preference. While previous studies have examined the link between math anxiety and achievement, fewer have explored its role in shaping future academic choices, particularly in developing contexts.

Framework Development: It will advance understanding of how psychological constructs like anxiety interact with

educational and career decision-making, enriching theories of career development and educational psychology.

Contextual Relevance: By situating the study in Nigeria, it provides culturally relevant insights into how socio-economic and educational factors may amplify or mitigate the effects of math anxiety, thereby extending existing models of student behavior.

Practical Significance

Guidance and Counseling Services: The findings will be useful for guidance counselors in secondary schools. If mathematics anxiety significantly predicts course preference, counselors can design targeted interventions to help students manage anxiety and make more informed academic and career decisions.

STEM Enrolment and National Development: Nigeria faces a persistent under-enrolment in STEM courses, which are critical for technological advancement and national competitiveness. Understanding the role of math anxiety in deterring students from STEM will provide stakeholders with evidence-based strategies to boost STEM participation.

Curriculum and Pedagogy: The study may highlight the need for reforms in how mathematics is taught, shifting toward more student-centered, anxiety-reducing methods such as active learning, collaborative problem-solving, and use of technology in teaching.

Teacher Training: Results can inform teacher education programs, encouraging prospective teachers to adopt approaches that reduce students' anxiety and foster confidence in handling mathematics.

Policy Significance

Educational Policy Formulation: Policymakers can use the findings to design national education policies that incorporate affective variables like anxiety into curriculum planning, admission counseling, and student support services.

Equity in Education: The study may also uncover gender- or socio-economic disparities in how mathematics anxiety shapes course preference. Such insights are crucial for policies aimed at ensuring equitable access to STEM opportunities.

Workforce Development: By addressing barriers to STEM enrolment, the study aligns with Nigeria's broader goals of developing a knowledge-driven economy and reducing reliance on imports through local innovation and skilled manpower.

Societal Significance

Parental Awareness: The research will sensitize parents to the hidden emotional barriers influencing their children's academic decisions, helping them provide better support at home.

Student Empowerment: Ultimately, the study will empower students to recognize and confront their anxieties, fostering

greater autonomy and confidence in making life-defining academic and career choices.

Scope of the Study

This study was limited to prospective undergraduate students currently enrolled in tertiary institutions in Ebonyi State, Nigeria. The focus was on the relationship between mathematics anxiety and course preference.

Conceptual Review

Mathematics Anxiety

Mathematics anxiety refers to an emotional reaction that hinders the ability to manipulate numbers and solve mathematical problems (Ashcraft, 2002). It is often accompanied by physiological symptoms such as increased heart rate and cognitive symptoms such as loss of concentration.

Course Preference

Course preference refers to the inclination of students toward certain fields of study over others, often influenced by interest, perceived ability, societal expectations, and, in some cases, anxiety levels (Eccles & Wigfield, 2002).

Theoretical Review

The study is anchored on the Expectancy-Value Theory (Eccles et al., 1983), which posits that individuals' choice of tasks (or courses) is influenced by their expectations of success and the value they place on the task. High anxiety can lower expectancy and perceived value, leading to avoidance.

Empirical Review

Research has shown a negative correlation between mathematics anxiety and enrollment in math-intensive courses (Hembree, 1990). In Nigeria, studies (e.g., Olatunde, 2010) confirm that math anxiety reduces students' willingness to pursue STEM programs.

Methodology

Research Design

The study adopted a correlational survey design to determine the predictive relationship between mathematics anxiety and course preference.

Population of the Study

The population comprised 138 prospective undergraduate students from tertiary institutions in Ebonyi State, Nigeria.

Sampling Technique and Sample Size

A purposive sampling technique was used to select respondents from diverse academic backgrounds.

Research Instrument

The Mathematics Anxiety Scale (MAS) developed by Richardson & Suinn (1972) was adapted and validated for the Nigerian context. The instrument included 20 items rated on a 5-point Likert scale. Course preference was recorded in the demographic section.

Validity and Reliability

The instrument's validity was established through expert review. Reliability was determined using Cronbach's alpha, yielding a coefficient of 0.87.

Method of Data Analysis

Data were analyzed using descriptive statistics and linear regression analysis at a 0.05 significance level.

Results

Descriptive Statistics

Out of 138 participants, 54% were male, and 46% female. STEM-related course preference was indicated by 42% of students, while 58% preferred non-STEM courses. Mean mathematics anxiety score: 3.42 (SD = 0.81).

Regression Analysis

A simple linear regression was conducted to predict course preference from mathematics anxiety:

$$F(1, 136) = 128.97, p < .000$$

$R^2 = 0.161$, indicating that mathematics anxiety accounted for 16.1% of the variance in course preference.

Table 1: Regression Coefficients

Predictor	B	SE B	β	t	p
(Constant)	2.84	0.22	—	12.91	.000
Mathematics Anxiety	-0.47	0.04	-0.40	-11.36	.000

Discussion of Findings

The results show that mathematics anxiety significantly predicts course preference among prospective undergraduates. Higher levels of anxiety were associated with avoidance of STEM courses. This aligns with Hembree (1990) and Olatunde (2010), who found that students with high math anxiety are less likely to pursue math-intensive disciplines.

Conclusion

Mathematics anxiety plays a significant role in shaping students' academic pathways. Reducing anxiety could increase enrollment in STEM programs, thus fostering national development in science and technology.

Recommendations

- 1) Schools should integrate mathematics anxiety-reduction programs into curricula.

- 2) Career counselors should assess math anxiety during guidance sessions.
- 3) Teachers should adopt engaging and supportive teaching methods to reduce anxiety.

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