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PREDICTORS OF RESEARCH METHODS COURSE PERFORMANCE AMONG NIGERIAN POSTGRADUATE STUDENTS: A DISCRIMINANT ANALYSIS IN SUB-SAHARAN AFRICAN HIGHER EDUCATION

[1]Nwafor, Obinna C. & [2]Mbelede, Gertrude N. (Ph.D)

[1&2]Department of Educational Foundations, Nnamdi Azikiwe University, Awka, Nigeria

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Abstract

Educational Research Methods and Educational Statistics are courses required for all postgraduate programs in Nigerian universities, especially those in the faculties of Education, yet many students fail these courses each year. This study used discriminant function analysis to examine how academic self-efficacy, statistical anxiety, and lecture clarity predict student performance among 350 postgraduate students in South-Eastern Nigerian universities. The discriminant function was significant (Wilks' $\Lambda = .512$, χ^2 (3) = 233.42, $p < .001$) and explained 48.7% of the variance in whether students passed or failed. The function correctly classified 91.4% of students. The findings showed statistical anxiety to be the strongest predictor of performance, followed by lecture clarity. Academic self-efficacy did not significantly predict performance. These findings differ from what is obtainable in most Western research that emphasizes self-efficacy. The results suggest that Nigerian universities should focus on reducing statistical anxiety and improving lecture quality rather than building general confidence. The study shows that factors affecting student success may work differently in African universities compared to Western universities. Implications for student support services and faculty training in Sub-Saharan African universities are discussed.

Keywords: Discriminant Function, Analysis, Statistical Anxiety, Lecture Clarity, Postgraduate, Research Methods. Education

1.1 Introduction

More students are enrolling in postgraduate programs across Sub-Saharan Africa than ever before. Nigerian universities have seen particularly rapid growth in postgraduate enrollment over the past twenty years. However, this growth has not come with enough resources to support all

these students. Many programs now have very large classes, limited teaching materials, and few lecturers to handle the growing student numbers.

All postgraduate students in Nigerian universities running educational programmes must pass Educational Research Method and Education Statistics courses (irrespective of the nomenclature in the respective Universities) to complete their degrees. These courses constitute core requirements as they teach students how to conduct research and analyze data (Reinna, 2014, in Ezeugo, Agu, and Anachunam, 2024). They also serve as gatekeepers who determine students' progression toward degree completion (Nwosu, Segotso, Enebe, and Nyakuwanika, 2024). Unfortunately, many students do not do well in these courses each year. Some students are so anxious about statistics that they cannot focus during lectures. Others find the teaching unclear and confusing. Some students lack confidence in their ability to learn quantitative methods. Understanding which of these factors most strongly affects student success can help universities provide better support.

The situation at Nnamdi Azikiwe University and the University of Nigeria, Nsukka, shows the challenges Nigerian postgraduate students face. Educational Research and Statistics classes often have more than 130 students in spaces that are not comfortable for learning. Many students are working professionals who attend classes during the week after their regular jobs. These part-time students sit in the same classes as full-time students, creating groups with very different preparation levels and time available for studying. Lecturers who are already handling heavy teaching loads cannot repeat lectures for different groups of students or provide individualized support. Most teaching follows the traditional lecture method with no other approaches used. When exam time comes, the halls are so overcrowded that students can barely move. These conditions create learning environments fundamentally different from the Western contexts that dominate educational research literature.

Most research on what helps education students succeed in quantitative courses, such as statistics and research courses, comes from Western countries like the United States, United Kingdom, and other European nations. These studies consistently find that academic self-efficacy is very important. Self-efficacy means how confident students feel about their ability to learn and succeed. Research from Western universities shows that confident students tend to perform better (Meng & Zhang, 2023). However, these studies were done in universities with manageable class sizes, good computer labs, plenty of textbooks, adequate technological resources, and stable academic calendars. Nigerian universities face very different conditions. Classes are overcrowded, many students cannot afford textbooks and rely on photocopies of selected topics, most students have never used statistical software before taking the courses, and there are no functional computer labs for these courses (Marcus and Owolabi, 2025). These differences in learning conditions raise important questions about whether findings from Western universities truly apply to postgraduate students in African contexts. Also. Whether psychological constructs like self-efficacy retain their predictive power under such conditions warrants empirical investigation.

Moreover, the paucity of African scholarship on postgraduate education creates an epistemic gap with practical consequences. When Nigerian universities implement student support

interventions, they typically adopt Western models emphasizing confidence-building and self-efficacy enhancement. Yet if anxiety reduction or instructional quality improvements prove more critical in African contexts, resources directed toward self-efficacy interventions may yield minimal returns. Understanding which factors most powerfully discriminate between successful and unsuccessful students in Nigerian settings can inform more effective, contextually appropriate support strategies.

This study examines three factors that might predict whether postgraduate students pass or fail Educational Research Method and Educational Statistics courses in South-Eastern Nigerian universities: academic self-efficacy (confidence in academic abilities), statistical anxiety (fear and worry about statistics), and lecture clarity (how clear and understandable the teaching is). The study uses discriminant function analysis to determine which of these factors most effectively classify students into performance categories and assess their relative discriminating power. The findings contribute to emerging scholarship on African higher education while providing empirical guidance for institutional policy and practice.

1.2 The Present Study

This study examined five research questions:

1. Do academic self-efficacy, statistical anxiety, and lecture clarity together significantly discriminate between students who pass and students who fail Educational Research and Statistics courses?
2. Does academic self-efficacy significantly discriminate between passing and failing students?
3. Does statistical anxiety significantly discriminate between passing and failing students?
4. Does lecture clarity significantly discriminate between passing and failing students?
5. Which of these three variables is the strongest predictor of student performance?

2. Literature Review

2.1 Higher Education in African Contexts

Universities across Africa have accepted many more students over the past decades, but government funding and university resources have not grown at the same rate. This creates a situation where there are many students but not enough lecturers, classrooms, or learning materials to support them properly (Okech, 2016; Sawyer, 2014). Nigerian universities now have very large postgraduate programs. Many students in these programs are working professionals who need advanced degrees to advance their careers. These working students often did not study much mathematics or statistics during their undergraduate programs, so they struggle when they encounter research methods and statistics courses (Ali, 2023; Kennedy, Williams and Asodike, 2020). These expanding postgraduate enrolments, combined with limited institutional resources, create learning conditions that directly influence how effectively students can engage with demanding courses such as research methods and statistics.

The resource constraints characterizing Nigerian universities fundamentally shape the learning experience. Large class sizes preclude the interactive, student-centered pedagogies

advocated in Western educational psychology literature. Limited access to computers means many students complete statistics assignments on smartphones or shared devices. Intermittent electricity disrupts computer lab sessions, even if they exist. When students can only afford photocopies of a few pages from textbooks, they miss important background information. These material conditions, rather than mere contextual details, constitute structural features that may alter how psychological variables influence learning outcomes. This expediates the need to study these psychological constructs as objectivized in Western concepts.

2.2 Academic Self-Efficacy in Non-Western Contexts

Bandura (1977) introduced the concept of self-efficacy, which means a person's belief in their ability to succeed at specific tasks. According to this theory, people who believe they can succeed will try harder, persist longer when things get difficult, and ultimately perform better. Hundreds of studies in Western countries support this idea. Research shows that students with high academic self-efficacy generally earn better grades and complete their degrees more often than students with low self-efficacy (Meng & Zhang, 2023).

However, whether self-efficacy works the same way in all contexts is not clear. Most self-efficacy research has been done in Western countries where students have access to many support systems. In these settings, confident students can take advantage of office hours, tutoring centers, online resources, and other help. In Nigerian universities, these support systems often do not exist. When structural problems like overcrowded classrooms and absent resources limit what individual effort can achieve, believing in yourself may not be enough. Additionally, postgraduate students in Nigeria have already proven their academic ability by completing undergraduate degrees and gaining admission to competitive programs. Most of these students probably have reasonably high general confidence. Whether domain-general self-efficacy predicts performance in specialized quantitative courses under resource constraints remains empirically uncertain.

2.3 Statistical Anxiety as a Universal Barrier

Statistical anxiety is a specific type of anxiety that occurs when people encounter statistics, data analysis, or research methods. It is different from general test anxiety or mathematics anxiety. Students with statistical anxiety feel worried, nervous, or afraid when they have to learn statistical concepts, work with data, or take statistics exams. Studies from many different countries show that higher statistical anxiety leads to lower performance in statistics courses (Korolkiewicz et al., 2025; Lethbridge et al., 2024).

Research in Nigeria has also found that statistical anxiety affects student performance. Achebe and Okoye (2022) studied postgraduate students in South-Eastern Nigerian federal universities and found that students with higher anxiety performed worse in advanced statistics courses. Ogbonnaya et al. (2019) found similar results with Nigerian psychology students. These findings match research from other countries, suggesting that anxiety affects learning in similar ways across different cultures and contexts.

Statistical anxiety might be especially problematic in Nigerian universities for several reasons. The high-stakes nature of these gatekeeper courses means that failing delays degree

completion and career advancement. The overcrowded exam halls create stressful testing conditions. Students who lack access to practice materials cannot gradually build confidence through repeated exposure. When students know that failure has serious consequences and they have limited support to help them succeed, their anxiety naturally increases.

2.4 Lecture Clarity

Lecture clarity refers to how well teachers explain concepts, organize their lessons, and help students understand the material. Clear lectures use logical sequencing, provide good examples, define terms carefully, and check whether students are following along. Research consistently shows that clearer teaching leads to better learning (Segabutla and Evans, 2019; Bolkan, 2016). A major review of 57 studies found strong positive relationships between instructor clarity and student learning across many subjects and grade levels (Titsworth et al., 2015).

Lecture clarity may matter even more in Nigerian universities than in Western universities. When students do not have textbooks to read at home, cannot access online tutorials, and have no office hours to ask questions, lectures become the only way they learn the material. In Western universities, if a lecture is unclear, students can read the textbook, watch YouTube videos, go to tutoring centers, or visit the professor during office hours. Many Nigerian postgraduate education students usually have none of these options. If the lecture is unclear, they simply do not learn the material. With more than 130 students in a class, lecturers cannot easily check whether everyone understands or slow down for students who are confused. Working professionals attending classes after full workdays require particularly clear instruction to compensate for fatigue and competing demands. Under these conditions, clarity may distinguish passable from incomprehensible instruction more sharply than in resource-rich settings where multiple learning supports exist.

3. Methods

This study used an ex post facto design, which means we examined relationships between variables after the outcomes had already occurred. We used discriminant function analysis as the statistical method. This technique helps identify which variables best separate groups that are naturally occurring, in this case, students who passed versus students who failed. The study was conducted in five federal universities in South-Eastern Nigeria during the 2023/2024 academic year.

The population comprised all postgraduate students enrolled in Educational Research and Statistics courses across participating universities. Through stratified random sampling by university and program, 350 students (98 FAIL, 252 PASS) provided complete data. The sample included both full-time students (43%) and working professionals pursuing part-time degrees (57%), reflecting typical Nigerian postgraduate demographics. Performance classification was based on final course grades, with FAIL representing scores below 50% and PASS representing 50% or above, consistent with Nigerian university grading systems. This mix reflects the typical makeup of postgraduate programs in Nigerian universities.

Three questionnaires were used to measure the variables in this study. Academic Self-Efficacy Scale, which had 20-item questionnaire measured how confident students felt about

handling academic challenges. Students responded to statements like "I can learn difficult academic material" and "I can handle the demands of my courses" using a 5-point scale from 1 (Strongly Disagree) to 5 (Strongly Agree). Higher scores indicated greater confidence. The scale showed good reliability with Cronbach's alpha of .85. Statistical Anxiety Rating Scale, which had 23-item questionnaire measured how anxious students felt specifically about statistics. Students rated items like "I feel worried when I think about taking a statistics test" and "I get nervous when I have to analyze data" on a scale from 1 (No Anxiety) to 5 (Extreme Anxiety). Higher scores indicated greater anxiety. The scale was very reliable with Cronbach's alpha of .92. Lecture Clarity Scale, which had 15-item questionnaire measured how clearly students felt their lecturers taught the material. Students rated statements like "My lecturer explains concepts in ways I can understand" and "The lectures are well organized" on a scale from 1 (Very Unclear) to 5 (Very Clear). Higher scores indicated clearer teaching. The scale showed good reliability with Cronbach's alpha of .88.

Permission was obtained from the universities and consent from the students before collecting data. Students completed the questionnaires near the end of the semester, before final exams. After final grades were posted, the students' actual performance results (pass or fail) were obtained from university records. Then the data was analyzed using discriminant function analysis in SPSS Version 26.

4. Results

Checking Assumptions

All the statistical assumptions were met. The Shapiro-Wilk tests showed that the data were approximately normally distributed for both groups ($p > .05$ for all variables). Box's M test was statistically significant ($M = 14.28$, $p = .026$), which technically indicates the groups have different variance-covariance matrices. However, discriminant function analysis can handle this when sample sizes are large, as in this study. The tolerance values were all above .40 and VIF values were all below 2.0, showing that multicollinearity was not a problem. The correlation matrices showed appropriate linear relationships between the variables.

Main Findings

The discriminant function significantly separated passing students from failing students, Wilks' $\Lambda = .512$, $\chi^2(3) = 233.42$, $p < .001$. This means that the three variables together do help distinguish between students who pass and students who fail. The canonical correlation was .698, which, when squared, gives .487. This R^2 value of .487 means that 48.7% of the difference between passing and failing can be explained by these three variables. This is considered a large effect.

When looking at each variable separately, different patterns were found. Statistical anxiety had the strongest effect in separating the groups (Wilks' $\Lambda = .591$, $F(1, 348) = 240.87$, $p < .001$). Lecture clarity also significantly separated the groups (Wilks' $\Lambda = .747$, $F(1, 348) = 117.96$, $p < .001$). However, academic self-efficacy did not reach statistical significance (Wilks' $\Lambda = .991$, $F(1, 348) = 3.18$, $p = .076$).

The structure coefficients confirmed this pattern. Statistical anxiety had the highest structure coefficient of .859, meaning it correlated most strongly with the discriminant function. Lecture clarity had a structure coefficient of -.601 (the negative sign simply indicates direction). Academic self-efficacy had the smallest structure coefficient at -.312. The standardized coefficients, which show each variable's unique contribution while accounting for the others, followed a similar pattern: statistical anxiety (.718), lecture clarity (-.512), and academic self-efficacy (-.186).

The discriminant function correctly classified 91.4% of students in the original sample. When cross-validation (a more conservative test) was done, the function still correctly classified 89.4% of students. This high accuracy shows that these three variables, particularly anxiety and clarity, do a very good job of predicting whether a student will pass or fail.

Looking at the actual scores, failing students reported much higher statistical anxiety (average = 78.42) compared to passing students (average = 54.67). Passing students perceived their lectures as much clearer (average = 55.73) than failing students did (average = 42.18). The difference in self-efficacy between the groups was small: passing students averaged 51.28 while failing students averaged 48.35.

5. Discussion

This study is the first to use discriminant function analysis to examine what predicts postgraduate student performance in Nigerian research methods courses. The findings show some patterns that match research from other countries and some patterns that are different. These results have important implications for understanding how African university contexts may change what matters most for student success.

Statistical anxiety was by far the strongest predictor of whether students passed or failed. This finding matches other research from Nigeria (Achebe & Okoye, 2022; Ogbonnaya et al., 2019) and from other countries (Lethbridge et al., 2024). The fact that anxiety predicts performance across so many different countries and cultures suggests that anxiety works as a barrier to learning statistics, regardless of where you are. When students are very anxious, their minds are busy worrying instead of focusing on learning. During exams, anxiety interferes with memory and problem-solving.

However, anxiety may be even more powerful in Nigerian settings than in Western settings. The structure coefficient of .859 in this study is higher than what most Western studies find. Several factors might make anxiety worse for Nigerian students. Overcrowded exam halls create very stressful testing conditions. Students have limited opportunities to practice before exams, so they cannot gradually build confidence. The high stakes involved make things worse - failing means delaying graduation and career advancement, and students know they have few support systems to help them if they fall behind. When students are already anxious and then face these additional stressors, their anxiety can become overwhelming.

Lecture clarity was the second strongest predictor of performance. This makes sense in Nigerian university contexts where lectures are often the only way the majority of students learn the material, especially when alternative learning resources are scarce. When you have more than 130 students in a crowded classroom, when students cannot afford textbooks and rely on photocopies of a few pages, when there are no computer labs to practice in, and when working students have no time to seek extra help, the lecture is all you have. If the lecture is unclear, you simply do not learn.

The finding aligns with meta-analytic evidence on clarity's importance (Titsworth et al., 2015) while highlighting contextual amplification effects. When students cannot compensate for unclear lectures through alternative resources, clarity becomes essential rather than merely beneficial. Working professionals attending classes after full workdays require particularly clear instruction to compensate for fatigue. The traditional lecture-dominant pedagogy prevalent in Nigerian universities places maximum burden on instructional clarity, making faculty development in clear communication crucial.

The most surprising finding was that academic self-efficacy did not significantly predict performance. This directly contradicts most Western research, which consistently shows that confident students perform better (Meng & Zhang, 2023). Several reasons might explain why confidence did not matter in this Nigerian sample.

First, all the students in this study are postgraduate students who have already proven they can succeed academically. They completed undergraduate degrees and gained admission to competitive postgraduate programs. Most of them probably have reasonably high general academic confidence. When everyone in a group has similar confidence levels, confidence cannot separate high performers from low performers. Second, general confidence about academics may not help much with the specific challenges of learning statistics. A student might feel confident about their overall academic abilities but still struggle with the particular demands of quantitative analysis.

Most importantly, confidence may only help when students have some control over their learning conditions. Self-efficacy theory assumes that if you believe in yourself and work hard, you can succeed. But what happens when working hard is not enough? When classes are so crowded that you cannot ask questions, when teaching is unclear and there is nowhere else to learn the material, when you cannot afford books or access computers, believing in yourself may not make much difference. If students face overwhelming anxiety and incomprehensible instruction, confidence alone cannot overcome these barriers. This finding suggests that Western psychological theories like self-efficacy may not work the same way in all contexts. When structural problems limit what individual effort can achieve, psychological factors like confidence matter less.

These findings have direct practical implications. Many Nigerian universities currently invest resources in confidence-building programs and motivational workshops because Western research emphasizes self-efficacy. This study suggests such investments may not help much.

Instead, universities should focus their limited resources on two priorities: reducing statistical anxiety and improving teaching quality.

For anxiety reduction, universities could screen students for statistical anxiety during the first week of classes. Students with high anxiety could be referred to counseling services or offered special support sessions. Lecturers could use teaching techniques that reduce anxiety, such as giving practice problems that do not count toward grades, providing detailed feedback, and creating less threatening assessment conditions. Even small changes, reducing overcrowding in exam halls, could help lower anxiety.

For improving lecture clarity, universities should invest in faculty training focused specifically on clear communication. Training workshops could teach lecturers how to organize content logically, provide clear explanations, use helpful examples, define terms carefully, and check whether students understand. Given the large class sizes and limited office hours in Nigerian universities, improving lecture quality may be the most efficient way to help more students succeed. The high classification accuracy in this study (91.4%) suggests another practical application: early warning systems. Simple surveys measuring anxiety and perceived clarity during the first weeks of a semester could identify students at high risk of failing. Universities could then provide targeted support before problems become severe.

6. Limitations

This study has several limitations that should be kept in mind. First, the design was cross-sectional, meaning everything was measured at one point in time. This means that anxiety or unclear teaching cannot be proven to actually cause students to fail, only that they are associated with failure. A study that follows students across a whole semester, measuring anxiety and clarity at multiple points, would provide stronger evidence. Second, the study was conducted only in South-Eastern Nigeria. One cannot know whether the same patterns would appear in other regions of Nigeria or in other African countries. Replication in different settings would help establish whether these findings are unique to this region or apply more broadly.

Third, student self-reports of anxiety and clarity perceptions were relied on. While self-report measures are standard in educational research, they may not capture the full picture. Future studies could add observations of actual teaching quality or physiological measures of anxiety. Finally, general academic self-efficacy was measured rather than statistics-specific self-efficacy. It is possible that confidence specifically about statistics, rather than confidence about academics in general, might predict performance better.

7. Future Research

Several important questions remain for future research. First, do interventions based on these findings actually work? Studies should test whether anxiety reduction programs specifically designed for African contexts improve student outcomes. Similarly, research should examine whether faculty training focused on clarity enhances student success. Second, comparative research across different African countries, and between African and non-African settings, would help clarify whether these findings reflect specifically Nigerian conditions or broader patterns in

developing country contexts. Third, qualitative research interviewing students and lecturers could provide a deeper understanding of how anxiety, clarity, and confidence interact in students' daily experiences. Such research could reveal mechanisms and suggest additional intervention strategies.

8. Conclusion

This study shows that what helps students succeed in statistics courses may work differently in African universities compared to Western universities. In Nigerian settings, statistical anxiety is the main barrier to student success, followed by lecture clarity. Academic self-efficacy, which Western research emphasizes so strongly, did not significantly predict performance in this Nigerian sample. These findings challenge the assumption that research findings from Western universities automatically apply everywhere.

The practical message is clear: Nigerian universities should focus on reducing student anxiety and improving teaching quality rather than on building general confidence. The theoretical message runs deeper: psychological factors do not work the same way in all contexts. When structural problems like overcrowding, resource shortages, and limited support systems constrain what individual effort can achieve, factors like anxiety and teaching quality matter more than confidence. Building effective higher education in Africa requires evidence from African contexts, not just copying Western approaches. This study contributes to the African evidence base and points the way toward more contextually appropriate support for African students.

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