

INFLUENCE OF COMPUTER ANXIETY AND COMPUTER SELF-EFFICACY ON STUDENTS' ACHIEVEMENT IN RESEARCH STATISTICS COMPUTER-BASED TEST IN THE UNIVERSITY OF JOS, NIGERIA.

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ABSTRACT

This study was motivated by the persistent decline and inconsistency in students' achievement in Research Statistics Computer-Based Tests (CBT) in the University of Jos, despite the perceived advantages of CBT over traditional paper-based testing. The noticeable decline in pass rates after the adoption of CBT suggested that factors beyond content mastery, particularly psychological readiness for CBT, might be influencing students' performance. Consequently, the study investigated the influence of computer anxiety and computer self-efficacy on students' achievement in Research Statistics CBT. A survey and correlational research design were employed. The study sampled 335 third-year students from a population of 2,229 within the Faculty of Education for 2022/2023 academic session using proportional stratified sampling. Data were collected through a validated Students' Psychosocial Factors Questionnaire (SPFQ) and documented achievement scores. Descriptive statistics addressed the research questions, while Pearson Product-Moment Correlation tested the hypotheses.

Findings revealed that 45.4% of students exhibited high computer anxiety, and most students reported low to moderate computer self-efficacy. A strong negative relationship emerged between computer anxiety and achievement ($r = -0.730$, $p < .05$), indicating that higher anxiety significantly reduced performance. Conversely, a strong positive relationship was found between computer self-efficacy and achievement ($r = 0.673$, $p < .05$), showing that higher confidence in computer use facilitated better performance in CBT. The study concludes that computer anxiety and self-efficacy are key psychological determinants of achievement in Research Statistics CBT. It recommends enhanced computer literacy programmes, regular mock CBT sessions, strengthened counselling support, increased access to digital facilities, technology-integrated teaching practices, and systematic monitoring of students' psychological readiness to improve learning outcomes in computer-based assessments.

Keywords: Computer Anxiety, Computer Self-Efficacy, Students' Achievement, Research Statistics, Computer-Based Test (CBT).

INTRODUCTION

Research Statistics is an essential course for students in education-related fields, especially those preparing for careers in teaching, measurement and evaluation, psychology, sociology, philosophy, the Sciences and beyond. Research Statistics play an important role in helping researchers make sense of the data they collect. Developing competence in this course for many students is not only essential for passing examinations but also crucial for conducting meaningful research projects and succeeding in future professional roles (Sani, 2017). In recent years, universities in Nigeria have been searching for better and more efficient ways to assess students' understanding of Research Statistics. Paper-based tests (PBTs) were the traditional method, but they often came with challenges such as slow marking, human errors and difficulty managing large student groups.

With growing enrolment, institutions increasingly turned to Computer-Based Testing (CBT) because it offers faster scoring, greater accuracy and easier administration. As a result, CBT has become a common mode of examination in many Nigerian universities, including the University of Jos. However, the shift to CBT has introduced new concerns. Students do not all have the same level of comfort with computers and this difference can affect how well they achieve (Abdulkareem & Lennon, 2023). For a course like Research Statistics, which many students already find demanding, adding the pressure of using a computer during examinations can increase anxiety levels. Some students may feel nervous, tense, or fearful when confronted with a CBT environment, a reaction commonly referred to as computer anxiety.

Computer anxiety is seen as the feeling of uneasiness towards learning or the use of computers. The uneasy feeling, fear, or discomfort in the use of technology and digital resources is reported to be a growing problem in education as the computer has become more predominantly used in instructional delivery and examination. Computer anxiety tends to arise among students when asked to work with computers and the anxiety escalates during computer testing exercises (Hayat, Barzegar, Faraji-Dehsorkhi, Keshavarzi, Azimnejadian, Rostami, Keshavarzi, & Mokhtarpour, 2024). Computer anxiety has been associated with decreased use and avoidance of information technology. Avoidance of technology use can seriously affect students' academic progress, lower their achievement and ultimately affect their career opportunities. Students experiencing computer anxiety often feel frustration, embarrassment, or failure during computer-related academic activities, regardless of their educational level. However, this anxiety tends to lessen with greater computer experience, early exposure, or frequent use (Oribhabor, 2020). Computer anxiety can significantly hinder students' achievement in Educational Statistics CBT by creating psychosocial barriers that impair students' cognitive functioning, leading to difficulties in concentration, understanding, and test interface navigation, causing students to overthink, make errors that can negatively affect their overall test scores.

Another key factor to consider is computer self-efficacy, which is also referred to as computer self-confidence. Self-efficacy reflects individuals' belief in their ability to perform tasks and achieve specific outcomes, influencing their engagement, effort and persistence. Thus, computer self-efficacy denotes students' belief in their capability to successfully execute and perform computer-based tasks (Sam & Idemudia, 2014). Students with high computer self-efficacy tend to approach CBTs with greater confidence, which helps them engage with test interfaces more effectively, follow instructions with ease, and use appropriate problem-solving strategies. This increased confidence also minimizes anxiety and supports better concentration, allowing for quicker and more accurate responses during examinations. As noted by Bayera, Dutse, and Ahmad (2017), computer self-efficacy has a significant and positive impact on students' academic performance. Low computer self-efficacy is linked to reduced confidence, heightened fear of computer-related tasks, and negative expectations regarding one's academic performance (Achim & Al-Kassim, 2015).

Against this background, data from the Department of Educational Foundations, University of Jos, revealed an inconsistent trend in student achievement in Research Statistics under CBT. During the first year of CBT implementation (2019/2020 session), the pass rate was 70.1%, which initially appeared promising. However, in the 2020/2021 session, the pass rate sharply declined by 11.1 percentage points to 59.0%. A slight recovery to 62.4% occurred in the 2022/2023 session, but this pattern of steep decline followed by minimal recovery reveals an unstable trend in students' achievement in Research Statistics CBT, posing concerns for student success, institutional credibility and the effectiveness of CBT delivery

Due to this challenge, it is essential to investigate how computer anxiety and computer self-efficacy affect students' achievement in Educational Statistics CBT. This inquiry is particularly significant in Nigeria, where students come from various backgrounds and do not all have equal access to digital resources. Gaining an understanding of these factors can help educators comprehend why some students excel while others struggle and what type of support may be necessary to enhance their achievement. Although CBTs have increased assessment efficiency,

students' mental preparedness to use computers significantly influences their success (Sobremisana & Aragon, 2016). The potential for computer anxiety to impede achievement, while computer self-efficacy may enhance it, highlights the need for this study. Examining these elements at the University of Jos will yield valuable results that will help formulate strategies to better assist students in mastering both Educational Statistics and the digital tools required for assessment.

The study made use of the Social Cognitive Theory (SCT) of individual behaviour developed by Albert Bandura in 1986, based on the idea that people learn from their interactions with others in a social context. The theory believes that after observing the behaviour of others, people assimilate and imitate these behaviours, especially if the observational experiences are positive ones or include rewards related to the observed behaviour (Bandura, 1997).

OBJECTIVES OF THE STUDY

The purpose of this study was to investigate the influence of computer anxiety and self-efficacy on students' achievement in Research Statistics CBT in the University of Jos. The specific objectives of the study were to:

1. find out the level of students' computer anxiety.
2. find out the level of students' computer self-efficacy.
3. determine whether the students' achievement in Research Statistics CBT is influenced by the level of their computer anxiety.
4. ascertain whether the students' achievement in Research Statistics CBT is influenced by the level of their computer self-efficacy.

RESEARCH QUESTIONS

The following research questions were raised to guide the study:

1. What is the level of students' computer anxiety in the University of Jos?
2. What is the level of students' computer self-efficacy in the University of Jos?
3. What are the levels of students' achievement in Research Statistics CBT based on their computer anxiety levels?
4. What are the levels of students' achievement in Research Statistics CBT based on their computer self-efficacy levels?

HYPOTHESES

1. There is no significant relationship between students' computer anxiety and their achievement in Research Statistics CBT.
2. There is no significant relationship between students' computer self-efficacy and their achievement in Research Statistics CBT.

METHODOLOGY

Survey and correlational research designs were adopted for this study. The survey research design was used to capture and analyze the relationships between psychological factors and students' achievement in Research Statistics CBT at a single point in time, providing a comprehensive snapshot of these influences within the University of Jos to form a generalized opinion on the population. The correlational design was used as a scientific approach to examine the relationship between the dependent and independent variables in the study.

The population of the study comprised all the 2229 year three students from the 2022/2023 academic session in the six (6) different Departments within the Faculty of Education in the University of Jos. The sample of 335 students, was drawn from the 300-level students in the six Departments (Arts Education, Science Education, Educational Foundations, Physical and Health Education, Social Science Education and Special Education and Rehabilitation Science) domiciled in the Faculty of Education. The study used 15% of the total population of the study to arrive at 335 participants. Justification of the sample size for the study was supported by Andrade (2020), who

opined that a sample size of 10% of the population is adequate to achieve reliable estimates with acceptable levels of accuracy and precision. The increase in sample size from 10-15% of the population was to compensate for unexpected sample dropout or incomplete records captured.

The proportional stratified sampling technique was used for selecting the students for equal Departmental representation using a sampling fraction of 0.15. Two instruments were used for data collection in this study. The first instrument was a questionnaire tagged "Students' Psychosocial Factors Questionnaire" (SPFQ), which was adapted from two different existing instruments. The second instrument was a document containing students' achievement scores in Research Statistics.

The validity type established for the questionnaire used was content and construct validity. The content validity of the questionnaire was established by four experts, two from Educational Psychology and another two from Research, Measurement and Evaluation Unit of the Educational Foundations Department in University of Jos, using the Item-Level Content Validity Index, while factor analysis (FA) was used to establish the construct validity. The internal consistency reliability of the questionnaire was established using the Cronbach alpha method during pilot testing where 0.83 was obtained as the internal consistency coefficient hence, the questionnaire was considered reliable. Descriptive and inferential statistics were used in the analysis of the data for this study. Research questions were answered using frequency counts, percentages, mean and standard deviation, while the Pearson Product-Moment Correlation and regression were used to test the hypotheses.

RESULTS

Research Question One

What is the level of students' computer anxiety in the University of Jos

Table 1

Level of Students' Computer Anxiety in the University of Jos.

Computer Anxiety	Anxiety score Profile	N	Percentage (%)
High Level	31 – 40	152	45.4%
Moderate Level	21 – 30	109	32.5%
Low Level	10 – 20	74	22.1%

Table 1 reveals the distribution of students' levels of computer anxiety at the University of Jos. The analysis shows that the largest proportion of students 45.4% (152) fall within the high-anxiety category, with scores ranging between 31 and 40, indicating that nearly half of the population struggles with significant fear in using computers, which could hinder their ability to engage in computer-based tests and digital learning activities. Another 32.5% (109) of the students exhibit a moderate level of computer anxiety, scoring between 21 and 30, suggesting occasional uneasiness or lack of confidence when working with computers. Only 22.1% (74) of the students fall into the low-anxiety category, with scores between 10 and 20, representing the minority who are relatively at ease and confident in using computers for examinations. These findings suggest that a significant proportion of students at the University of Jos face challenges related to computer anxiety, with 45.4% experiencing high levels of computer anxiety.

Research Question Two

What is the level of students' computer self-efficacy in the University of Jos?

Table 2
Level of Students' Computer Self-Efficacy in the University of Jos.

Computer Self-efficacy	Self-efficacy Score profile	N	Percentage (%)
High Level	31 – 40	91	27.2%
Moderate Level	21 – 30	135	40.3%
Low Level	10 – 20	109	32.5%

Table 2 shows that among the 335 students surveyed, the largest proportion of 40.3% (135 students) demonstrated a moderate level of computer self-efficacy, scoring between 21 and 30 on the computer self-efficacy scale. This suggests that while a significant portion of students possess basic competence in using computers, their confidence in handling more complex computer tasks may still be limited. Students with low computer self-efficacy, scoring between 10 and 20 on the self-efficacy scale, constituted 32.5% (109 students) of the sample, indicating that nearly one-third of respondents lack confidence in their ability to navigate computer-based tasks effectively. This group may struggle with challenges to succeed in CBTs. On the other hand, only 27.2% (91) of the students exhibited a high level of self-efficacy (scoring 31 - 40), reflecting strong confidence in their computer skills. While a small number of students felt highly capable with technology, the majority of them were either moderately confident or hesitant about their level of computer self-efficacy.

Research Question three

What are the levels of students' achievement in Research Statistics CBT based on their computer anxiety levels?

Table 3
Descriptive Statistics of Students' Achievement in Research Statistics CBT Based on Computer Anxiety Levels

Computer Anxiety Level	Anxiety Score Profile	N	Achievement Mean Score (Research Statistic)	Std. Deviation
High	31 - 40	152	21.70	4.62
Moderate	21 - 30	109	27.25	4.15
Low	10 - 20	74	36.23	7.04

Analysis on Table 3 shows a strong inverse relationship between computer anxiety levels and academic achievement in CBT for Research Statistics. Students with high computer anxiety recorded the lowest achievement mean score of 21.70 (SD=4.62), followed by those with moderate computer anxiety who had mean score of 27.25 (SD=4.15). The low-anxiety group achieved a higher mean score of 36.23 (SD = 7.04). The achievement gap is particularly pronounced here, where the low-anxiety group outpaced the high-anxiety group by over 14 points, suggesting that Research Statistics is particularly susceptible to the negative effects of computer anxiety. The large number of students who fell into the high-anxiety category is a significant concern, as it implies that computer anxiety is a prevalent barrier to achievement for a substantial portion of the student population, potentially necessitating targeted interventions.

Research Question 4

What are the levels of students' achievement in Research Statistics CBT based on their computer self-efficacy levels?

Table 4

Descriptive Statistics of Students' Achievement in Research Statistics CBT Based on Computer Self-Efficacy Levels

Computer Self-Efficacy Level	Self-Efficacy Score Profile	N	Achievement Mean Score (Research Statistic)	Std. Deviation
High	31 - 40	91	32.52	8.44
Moderate	21 - 30	135	28.39	4.44
Low	10 - 20	109	19.81	3.76

Analysis on Table 4 shows that students' achievement in Research Statistics CBT varied according to their levels of computer self-efficacy. Students with high computer self-efficacy recorded the highest mean score of 32.52 (SD = 8.44). Those with moderate computer self-efficacy followed closely with mean scores of 28.39 (SD = 4.44). Students with low computer self-efficacy obtained the lowest mean score of 19.81 (SD = 3.76). This result suggests a positive relationship between computer self-efficacy and academic achievement in CBT as higher levels of self-efficacy are associated with better achievement outcomes in Research Statistics.

Hypothesis One

There is no significant relationship between students' computer anxiety and their achievement in Research Statistic CBT.

Table 5

Relationship between Students' Computer Anxiety and their Achievement in Research Statistics CBT

VARIABLES	N	Df	R	P-value
Students' Computer Anxiety	335	333	-0.730	0.002
Achievement in Statistics CBT				

$P < .05$

Table 5 shows the correlation analysis between students' computer anxiety and their achievement in Research Statistics CBT. With a sample size of 335 and 333 degrees of freedom, the analysis produced a correlation coefficient of $r = -0.730$ with a p-value of 0.002. Since the p-value is less than the 0.05 level of significance, the null hypothesis of no significant relationship is rejected, indicating a strong and statistically significant negative relationship between computer anxiety and achievement in Research Statistics CBT. This finding implies that as students' computer anxiety increases, their achievement scores in Research Statistics CBT decrease correspondingly, highlighting anxiety as a substantial barrier to achievement in computer-based assessments. The strength of this correlation suggests that computer anxiety is a major factor influencing students'

outcomes, where high anxiety may weaken concentration and limit effective demonstration of knowledge and lower anxiety levels are associated with better achievement.

Hypothesis Two

There is no significant relationship between students’ computer self-efficacy and their achievement in Research Statistics CBT.

Table 6
Relationship between Students’ Computer Self-Efficacy and their Achievement in Research Statistics CBT

VARIABLES	N	df	R	P-value
Students’ Computer Self-Efficacy	335	333	.673	.001
Achievement in Statistics CBT				

P < .05

The results of analysis on Table 6 revealed that the correlation coefficient ($r = 0.673$) indicated a strong positive relationship between the variables, the p-value ($0.001 < 0.05$) at $df = 333$ also revealed that a statistical significance relationship does exist between students’ computer self-efficacy and their achievement in Research Statistics CBT suggesting that higher computer self-efficacy is associated with better academic achievement in the CBT. Therefore, the null hypothesis is rejected because a significant relationship does exist between the two variables, which implies that higher levels of computer self-efficacy are strongly associated with higher achievement scores in Research Statistics CBT.

DISCUSSION

The findings of the study revealed that critical psychosocial factors like computer anxiety influence students’ achievement in Research Statistics CBT. A substantial proportion of the students exhibited high levels of computer anxiety. The analysis further demonstrated a strong inverse relationship between computer anxiety and achievement, with students in the low-anxiety category attaining the highest scores. This observation aligns with the findings of Oribhabor (2020) and Hayat et al. (2024), who confirmed that elevated computer anxiety significantly hinders learning, engagement, and academic achievement in technology-mediated tasks. Collectively, these findings underscore computer anxiety as a persistent barrier to optimal achievement within CBT environments.

Furthermore, the results on computer self-efficacy indicated that the majority of students possess low to moderate levels of confidence in their ability to use computers effectively, with only a minority demonstrating high self-efficacy. The study also established a strong and positive relationship between computer self-efficacy and achievement in Research Statistics CBT, supporting Bandura’s social cognitive theory, which posits that individuals’ beliefs in their capabilities directly influence achievement outcomes. This finding aligns with Bayera, Dutse, and Ahmad (2017), affirming that higher computer self-efficacy contributes meaningfully to improved achievement, particularly in computer-based tasks requiring numerical reasoning, such as Research Statistics CBT.

CONCLUSION

The findings of this study demonstrate that computer anxiety and computer self-efficacy are critical psychological variables influencing students' achievement in Research Statistics CBT at the University of Jos. High levels of computer anxiety were shown to significantly reduce students' achievement, wherein strong computer self-efficacy reliably predicted higher achievement, confirming that students' computer confidence plays a central role in determining their success in CBT environments. The agreement of these findings with several previous studies reinforces the need to address digital readiness as an important element for contemporary assessment practices.

RECOMMENDATIONS

The following recommendations were made in view of the findings from the study.

1. Strengthen computer literacy and CBT-orientation programmes to enhance students' digital readiness and familiarity with computer-based examinations.
2. Organize regular mock CBT sessions to give students hands-on practice in a low-pressure environment and boost their confidence.
3. Provide targeted counselling and psychological support for students experiencing high computer anxiety.
4. Integrate more technology-based activities into teaching so that students gain continuous exposure to computer use through coursework.
5. Improve digital infrastructure, including functional computer laboratories and stable internet connectivity, to support consistent practice.
6. Train lecturers in CBT-aligned instructional strategies and establish a system for monitoring students' computer anxiety and self-efficacy to guide early intervention.

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