STUDENTS' COMPUTER ANXIETY AND KNOWLEDGE IN COMPUTER-BASED ASSESSMENTS

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Abstract

The study examined computer anxiety and computer knowledge among students in computer-based assessments. Four research questions guided the study. The study was conducted at the School of Technical Education, Yaba College of Technology, Epe Campus, in affiliation with the University of Nigeria, Nsukka. The study was guided by four research questions and zero hypotheses. The population comprised 1,536 university students, and no sampling technique was used because the population was manageable; therefore, the entire population was studied. Data were collected using a self-developed instrument titled: Anxiety and Knowledge on Computer-Based Assessment (AKCBA)The instrument was validated by three experts from the Department of Psychology, Faculty of Social Sciences and Humanities, Ebonyi State University, Abakaliki. The reliability of the instrument was established using the test–retest method, which yielded a reliability coefficient of 0.86 for the computer anxiety section and 0.73 for the computer knowledge section. Data were analysed using mean, standard deviation, and percentage. The findings showed that students experienced noticeable computer anxiety during computer-based assessments and possessed an average level of computer knowledge. The study contributed to knowledge by establishing the relationship between students' psychological disposition and their preparedness for digital assessment environments. It was recommended that institutions organise regular orientation and hands-on practice sessions to enhance students' competence and confidence in computer-based assessments.

Keywords: Assessment, computer-based assessment, test anxiety, technology

Introduction

The increasing reliance on computers in educational assessment has raised concerns about students' readiness to engage effectively with digital examinations. Many students experience apprehension and stress when interacting with computer-based assessments, which may affect their ability to demonstrate their knowledge accurately. This worry becomes more critical when students lack sufficient computer knowledge, as limited familiarity with digital tools can hinder their navigation and understanding of computer-based tests. Understanding how computer anxiety and computer knowledge influence students' experiences is therefore essential to ensure equitable and effective assessment practices. The trend in recent times is the era of the scientific, information, and technological revolution, where there is a knowledge explosion. The emergence of technological innovations has been particularly significant in the use of computers in education (Ibrahim, Majeed and Jawad, 2023). Computers are increasingly integral to contemporary human activity, and their use in the educational environment continues to expand (Dangi and Choudhary, 2021). With rapid technological advancements, the

educational landscape has evolved to incorporate digital tools, online learning platforms, and computer-based assessments.

Assessment plays a central role in education because it involves gathering and analysing data to evaluate a student's understanding and academic progress. William (2011, p.3) emphasises, "It is only through assessment that we can find out whether a particular sequence of instructional activities has resulted in the intended learning outcomes." This highlights the importance of continuous evaluation to ensure teaching methods are effective and that students are genuinely benefiting from the learning process. Researchers have increasingly emphasised the positive impact of formative assessment on students' learning outcomes. One significant advancement in educational assessment is the use of computer-based assessments, which are administered and sometimes automatically graded by computers. Such assessments offer advantages including timely feedback, efficiency, and the ability to evaluate students' learning in more dynamic and creative ways (Van der Kleij, Eggen, Timmers and Veldkamp, 2011). Computer-based assessments may include objective tests, simulations, e-portfolios, and adaptive assessments. Digital assessments not only automate conventional testing but also provide new ways to collect evidence of student learning, supporting a broader range of skills than paper-based assessments allow (United Nations Educational, Scientific and Cultural Organization, 2012; Organisation for Economic Co-operation and Development, 2023). Immediate feedback from digital assessments helps bridge the gap between students' current understanding and intended learning objectives, enabling a more personalised and effective learning experience (Hattie and Timperley, 2007).

Regardless of these advantages, the transition from paper-based tests to computer-based assessments introduces challenges that affect students' experiences. Two critical factors influencing students' ability to succeed in computer-based assessments are computer anxiety and computer knowledge. Computer anxiety is characterised by fear or apprehension when interacting with computers, which can result in stress, discomfort, and resistance to using digital tools (Carlson and Wright, 1993). Students with high computer anxiety may struggle to complete computer-based assessments efficiently due to nervousness or lack of confidence, often resulting from limited exposure, insufficient training, or negative past experiences (Gressard and Loyd, 1986). Computer knowledge, also known as computer literacy, refers to an individual's ability to effectively use computers and digital technologies to perform specific tasks (Mesoudi, 2017). Students with higher levels of computer knowledge navigate computer-based assessments with greater confidence and lower stress levels. Access to digital resources through media and the internet allows students to become computer literate even if they are not computer specialists (Alairaji, Aljazaery and Alaidi, 2022). Research shows that students with higher computer knowledge perform better in computer-based assessments than those with limited skills.

Prearranged the increasing adoption of digital assessments in education, it is essential to consider how computer anxiety and computer knowledge interact to influence students' experiences and outcomes. Addressing these factors ensures that all students are adequately prepared for computer-based assessments, thereby improving the fairness and effectiveness of digital evaluation methods (Schillinger, Mosbacher, Brunner, Vogel and Grabner, 2021). Test Anxiety Theory provides a useful framework for understanding why some students experience heightened anxiety during computer-based assessments. According to the theory, students may feel anxious when they are unfamiliar with technological devices, fear technological failure, and perceive little control over the testing

environment (Cassady and Gridley, 2005). When students are uncertain about using digital tools or platforms, this fear is amplified, and system warnings or strict timing on screens can intensify emotional responses (Bennett, 2003). The theory is particularly relevant to this study because it explains how anxiety can affect students' performance in assessment situations. Even well-prepared students may experience reduced cognitive resources for material retention and problem-solving when worry levels are high, leading to poorer learning outcomes (Eysenck, Derakshan, Santos and Calvo, 2007). Educators can apply this theory by adjusting assessment conditions, such as reducing excessive time pressure, providing clear instructions, and incorporating formative assessments to help lower student anxiety (Zeidner, 1998).

Although some studies suggest that moderate levels of anxiety can have positive effects on academic performance, excessive anxiety is generally detrimental (Buchwald, 2010). Earlier research consistently indicates a negative correlation between test anxiety and performance (Chapell, Blanding, Silverstein, Takahashi, Newman, Gubi and McCann, 2005). Anxiety, in general, is a natural response to perceived risk or danger (Matthew, 2012), often manifesting as persistent worry or a strong feeling of dread (Olatoye, 2009). Within the context of technology, computer anxiety is defined as apprehension or worry when using or even considering the use of computers (Leso and Peck, 1992). Causes of computer anxiety include limited exposure to technology, previous negative experiences, and fear of making mistakes during computer use. Research shows that both paper-based and computer-based examinations can induce moderate levels of test anxiety regardless of student characteristics (Deloatch, Bailey and Kirlik, 2016). Interestingly, studies indicate that while a majority of students (76%) prefer computer-based exams, slightly more students report moderate anxiety in paper-based assessments compared to computer-based assessments (Devathasan, Craig, Damian and Berg, 2024). Computer anxiety is also referred to as computer-phobia or cyber-phobia and can manifest as severe uneasiness or fear related to computer use. Physical symptoms may include sweaty palms, lightheadedness, shortness of breath, rapid heartbeat, or even a feeling of disconnection from reality (Appelbaum and Primmer, 1990). These reactions suggest that for some students, interacting with computers triggers a stress response similar to other anxiety-inducing situations, highlighting the need to address computer anxiety in educational contexts.

Recent advancements in educational technology have led to the widespread adoption of computer-based assessments, which offer advantages such as efficiency, immediate feedback, and adaptive testing (Van der Kleij, Eggen, Timmers and Veldkamp, 2011; United Nations Educational, Scientific and Cultural Organization, 2012; Organisation for Economic Co-operation and Development, 2023). Research indicates that students' experiences with these assessments are influenced by psychological and cognitive factors, particularly computer anxiety and computer knowledge (Carlson and Wright, 1993; Gressard and Loyd, 1986; Mesoudi, 2017). High levels of computer anxiety can negatively affect students' engagement and performance in digital assessments, while strong computer knowledge enhances confidence, navigation, and efficiency (Alairaji, Aljazaery and Alaidi, 2022). Notwithstanding these insights, existing studies have often examined computer anxiety or computer knowledge in isolation, with limited focus on their combined effect on students' experiences in computer-based assessments. Additionally, most research emphasizes technical skills or performance outcomes without fully exploring the psychological readiness of students for digital assessments. This study aims to fill these gaps by investigating the interplay between students' computer anxiety

and computer knowledge, providing a comprehensive understanding of how both factors influence engagement with computer-based assessments.

Statement of the Problem

In modern education, assessments are essential for evaluating students' learning, providing feedback, and guiding instructional decisions. Ideally, all students should be able to engage confidently and effectively with computer-based assessments, demonstrating their knowledge without being hindered by psychological or technical barriers. In reality, many students face challenges when interacting with digital assessment platforms. Some experience computer anxiety, which causes stress, apprehension, and reduced confidence, while others may lack sufficient computer knowledge, limiting their ability to navigate and complete assessments efficiently. These challenges can negatively affect students' engagement, accuracy, and overall learning outcomes. Consequently, there is a need to understand how students' computer anxiety and computer knowledge influence their experiences with computer-based assessments. The problem this study seeks to address is the extent to which computer anxiety and inadequate computer knowledge hinder students' effective participation in digital assessments, and how these factors can be mitigated to improve assessment practices in educational settings.

Objectives of the Study

This study seeks to investigate the influence of computer anxiety and computer knowledge on students' learning outcomes in a CBA. Specifically, it aims to:

1. examine the perceived influence of computer anxiety on students' knowledge during CBA in tertiary institutions.
2. determine the level of ICT knowledge among students in the tertiary institutions.
3. examine the influence of prior knowledge of computer to minimising anxiety during CBA
4. suggest effective measures to reduce student anxiety during CBA in the tertiary institutions.

Research Questions

The following research questions guided the study:

1. What is the computer anxiety experienced by students during CBA?
2. What is the level of students' knowledge of the usage of computers?
3. What is the influence of prior knowledge of computer to minimising anxiety during CBA?
4. What are the measures to reduce students' anxiety during CBA in a tertiary institution?

Methods

This study adopted a quantitative approach to data collection and employed a descriptive research design of the survey type. This design was considered appropriate because the key variables of the study computer anxiety and computer knowledge were observed as they naturally occurred and were not manipulated by the researchers. The target population comprised 1,536 university students from the School of Technical Education, Yaba College of Technology, Epe Campus, in affiliation with the University of Nigeria, Nsukka, who participated in computer-based assessments for Entrepreneurship Studies during the 2023/2024 academic session. Purposive sampling was employed to select students who met specific inclusion criteria, particularly those who had participated in at least one computer-based assessment during the academic session. This sampling technique ensured that all respondents possessed relevant experience with digital

assessment platforms, thereby allowing for a focused examination of the study variables. The sample size was determined using Taro Yamane's formula for finite populations Based on a population of 1,536 students and a margin of error of 5 percent, a sample size of 316 was obtained. However, due to time constraints, 50 percent of this number was randomly selected, resulting in a final sample size of 158 students.

Data were collected using a self-designed instrument titled Anxiety and Knowledge on Computer-Based Assessment (AKCBA). The instrument comprised both a questionnaire and a knowledge test and was administered electronically using Google Forms to facilitate easy distribution and automated data collation. The AKCBA consisted of three sections. Section A elicited participants' demographic information. Section B measured computer anxiety using a modified four-point Likert scale of Strongly Agree, Agree, Disagree, and Strongly Disagree, weighted 4, 3, 2, and 1 respectively. Section C consisted of a computer knowledge test made up of twenty multiple-choice questions (options A–D), designed to assess students' competence and preparedness in using digital tools for assessments. The instrument was validated by an expert in questionnaire and test development from the School of Technical Education, Yaba College of Technology, to ensure content accuracy, clarity, and relevance to the study objectives. The AKCBA was pilot-tested using twenty-five students from the Lagos State University of Education, Noforija, Epe, who were not part of the main study. Feedback from the pilot test informed minor modifications to enhance clarity and improve the effectiveness of the instrument.
The reliability of the AKCBA was established using the test–retest method. The instrument was administered to a group of respondents and re-administered after a short interval under similar conditions. The Pearson Product–Moment Correlation was used to determine the consistency of responses. The analysis yielded reliability coefficients of 0.86 for the computer anxiety section (Section B) and 0.73 for the computer knowledge section (Section C), indicating acceptable reliability.

For data collection, a unique shareable Google Form link was generated and distributed through class WhatsApp groups, departmental platforms, and with the assistance of lecturers during lectures. In addition, the researchers conducted on-site sensitization sessions across the School of Technical Education at the Epe Campus. During these sessions, students were guided on how to access and complete the questionnaire using mobile phones, tablets, or school-provided computers. The researchers remained available to provide real-time support, address technical challenges such as internet connectivity, and clarify questionnaire items. This approach enhanced participation and minimized incomplete or inaccurate responses. Data collected were analysed using descriptive statistics, including mean, standard deviation, and percentage. For the Likert-scale items, a mean score of 2.50 and above indicated agreement, while a mean score below 2.50 indicated disagreement. This method facilitated clear interpretation of students' levels of computer anxiety and computer knowledge within the context of computer-based assessments..

Results
Research Question 1: What is the computer anxiety experienced by students during computer-based assessment?

Table 1: Descriptive Statistics of Computer Anxiety on Computer-Based Assessment

S/N	Item Statement	Mean	Standard Deviation	Remarks
1	I feel anxious as soon as I am assigned my seat	2.62	0.82	Accept

	for the CBA			
2	Logging into the CBA platform makes me nervous	2.49	0.85	Accept
3	I worry that I might forget my login details for the CBA	2.30	0.91	Reject
4	I feel uneasy while waiting for the exam to begin after logging in	2.68	0.82	Accept
6	I often feel distracted by the timer or the remaining time during the CBA	2.75	0.86	Accept
	Aggregate Score	2.57	0.85	Accept

Table 1 shows that the highest mean 2.75 on the statement: they often feel distracted by the timer or the remaining time during the CBA followed by the statement they feel uneasy while waiting for the examination to begin after logging in with the mean of 2.68, followed by they feel anxious as soon as they are assigned my seat for the CBA with mean of 2.62 and logging into the CBA makes me nervous with mean 2.49 which all the respondents were in support of the statements. The respondents disagree with the statement because they worry that they might forget their login details for the CBA. This implies that the respondents experienced computer anxiety such as feeling distracted by the timer or the remaining time during the CBA, feeling uneasy while waiting for the examination to begin after logging and feeling anxious as soon as they are assigned a seat for the CBA and logging into the CBA makes them nervous.

Research Question 2: What is the level of students' knowledge on the usage of computers?

Table 2: Percentage and Mean of Students' Knowledge of Computer

Items	Sample	Mean	Percentage (%)
Minimum	20	1.34	27.32
Maximum	20	3.38	86.84
Average	20	2.16	51.95

Table 2 shows the students' level of knowledge on the usage of computers**.** The responses of the students to the twenty questions on their level of computer usage show that the maximum mean is 3.38 and the minimum mean is 1.34. The average mean is 2.16, which implies that the students have moderate knowledge of computers. The highest proportion of the students 86.84% have knowledge of computer while the least proportion 27.32% have no knowledge. The average percentage is 51.95%, and the students have a little above average knowledge of computers. This might lead to competence as it relates to their ability to participate effectively in Computer-Based Assessments (CBAs)**.** This implies that students have average knowledge of the usage of computers.

Research Question 3: What is the influence of prior knowledge of computer in minimizing anxiety during computer-based assessment?

Table 3: Descriptive Statistics on Computer Knowledge in Minimising Anxiety

S/N	Statements	Mean	Standard Deviation	Remarks
1	Being oriented on how the CBA platform works before the exam assists calm my nerves	3.28	0.95	Accept

2	Having technical support available during the test reduces my stress levels	3.33	0.87	Accept
3	Practicing CBA mock tests regularly helps me feel more prepared and less anxious	3.42	0.94	Accept
4	Having clear instructions and guidelines before starting the CBA makes me feel more confident	3.37	0.87	Accept
5	Knowing there's extra time for technical delays makes me feel less anxious	2.92	1.07	Accept
	Aggregate Score	3.26	0.94	Accept

Table 3 shows the influence of prior knowledge on minimising anxiety during CBA. The highest mean 3.42 shows that students agree with the statement that practicing CBA mock tests regularly helps them feel more prepared and less anxious, followed by the statement with mean 3.37 having clear instructions and guidelines before starting the CBA clear instructions, followed by mean 3.33 having technical support available during the test reduces my stress levels, followed by mean 3.28 being oriented on how the CBA platform works before the examination assist calm their nerves and the least with mean of 2.92 on the statement that knowing there is extra time for technical delays makes them feel less anxious. This implied that the prior knowledge of students on the usage of computers might minimize computer anxiety during CBA.

Research Question 4: What are the measures to reduce students' anxiety during computer-based assessment in a tertiary institution?

Table 4: Descriptive Statistics on Measures to Reduce Students' Anxiety

S/N	Item Statements	Mean	Standard Deviation	Remarks
1	Offering more training on using computers effectively for exams would improve my performance	3.21	0.90	Accept
2	Learning keyboard shortcuts and other navigation tips could make me more confident during CBAs	3.10	0.86	Accept
3	Having technical support available during the test reduces my stress levels	3.10	0.74	Accept
4	Receiving feedback on the practice of CBAs would help me feel more prepared for the actual exam	3.22	0.71	Accept
5	I believe that familiarising myself with the exam platform beforehand can reduce my anxiety during the actual exam	3.13	0.78	Accept
6	Participating in mindfulness or relaxation exercises before the exam could help reduce my anxiety	3.07	0.81	Accept
	Aggregate Score	3.14	0.80	Accept

Table 4 shows the measures to reduce students' anxiety during CBA. The highest mean 3.22 shows that students agree with the statement that receiving feedback on practice of CBAs would help me feel more prepared for the actual examination, followed by mean 3.21 offering more training on using computers effectively for examinations would improve my performance, followed by mean 3.13 they believe that familiarising myself with the examination platform beforehand can reduce my anxiety during the actual examination, followed by mean of 3.10 having technical support available during the test

reduces my stress levels and learning keyboard shortcuts and other navigation tips could make them more confident during CBA and the least mean of 3.07 with statement participating in mindfulness or relaxation exercises before the examination could help reduce my anxiety. This means that the respondents suggested measures such as receiving feedback on practice CBAs, offering more training on using computers, familiarising themselves with the examination, having technical support, learning keyboard shortcuts and other navigation tips to reduce computer anxiety during CBA.

Discussion

The findings of the study revealed that respondents experienced computer anxiety in several ways during computer-based assessments. These included feeling distracted by the timer or remaining time, feeling uneasy while waiting for the examination to begin after logging in, feeling anxious as soon as they were assigned a seat, and becoming nervous while logging into the platform. The findings of this study corroborate Eysenck (2012), who noted that anxiety consumes cognitive resources, making it more difficult for students to concentrate and access long-term memory during assessments. Students experiencing these psychological challenges are more likely to make errors, suggesting that even well-prepared students may struggle to perform effectively due to computer anxiety.

The findings of the study revealed that prior knowledge of computers helps in minimizing anxiety during computer-based assessments. This aligns with Pook et al. (2019), who found that practice and preparation reduce cognitive load by familiarizing students with the examination environment, thereby lowering anxiety. These findings suggest that computer literacy equips students with the confidence and skills necessary to navigate assessments with minimal fear, emphasizing the critical role of prior exposure and competence in digital tools.

The findings of the study revealed that several measures were effective in reducing students' anxiety during computer-based assessments. These included receiving feedback on practice tests, offering more training on using computers, familiarizing themselves with the examination platform, having technical support available, and learning keyboard shortcuts and other navigation tips. This is consistent with Chiesa and Serretti (2009), who found that mindfulness practices enhance emotional regulation and reduce cognitive interference during assessments. It also supports Pook et al. (2019), who noted that providing students with practical skills and familiarity with the test environment improves performance and lowers anxiety. Furthermore, the findings align with Bögels and Hulsbosch (2018), who proposed an integrated model of anxiety regulation, suggesting that combining cognitive training with emotional regulation strategies can reduce students' computer anxiety. These results highlight the importance of instructional practices and preparatory interventions in helping students cope with anxiety and indicate areas for further research on practical measures to mitigate stress in digital assessments.

Educational Implications of the Study

The findings of this study have important implications for educational practice, particularly in the design and implementation of computer-based assessments. The evidence that computer anxiety affects students' ability to engage effectively with digital examinations suggests that assessment outcomes may not always reflect students' true academic abilities. As a result, educators and examination bodies need to consider students' psychological readiness alongside content mastery when adopting computer-based assessment systems. Integrating preparatory activities such as orientation sessions, practice tests, and supportive assessment environments can help reduce anxiety and

promote fairness in evaluation. The study also underscores the importance of strengthening students' computer knowledge as a means of improving confidence and participation in digital assessments. This implies that digital literacy should be systematically embedded within the curriculum across all levels of education. By providing continuous training and hands-on exposure to computer-based platforms, institutions can ensure that students are adequately prepared for modern assessment practices. Furthermore, the findings highlight the need for institutional support structures, such as technical assistance during examinations and clear instructional guidelines, to enhance students' assessment experiences and learning outcomes.

Contribution to Knowledge

This study contributes to existing knowledge by providing empirical evidence on the combined influence of computer anxiety and computer knowledge in the context of computer-based assessments. While previous studies have often examined these variables independently, this research demonstrates how both psychological and technical factors interact to shape students' experiences during digital examinations. By focusing on students' perceptions, levels of anxiety, and computer knowledge within a real assessment context, the study offers a more comprehensive understanding of the challenges associated with computer-based assessments in tertiary institutions. Additionally, the study contributes to knowledge by identifying practical measures that can reduce computer anxiety, such as prior orientation, practice assessments, and technical support. These insights extend existing literature by emphasizing the role of institutional preparation and instructional strategies in mitigating anxiety. The findings provide a valuable reference for educators, policymakers, and researchers seeking to improve the effectiveness and inclusiveness of computer-based assessment practices in higher education.

Conclusion

Based on the findings of the study, it can be concluded that computer anxiety and computer knowledge significantly influence students' experiences in computer-based assessments. The results showed that many students experience anxiety triggered by factors such as time pressure, unfamiliarity with the examination platform, and fear of technical issues. Such anxiety can interfere with concentration, reasoning, and overall effectiveness during assessments. The study also established that prior knowledge of computers plays a vital role in minimizing anxiety. Students who possess adequate computer skills, receive proper orientation, and engage in practice assessments demonstrate greater confidence and emotional stability during computer-based examinations. Therefore, reducing computer anxiety and strengthening students' computer knowledge are essential for improving their readiness and performance in computer-based assessments. Educational institutions must prioritize both technical training and psychological support strategies to ensure that digital assessment practices are fair, effective, and beneficial to all students.

Recommendations

Based on the findings of the study, the following recommendations are made:
1. Examination bodies and institutions should incorporate strategies such as mindfulness exercises, relaxation techniques, and clear pre-test instructions to help reduce anxiety before computer-based assessments.
2. Institutions should continuously assess students' digital literacy levels in order to facilitate progressive improvement in their computer knowledge and competence.

3. Students should be provided with regular orientation sessions and hands-on exposure to computer-based assessment platforms prior to the main examination.
4. Schools should organize preparatory workshops that cover both technical skills and coping strategies, ensuring that students are emotionally and technically prepared for computer-based assessments.
5. Educational institutions should provide adequate technical guidance and practice examinations to reduce anxiety and emotional arousal, thereby enhancing students' performance during computer-based assessments.

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