Student Perception of Computer-Based Testing in Kwara State, Nigeria

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ABSTRACT

Computer-based testing has become a prominent method of student assessment in Nigeria, and student perception on this testing technique is paramount. This study examined the perception of undergraduate students towards computer-based testing by comparing several modules studied by undergraduate students in Nigeria, which constitutes a major gap in literature. Results showed that the majority of students preferred computer-based testing to paper-based testing but were not willing to adopt this technique in all courses. Results further showed the majority of students showed a preference of paper-based tests in mathematics; more than 50% of students had below average grades when the CBT technique was implemented. Similarly, students showed poor grades in mathematics, chemistry, and physics. Results further showed the relationship between computer and anxiety and performance in mathematics. This study has implications for university administrators in the creation of policies for computer-based testing.

KEYWORDS

Computer Anxiety, Computer-Based Testing, Nigeria, Science Courses

INTRODUCTION

Information technology has influenced the entire academic landscape and several institutions worldwide have tapped into the benefits of these technologies. Computer Based testing is a major change that has occurred based on the emergence of educational technologies to provide feedback to students and instructors on the entire learning process by changing the educational landscape by bringing about advancement in pedagogy and learning. The benefits of Computer Based Tests are enormous ranging from flexibility in timing, immediate scoring, security and ensuring examination integrity amongst other benefits (Noyes & Garland, 2008; Nutty, 2008; Tella and Bashorun, 2011) and is viewed as a solution to the major challenges facing testing in the world (Trotter, 2011). However, despite these benefits developing countries still lag behaving in the implementation of computer based testing (Mandika et al, 2010).

A study by Luech & Sureci (2011) showed the emergence of computer based testing occurred in 1985 in an ACCUPACER testing program which was conducted in order to access students entering college in Mathematics and English language. But several national tests have emerged since its introduction including the Certified Network of Engineers examination in 1990 Computer Based testing format was introduced for GMAT in 1997 and other major international licenses and certifications have been introduced since then. In Nigeria CBT was introduced in university examinations in 2006 with University of Ilorin and Covenant University pioneering the innovation (Tella & Bashorun 2011). As at the 2018/2019 academic session, University of Ilorin had a student population of 55,242 while

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Covenant University currently has a student population of 8,768 full-time students. Similarly, Joint Admission and Matriculation Board was conducted in 2013 and was quickly followed by other national examinations such as the West African Examination Council (WAEC) and National Examination Council (NECO) as well as college entrance examinations and job entrance examinations in Nigeria. However, questions still arise based on variation in performance between Computer Based Tests and Paper Based Tests as well as variations in the adoption of Computer based Testing across different courses taken. Previous studies have shown preference for CBT over PPT (Tella and Bashorun, 2011; Alabi et al.2005& Croft et al, 2001). Though students showed preference for CBT (Noyles & Garland,2008; Notty,2008, Tella,2011), other studies have shown students performed poorly in Computer based tests as compared to Paper Based Test. Research shows that students experience challenges when paper based tests are transferred to computer tests with variations in test scores between Paper based tests and computer based test (Mills et al, 2005; Noyes & Garland, 2008).

PROBLEM STATEMENT

The International Test Commission state that paper based testing and Computer based testing should have equivalent scores in the same test. However studies have shown different findings on the equivalence of scores in Paper and Computer-Based Testing methods. Studies in Denmark, Iceland and Korea (OECD, 2010) showed variations exist between PPT and CBT. However, this finding differed from other studies (Choi& Tinkler, 2002, Bridgeman et al.2003), as variations between Paper-based tests and Computer-based tests were seen higher in mathematics, Science and Language tests (Choi, Kim & Boo, 2003. Fredrich & Bjornsson, 2008), Hence the objective of this study is to examine students' preference for computer based testing in Nigeria by

1. Establish a relationship between gender and the acceptance of computer based testing
2. Examining the relationship between computer anxiety and student performance in Mathematics
3. Examining the relationship between level of study and the performance of students in
4. several science modules
5. Compare performance of students in selected courses taken using computer based testing in Federal and State Universities

REVIEW OF LITERATURE

Several studies have been carried out on the adoption of computer based testing worldwide. However, key areas of research range from preference of computer based testing in comparison to paper based testing, computer anxiety and experience in computer based testing. The role of students as stakeholders in the education landscape is important and assessment of perception of computer based testing is paramount in engendering adequate satisfaction in usage.

Preference of Computer Based Testing

Tella & Bashorun (2012) conducted a study on attitude of students to CBT in Nigeria, results showed that more than 50% of students showed preference to computer based testing over paper based testing. This study was corroborated by Dermo (2009) who found that students showed positive attitude towards CBT but showed concern on the banking of questions for examinations. Similarly, Hassanien et al. (2013) surveyed third year medical students in Saudi Arabia on computer based assessment, though majority expressed satisfaction in their first experience of CBT, about 50% showed preference for a pilot CBT test before formal application. Similarly, Noyes and Garland (2008) surveyed one hundred and thirty three students of which 91 had no experience with computer based testing, results showed

that 59% of students found CBT easy, while 29% considered it moderately difficult and only 12% found it difficult.

Performance in Computer Based Testing

In comparing performance of paper based tests as against computer based tests, Rickettes & Wilkis (2002) conducted a study comparing results of numeracy and statistics in biology tests. Results showed that after the first year, students who took tests in CBT format did not perform as well as those who used OMR sheets. Similarly, a study conducted by OECD in 2010 on the equivalence of scores between CBT and PPT in Denmark, Iceland and Korea showed variations existed in students performance in the CBT and PBT methods of testing with the highest disparity found in Mathematics, Science and Language. Mcvay (2002) conducted a study to examine disparity in testing between CBT and PBT, results showed that disparity exists with these testing methods, these findings were similar to Clariana & Wallace (2002) where the CBT group outperformed the paper based testing group in tests. However Yindakaba (2012) stated that computer usage was a predictor of performance with poor grades linked to poor computer usage. These findings differed from Choi & Tinker (2012) and Bridgeman et al (2003) in which results showed no disparities in performance between the two testing methods. In Nigeria, Tella & Bashorun (2007) stated that students believe the use of Computer based testing significantly increased performance in examinations.

Challenges of Computer Based Testing

In developing countries certain challenges are still faced with the full implementation of computer based testing Brown(2016) listed several challenges in computer based testing and categorized them into physical challenges and performance challenges. In accessing the performance drawbacks, validity threats could due to computer anxiety, lack of prior computer experience and the results from such examinations may not be representative of the actual performance of the test-taker which could cause disparities between the CBT and PBT scores. Another major performance challenge is the issue of security, this is necessary to curb cheating and can be resolved by the introduction of web cameras in testing centers and having an increased number of questions in the test bank . This is similar to challenges identified by Bugbee (1996) in which barriers includes poor test preparations and failure in implementation and maintenance of computer based testing. Majority of the physical challenges include the availability and the quality of equipments. However, the dominance of CBT in developing countries is a sign of a bridge in the digital divide with low cost technologies (Winke and Isbell, 2017). In Nigeria, Tella & Bashorun (2012) highlighted challenges such as shortage of computers, poor infrastructure, inadequate skills, and loss of data during examinations as major factors hindering computer based testing .

Outcomes of Computer Based Testing in Different Countries

Several studies (Mcclelland and Cuevas, 2020; Yao, 2020; Lu et al ., 2016 & Flowers et al., 2011) have sought to examine the performance of test takers in CBT and PBT format. McClelland and Cuevas (2020) compared the performance of students in Mathematics using both formats of testing, results showed that students performed better in the PBT than CBT, this finding is also similar to Logan (2014) who found that students that took algebra in paper based format performed better than CBT. Similarly, Flowers et al. (2011) studied students on reading, math and science results showed that students performed better in PPT than CBT .In China, Yao (2020) compared the test takers performance on CBT and PBT across different language levels, results revealed a difference based on mean scores on listening and writing as test takers performed better on CBT than PBT. However, in study by Boeve et al (2015), students were examined on the use of CBT and PBT in final exams, results showed there were no performance differences between students who took CBT and PBT.

RESEARCH METHODOLOGY

The Nigerian Educational System has three categories of universities which comprise of Federal, State and Private universities, and are run by the federal government, state government and privately owned. In this study only Federal and State universities were considered based on the age of establishment. A total of 250 respondents were randomly selected based on convenience from these universities of which one hundred and twenty five respondents were drawn from each of the universities studied. University of Ilorin has a population of 55,242 while Kwara State University has a population of 11,855. The Federal Universities in Nigeria are owned by the Federal government and they receive sponsorship from them while the State Universities are owned by the state government, Unilorin was founded in the year 1975 while Kwara State University was founded in 2009 . Students who completed this study comprised of different colleges which includes Engineering, Business, Applied Sciences and Medicine

The modules selected in this study include Mathematics, English, Physics, Chemistry, Computer and Biology. Participants were selected randomly during library visits, Though participants were from different disciplines, they are still required to take general modules in the course of their study. The collection of data by the respondents was done willfully and had no impact on the performance of students.

A close ended structured questionnaire was used for data collection which was divided into three sections. Section A measured the demographic characteristics of students ranging from gender, level of study and university of study, Section B measured students perception of Computer Besting Testing, while Section C measured student's preference and performance of specific courses in computer based testing. This was the only instrument used in the study and data was collected using a 5 point Linkert scale.

To analyze the data frequency distributions and cross tabulations were used to analyse variables thereafter regression analysis was used to test hypothesis of study

RESULT

4.0 Descriptive Statistics

In analysis of the demographic profile of respondents, Table 1 shows that majority was female with 72.7% and males with 27.3% based on the random sampling technique adopted

All levels of study were represented in the study with 100 level students constituting the majority of population being studied. Similarly, both universities studied were fully represented in the study.

Students Experience and Attitude towards Computer Based Testing

4.1 Preference for Paper Based Tests over CBT

Table 2 and 3 showed students' preference of computer based testing, results showed that 50% and 64% of Federal and State University students preferred computer based testing over paper based testing. However, 56% and 63% of students were not willing to take all modules studied using computer based testing method.

Number of Students (University of Ilorin-80; Kwara State University-103)

4.2 Computer Experience and Computer Based Testing

In accessing how students computer experience affects students scores in examinations, results showed that 59% and 66% of Federal and State University students stated that students prior exposure to computers affects scores in examinations. Similarly, 98% and 97% of students from Federal and State Universities advocated for Training before the commencement of these examinations

Table 1. Gender, Level of Study and College of respondents

Gender	Frequency	Percentage
Male	50	27.3
Female	133	72.7
Level of Study		
100 Level	66	36.1
200 Level	56	30.6
300 Level	43	23.5
400 Level	17	9.3
500 Level	1	5.0
University		
University of Ilorin	80	43.7
Kwara State University	103	56.3

Table 2. Preference for Paper Based Tests over CBT

University	Yes	No
University of Ilorin (Federal)	39	40
Kwara State University (State)	66	77

Table 3. Will students like to take all modules with the Computer Testing module?

Perception Variable	University	SA	A	U	SD	D
Take all courses in CBT mode of testing	University of Ilorin	12	22	1	15	30
	Kwara State University	20	17	1	27	38

Table 4. Students Computer Experience affects Scores

University	Yes	No
University of Ilorin (Federal)	47	32
Kwara State University (State)	68	33

Table 5. Training is necessary before testing

Perception Variable	University	SA	A	U	SD	D
Training necessary before testing	University of Ilorin	60	18	0	1	1
	Kwara State University	69	31	0	1	2

Number of Students (University of Ilorin-80; Kwara State University-103)

5.4 Anxiety and Computer Based Testing

Anxiety in Computer based testing was studied, results revealed that 61.2% and 71.8% of undergraduate students in Federal and State Universities stated that computer testing made them anxious.

Number of Students (University of Ilorin-80; Kwara State University-103)

Table 5. CBT Tests make me anxious

Perception Variable	University	SA	A	U	SD	D
CBT tests make me anxious	University of Ilorin	17	32	1	6	24
	Kwara State University	35	39	0	11	18

Student Performance in Computer Based Testing in Different Modules

Tables 6 below reveals students who had taken several modules with computer based testing out of which 54.4% and 59.5% showed preference for paper based testing as against computer based testing in mathematics, 21% and 9% showed preference for Biology paper based testing,20% and 2.6% showed preference for Physics PPT, 15.5% showed preference in Chemistry PPT in Federal University studied,26.25 and 38.83% showed preference for English PPT and 11.4% and11.9% showed preference for Computer PPT in Federal and State Universities in Kwara State

Table 6. Students that had taken courses in CBT

	Mathematics	Biology	Physics	Chemistry	English	Computer
University of Ilorin	79	71	70	71	80	70
Kwara State University	89	55	38	41	103	84

Table 7. Preference for Specific courses in Paper based format

	Mathematics	Biology	Physics	Chemistry	English	Computer
University of Ilorin	54.4%	21%	20%	15.5%	26.25%	11.4%
Kwara State University	59.3%	9%	2.6%	0%	38.83%	11.9%

Students Performance in CBT courses in University of Ilorin

In accessing student performance in Computer Based testing, results showed that more than 50% of respondents had above average grade is all subjects except mathematics where 45.5% of students recorded above average grades in the Federal University in Kwara state

	Excellent	Good	Average	Not Good
Mathematics	15.2	30.3	43.0	6.3
Biology	49.2	39.4	7.04	2.8
Physics	18.6	44.3	31.4	5.7
Chemistry	16.9	47.9	26.8	4.23
English	55.0	31.25	6.25	6.25
Computer	37.14	38.57	11.43	4.3

Students Performance in CBT courses in Kwara State University

Results from the State university in Kwara state revealed that students had above average grades in Biology, English and Computer while performance in Mathematics, Physics and Chemistry were below average with grades at 30.3%, 28.9 and 21.9 in each subject respectively

	Excellent	Good	Average	Not Good
Mathematics	4.5	25.8	40.45	22.47
Biology	23.64	29.1	30.9	14.5
Physics	13.1	15.8	44.7	23.68
Chemistry	4.8	17.1	51.2	21.95
English	59.22	35.92	1.94	1.94
Computer	45.23	42.85	14.23	0

4.1 Hypothesis Testing

Hypothesis 1: There is no significant difference in the acceptance of computer based testing between male and female students

Results showed that there is no significant difference (p=0,694) in the acceptance of computer based testing between male and female students. We therefore accept the hypothesis

ANOVA					
CBT is an interesting technique in examinations					
	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.121	1	.121	.155	.694
Within Groups	141.649	181	.783		
Total	141.770	182			

Hypothesis 2: There is no significant relationship between computer anxiety and student performance in Mathematics.

Pearson correlation was used to examine the relationship between performance in mathematics and computer anxiety, result showed a significant relationship (p= 0.042) between computer anxiety and performance in mathematics which are negatively correlated (r=-0.150)

Correlations			
		CBT Tests make me anxious	Performance Mathematics
CBT Tests make me anxious	Pearson Correlation	1	-.150*
	Sig. (2-tailed)		.042
	N	183	183
Performance Mathematics	Pearson Correlation	-.150*	1
	Sig. (2-tailed)	.042	
	N	183	183

*. Correlation is significant at the 0.05 level (2-tailed).

Hypothesis 3: There is no significant relationship between level of study and performance in English, Mathematics, Physics, Chemistry, Biology and Computer.

The ANOVA test results show that there is a significant relationship between the level of the student and performance in physics and chemistry while no significant relationship exists in mathematics, english, biology and computer. We therefore accept the hypothesis that a significant relationship exists between level of study and performance in physics and chemistry.

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Performance English	Between Groups	1.029	4	.257	.551	.699
	Within Groups	82.691	177	.467		
	Total	83.720	181			
Performance Mathematics	Between Groups	.933	4	.233	.152	.962
	Within Groups	274.050	178	1.540		
	Total	274.984	182			
Performance Physics	Between Groups	31.895	4	7.974	3.929	.004
	Within Groups	359.254	177	2.030		
	Total	391.148	181			
Performance Chemistry	Between Groups	21.512	4	5.378	2.539	.042
	Within Groups	377.089	178	2.118		
	Total	398.601	182			
Performance Computer	Between Groups	.581	4	.145	.145	.965
	Within Groups	178.861	178	1.005		
	Total	179.443	182			
Performance Biology	Between Groups	6.231	4	1.558	1.037	.390
	Within Groups	267.387	178	1.502		
	Total	273.617	182			

DISCUSSION OF FINDINGS

The study evaluated the perception of undergraduate students on computer based testing comparing performance of undergraduate students in Federal and State Universities on several science subjects. Findings from the study revealed majority of students preferred computer based tests to paper based test which corroborates findings of (Tella, 2012; Alabi et al.2005& Croft et al, 2001 ; Mcclelland and Cuevas, 2020; Yao, 2020 ; Lu et al ., 2016) . However, students were not willing to take these tests for all courses; the study also revealed the need for trainings before the commencement as students are of the opinion that computer experience affects scores in examinations. In accessing the role of computer anxiety in computer based testing majority of students stated that computer based testing increased their anxiety levels. The study also revealed that more than 50% of students showed preference for paper based testing in Mathematics; similarly, more than 50% of students had an above average score in all courses except mathematics in both Federal and State Universities in Kwara state.

In testing the hypothesis, results revealed a significant relationship between computer anxiety in students and performance in Mathematics. This implies that students anxiety levels affects performance in mathematics, similarly, results revealed a relationship between students level of study and performance in physics and chemistry. This findings corroborates the study conducted by OECD in 2010 on the equivalence of scores between CBT and PPT in Denmark, Iceland and Korea showed variations existed in students performance in the CBT and PBT methods of testing with the highest disparity found in Mathematics, Science and Language However, no relationship was found between gender and the acceptance of computer based testing. This study has implications for university administrators in the creation of policies guiding computer based testing.

5.1 Implications

This study contributes to literature on computer based testing by examining students perception in the Nigerian context. The findings from this study provide useful insight to educational stakeholders in establishing test-takers prior exposure to computers and focusing more on theoretical courses than calculative courses improve performance.

5.2 Limitation to Study and Future Study

This study collected data from only two universities in kwara state, this can be seen as a major limitation. Future researchers could increase the number of universities under consideration. In enhancing the methodology, the present study gave consideration to quantitative research, future studies could include either experimental data or qualitative data to generative a more robust database.

5.3 Conclusion

The study examined the student perception of computerized testing by considering universities in Kwara State Nigeria. The study revealed that though students showed preference to CBT over PBT, it was not inclusive in all modules. The study further revealed a negative and significant relationship between computer anxiety and performance in mathematics. Performance of students was compared across levels of study; results showed a significant relationship in Physics and Chemistry.

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