Prospects and Challenges in Computer-Based Assessment in Tertiary Institutions in Nigeria: A Case of Imo State Polytechnic, Umuagwo

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Abstract
*Computer-Based Assessment, as a new introduction in the assessment processes in Nigerian education system is a method of giving and answering questions such as in tests and examinations using computer rather than the traditional paper and pen/pencil method. This method is not widely used in the nation's education system, though a few tertiary institutions have adopted it in the assessment of students' academics in some and/or all of their courses. This study, therefore, examines the prospects and challenges of the method in assessments in tertiary institutions in Nigeria. To guide the study three (3) research questions and hypotheses are addressed. The study adopted descriptive and analytic designs with a 18-item instrument of Likert form named **SPCBA**. All 68 lecturers in the School of General Studies of Imo State Polytechnic, Umuagwo and 32 ICT staff of the institution constituted the sample that completed the instrument with reliability coefficient of 0.73. The findings showed some prospects of the method in revolutionizing the education system with a number of challenges to the method. In the light of the findings and their implications recommendations are made to guide institutions and examining bodies.*

***Keywords**: Prospects, Challenges, Computer- Based Assessment, Tertiary Institution*

Introduction

Computer-Based Assessment is an aspect of educational technology process that is becoming widely used in education. Assessment of learning in education system is an essential part of the system which tends to evaluate students' knowledge, skills and attitudes in what is taught (Mogey & Watt, 2017). The advent of technologies allowed the introduction of computer-based tools to enhance and assist in among all stages of assessment in educational process.

Computer-Based Assessment (CBA) is the practice of giving and answering questions such as tests and examinations using computer rather than the traditional paper and pencil method (Singleton, 2001). In other words, it is a method of administering tests or examinations in which the responses are done and assessed electronically. The gradual introduction of CBA is dramatically changing the landscape of assessment of students' learning.

Furthermore, some authors, Abubakar and Adebayo, (2014) see CBA as the use of digital tools such as laptops, smartphones etc for assessment-related activities. Therefore, any assessment that involves the use of these technologies other than the traditional paper and pencil is a CBA. The practice is virtually new in Nigeria until the Joint Admission and Matriculation Board, JAMB, in 2015 introduced it in their admission process test (examination) for the Unified Tertiary Matriculation Examination (UTME). The aim, being to reduce examination

malpractices and to restore confidence in the education polity and in turn, promote use of electronic assessment (Suryadi & Rahmawati, 2018).

This process is being introduced into tertiary institutions when at a point examination malpractices and cheating are becoming an act that must be exhibited in examinations among post-secondary school students which is leading to doubts of the authenticity and reliability of undergraduate examinations results.

Computer-Based Assessment, as a new innovation in assessment has not been generally adopted in the entire education system. This study examined the prospects and challenges of adopting it in the assessment process of tertiary institutions in Nigeria.

Prospects

For CBA to work effectively, according to Singleton (2001), online software must be created by the instructor for the assessment, to develop whatever test that is needed to be given to the testees. In the software the instructor ensures that certain information are added which may include time frame for the test, attendance to the test (i.e. participation in the test), grading or scoring of the test and so on. According to Mogey and Watt (2017), timing in CBA is automated which makes teachers to focus on students rather than on administrative protocols.

Computer-Based Assessment has number of prospects, both for the students, teachers and institutions. Such prospects, according to Singleton (2001) include: ***convenience*** which allows students to sit for the examination when and where that may be convenient or accessible for them rather than at a designated location and time. ***Publication of Results*** which are not delayed any longer but can be promptly published. This, according to him, is because of ***Elimination of Human errors*** as in grading and scoring. Collaborating with Singleton, Sparks (2018) opined that scoring in CBA is also automated, occurring as the tests are being answered. The administrators of CBA have access to each student's aggregate reports and can extract or retrieve these for planning to meet the students' needs.

However, according to Suryade and Rahmawati (2018), the introduction of CBA by examining bodies aims at revolutionizing the education system and building a better human character. It is seen to be more effective and efficient than the PBA (Paper-Based Assessment) in terms of costs effectiveness, time frame in grading and scoring etc.

The testees find CBA easy to choose and make changes in the options. It reduces cheating on the parts of the students as they work in different questions. Again, Oluwasanumi (2016) highlighted a number of prospects of CBA which include reduction in security challenges, high cost of producing writing materials for Paper-Based tests, high cost of transportation of such materials etc.

Again, CBA reduces teacher's interpretation of the tests which eliminates partiality in results but encourages students' use of ICT as well as increase their motivation and skills. According to Abubakar and Adebayo (2014), the introduction of ICT into education has brought significant advancement, though not without some issues to be dealt with.

Challenges

The use of Computer-Based Assessment has some shortcomings on students' approaches to learning in developing their higher order cognitive abilities of synthesis and evaluation. It narrows down their in-depth learning and studying as CBA involves only multiple choice questions.

Testing or assessment with computer is prone or susceptible to cheating as in traditional paper-and-pencil assessment although the type of cheating and strategies for checking it may differ (Sparks, 2018). It is pertinent to note that CBA must have to be of a reasonable quality as paper-and-pencil assessments if the results are to be used to make important decisions.

Some scholars, Olapade (2019), Nwaocha (2019) and Oluwasanumi (2016) emphasized on such challenges the students, teachers and schools experience in CBA as: students' incompetency in computer skills, network problem, students' inability to in-depth study of the contents, non-availability of enough computers, power failure etc.

Fuentes (2014) portends that although CBA has some prospects, it has failed to realize its anticipated potentials. The scholar continued as he opined that the major challenge of CBA is the inability of the administrator to develop the system that ensures test and score security. In spite of these challenges the capability of CBA to deliver authentic tests than paper-and-pencil is expanding.

In summary, Sparks (2018) argued that to ask students and schools to switch to a new mode of assessment does not affect students' performance adversely though the challenges might not last long than some stakeholders fear.

McLaughlin, Fowell, Dangerfield, Newton and Perry (2004) argued that students seem to be confused with the CBA question styles and as a result lack confidence in writing the questions. They continued that students tend to find it difficult answering questions evaluating higher order thinking which resulted from poor staff development and training in CBA test construction. Earlier in their write up McLaughlin et al (2004) had opined that CBA is not sophisticated enough to examine complex contents in English language as well as marking essay-type assignments. Therefore quiz questions to access a range of cognitive skills may not be sufficient test for such skills, they said.

Statement

The process of conducting authentic and reliable examinations in Nigeria has raised much doubt in parents, guardian and stakeholders alike. This is for both schools' internal and selection examinations into post-secondary schools. The doubts are a result of examination malpractices and cheating which characterized the nation's examination processes. It is in the light of these that JAMB in 2015 introduced the CBT for their UTME with the aim of eliminating examination malpractices and cheating which some tertiary institutions adopted in their examination processes.

In the light of this, one therefore is tempted to ask such question as: what are the prospects and challenges in adopting Computer-Based Assessment (CBA) in tertiary institutions in Nigeria? The answers to such question and more will constitute the solution to this study.

Purpose

The purpose of this study was to examine the prospects and challenges in Computer –Based Assessments in tertiary Institutions in Nigeria. The study therefore, is specifically aimed at:

(1) Ascertaining if the adoption of CBA in tertiary institutions would reduce cheating and examination malpractices among the undergraduates.

(2) Determining the hiccups in CBA processes in the institutions

Significance

This study is considered to be very relevant to tertiary institution policy makers in examination planning to eliminate cheating and examination malpractices that have eaten deep into the system. It would also help the institutions managements to assess both the CBA and paper and pencil (pen) process in making their students better graduates.

On the other hand the study is set to assist the institutions understand the facilities to mount for successful CBA. It would encourage teachers for better development and training in CBA test construction as well as encouraging students to develop skills in technology.

Research Questions

The following questions were addressed to guide the study:

1. To what extent does CBA process reduce human stress, cheating, costs, and other examination factors?
2. To what extent do certain factors as network disruption, power supply, poor ICT factors etc challenge CBA processes?
3. How do human factors challenge CBA process?

Research Hypotheses

Three research hypotheses were formulated to guide the study which and are tested at 5% significance level.

1. The mean reduction of certain examination factors by CBA is not significantly different from the population mean ($P<0.05$).
2. The mean challenge of network and technical factors does not differ significantly from the population mean ($P<0.05$)
3. Human factors do not challenge CBA process significantly ($P<0.05$).

Methodology

Descriptive and inferential statistics were adopted in the study aimed at examining the prospects and challenges in Computer- Based assessments in tertiary institutions in Nigeria. A scale of Prospects and Challenges in Computer- Based assessment in Tertiary Institutions (SPaCBATI) consisting of three subscales of reduction of examination factors, challenge of network and technical factors and challenge of human factors was used for the study.

A total of 32 ICT staff of Imo State Polytechnic, Umuagwo and 68 lecturers of the School of General Studies of the institution constituted the target population for the study. The 32 staff of ICT and the 68 lecturers were used to complete the study instrument. Imo State Polytechnic is one of the tertiary institutions in Imo State, an institution which adopted CBA in conducting her semester and sessional examinations in General Studies courses for a period of three years of 3 sessions or 6 semesters. The CBA involves all courses offered in the school of General Studies.

The instrument for the study was developed by the researchers and validated by the director and the software administrator of ICT of the institution. The instrument adopted a Likert-Scale-of 5-points of Very Great Extent; Great Extent; Moderate Extent; Low Extent and Very Low Extent response options for subscales A and B weighted 5,4,3,2 and 1 and Strongly Agreed, Agreed, Disagreed and Strongly Disagreed for subscale C weighted 4,3,2 and 1 respectively.

The scale was a – 18 item instrument of three sections. While sections A and B consisted of 6 and 7 items respectively, measuring responses on reduction of examination factors with CBA and challenge of network and technical factors, section C consisted of 5 items measuring responses on challenge of human factors. The lecturers completed section A and C while ICT staff completed section B. The reliability of the instrument was determined using a double administration (Test retest) method and calculated to be 0.73 which was considered appropriate for the study.

The data collected were analyzed for each sub-scale to answer the research questions and test the hypotheses. While the research questions were answered using mean rating responses, the hypotheses were tested using Z-test statistic. While the mean of 3.0 and 2.5 and above were adopted as the criterion mean or population mean for decision making of the mean rated scores, the absolute value of Z_{cal} greater than the critical value was used for rejecting no significant different.

Results

Research Question One: To what extent does CBA process reduce human stress, cheating, cost and other examination factors?

Table 1: Lecturers' Responses on Reduction of Examination Factors (with CBA).

S/N	Item	VGE	GE	ME	LE	VLE	n	fx	×
1.	Does not take time in scoring	62	3	3	-	-	6	33	4.87
2.	Cost more than PBA	7	5	8	16	32	68	143	2.10
3.	Administration of CBA is tedious	-	4	s13	23	28	68	116	1.71
4.	Difficulty in making changes in the options	5	10	26	11	16	68	181	2.66
5.	Cheating and malpractices by students	23	19	21	4	1	68	263	3.87
6.	Students' working on same questions	20	17	13	9	9	68	234	3.44
		∑					408	1367	18.65
		×							3.35

Table 1 shows that the rated mean (3.35) is slightly greater than the sample mean (3.00) showing that CBA process, to a great extent, reduces examination factors. This is with the exception in items 2, 3, and 4 showing that CBA process does not cost more than PBA, is not tedious in administration and not difficult in making changes in the option.

Research Question Two: To what extent do cerstain factors as network disruption, power supply, poor ICT factors etc challenge CBA process?

Table 2: ICT staff responses on challenge of Network/Technical factors

S/N	Item	VGE	GE	ME	LE	VLE	n	fx	x
1.	Power failure/Epileptic power supply	9	6	10	3	4	32	109	3.41
2.	Unsteady or delay due to traffic	16	9	5	2	-	32	135	4.21
3.	Ability to see apportioned questions	-	9	7	9	7	32	81	2.56
4.	Shortage of computer systems	10	6	8	8	-	32	114	3.56
5.	Rescheduling of Exam meant for one day	9	11	8	2	2	32	119	3.72
6.	Poor weather condition	6	9	9	3	5	32	134	3.25
7.	Inferior/bad networking tools	6	10	8	6	2	32	108	3.38
		∑					244	800	24.09
		×							3.28

In table 2, the rating mean (3.28) is greater than the population mean (3.00), showing that network and technical factors moderately challenge the CBA process.

Research Question Three: How do human factors challenge CBA process?

Table 3: Analysis of lecturers' responses on challenge of human factors.

S/N	Item	SA	A	D	SD	n	fx	x
1.	Takes time to construct items	24	28	13	3	68	209	3.07
2.	Production of materials for use in Exam	19	15	23	11	68	178	2.62
3.	Ability of students to make indepth course coverage	26	17	19	6	68	199	2.93
4.	Insufficient ICT Technicians	20	26	16	6	68	196	2.88
5.	Students' inability to use the system	27	18	16	7	68	201	2.96
		∑				304	983	14.46
		×						3.23

Table 3 shows that the response mean (3.23) of the items is greater than the criterion population mean (2.50). This shows that the human factors greatly after the process of Computer-Based Assessment.

Research Hypothesis One: The mean reduction of certain examination factors by CBA process is not significantly different from the population mean (P< 0.05)

Table 4: Z-test analysis of responses on reduction of examination factors by CBA process.

n	$\bar{\times}$	μ	SD	st. erro	Z_{cal}	Z_{crit}	Decision
68	3.35	3.00	0.95	0.12	2.92	1.96	Ho Rejected

Since Z_{cal} (2.92) > Z_{crit} (1.96), Ho is rejected. This implies that the mean reduction of certain examination factors by CBA process is significantly different from the population mean (P < 0.05).

Research Hypothesis Two: The mean challenge of network and technical factors does not differ significantly from the population mean (P< 0.05).

Table 5: Z-test analysis of responses on challenge of network and technical factors.

n	$\bar{\times}$	μ	SD	St. error	Z_{cal}	Z_{crit}	Decision
32	3.28	3.00	1.25	0.08	3.5	1.96	Ho Rejected

Since Z_{cal} (3.5) > Z_{crit} (1.96), Ho is rejected. This indicated that the mean challenge of network and technical factors differ significantly from the population mean. This implies that there are challenges of network and technical factors on CBA process.

Research Hypothesis Three: Human factors do not challenge CBA process significantly (P< 0.05).

Table 6: Z – test analysis of responses on challenge of human factors.

n	$\bar{\times}$	μ	SD	St.error	Z_{cal}	Z_{crit}	Decision
68	3.23	2.50	0.24	0.01	73	1.96	Ho Rejected

Table 6 shows that Z_{cal} (73) > Z_{crit} (1.96), therefore Ho is rejected. This implies that human factors challenge CBA process significantly.

Discussion of Findings

Results in tables 1 and 4 showed that Computer-Based Assessment process reduces certain examination factors like cheating and malpractice. These results collaborate Sureyadi and Rahmawati (2018) who opined that JAMB's aim of introducing CBA in their examination process for UTME was to reduce examination malpractices and to restore confidence in the education polity. These findings also support a number of authors like Singleton (2017) in their opinions on convenience for the students to sit for the examination at accessible locations and Sparks (2018) on elimination of errors in grading and scoring.

Again, the finding supports Oluwasanumi (2016) whose angle was on reduction of cheating as students work on different questions as well as reduction in high cost of producing writing materials for Paper-Based tests. Finally the findings were in support of Abubakar and Adebayo (2014) that the introduction of ICT brought significant advancement into education.

On the other hand tables 2, 5, 3 and 6 showed the challenges inherent in network, technical and human factors. The results support authors like Olapade (2019), Nwaocha (2019) and Oluwasanumi (2016) who emphasized on challenges of students' incompetence in computer skills, inability to do in depth study of the course contents, network problem, and insufficient computers and so on.

In addition to the challenges, CBA process is challenged by unsteady and delay due to traffic, poor weather condition as well as inferior networking tools. Again, teachers' inability to construct CBA items/questions, students' inability to use computer systems and insufficient ICT technicians pose serious challenges to the process.

Conclusion

From the discussions, the introduction of ICT into education assessment is bringing significant advancement though with some challenges. In spite of the challenges, the capability of CBA to deliver authentic tests than Paper-and-Pencil Assessment (PBA) is expanding. Therefore switching to a new mode of assessment will not affect students' studies and performances adversely because the challenges might not last long as many stakeholders think.

Recommendations

Following the findings and possible implications, the following recommendations are made:

1. The CBA administrators or instructors should create software that may accommodate higher order questions.
2. School managements should endeavour to provide enough ICT systems or technicians in schools that wish to adopt the CBA processes.
3. An introductory computer course should be introduced in every freshman year to enable students acquire the skill.
4. Adequate provision for power supply should be made by schools.

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