

Effect of Computer Based Test (CBT) Examination on Learning Outcome of Colleges of Education Students in Nigeria

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Abstract: Examination is an important aspect of teaching and learning process in colleges of education in Nigeria. Therefore, to conduct examination for courses involving large number of students is a major challenge. The adoption of the use of relevant technology tools in recent times have made a way out of this challenge. Hence, this study examined the effect of Computer Based Test (CBT) examination on learning outcome of colleges of education students in Nigeria. A descriptive survey design was adopted and two research questions guided the work. The population was made up of 2112 NCE students and lecturers in the School of Education, Federal College of Education (Special), Oyo. The work sampled 10% of the population of the study that is 211, comprising 200 students and 11 lecturers selected through random sampling technique. The instrument for data collection was structured questionnaire developed by the researchers. The instrument was validated by two experts in the field of evaluation and measurement in Federal College of Education (Special), Oyo. Cronbach Alpha method was used to determine the reliability of the instrument and it was estimated at 0.75 which was considered reliable enough for the study. The findings of this study revealed the challenges militating against CBT examination on learning outcome of colleges of education students in Nigeria, among which are lack of ICT practical knowledge by lecturers assigned to supervise CBT examination, visually impaired students complained of unclear voice, some physically handicapped students could not use mouse, erratic power supply during CBT examination couple with high cost of diesel for alternative source of power and time duration allotted affect some students who are not that versatile with the use of mouse and keyboard. Furthermore, some benefits of CBT examination on learning outcome of colleges of education students in Nigeria are stated. Based on the findings, it was recommended that lecturers to supervise CBT examination should be practically good in the use of computers in order to be able to attend to minor issues that may arise during the examination.

Keywords: Computer Based Test, Examination, Learning Outcome, College of Education

1. Introduction

Examination is one of the most widely used means of assessing learning and capability of students. Also, it is an important part of the teaching and learning process of education that allows lecturers to evaluate their students after teaching. Examination is used to determine the extent to which course objectives are achieved [1, 2]. According to Nnam, M. U. & Inah, A. F. [3], examination is a criterion

upon which students can be properly measured or appraised in the school. Teaching and learning can become more efficient when students sit for examination or test in order to measure the extent students have understood the instruction given and also the lecturer can as well assess himself or herself based on the performance of the students [4].

Nowadays, there are numerous ways of examining students. They are traditional pen-paper (essay), computer-based test (CBT), quizzes, oral examinations, multiple choice

examinations among others. According to Ajinaja, M. [5], various methods of assessing students are pencil-written examination, projects, assignments, presentations and oral examinations. The author vividly described traditional examination as a formal examination which is generally common and administered through printed questions to which students are allowed to answer in written form within a stipulated time to a previously unseen questions that is set in advance and done in designated examination centres with proper invigilation that prevents communication among students, any notes or written materials. Fortunately, with the introduction of Information and Communication Technology (ICT) to educational systems, system of examining students has changed from pen-paper to computer-based which is one of the recent innovative methods of assessing students.

Computer Based Test (CBT) can be described as the use of computer hardware and software to test students on previously taught lesson. It consists of multiple-choice questions in objective formats. Learners read through a displayed question on screen and expected to select the correct option from a list of displayed options. At the back end of the CBT customized software, the teacher/tutor has the opportunity to select the correct option and determine allotted point upon which is automatically used to assess the learner's work on submission and this makes it possible for the learner to immediately see his/her score in the test [6]. It is a multiple-choice item for examining students with user friendly computer interface [7]. According to Ejim, S. [8], CBT has many advantages compared to the traditional pen-paper test (examination). The advantages are immediate scoring and feedback for multiple choice questions. It allows more innovative and authentic assessments because of the use of technology. However, the author mentioned some shortcomings when using CBT, need for sufficient facilities, security of software, storage (back-up) procedures should there be technological failure, time for lecturers and students to get familiar with new

technologies, tools to meet new challenges as they arise compared to conventional practices. Burns [6] stated fifteen benefits of CBT to teachers and students which are: multiple test administrations, dynamic and individualized assessments, immediate grading, helps with open ended assessments, immediate feedback, vertically and horizontally aligned assessments, value added growth measures, uncover student thinking, engaging, analytics for the instructor and student, greater amount of test items, help students with disabilities, incorporate other types of technology, improves writing and can secure testing.

There are some factors that can either affect positively or negatively the learning outcome of students. Studies in socio-economic had shown that the status and motivation from parents can have positive effect on learning outcome of students. Similarly, qualities of intake also influence the quality of output performance of students in tertiary institution [7]. Kapur [9] mentioned the following: student's attitude, school facilities, leadership of the school, lecturer's ability, school environment, social circle, parents' responsibility, teaching-learning methods, psychological and health related factors etc. as some learning outcome factors that can affect students in tertiary institutions. The author was able to come up with the stated factors based on his view of assessing critically reasons why some students perform woefully in class despite the fact that they were taught by the same teacher and assess using the same questions. Learning outcome of students is an area of research in higher institution that has received many researchers' attention around the world over the years. The factors that affect learning outcome of students vary from student to student and from one institution to another. Factors mentioned include environmental, economic, social and psychological, course experience, student effort, motives and learning strategies [10, 11]. In summary, three key factors were mentioned which are teacher, institutional factors and personal as shown in Figure 1.

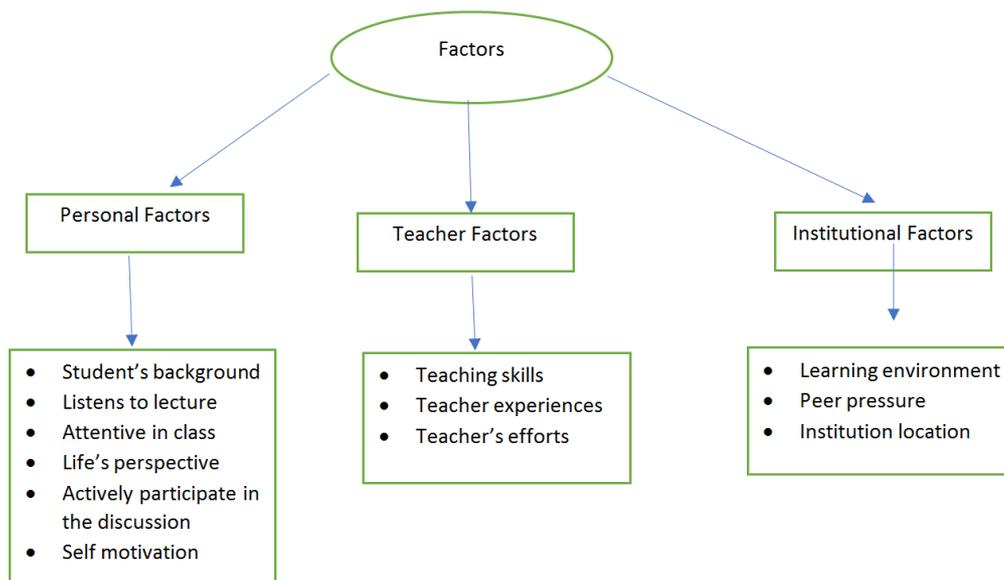


Figure 1. Adapted: Factors affecting students' learning outcome [10].

Conducting examination for large classes is one of the challenges facing tertiary institutions especially when it involves pen and paper mode. In this modern era, the world has experienced tremendous interest in the use of CBT in academic activities, more importantly in students' assessments [12]. It was reported that the introduction of CBT into schools' examinations has controlled to a very good level examination malpractice in Nigeria. In addition, it allows schools to set questions across the school curriculum and ensures international best practice in the examining students. The Joint Admission and Matriculation Board (JAMB) has long adopted the use of CBT to eradicate examination malpractice in public examination [13, 14].

1.1. Statement of the Problem

To conduct examination for courses involving large number of students is a major challenge in colleges of education in Nigeria. In the past, the mode of conducting examination was pen and paper but in recent years most colleges have adopted the use of CBT to examine students in large classes. However, being in early stage, studies have shown that there are many challenges which needs to be identified and improve to maximize the benefits of its usage. Oladimeji and Mwuese [15] revealed loss of network connection, computer malfunctioning during examination and insufficient time allocated for CBT examination as challenges observed in their study. Also, inadequate ICT infrastructure was identified by Okocha, T., Toluwani, E. & Owolabi, S. [16] in their study of CBT usage in higher institution examination for large classes. In addition, Ebimgbo, S. O., Igwe, N. J. & Okafor, A. E. [12] mentioned insufficient time and system or software failure as observable challenges facing CBT examination in higher institutions. The researchers during the conduct of CBT examination in Federal College of Education (Special), Oyo also observed the following challenges: lack of ICT practical knowledge by lecturers assigned to supervise CBT examination, visually impaired students complained of unclear voice, some physically handicapped students could not use mouse, erratic power supply during CBT examination coupled with the present high cost of diesel for alternate source of power and time duration allotted affect some students who are not that versatile with the use of mouse and keyboard. Hence, this research examines the effect of CBT examination on learning outcome of colleges of education students in Nigeria with the view of eradicating these problems.

1.2. Purpose of the Study

This study examines the effect of computer-based test examination on learning outcome of colleges of education students in Nigeria. Pen-paper was widely in use in colleges of education in the past but with the adoption of using CBT

for examining large classes, how as it affects the learning outcome of students in colleges of education? The poor learning outcome of students in the results of CBT examination in colleges of education coupled with previous research observable challenges are the motivating factors to carry out this research.

1.3. Research Questions

Two research questions were drawn for the study as stated below:

- 1) What are the benefits of CBT examination on learning outcome of students in colleges of education in Nigeria?
- 2) What are the challenges militating against CBT examination on learning outcome of students in colleges of education in Nigeria?

2. Methodology

This study examined the effect of CBT examination on learning outcome of colleges of education students in Nigeria. A descriptive survey design was adopted and two research questions guided the work. The population was made up of 2112 NCE students and lecturers in the School of Education, Federal College of Education (Special), Oyo. The work sampled 10% of the population of the study that is 211, comprising 200 students and 11 lecturers selected through random sampling technique. The instrument used for data collection was structured questionnaire developed by the researchers. The instrument was validated by two experts in the field of evaluation and measurement in Federal College of Education (Special), Oyo. Cronbach Alpha method was used to determine the reliability of the instrument and it was estimated at 0.75 which was considered reliable enough for the study. The instrument for data collection was a 20-item modified Likert 4-point type of questionnaire (weighted; Strongly Agree (SA) = 4 points, Agree (A) = 3 points, Disagree (D) = 2 points, Strongly Disagree (SD) = 1 point). The data generated were collated and tabulated. The research questions were answered using mean and standard deviation. To answer the research questions, the decision was based on the instrument mean value of 2.50. Any item which is positively constructed with mean of greater or equal to 2.50 was considered valid while any mean value below 2.50 was termed to be invalid. Likewise, any item which was negatively constructed with mean value below 2.50 was construed as invalid.

3. Results and Discussions

The results of this study are presented as shown below:

Research Question One: What are the benefits of CBT examination on learning outcome of students in colleges of education in Nigeria?

Table 1. Benefits of CBT Examination on Colleges of Education Students.

SN	Items	Students		Lecturers			
		N=200		N=11			
		Mean	SD	Decision	Mean	SD	Decision
1	CBT is one of the recent innovative methods of examining students	3.91	0.29	Valid	3.91	0.23	Valid
2	CBT helps to cover course curriculum	3.74	0.44	Valid	3.82	0.39	Valid
3	CBT gives instant feedback	3.95	0.23	Valid	3.55	0.50	Valid
4	CBT uses immediate scoring method	3.85	0.36	Valid	3.73	0.45	Valid
5	CBT assessment is authentic	3.96	0.21	Valid	3.73	0.45	Valid
6	CBT allows multiple test administration	3.73	0.45	Valid	3.82	0.39	Valid
7	CBT uncovers students' thinking	3.66	0.47	Valid	3.45	0.50	Valid
8	CBT allows large number of questions items	3.96	0.20	Valid	4.00	0.00	Valid
	Grand Mean	3.85	0.33	Valid	3.75	0.36	Valid
9	CBT disallows individualized assessments	1.14	0.34	Invalid	1.09	0.29	Invalid
10	CBT does not help to reduce examination malpractice	1.06	0.24	Invalid	1.09	0.29	Invalid
11	Students with disabilities cannot take CBT	1.46	0.61	Invalid	1.18	0.39	Invalid
12	CBT does not eliminate the stress of scripts marking	1.13	0.37	Invalid	1.00	0.00	Invalid
13	CBT does not eliminate missing results in large classes	1.07	0.26	Invalid	1.09	0.29	Invalid
14	CBT is not cost-effective compare to pen-paper	1.30	0.59	Invalid	1.45	0.75	Invalid
15	CBT scores are not accurate	1.01	0.10	Invalid	1.00	0.00	Invalid
	Grand Mean	1.17	0.36	Invalid	1.13	0.29	Invalid

Table 1 shows that items 1-8 which are positively constructed were valid because the students' and lecturers' responses all had mean values greater than the benchmark of 2.50. In addition, the grand mean for students and lecturers were 3.85 and 3.75 respectively. This implies that the items according to students and lecturers are all benefits of CBT examination on colleges of education students in Nigeria. The results of items 9-15 which were negatively constructed were less than 2.50. For example, item 10 which stated that CBT does not help to reduce examination malpractice is invalid. This implies CBT helps to reduce examination malpractice. Likewise, item 13 which stated that CBT does not eliminate missing results in large classes is invalid. It implies that CBT eliminates missing results in large classes.

The findings from this study revealed the benefits of CBT examination on learning outcome of colleges of education students in Nigeria which are: it helps to cover course curriculum, it gives instant feedback, it uses immediate scoring method, CBT assessment is authentic, and so on. In

addition, it also revealed that CBT is one of the most recent innovative methods of examining students. It eliminates the stress of scripts marking and the results are accurate. It helps to reduce examination malpractices and more importantly students with disabilities who have undergone training can take CBT. These findings are consistent and in agreement with the findings of Ojerinde, D. [13] that CBT can eradicate examination malpractices, Ejim, S. [8] that CBT has many advantages compared to the traditional pen-paper test (examination) such as immediate scoring and feedback for multiple choice questions and Egoigwe, S. V. et al [7] that CBT provides immediate feedback and is a good means of assessing students in university. The findings are also in line with Burns, M. [6] which stated fifteen benefits of CBT to teachers and students among which are immediate grading and help students with disabilities to express themselves.

Research Question Two: What are the challenges militating against CBT examination on learning outcome of students in colleges of education in Nigeria?

Table 2. Challenges Militating Against CBT Examination on Colleges of Education Students.

SN	Items	Students			Lecturers		
		Mean	SD	Decision	Mean	SD	Decision
1	CBT needs adequate ICT facilities	3.89	0.32	Valid	3.91	0.29	Valid
2	Some students always come late for CBT	3.91	0.29	Valid	3.82	0.39	Valid
3	CBT allotted time affects some students' performance	3.78	0.54	Valid	3.45	0.50	Valid
4	Improper course registration affects some students during CBT examination	3.72	0.62	Valid	3.64	0.48	Valid
5	Some students have phobia for CBT	3.58	0.70	Valid	3.55	0.50	Valid
6	Network failure can affect students' performance	3.97	0.18	Valid	4.00	0.00	Valid
7	CBT time on time table can affect some students' performance	3.79	0.52	Valid	3.45	0.78	Valid
8	CBT batching method can affect learning outcome of students	3.89	0.31	Valid	3.73	0.48	Valid
	Grand Mean	3.82	0.44	Valid	3.69	0.43	Valid
9	Irregular power supply cannot affect learning outcome of students	1.15	0.35	Invalid	1.09	0.29	Invalid
10	Poor attitude of some invigilators cannot affect learning outcome of students	1.12	0.33	Invalid	1.45	0.50	Invalid
11	Lack of qualified ICT personnel in CBT centre cannot affect students' performance	1.12	0.32	Invalid	1.09	0.29	Invalid
12	Inadequate air conditioners cannot affect students' performance	2.02	1.16	Invalid	1.82	0.83	Invalid
13	Inadequate air conditioners cannot affect system functionality	1.24	0.53	Invalid	1.36	0.48	Invalid
14	Inadequate training of students for CBT cannot affect their performance	1.12	0.32	Invalid	1.18	0.39	Invalid
15	Poorly designed CBT software cannot affect students' performance	1.06	0.24	Invalid	1.27	0.45	Invalid
16	Students' health status cannot affect their CBT learning outcome	1.05	0.21	Invalid	1.55	0.50	Invalid
	Grand Mean	1.24	0.43	Invalid	1.36	0.47	Invalid

Table 2 shows that items 1-8 which are positively constructed were valid because the students' and lecturers' responses all had mean values greater than the benchmark of 2.50. In addition, the grand mean for students and lecturers were 3.82 and 3.69 respectively. This implies that the items according to students and lecturers are all challenges militating against CBT examination on colleges of education students in Nigeria. The results of items 9-16 which were negatively constructed were less than 2.50 which means the statements were invalid. For example, item 15 with mean values of 1.06 and 1.27 for students' and lecturers' responses which stated that poorly designed CBT software cannot affect students' performance were invalid because the mean values were less than 2.50. This implies that poorly designed CBT software can affect students' performance in CBT examination.

The findings also reveal the challenges militating against CBT examination on learning outcome of colleges of education students in Nigeria. The challenges are inadequate ICT facilities, time allotted for each CBT course, irregular power supply, network failure, inadequate ICT training for students, poorly designed CBT software and so on. The responses of the both the students and lecturers supported these challenges as challenges militating against CBT examination in colleges of education. The findings are in conformity with Oladimeji, O. F. & Mwuese, B. C. H. [15] study that revealed loss of network connection, computer malfunctioning during examination and insufficient time allocated for CBT examination as challenges observed in the conduct of students CBT examination. In addition, the findings of this study are well supported by Ebingbo, S. O., Igwe, N. J. & Okafor, A. E. [12] who mentioned insufficient time and system or software failure as observable challenges facing the use of CBT for examining students in higher institutions in Nigeria.

4. Conclusion

Smooth conduct of examination for general courses involving large number of students has been a major challenge in colleges of education in Nigeria. CBT examination with the use of ICT facilities is one of the recent innovative methods to overcome this challenge. However, despite the many benefits of using CBT examination to assess students' learning outcome, they are faced with many challenges which are observed during its usage by the lecturers and students who participated in general courses in colleges of education in Nigeria. Consequently, this study had shown that there is need to eradicate these observable challenges such as network failure, inadequate ICT infrastructures, poorly designed CBT software among others which in no small measure improve the uses of CBT examination for large classes in colleges of education in Nigeria.

5. Recommendations

Based on this study, the following recommendations are made:

- 1) Lecturers to supervise CBT examination should be practically good in the use of computers in order to be able to attend to minor issues that may arise during the examination.
- 2) CBT software developed for CBT examination should be updated from time to time based on observable challenges.
- 3) ICT infrastructures should be maintained regularly and replaced every six years.
- 4) There is the need for adequate students training in ICT prior to CBT examination in colleges of education.
- 5) There is the need for installation of high capacity solar system because of the erratic power supply in Nigeria and high cost of diesel.
- 6) There is the need for procurement of special ICT equipment for the use of students with disabilities in colleges of education in Nigeria.
- 7) Government should from time to time help in supporting the procurement of ICT equipment in colleges of education in Nigeria.
- 8) There is the need of employment of software engineer, computer engineer and computer lecturers to facilitate the development, usage and maintenance of CBT software in colleges of education in Nigeria.

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