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Computer Based Testing Technique in Nigeria: Prospects and Challenges

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Abstract
There has been a public outcry over the conduct, authenticity and reliability of public examinations in Nigeria. In response to these complaints, the Joint Admission and Matriculation Board (JAMB) introduced a full scale computer-based test (CBT) in the 2015 Unified Tertiary Matriculation Examination (UTME) to eliminate examination malpractice and to facilitate examination registration and prompt release of result. This paper examines the challenges militating against CBT in Nigeria and the prospects of full adoption of CBT in all public examinations in the country. Secondary data sources including relevant journals, conference papers, and internet resource materials among others were mainly used for this study. Several challenges were identified, but the chief among them is gross inadequacy of ICT infrastructure in the country. The prospects of CBT in Nigeria were found to be very high owing to JAMB, Nigeria Immigration Service (NIS), and other key government agencies' acceptance of CBT for public examination. This paper rejects building of one CBT centre per local government area as being planned by federal government, rather recommends that at least four (4) government owned standard CBT centres should be built and equipped in each of the 774 local government areas to facilitate seamless transition from paper and pencil test (PPT) to CBT.
Keywords: computer-based test, education, examination, ICT, infrastructure

1. Introduction

The Longman Dictionary of Contemporary English (5th. ed) defined education as a process of teaching and learning. Through education, learners are not only taught, trained, and adequately guided to acquire relevant skills and knowledge but also how to adapt to acceptable public life. In line with the above statement, Yekini (2013) defined education as the process of acquiring knowledge, skills, attitudes, interests, abilities, competence and cultural norms of a society by people and to transmit this life to the coming generations so as to enhance perpetual development of the society.

Education could be formal or informal. Formal education occurs in a structured environment whose explicit purpose is teaching of student. Usually, formal education takes place in a school environment with classrooms of multiple students learning together with a trained, certified teacher of the subject. While informal education does not follow a specified curriculum and may originate accidentally, sporadically, in association with certain occasions, or from changing practical requirements.

The traditional educational system is a setup where teacher(s) and students stay in the same geographical location (often referred to as classroom) using board and other instructional materials to effect teaching and learning. Recently, information and communication technology (ICT) through e-learning has made education to be more flexible, where teaching and learning can be done from different geographical locations. E-learning, according to Oye et al. (2011) refers to the use of ICT to enhance and support teaching and learning process. Dabesaki (2005) defined e-education as the electronic mode of knowledge sharing and transmission which may not necessarily involve physical contact between teacher and student. The devices used for e-education or e-learning include personal computers, CD ROMs, television, personal digital assistants (PDAs), MP_3 players and mobile phones.

All formal education; whether traditional face-to-face type or e-learning is subjected to a form of assessment at the end of the learning period. Evaluation, test, assessment, or examination is a term synonymously used as a measure of the level of knowledge acquisition by the trainees at the end of their learning period. According to Emaikwu (2012), examination as part of evaluation in education is aimed at determining a learner's level of skill acquisition or intellectual competence and understanding after a given period. Ojedele & Ilusanya (2006) cited in Ogunlade et al. (n.d) defined evaluation as a way of assessing a system in order to make a declaration on the outcome of that system. Again, Joshua (2004) identified evaluation as a systematic collection of information for use in judging the worth of a programme, product, procedure, or objective; or the potential utility of alternative approaches designed to attain specific objectives. Onuka (2006) classified evaluation into two main types: formative and summative evaluation. Formative evaluation is the assessment during the developmental

stage of a programme or in the course of teaching and learning for the purpose of guiding and assisting a programme to achieve its objective. Summative evaluation takes place at the end of a programme. Summative evaluation according to Obemeata (2005) cited in Ogunlade et al. (n.d) provides evidence to judge the success or otherwise of a training programme.

Evaluation of students could be by the traditional paper-based test or through computer-based test. The predominant mode of testing students in Nigeria's educational system is the paper-based test. In this mode, students answer questions presented to them using paper and pen. Paper-based test (PBT) in Nigeria is characterized by different forms of examination malpractices such as bringing in unauthorized materials, writing on currency notes and identity cards, spying of other candidates in examination hall, substitution of answer sheets and change of examination scores or grades. Others include; impersonation, leakage of questions to students before the examination, connivance with supervisors and school authorities to cheat, body writing or tattoo in which students especially females write on hidden parts of their bodies (Ogunlade et al., (n.d); Abubakar & Adebayo, 2014). Computer-based test is the use of computers to administer tests. Other terminologies used to describe Computer-Based Test (CBT) include Computer Assisted Testing (CAT), Computerized Assessment, Computer Aided Assessment (CAA), Computer Based Assessment (CBA), Online Assessment, Web-Based Assessment, Technology Enhanced Assessment, Automation Assessment, and E-Assessment or Test or Examination (Mubashrah et al., 2012; Obioma et al., 2013; Alabi et al., 2012). Computer Based Test means the candidate sits in front of a computer and the questions are presented on the computer monitor and the candidate submits the answers through the use of keyboard or mouse (Ogunlade et al., n.d). Automation of educational assessments, be it school-based assessment or other public examinations, can be described as the application of technology for the assessment of learning outcomes; using machines to perform those operations which hitherto was performed wholly or partly by teachers or employees (Obioma, et al., 2013). Alabi et al. (2012) described computer based testing as a method of administering tests in which the responses are electronically recorded, assessed, or both.

Computer Based Test (CBT) is grouped into linear/fixed CBT and adaptive CBT. Linear and fixed computer based test, most similarly to paper-based testing is the random method which can be used to administer a fixed set of items to provide a modest test security benefit. Alabi et al., (2012) defined a linear CBT as a full-length examination in which the computer selects different questions for individuals without considering their performance level. In CBT adaptive testing, when an examinee answers a question correctly, the next test item has a slightly higher level of difficulty. And the difficulty of the questions presented to the examinee continues to increase until a question is answered incorrectly. Then a slightly easier question is presented. Alabi et al. (2012) further explained that in a computer adaptive test, each test-taker receives questions that are at the level of difficulty for his or her ability. After each question is answered, the computer uses the answer and all previous answers to determine which question will be presented next. This means that different test takers, even in the same hall on the same day will receive different questions. With this approach; collusion, giraffing, and many other forms of examination malpractices will be eliminated using CBT technique.

2. Why Migration to CBT?

Change they say is the only thing that is constant. But every change should bring about a positive development to the society. According to Fluck et al. (2009) … educators must consider which assessment technique permit students to utilize the affordances of new technology. Paper and pencil test (PPT) or paper-based test (PBT) is gradually being phased out globally because of its limitations that have allowed widespread malpractices during the examinations.

The problems of PPT as enumerated (by Alabi et al. 2012) are summarized below:

1. Tedious processes as the examination was conducted at various and distant centres simultaneously and marking done manually.
2. High risks of accidents during travels by both the examination officials and the candidates for the paper examination.
3. Subjective scoring and plausible manipulation of results.
4. Late release of results and missing grades.
5. High cost of conduct of the examination on the part of the examination bodies including honoraria for invigilators, coordinators, markers, collators and other allied staff.
6. Bank draft method of payment by candidates was riddled by fraud, loss of money, stress and trauma.

The above steps are very much prone to violation at any stage and also it involved heavy resources in terms of manpower and funding.

Technology based assessment or CBT provides opportunities to measure complex form of knowledge and reasoning that is not possible to engage and assess through the traditional PPT method. Abubakar & Adebayo (2014) observed that PPT assesses students only on cognitive abilities. They also noted that e-examination can be used to assess both cognitive and practical abilities. Cognitive abilities are assessed using e-testing software while practical abilities are assessed using e-portfolios or simulation software. Similarly, Obioma et al. (2013) opined

that automated assessment if carefully designed can comprehensively and reliably assess students in the three domains (cognitive, psychomotor and affective) of learning.

In Nigeria, employers now conduct aptitude test for job seekers through electronic means, the universities and other tertiary institutions now register and conduct e-examination for their students during semester examinations and admission selection test due to the numerous advantages of CBT. The benefits of CBT to the education sector and the country in general include:

1. Precision evaluation through adaptive testing, where the next question to be posed is determined by prior response(s).
2. Creation of digital records of student growth and development which can easily be passed along from grade to grade.
3. Greater flexibility with respect to location and timing of examinations
4. Improved reliability because machine marking is much more reliable than human marking.
5. Impartial assessment – computerized marking does not 'know' the students and so neither favour nor witch-hunt any candidate.
6. Greater storage efficiency – tens of thousands of answer scripts can be stored on a portable hard disk of a server compared to the physical space required for paper scripts.
7. Enhanced question styles which incorporate interactivity and multimedia.
8. Question banks and randomization of questions and response orders to reduce cheating.
9. Immediate feedback can be given to the examinee.
10. Improved test security due to electronic transmission and encryption.
11. Saves time and manpower for the test administration.
12. Environment conservation as plants used for paper and pencil making will be preserved.
13. Lower long-term costs; CBT is going to be cheaper with time, once we have all the computer systems in the next 10 to 15 years, no body will be complaining (Okoronkwo, 2015).

3. Challenges of Computer Based Test in Nigeria

Baker-Eveleth et al. (2006) observed that implementing computer exams requires a secure testing environment, one that prevents students from seeking answers by scanning their computer hard drives, instant messaging or e-mailing friends, or browsing the internet. To Fagbola et al. (2013), lack of standardized/unified CBT development model alone undermines the success of the e-examination platform for real-time adoption in practice. Fluck et al. (2009) is of the opinion that online assessment may not be effective for evaluating creativity, problem solving ability, critical thinking, reflection, or authentic learning; collectively the characteristics of deep and effective learning. Other challenges militating against the full adoption of CBT in Nigeria and other developing countries are highlighted below:

1. Inadequate ICT infrastructure including hardware, software and bandwidth accessibility. Obioma et al. (2013) observed that much of the infrastructures for automated examinations are either obsolete or overstretched in terms of capacity, accessibility, reliability and security. Again, the absence of internet facilities in our rural areas requires students travelling long distances to urban centres to have access to internet. Broadband penetration needs to be fast-tracked to reduce the cost of internet bandwidth access in Nigeria.
2. Power supply: The challenge of erratic power supply in Nigeria has defied all attempts by various governments. Irregular and frequent interrupted power supply in Nigeria is a perennial problem affecting every aspect of the economy including education (Oye et al., 2011). Most rural communities are not connected to the national grid, the implication is that schools located there cannot undertake practical effectively. During JAMB's online UTME, cases of power failure interrupting the examination abound.
3. Students / candidates inadequate skills in ICT: Many school leavers in the country are not computer literate. Even many teachers in the primary and secondary schools cannot boot a computer not to talk of using any application. With these 'analogue' teachers to impart ICT skills to students, definitely the students cannot be adequately equipped for CBT. And this anxiety explains why the resistance to JAMB's full use of CBT in 2015 UTME by students, parents and even teachers. Nigeria does not only lack ICT infrastructure, it also lacked the human skills and knowledge to fully integrate ICT into secondary school education (Ilesanmi & Lasisi, 2015).
4. Integrity of examination managers: Outside tertiary institutions ICT centres, other CBT centres in Nigeria are privately owned cyber-café. One of the key reasons advanced for migrating from PPT to CBT is to curb the rampant cases of examination malpractices in the country, the integrity of these businessmen in adhering to the laid down procedure for biometric data capturing during registration and verification during examination cannot be guaranteed. Experience in SSCE examination has shown that most of the privately owned schools are for pure economic gains leading to all sorts of examination malpractices. These exam 'miracle' centres syndrome may be transferred to CBT centres if urgent measures is not taken.

All tiers of government in collaboration with corporate organization through public-private partnership (PPP) should build, equip and maintain standard CBT centres at least four in each of the 774 local government areas in the country. This will facilitate e-examination in the country and ensure fairness and equity to the examinees.

5. Acceptability: There are series of reasons different stakeholders are kicking against automation of examination in Nigeria. Dreher et al. (2011) cited in Obioma et al. (2013) observed that for teachers and educators, job-roles and control are major reasons for resisting automated assessment. They argued that since automated assessments are likely to facilitate a more independent approach to learning for students, teachers who see themselves as "expert that translate knowledge in the classroom" are challenged and consequently resist its uptake in their classroom practices. For school proprietors and other education services providers, economic factor may be the reason for resisting the uptake of CBT. Ilesanmi & Lasisi (2015) noted that ICT has remained a low financial priority in most educational systems in Africa. To conserve fund that would be used to acquire computers, internet facilities and other needed infrastructure, some school proprietors may want to evade the positive change CBT has brought to our educational system. For candidates and students, poor ICT skills could be the only genuine reason for not embracing CBT in this era.
6. Software factors: Currently, there is no software or multimedia that has universal application as far as CBT is concerned. School curriculum and education standard differ from one country to the other. Fluck et al. (2009) observed that assessment of student knowledge and skills within a web browser window or delivered by bespoke assessment software (specifically crafted for a particular set of questions) provides a restricted environment which prevents the demonstration of abilities associated with the use of specialist software or a combination of applications. Again, a corrupt software or network failure can cause rescheduling of the examinations.

4. Prospects of CBT in Nigeria

With the total conduct of the 2015 JAMB UTME examination (Nigeria's tertiary institutions entrance examination) by CBT, e-testing has come to stay in Nigeria. Again, with the Nigerian Immigration Service (NIS) and other government agencies keying into computer-based test for recruitment exercise, in next ten years, all public examinations would have been by CBT.

It is also heart-warming to note that federal government has plan to build and equip CBT centres one in each of the local government area of the federation. The former Minister of Education, Mallam Ibrahim Shekarau said that the JAMB CBT centre at Kogo, Bwari in the federal capital territory is a world-class centre; and every state and local government will have that kind of centre in years to come, (Okoronkwo, 2015). With standard facilities; ranging from functional computers, power generating sets, and internet connectivity among other things, the prospects of CBT in Nigeria is very high. For tertiary institutions, collaboration with corporate organization through PPP and TETFUND is already yielding a positive result. Presently, all tertiary institution in Nigeria has a functional ICT centres which is serving as backbone to the JAMB's UTME CBT resources.

Finally, with the increasing ICT education in the primary and post-primary levels of education, candidates will soon be canvassing for CBT because of its effectiveness – year-round testing, flexible scheduling, personalized testing environment, prompt viewing of scores, etc. With this, paper and pencil test (PPT) will die a natural death.

5. Conclusion

Widespread examination malpractices have made documents or certificates emanating from Nigeria to be treated with suspicion. Every available resource should be channelled towards full implementation of CBT in all public examinations as long as examination malpractice will be eradicated.

Again, challenges facing CBT should be addressed firstly by making computer education compulsory in all levels of education and not elective as it is in the senior secondary school curriculum presently. All teacher education programme curriculum should be strengthened with more practical contents in ICT since the teachers are required to transmit knowledge to the students before examination.

Finally, all tiers of government should increase funding of education sector to meet the stipulated UNESCO's 26% of the total annual budget. This will ensure that more funds are allocated to the acquisition of ICT infrastructure in the country. Public-private partnership initiative should also be vigorously pursued by various educational institutions to boost e-learning capacity in terms of human and material resources. Furthermore, government should build and equip CBT centres to avoid private testing centres from merchandizing examination in Nigeria.

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