

On the Migration of Senior Secondary Final Examinations from Paper-based to Electronic Examinations

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ABSTRACT

This study investigated the readiness of the society viz students, teachers and examination bodies to migrate the WAEC/NECO/JAMB examinations from paper-based to wholly Computer Based Tests (CBT). It also examined the success level of JAMB CBT in Lagos, Nigeria. Overall it re-examines the effects of using ICT in education for both students and teachers. The descriptive survey design and inferential statistics were used for the research study. The population consisted of examination bodies' staff, teachers and students of secondary schools in Lagos State. Data collected for the study were analysed using percentage scores and Chi-square test. The study revealed at a level of significance of 0.05 that ICT facilities are marginally available in Lagos State, there are a high number of computer literates among the stakeholders, CBT has made some in-road and is preferred to paper-based tests. It reveals CBT as a relative success which must be consolidated. Similarly, the study makes suggestions to enhance the migration from paper based examinations to standardized CBT.

Keywords- Electronic Examinations, Schools, E-exam, CBT, Senior Secondary

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1. INTRODUCTION

Examinations are still regarded as the most preferred measure of knowledge and performance in the educational sector. Globally, examination results serve as an indicator or factor on which decisions about students, instructors, administrators, boards at the district, local or national level. The Federal policy states that "Nigeria shall use public examination bodies for conducting national examinations in order to ensure uniform standards at this level." It further specifies among other things the adoption of Open and Distance Education being the mode of teaching in which learners are removed in time and space from the teacher; "using a variety of media and technologies." [1] Whereas school examinations are used for internal purposes such as promotion, public examinations are more involved and competitive being conducted on behalf of the state to all those who meet defined entry criteria [2]. They include examinations used to shortlist candidates for government service; state schools or other higher institutions, scholarship beneficiaries and training programs. In Nigeria, these include Primary School Leaving Exams, Secondary School Certificate Exams, Unified Tertiary Matriculation Exams, Presidential Scholarship Exams, etc. which are respectively administered by bodies such as the West African Examinations Council (WAEC), the National Examinations Council (NECO), the Joint Admissions and Matriculation Board (JAMB), the National Universities Commission (NUC), the Public Service Commission, etc. under the supervision of the Federal Ministry of Education.

Public examinations started in Nigeria when the colonial government introduced it to select qualified people into the civil service. It involved written tests and at times was supplemented with oral interviews and practical demonstration of proficiency. Though our focus is on secondary school leavers' final examinations and associated examinations to enter into higher institutions, we note that the issue is similar for graduates seeking further studies in foreign schools, professional qualifications from various professional bodies or employment through various recruitment tests administered by external agencies. In order to overcome the challenges associated with written tests or paper based examinations, an electronic examination (e-exam) is explored. This is termed Computer Based Testing (CBT) and refers to the electronic copy of an existing conventional paper and pencil test administered on computer or allied devices. The two tests are identical in terms of scope and content but the mode of delivery differs [3]. E-examinations platform is a system that involves the conduct of examinations through the web or intranet or other information technology accessories [4]. The recent trend of electronic testing in the country is worthy of study to ascertain the preparedness of stakeholders on its adoption.

This is to verify whether the core challenges are being addressed adequately in a timely and cost effective manner, namely:

- i. The huge financial cost of administering public examinations and logistics problems
- ii. The prevalence of examinations malpractices
- iii. Late release of candidates results

Comparatively it may also be possible to assess overall performance of students and to identify new problems that need to be mitigated.

2. RELATED WORKS

Recent studies [5 - 9] identify advantages of E-examinations to include the following:

- i. Simplification of the examinations delivery process
- ii. Time savings in creation, deployment, assessment and archiving of examinations
- iii. Use of fewer personnel for supervision/invigilation and grading which translates to cost savings
- iv. Auto-marking of scripts which facilitates prompt release of results especially for multi-choice type questions. Legibility issues are eradicated.
- v. Re-useability of software systems and updating database pools for further examinations with randomization of questions sequencing.
- vi. Improvements in analysis of exam data and quality of information they can yield
- vii. Minimization of exam malpractices via impersonation, collusion, leaked question papers, etc.
- viii. Quick correction of observed lapses in the entire process

It is desired that a comprehensive system support different types of questions viz multiple choice, ordering or ranking, open ended and essay writing, drag and drop, hot spot and all linguistics skills, with options to include images, audio and video files, aside having a management tool for analyzing, scheduling and reporting. From the students' perspective, there are even more benefits of electronic examinations such as new forms of self-contained knowledge diagnostics represented by digital practice examinations (for the purpose of exercising) and periodic course-accompanying electronic tests. Self-contained knowledge diagnostics can also be fostered through supplying exemplary solutions to students' incorrect exam answers. Moreover, the (partial) automatic correction of tests leads to an increase in objectivity of examination marks. Additionally, the notification on results immediately after the end of the exam is highly welcome among students as an effective means of feedback. All these are implemented in a project the author is involved in named *Andrews Challenge* [10] which is a secured e-exam web portal to publicly compete for scholarships and job placements amidst one's peers. It is also being utilized for "mock school-cert" O'Level examinations by several schools.

It is a customizable and configurable web-based system encoded with PHP and MySQL database for testing various educational levels and public segments according to divers curricula and settings. We posit that a robust students' record management system should not only handle personal bio-data, fees payment status, courseware and grades but should also facilitate E-examinations.

The need to process large volumes of exam candidates with inherent risks as manifested at the March 2014 Nigerian Immigration Service recruitment tragedy [11] has brought the need for E-examinations to the fore. The Nigerian legislature has resolved that such public examinations must henceforth be conducted on electronic platforms. Presently, the National Open University (NOUN) and JAMB have commenced e-examinations and most universities also conduct their Post-UTME examinations electronically at designated test centres. JAMB introduced CBT in May 2013 alongside its conventional paper examinations which was expected to be phased out by 2015. It is still an option for its nearly two million candidates who have to grapple with computer literacy and its biometric authentication [12].

JAMB used over 300 centres for the just concluded CBT across the nation and staggered the exam over a reasonable period which shows that though Nigeria might not have enough centres but we are moving forward in this sector. We still need more CBT examination centres in each state of the country so as to avoid students travelling down to another state for them to be able to write their CBT. However, the preparedness of schools, students, administrators and examination bodies ought to be well ascertained as well as their adaptation to this innovation. Calls for the adoption of e-examinations abound though little is known to have been done with respect to the evaluation of its implementation in our environment. Most universities, as depicted in Figure 1 have IT centres for deploying their POST UTME as CBT and equally schedule over a period due to paucity of computers relative to the large pool of applicants.



Figure 1: A CBT Session

Recently, West Africa Examination Council introduced Computer Studies as a subject in secondary schools as from 2015 students will start writing computer studies WAEC examination irrespective of the school whether public or private secondary school. Lagos State government started a programme “Train the trainers” that is train the teachers in computer literacy it was supported by the British Council, the programme has helped a lot both the teachers and the students. Nigerian Universities also have CBT has entrance examination, University of Lagos, University of Ilorin just to mention a few also have some of their general 100 and 200 level course examinations administered via by CBT. This tells us that if a student doesn’t have a good foundation from secondary school he/she would not be able to adapt well for tertiary education.

Interestingly, much has been done in proposing E-exam models [13]. It was noted that teachers are already being trained for ICT skills in Lagos state where teachers do write promotional examinations through computer tests. Having established previously the availability of ICT facilities for education and their utilization for e-learning in Lagos [14], this study focuses on the readiness of students, teachers, school management and exam bodies for CBT at the Senior Secondary completion level.

3. METHODOLOGY

The technique employed in this research is the conduct and analysis of a statistical survey. This was via designed questionnaires for secondary school pupils, teachers and national examination bodies’ staff. The population though Nigeria is taken as fairly represented by Lagos which is the

commercial hub and former federal capital. Random sampling of data is done across all the educational zones of the state in each local government area. The main survey took place (in 2014/2015 academic session) after an initial two-week pilot study that allowed us to moderate the questionnaires appropriately. Students returned 1868 questionnaires in all, teachers returned 548 and exam bodies staff returned 44. The core issues the survey sought to address are perceptions on computer literacy, facilities availability, preferred testing modes and resolution of perceived challenges.

4. DISCUSSION OF RESULTS

An introductory part of our questionnaire collects demographic data as per status, sex etc. and other generic information on perception of ICT and CBT. The comments highlight the perceived challenges facing CBT deployment such as inadequate CBT examination centers, irregular power supply, potential hacking of the systems for compromises, inadequate fund by the government and school proprietors for infrastructure, etc. In each questionnaire, section A options for answers are just 2 (YES or NO) while Section B options for answers are 3 (HIGH, AVERAGE and LOW). The Chi-square method [15] was used to analyse several hypotheses based on the answers from the questionnaires distributed to senior secondary school students, teachers and staff of examination bodies. Few calculations are shown for illustration of how results are obtained within each group.

Table 1: Respondents Opinion in Section A

SN	Question		Yes	No	Total
1	Are you computer literate?	Students	1461	402	1863
		Teachers	532	13	545
		Exam Bodies	44	0	44
		Total	2037	415	2452
2	Have you ever been involved in a CBT?	Students	583	1225	1808
		Teachers	48	498	546
		Exam Bodies	28	16	44
		Total	659	1739	2398
3	For WAEC/NECO/JAMB, do you prefer CBT to paper based tests?	Students	978	864	1842
		Teachers	467	78	545
		Exam Bodies	36	8	44
		Total	1481	950	2431

From Table 1, it is deduced that 78%, 98% and 100% of the respondents are computer literates in the respective student, teachers and external examiners categories. Besides, 32%, 9% and 64% have been involved or partaking in CBT in these categories while 53%, 86% and 82% prefer CBT to paper based tests. This results indicate that while the exam bodies feel prepared and eager for CBT, the students are not as much while the teachers though moderately enthusiastic have not had enough opportunity to deploy such in schools due to infrastructural constraints.

We could ascertain whether the opinions offered are totally random or dependent on the categories by evaluating Chi-Square tests as illustrated with sample calculations for Question 1.

Table 2: Respondents Opinion in Section B

SN	Question		High	Ave	Low	Total
4	Rate your skill at using the computer	Students	824	755	230	1809
		Teachers	327	171	6	504
		Exam Bodies	39	5	0	44
		Total	1190	931	236	2357
5	Rate the success of CBT for entrance examinations into Nigerian Universities	Students	1226	432	163	1821
		Teachers	432	90	5	527
		Exam Bodies	38	6	0	44
		Total	1696	528	168	2392

Approximately 10%, 1% and 0% of the Students, Teachers and exam bodies attest that they have low proficiency in computer usage and similar percentages perceive CBT for UTME and POST UTME success rate as low. This might be explained by the fact that people are usually sceptical of change and doubt/fear what they don't know. For Question 1, is the response as per literacy of respondents random or intrinsically dependent on categories?

We formulate the Null Hypothesis that it is independent and the Alternate Hypothesis that they are related. Let o be the observed value, e the expected value then we have Table 3 as follows

Table 3: Contingency table for Chi-Square Evaluation - Question 1

o	e	$[(o-e)^2]/e$
1461	1547.69	4.86
532	452.76	13.87
44	36.55	1.52
402	315.31	23.83
13	92.24	68.07
0	7.45	7.45
		$\Sigma = 119.59$

The degree of freedom (DF) for each contingency table is $(r-1)(c-1)$

Where $r = 3$ and $c = 2$, thus DF is 2×1 or 2

Chi-square calculated from our table is 119.59. At Level of significance 0.05, Chi-square tabulated (0.05, 2) is 5.99

The calculated value (4119.59) is greater than the tabulated value (5.99 so we reject the Null Hypothesis).

The inference is that computer literacy in these various categories have some underlying factors responsible for it. Such factors are due to policy implementation and the digitalization of this era, which are inherent enablers for adopting CBT. Similarly, it is found that other responses are not based on pure chance but intrinsic to the various categories.

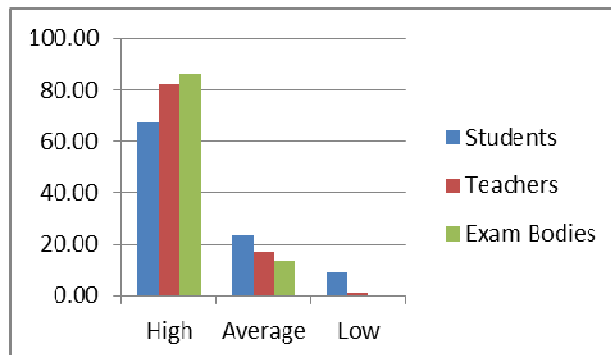


Figure 2: Perception of JAMB CBT Success Rate by Percentage of Categories

Our contributions to knowledge include the following:

1. Demonstrating the need for and advantages of CBT
2. Evaluating the stakeholders' perception of and readiness for wide-spread adoption of CBT for SSS final examinations. In particular, we showed that preference rate to abandon paper-based examinations is correlated to e-literacy levels among students, teachers and exams-body staff.
3. Providing an e-platform such as Andrews Challenge for schools to deploy mock or real CBT

5. CONCLUSIONS

CBT has become a reality in our society despite the associated challenges of its implementation for final senior secondary school examinations. Foreign institutional examinations and international certifications are increasingly being offered via this mode and the citizens are adapting. The transition to computer-based testing will place Nigeria at the forefront of innovative, 21st-century assessment design and delivery. For students, the benefits include using technology to better demonstrate what they know and are able to do. For teachers and administrators, the benefits include more immediate feedback on student achievement, to help address student mastery of knowledge and skills and to guide instructional planning in subject areas.

It facilitates prompt release of results but the systems must be secured and verified before such releases, hacking or errors due to 'technological hitches' will lower user confidence. Government and industry should support CBT due to its potential to open up the educational space (via distant learning programs) and cost effective measures. JAMB needs to improve its operations while WAEC and NECO may plan towards CBT for it is expected of them. It is a question of "When not If..." in the not too distant future, all examinations will be electronics-based.

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Author's Brief



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