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## Comparative Analysis of e-Assessment Platforms: Implications for E-examination Administration in Developing Countries

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### ABSTRACT

The adoption of electronic examinations by the National Open University of Nigeria (NOUN) remains one of the major turning points for the institution. The nation-wide spread of the students; the capacity of the available lecturers for marking the ever increasing number of scripts within a given period of time; as well as the need to ensure the integrity of the examination process posed initial nightmares to the institution. Having successfully driven the conduct of over ten e-examinations across the nation for the institution, it was necessary to carry out a retrospective view of the experiences gathered from the technical implementation and administration of the e-exams in the Nigerian open and distance learning (ODL) environment. Focus group discussions and interviews were held with the technical officers who were directly involved in the planning, implementation, and administration of the e-exams platform in NOUN. Furthermore, the study examined the benefits of e-exams as well as some factors that affected the usage of e-assessment from the practical perspectives of the technical officers. Technical challenges experienced during e-exams were also identified and practical recommendations made with a view to improving on the current system and ensuring optimal utilization and performance of the system. It is hoped that this would constitute formidable bedrock for the eventual realization of the on-demand examination ambition common among ODL institutions globally.

**Keywords:** e-examinations, technical officers, open and distance learning, maple ta, exam pro plus etc.

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### 1. INTRODUCTION

The year 2010 marked a significant turning point in the existence of the National Open University of Nigeria as far as the assessment phase of the students' life cycle was concern. While it was possible for the admission of large number of students to undergo the various programmes being run by the University, and being given course materials to study from different destinations, the assessment of these students became a major bottleneck due to the "campusless" nature of the students. Awosiyani (2010) quoting Professor Olu Jegede, the former Vice-Chancellor of NOUN, said that "e-examination was introduced to address a series of anomalies being encountered in the manual tests.

He said that the e-examination would remove all human errors recorded in manual examination and create opportunity for students to access their results immediately. . . “With this, we have removed so many hiccups in the compilation of answer scripts and movement of examination papers from one part of the country to another. The examination is conducted now through the net ... it would be much more difficult for students to carry out any form of examination malpractice”

Preparatory to e-examination, Academic staffs of the various departments uploaded appropriate examination questions into some servers in the cloud. Staff of the Information and Communications Technology (ICT) Directorate engages in pre-preparatory e-exams activities which include the preparation of servers (cloning related activities), systems, and network infrastructure at the different examination venues. In that regard, the questions in all the courses to be administered during the exams would be the same across the study centres nationwide.

ICT staff based at the study centres collaborates in the administration of the exams. But environmental factors like the quality of the power supply, the number and quality of computer systems to be used, the design of the network, the proportion of students taking the examination and the security of the venue all contribute to the success of e-exam's administration. At the end of each examination, reports are usually written by these Technical Officers based on their experiences in the field and how the e-exams platform can be further enhanced for usability or user friendliness to the students, thus making the use of the system easier while maintaining the standard practices and integrity of the examination process.

According to Osang (2012b), the following activities were handled by the technical officers with respect to e-exams:

- Planning and building high end servers where the functional question bank resides.
- Providing technical training for the question databank administrators.
- Training lecturers on item development procedures for courses to be examined (that is, the academics involved in items development processes)
- Uploading of scripted and formatted questions onto the servers.
- Providing functional network solutions and workstations to be used by students for the e-exams.
- Administration of e-exams at the study centres nationwide.
- Submission of harvested results and appropriate reports from the data banks to the headquarters from the Study Centres.
- Backing up of grade books, reports and servers used for examinations for extraction of results.

From the roles listed above, it can be inferred that technical officers are key players in the administration of electronic examinations in NOUN.

Having successfully administered e-exams simultaneously across the centres in the nation over ten times and running, it has become necessary to seek the views of NOUN Technical officers. Their views, observations, and experiences are crucial in assessing the practical experiences as far as the use of electronic examinations among universities in Sub-Saharan Africa are concerned.

### **1.1 Objectives of the Study**

This study evaluated the perceptions of the technical officers on electronic examinations. The benefits, user friendliness of the platform as well as the challenges encountered in the administration of e-exams in NOUN were analyzed. Technical challenges were identified and specific suggestions and solutions proffered to address the identified challenges.

These suggestions and findings would not only be useful to open and distance institutions but to other institutions of learning as they attempt to adopt this noble and laudable innovation aimed at standardizing and sanitizing the evaluation phase of students' study cycle. Software developers would also benefit from these contributions that could provide feedback which could be used toward the improvement and enhancement of their products. NOUN management is desirous of having a robust platform capable of accommodating a question bank that can handle critical mission associated with "on-demand" examinations. It is however, hoped that these contributions would go a long way towards the realization of the on-demand exams thereby ensuring wider access to education.

## **2. RELATED LITERATURE**

With the increasing acceptance of open and distance learning (ODL) as a major channel of widening access to higher education in Nigeria, it has become increasingly necessary that the procedure for educational evaluation processes be established to maintain standard if the ODL provision is to be relevant and recognized as complementary to the conventional higher education (Osang, 2012). While several studies have focused on the comparison of pen-on-paper exam with e-examination as well as the cost, logistics and technical reliability of e-exam (Lin & Dwyer, 2006), Dede (2003) suggested that the barriers to using e-exam technologies to support alternative forms of assessment are not so much technical or economic as "psychological, organizational, political and cultural" (p.9). The slow rate of adoption of e-exams technologies in high-stake examination processes is enough indication of the inadequate conviction of the efficacy of computer-supported assessment by the educators, technical officers, the students and other stakeholders and the inability to adequately identify and resolve issues being experienced by current users of information systems.

According to Olawale and Shafi'i (2010), the recent employment and eventual widespread acceptance of electronic tests in examining students of various classes in Nigeria has created a significant impact in the security and resulting integrity of e-exams in Nigeria. Their study featured some anomalies experienced by examination bodies that have adopted e-examination in Nigeria like the West African Examination Council (WAEC), National Examination Council (NECO), and Unified Tertiary Matriculation Examination (UTME). Some Nigerian Universities like the University of Ilorin, the Federal university of Technology, Akure and the Obafemi Awolowo University, Ife were also included in that study.

In proposing a design model for the architecture of electronic examination, Ayo, et. al (2007) defined e-exams as "a system that involves the conduct of examinations through the web or the intranet" (p. 126). He maintained that e-examination reduces the large proportion of workload on examination, training, grading, and reviewing, thus bringing the ability for the institution to release examination results in record time. This is because where the lecturers would spend weeks marking scripts manually, the computer would grade the students as soon as they finish their papers. Olubiye et al. (2011) administered a questionnaire to 459 students in order to elicit students' responses on the use of e-examination. They found out that there was a significance difference on the acceptance or perception of students before and after an e-examination.

The post test results showed that students believed that e-examinations reduce exam malpractice and enhance academic performance. In addition, students below the age of 35 were found to support e-exams more than those above 35 because the latter experienced difficulties in getting acquainted with this format. In his work on electronic examination in Nigeria, Osang (2012) reported that 81.9% of the Lecturers in NOUN were computer literate, while the remaining 28.4% were still getting used to basic computer usage skills which implies that most academic staff (lecturers) employed by National Open University of Nigeria were computer literate and hence appreciated e-exams.

While 63% of the Lecturers found Maple TA (the former software) quite challenging due to scripting demands, 47.3% of respondents had it easy using the examination platform after training. There are a number of examples of the use of electronic technologies in assessment. From the literature reviewed, while some of these researches on e-exams in Nigerian pace setter in e-examination (NOUN) focused on the advantages of e-exam over pen-on-paper, as well as emphasis of other stake holders like the educators and student, there has been no known research that examines the experiences of the technical officers as key drivers in the e-assessment project. The need for compelling research findings that examines the experiences of technical officers cannot be underestimated. This research therefore seeks to explore the perception of the technical officers on electronic examinations as important stakeholders in the e-examination domain.

### 3. METHODOLOGY

The research adopted qualitative research methodologies. In quantitative approach, a research instrument was developed to elicit ICT Professional's responses on their experiences with the maple ta and exam pro plus platforms. In order to ensure validity and reliability of the instrument, the test-re-test reliability method as well as validation by other scholars was adopted. The pilot study was carried out at the headquarters of the University in Abuja. In the main study, out of the 132 ICT professionals that were given the questionnaire, only 107 were returned and used for analysis. An independent samples t-test was used to compare means from independent platforms on 6 issues raised.

There are six geopolitical zones in Nigeria. Three of the zones are in the southern parts of the country while three others are in the northern part. As at the time of this study, each of these geopolitical zones had a minimum of seven study Centres. Five technical officers were randomly selected within each of the six geopolitical zones making a total of 30 respondents. Group discussions were conducted with the selected technical officers. These discussions were held thrice with all participants expressing their views and experiences during each session. A particular problem associated with focus group is the choice of members of that focus group. Two focus groups were constituted with each group comprising of fifteen participants as recommended by Krueger (1994, p.18) regarding the composition and size of focus groups. In his word, "focus groups must be small enough for everyone to have an opportunity to share insights and yet large enough to provide diversity of reflections".

Before the commencement of the discussions, the participants were intimated of the purpose of the research in order to elicit objective and truthful responses on their perceptions regarding the conduct of electronic examinations. Respondents were required to discuss their views on the benefits of electronic examinations, some key factors that affect usage and performance using e-assessment platform. They were also required to analyze the challenges being encountered in the course of carrying out their responsibilities as ICT professionals. Based on the objectives of the research, some of the following questions were asked:

1. Having been involved in the conduct of e-examinations for NOUN, what in your views are the greatest benefits/weaknesses of e-examinations?
2. In comparing maple ta platform and exam pro, what factors do you consider in using any of these platforms and which of these platforms do you prefer in terms of e-exam administration and support services?
3. What are the challenges of the current e-examination platform and how can these challenges be resolved?

4. The choice of focus group followed by interviews is used by researchers to gain in-depth knowledge of the respondents' views. Responses from focus group discussions were analyzed by controlling all statements about a particular aspect, and by summarizing the main points of consensus existing among the respondents in line with the research questions. The differences on issues between the respondents were noted by selecting illustrative comments for inclusion.

The researchers specifically adopted the use of semi structured interviews which are especially suited to the study of respondents' attitudes, behaviour, as well as exploring lifestyle and contextual issues. Face to face interviews were carried out with the technical officers at the headquarters during the submission of the harvested results. The use of open ended questions enabled the respondent to elaborate on their experiences as some of their views were written down.

#### A. Responses from Technical Officers

Respondents expressed positive comments on the benefits of electronic examination adoption by the Institution as a means of not only coping with the increasing students' population, but also as a reliable option in sanitizing the examination process. In comparing the new platform to the older maple ta platform, participants agreed that the new platform is more friendly and easier to use than the former. It was suggested that e-assessment tools be developed with simple user interfaces such that users with low computer literacy level should be able to use the platform with minimum computer training or guidance.

Excerpts from the focus groups and interviews are captured below:

**Computer Analyst, North Central:** In response to the question on the observed differences between exam pro and maple ta platforms, the response from a staff from the north central part of the country was instructive. "Having administered exams with the two platforms, the major difference is in the group session administration of exam sessions". That is, exams run in sessions. Student are logged-in in sessions, the 1:30 or 2 hours exams starts and ends the same time while the new exam pro platform uses the individualized session approach. As the student logs in, the 1:30 or 2 hours session begins independently. The exam starts and end independent of other student's session. The individualized approach was preferred based on the fact that administration of exams is made easier even in Centres where frequent power interruptions occur.

**Network Administrator, South West:** Regarding support during the preparations and uploading of exam questions, the views of some staff were along this line. "The current approach of using the popular Microsoft excel based template is good compared to the maple ta format". The notepad like format adopted by maple ta was error pruned. The scripting process (typing questions into the format provided) was a nightmare to some Lecturers as so much time was needed in debugging errors.

**Hardware Engineer, South East:** Timing is one of the major challenges usually experienced at different centres. Fluctuations in power adversely usually affect timing on the work stations. The students would always demand for their time and if the impasse is not carefully managed, rowdiness can ensue. Conducting e-examinations in such environment can be cumbersome and fruitless especially in courses with large students' population.

**System Analyst, South:** On additional features embedded by the developers, measures such as restriction of uploading and access rights to only the lecturers in-charge of specific courses, the restriction of technical officers privilege of exporting questions after upload, the display of students passport on the exam portal, encoding of students details etc made pro plus to be preferred as it addressed the needs of the institution.

**Web Developer, South West:** In responding to the question on the challenges being experienced with the exam portal, some web developers expressed concern with the rendering of images uploaded on the workstations. It was pointed out that mathematical courses like differential equations, calculus, algebraic equations etc are usually difficult to handle during uploading. It is recommended that equation editors and latex tools should be incorporated into such platforms. However, it is one thing for the symbols to be uploaded and another for the client systems to have the capacity to display such diagrams and graphics”.

**System Analyst, North West):** Although electronic examinations are capable of handling the large student population associated with Open and Distance learning institutions as well as reducing examination malpractice, its inability to handle essay type questions in my view remain its greatest weakness. Popular questions type commonly employed for e-exams are objective and subjective question type.

#### 4. DISCUSSION

From the findings above, technical Staff agreed that electronic examination is a major step towards the realization of a robust and reliable system with the capacity to satisfactorily handle the evaluation stage of the students study circle. They agreed to the fact that electronic examination has become very popular and preferred due to its capacity to reduce exam malpractice, handle very large student population, ease of administration, increase computer literacy level among users and guarantee security and integrity of the evaluation process. This is in line with the previous findings of Awosiyani (2010) that quoted Professor Olu Jegede that the introduced e-examination has addressed series of anomalies earlier encountered with the manual tests.

The respondents also noted some additional security features such as the upload of questions directly from the lecturers accounts, restriction of technical officers privilege of exporting questions once uploaded, display of students passport on the exam portal, administration of the exams at study centres within controlled local area networks (LAN), encoding of students details and grades until the servers are decrypted when returned to head office etc. This finding is equally in line with the findings of Olawale and Shafi'i (2010) that found that the recent employment and eventual widespread acceptance of electronic tests in examining students of various classes in Nigeria has created a significant impact in the security and integrity of e-exams in Nigeria.

The research also found that user friendliness and ease of use are some of the key factors that determine e-assessment usage and performance from the perspectives of the technical officers. Compared to the previous e-exams platform used by the Institution, the current platform was preferred by technical officers due to its user's friendliness, ease of use and the level of technical support enjoyed by the technical officers from the system developers. This is viewed from the perspective that the usually cumbersome scripting process associated with the former Maple TA platform as reported by Osang (2012) had some level of difficulty as experienced by the Academic staff of the institution. Some of the areas of difficulties include the use of a customized questions format which has been replaced with the popular excel sheet format in the new platform.

Other differences include independent session login approach, improved timing etc. The scripting process used by the earlier used e-exams platform was considered tedious and error prone than the current platform hence the rejection by the institution of the earlier platform. It was however observed that efforts should still be made towards the building of systems with integrated symbols and graphical capabilities. This will guarantee the smooth utilization of examination platforms across all disciplines. Measures should also be put in place to correct the human related errors being made by the lecturers in order to ensure that exams taken by the students are released to the students.

The use of objective type and fill in the blank type questions and the absence of essay type questions remain a source of concern to most of the respondents. Although, most of the electronic examinations conducted by renowned institutions in the world make use of these types of questions, it is imperative that essay type questions be inculcated in order for students to learn how to fully express their views on their subject areas using ICT. This will not only further improve users IT proficiency, strategies such as the use of keywords and their synonyms will be useful. The inclusion of essay questions to be written and submitted online for manual marking can also be employed.

This research can be generalized to institutions of higher learning in developing economies like Nigeria where computer literacy level is still low and access to computer resources and internet facilities is still a major challenge. The results of this research would expand the body of knowledge on information system usage. Software developers would benefit by gaining feedback from their designed systems being used in different environments. Understanding users' experiences is crucial to avoiding underutilization or abandonment of information systems. Institutions of higher learning especially ODL institutions would also better understand the salient software needs of the stakeholders as key determinant of information system continued usage in institutions of learning.

#### **4.1 Limitations of the Study**

One of the limitations of this study was the restriction of the scope of the respondents to only technical officers. Although, other stakeholders exist in the e-assessment project, this study focused on the experiences of the technical officers that have been involved in the administration of e-exams using both exam pro and maple ta e-assessment technologies at National Open University of Nigeria. It therefore implied that other staffs like the Lecturers, student Councillors, Study Centre Directors and Researchers were not included in this study. Technical officers were considered in this work considering their unique role in the assessment process.

#### **4.2 Ethical Issues**

The researcher ensured that respect for participants involved in the research was greatly considered by showing much commitment to the autonomy of research participants. The dignity of all research participants was respected. People can become upset and untrusting about even seemingly trivial comments being shared, especially if they have divulged very personal information and grow concerned that you will divulge more. The adoption of titles in the various geopolitical zones in place of names and specific study centres was a well thought out strategy aimed at protecting the confidentiality of the respondents in this research. All the questions provided were in a simple language and at an educational level that the participants understood. Participants were not in any way coerced to participate as participation in this study was voluntary, free from coercion or undue inducement to participate. Participants were individually informed orally.

### **5. FURTHER RESEARCH**

From the findings above, it was identified that technical officers prefer the adoption and use of one e-examination platform to the other. Understanding the factors that influences users' choices of e-assessment software in order to solve their workplace or individual needs is fundamental especially in the mist of increasing number of both open sourced, customize and generic e-assessment platforms. The relationship between appropriateness (fit) of specific and generic e-assessment task, its usage and the satisfaction derived from such use by the different stakeholders in the open and distance learning environment need to be investigated.

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