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**Theme: Re-Interpreting Assessment: Society, Measurement and Meaning**

**Sub Theme: Using Technology in Assessment**

**Title: Re-engineering the Examination Process in the National Open  
University of Nigeria: The On Demand Examination Initiative**

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**Abstract**

Assessment of students learning outcome is an integral component of any teaching/learning process. Open and distance learning (ODL), with its peculiar mode of instructional delivery ascribes much importance to this. So far, conduct of examinations at the National Open University of Nigeria (NOUN), has been cumbersome and be-decked with 'hydra headed' problems, such as: dearth of skilled academics, finances, prompt marking of scripts and collation/processing of acceptable results, e.t.c. hence the need for re-engineering the examination process at the NOUN.

ODL is technology driven and there are recent pointers towards its use in assessing learners. For instance, UCTL (2006) showed how packages like WebCT are useful tools in assessment exercises. This paper discusses the On Demand Examination System (ODES), an Information Communication and Technology (ICT) based innovation (Prasad and Xavier, 2006), which enables

the assessment of students, as at and on their own readiness and demand. This is the current focus of NOUN.

## **Introduction**

### **An overview of Open and Distance Learning**

The terms open learning and distance education represent approaches that focus on opening access to education and training provision as well as freeing learners from the constraints of time and space and offering learning opportunities to individuals and groups of learners. According to UNESCO (2002), open and distance learning is one of the most rapidly growing fields of education, and its potential impact on all education delivery systems has been greatly accentuated through the development of internet based information technologies, particularly the World Wide Web.

Nigeria like other highly populated countries of the developing world see open and distance learning (ODL) an avenue for offering opportunities for education and training. However, lack of infrastructure and professional competencies in ODL remain important barriers. Thus, a reasonable number of youth seeking admission in Nigeria higher institutions are denied the opportunity. Jegede (2003) observed that less than 20 percent of candidates seeking placement with the higher education sector are able to secure admission. In fact, the problem still persists. For the current year, of the over 1 million candidates who sat for the University Matriculation Examination (UME), only 200,000 were able to get placement (Ojerinde; 2008). Those who usually loose out, according to Adeoye and Ikpe (2005), do so because of the limited space available and not because they were not qualified. Hence the open and distance education method becomes imperative.

### **The National Open University of Nigeria**

The National Open University was formally established on the 22<sup>nd</sup> day of July, 1983 with a view of becoming the fountain head and spring board of modern open and distance education in Nigeria. The institution was however suspended by General M Buhari on April 25<sup>th</sup>1984, though the act establishing the institution was not abrogated.

A workshop on evolving a national policy on distance education in Nigeria held from the 27<sup>th</sup>-29<sup>th</sup> September, 2000 in Abuja was a major turning point for ODL in Nigeria. At the end of the workshop participants evolved a ten year plan for rejuvenating distance education in the country. Since then a number of things have happened which include;

- The enactment of a National Policy on Open and Distance Education
- The establishment of the National Virtual Library and the
- Re-establishment of the National Open University of Nigeria, amongst other activities.

The National Open University of Nigeria was thus re-born on the 1<sup>st</sup> day of October, 2002 by President Olusegun Obasanjo.

### **An overview of Assessment**

Assessment is an integral part of the education process designed to guide both instructors and students by providing insight on student learning and the effectiveness of institutional activities (Mandernach; 2003). Therefore, feedback plays a vital role in auditing students' performance. Since assessment is the engine which drives learning, it is vital that we design assessment processes, instruments and practices well by looking at the ways of diversifying assessment so that the same students are not repeatedly disadvantaged by the same process. Mc Isaac and Gunawardena (1996) opined that given large class size and the fact that they are physically separated from their students, many distance education learner instructors feel they have few options for assessing student performance. Another important consideration is the quality of the assessment. This deserves attention because ODL institutions in Nigeria draw their support staff (facilitators) from the overloaded academics from conventional tertiary institutions in Nigeria. Hence, the evaluation process appears more challenging. The challenge is therefore not easy to overcome and appears quite elusive without the use of technology.

### **Computer Supported Assessment**

It is universally recognized that open and distance education is technologically driven. The recent trend is towards its use in the assessment of learning outcomes. For instance WebCT has a test construction tool which allows for the creation of Multiple Choice Questions (MCQ) and short answer and completion tests. It is an ideal learning tool; since it provides quick feedback to students about the learning materials they are using as well as preparing them for the upcoming topics.

Another innovative system which takes advantage of Information, Communication Technology (ICT) is the On Demand Examination System (ODES), which hallmark is that students can be examined at their own readiness or demand. Other examples include the A-Tutor, which is an open source web-based Learning Content Management System (LCMS), designed with accessibility and adaptability in view. The National Open University of Nigeria is taking steps to develop Computer Supported Assessment.

### **Assessment at the National Open University of Nigeria**

NOUN uses the following modes of assessment for its students:

- Self-assessment exercises within each study unit of the course material;
- Tutor Marked Assignments (TMAs);
- End of semester face to face examination;
- Hands on practical, teaching practice, Industrial training/attachment; and
- Project work.

Of these assessment modes, the end of semester examinations has emerged as the most problematic to contend with. Before now, examination in NOUN has been saddened with challenges that are human, material and technology based.

### **Re-engineering Examination Process in NOUN**

Engineering is the application of science to the design, building and use of machines. Re-engineering examination process in NOUN is therefore a call for re-focusing and redesigning of

NOUN examination system for the purpose of achieving more desirable results with respect to the set goals. Amongst these goals is the qualitative assessment of the teaming population of thousands of students across Nigeria who grossly out numbers the academics in the conventional universities from where staff is hired on part-time basis for assessment purposes.

### **Why Re-engineer the Examination Process in NOUN**

Examination process at NOUN has been challenging since inception. The generation of questions and the conduct of examination in NOUN has been a big burden due to insufficiency in the number of skilled academics, financial implications, and large number of examinees and spread of Study Centres across the six geographical zones of Nigeria. Even more challenging is the marking exercise. The collation and processing of results take months to produce comprehensive and near perfect results for every examinee.

For instance, NOUN admission data base has shown that NOUN has a total student population of about forty five thousand (45,000) from three admission exercises. There are one hundred and five (105) academic programmes on offer and these harbour a thousand three hundred and eighty three courses (1383). Students offering these courses must be assessed. The first set of students were admitted in the year 2004, they are as such expected to have sat for at least ten (10) semester examinations. However, conduct of examinations for the students have remained an arduous task. Students have not been able to be assessed the number of times due, and of the few end of semester examinations conducted so far, the results are not promptly scored and collated for presentation to the students. Such results, when subsequently presented have observable lapses.

The challenges occasioning the examination process at the NOUN can be attributed to the following reasons:

- Large student population, spread across thirty six study centers in Nigeria;
- Lack of adequate skill in the processes of examination in ODL;
- Logistical problems; and
- Finance

In view of these myriad of problems confronting the successful conduct of examinations at the NOUN, the university management felt the need to re-think and reform the examination process at NOUN, if the institution must succeed and attain its set goals and objectives. In line with this thinking, the university sought collaboration with the Commonwealth of Learning (COL), the National Institute of Open Schooling (NIOS), New Delhi, India to develop the On-Demand Examination System (ODES), at NOUN. This is a joint project that would lead to the desired reform.

### **The On-Demand Examination System (ODES)**

The On-Demand Examination System (ODES) is a highly flexible examination system, where assessment takes place when the individual learners consider themselves ready to take it. According to Prasad and Xavier (2006a), "not only is ODES time independent but it also allows the learners to improve their performance till they are satisfied with the mastery level set by them individually". Thus, ODES adds another dimension of openness in the Open Schooling

System where examination is self paced and degree of performance is learner controlled, they further reiterated. In agreeing with this, Peters (2007) averred that "the NOUN seeks to introduce this innovative venture of ODES in Nigeria as part of the university's flexible approach to learning". However, the number of times and the conditions in which an examinee will be allowed to re-sit a paper in NOUN depend on university senate regulation governing the conduct of examination in NOUN.

For effective deployment of ODES in re-engineering examination, the following demands should be met. They are:

- Development of quality question bank to take care of learners need anytime of the year since it is learner centred;
- Development of large number of credible items and their marking guide at various levels of cognition that will enable generation of parallel question papers for public examination of a large number of examinees;
- Special coding of the questions and their marking guide during item writing in order to be identifiable for item generation as at when needed; and
- A pre-planned well structured test blue print on which to base the generation of items

### **How ODES functions**

An in-depth description of the technicalities involved in the operation of ODES is beyond the purview of this presentation, but however, to be able to conceptualise the system better, a brief explanation is offered here. Under the System of ODE, a unique question-cum-answer booklet having defined number of items is randomly generated electronically, through the assistance of a programming package on the day of the examination, out of the already developed question bank. However, it is important to note that the number of items in the question bank is crucial in determining the number of unique sets of question paper. Prasad and Xavier (2006b) observed that the larger the size of the question bank, the higher the number of unique sets of question papers.

The question-cum-answer booklet is unique for each subject for each student. The student is provided with his/her question-cum-answer booklet to write the examinations. Note that ODES is time independent and also allows the learners to improve their performance till they are satisfied with the achievement level set by them individually and so it is referred to as a learner centric examination system.

ODES can be used effectively to control examination processes since generation of question papers are computer based and the items in the question papers are electronically generated. The questions will be. As such, no individual can influence the selection.

### **Deployment of ODES into NOUN End-of-Semester Examination**

On Demand Examination System can be effectively deployed in NOUN end-of-semester examination in the following ways:

- ✚ Registration of students

- This lays the foundation for subsequent administrative processes since students are required to compulsorily register for ODES;
- It is a high volume activity which requires a high degree of accuracy
- ✚ Registration forms for candidates are usually completed at the Study Centres
  - Error rates are generally high and include error in spelling of names, course entries and even matriculation/identification number;
  - A checking stage must be provided to clean up the data.
- ✚ The master data base is used to prepare
  - Attendance register;
  - Packaging and distribution lists for question papers;
  - The data base for entry of students scores;
  - Printing file for result listing
- ✚ The registration process assigns an examination number to each candidate such as an identity number made up of Study Centre code/Programme code/Student unique number entry code
  - This provides a unique identifier for each student for the examination period;
  - The unique identifier also makes it possible to link results files to the examinees, their programmes and their study centres.
- ✚ ODES can be more responsive to the needs of both the test provider or the institution and the distance learners
- ✚ Smaller number of candidates can be tested throughout the year in addition to several larger others several times a year
- ✚ Study Centres can offer different tests at the same time since examinations may be delivered using local area network
- ✚ The computer selects the test questions in a pool so candidates taking the same examination will not be answering identical questions, which would enhance test security
- ✚ It allows for a diverse range of question types which is a better test of examinees competencies.
- ✚ It can be offered at different times, locations and even different but parallel tests to different students
- ✚ It improves the link between instructions and assessment, providing profile of candidates strengths and weaknesses
- ✚ On Demand Examination System examination results are processed, collated, accurately documented and released in reasonable time.

### **Operational Processes of ODES**

The generation of the set of question papers is based on the following inputs:

- Question paper design and blue print
- Number of items in a question paper
- Total number of items in the question bank

(Prasad & Xavier; 2006b)

### Question Paper Design and Blue Print

The design of the question paper considers setting percent weight to the essential parameters namely learning objectives; types of questions; the content areas in a subject and the required difficulty level. Based on this design, a blue print is developed. The blue print allocates the number of questions and the marks to each module/unit of a course (content), the learning objective and the type of question. It defines how many items are to be taken from each content unit, for each learning objective and for each type of item. A model blue print for a hypothetical course is presented in table 1 below.

**Table 1: A Model Blue Print for Hypothetical Course**

Content		Very Short Answer					Long Answer
		Objective Level					
Area	Weight	K (10%)	U (15%)	A (15%)	S (60%)	Total (100%)	D (100%)
Module 1	20%		1		3	4	0.75
Module 2	25%	1		1	3	5	1.00
Module 3	25%		1	1	3	5	1.00
Module 4	30%	1	1	1	3	6	1.25
Total	100%	2	3	3	12	20	4.00

K=>Knowledge, U=>Understanding, A=>Application, S=>Skill, D=>All Objectives Defined

A specified type of question, under a specific objective of content/unit is called a cell in the blue print. A number of questions have been developed and computerized for each cell of the blue print. Once items are developed rigorously by undergoing the processes of item development and validation and are based on the specifications of the blue print, such items are computerized for use in ODES, Then, the quality of items generated using the ODES are automatically taken care off.

### Number of Items in a Question Paper

The blue print assigns the weights to each cell according to its earlier design and thus fixes the total number of items in a question paper. While generating a question paper, the computer randomly picks up a question item from the item pool in each cell of the blue print. Thus, each student appearing in a course will get different item leading to different question paper but of equal weight, sample of content, objectives and the type of questions. Prasad & Xavier (2006b) demonstrated using a blue print as guide, that the generation of question paper by the computer programmed for ODES, the weight of each paper set is maintained in terms of content, objectives and the type of questions.

### Total Number of Items in the Question Bank

The number of items in the question bank is very crucial in determining the number of unique sets of question papers. Prasad and Xavier (2006b) observed that the larger the size of the question bank, the higher is the number of unique sets of question papers. They further clarified this issue using the following illustration. If an existing question bank has about 1000 items developed in each course and such items are computerized using the ODES software to

form an item bank for the course, then, the number of distinct question papers generated in that course using the question bank is very large as depicted below:

1. The total number of questions in the item bank = 1000
2. Total number of items in a randomly generated question paper = 30
3. The number of modules/units from which the questions are to be taken = 07
4. The number of objectives areas from which questions are to be taken = 04
5. The number of types of items included = 04

Then, by using the theory of permutation and combination, the number of unique sets of question papers that can be randomly generated is given by:

$$\frac{{}^{1000}C_{30}}{{}^{30}C_7 \times {}^{30}C_4 \times {}^{30}C_4}$$

=  $2 \times 10^{42}$  (approx.)

That is, approximately  $2 \times 10^{42}$  unique sets of question papers may be generated from the data bank.

### **Advantages of ODES**

There are observable advantages that can be ascribed to a successfully implemented ODE System. Some of these are listed below:

- Allows the students to take examination as and when he/she is ready.
- Readiness depends on the Student and not on the institution.
- Students themselves will decide about their examination dates.
- Attempts to remove the stress of appearing in examination, whether for all subjects or in one subject at a fixed time and schedule.
- Attempts to remove the threat of failure in examination
- Removes frustration, loss of self esteem, peer group ridicule, depression etc.
- Knowledge of results is almost immediate and success, even in one subject, is a strong motivating factor.
- Degree and level of performance is decided by the Student who can reappear in the examination as many times as one wants, till satisfied.
- Malpractices will be reduced, as it is a system where the tools for evaluation are unique to an individual Student. Every question paper for each Student is different having comparable difficulty level.
- Respects the *individuality* and *sovereignty* of each student.
- Emphasis on flexibility: the system allows an open learner to pace learning which is the key to open and distance learning system.

### **Implication of ODES to NOUN**

Reju and Adesina (2008) are of the view that in the final analysis, the use of technology based assessment is inevitable for the NOUN. They asserted that apart from enhancing the control of the overwhelming growth in student enrollments, it provides access to dispersed groups, handles some security issues as well as reducing the response time occasioning assessment.

ODES as a technology based assessment strategy has the following implications for assessment at the NOUN:

- The use of ODES by the NOUN will reduce significantly, the problems associated with the traditional method in use now
- It allows for the spacing examination period, without necessarily compromising the quality and integrity of the process
- The system can curtail examination malpractices since examinees are usually authenticated before being allowed to sit for examinations.
- In view of the fact that the number of students that may seek to be examined at any point in time may not be unmanageably large, scoring and processing of acceptable examination results would be possible in record time
- Rather than engage the services of an 'army' of staff to assist in scoring scripts as is the situation now, only a handful may be necessary with the ODE system, since the population seeking to sit examination at a particular point in time is low. This implies that financial requirements will not be mind boggling any longer

### **Conclusion**

This paper views assessment of students learning outcome as an integral component of any teaching/learning process. Most systems in the universe have their peculiar problems, the NOUN has its peculiar problems with the administration of examination in the institution. There are some technologically based assessment systems available these days; they include Web-CT, the A-Tutor, and the ODES e.t.c.

The On-Demand Examination System (ODES) is a highly flexible examination system, where assessment takes place when the individual learners consider themselves to be ready to take it. If properly deployed at the National Open University of Nigeria, ODES will no doubt assist towards ameliorating the failures attending the assessment of student learning outcome in the institution.

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