

MANAGEMENT OF ASSESSMENT DATA IN OPEN AND DISTANCE LEARNING (ODL) INSTITUTIONS IN NIGERIA

By

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Abstract

The study examined the management of assessment data in ODL institutions in Nigeria. Specifically, it investigated how the assessment data generated for the post-graduate ODL students is being managed (in terms of organization, storage and analysis for effective decision making). The assessment data is a Big data considering the large number of students that register for programs/courses in ODL institution (the volume); the variety of courses offered; the velocity or increasing rate at which the data is being generated and the veracity or differing quality of data sources. All these characteristics of assessment data pose challenges to the data, it's processing and management. Thus, the study also identified the challenges of managing the assessment data (Big Data) that is generated for the students. The study was carried out in Nigeria, using the National Open University of Nigeria (NOUN). Exploratory research design was adopted for the study. The population of the study was the post-graduate students and Heads of Departments in eight faculties of NOUN and the directorates of Management Information System and Examinations and Assessment of the University. Two research questions guided the study. The instrument for data collection was oral interview and NOUN News reports. The data collected was analyzed qualitatively and the information deduced from the interview and news report was used to support the discussion. The findings revealed that the big data is being properly managed by NOUN.

Key Words: ODL, Big data, Assessment data, Management.

INTRODUCTION

The Open and Distance Learning (ODL) institutions in Nigeria are instituted to remove the problems that characterize the conventional institution: The problems of inadequate access and opportunity for people seeking admission for higher education. The difference between ODL education and the conventional education is that in ODL all the instruction is carried out by someone or a device in a distant place from the learner, and the learner can access the instruction from any part of the country, any time he/she needs it.

There are two single ODL institutions in Nigeria: the National Open University of Nigeria (NOUN) and the National Teachers' Institute (NTI). The NOUN has the largest number of registered students in the country and it offers many of the courses offered in conventional universities in such areas as management sciences, education, law, sciences, arts, social science, health and agricultural sciences. They award Bachelors, Masters and Ph. D degrees to undergraduates and post-graduates that successfully complete the courses/programmes. The university is flexible in its operations and allows students to seat for exams when they want. It generates large volume of data on the students, ranging from registration (Bio-data, email, addresses etc.), payments to assessment.

Data in this context is information for computer processing: e.g. names, registration numbers, phone numbers, emails, texts, courses, scores, images etc., in a form that is suitable for storage in or processing by a computer. Big Data (BD) is a term that describes the volume of data: both structured and unstructured. It refers to extremely large data sets that may be analyzed computationally to reveal pattern, trends and association, especially relating to human behavior and interest (Simoudis, 2016). Big data challenges include capturing of data, data storage, data analysis, search, sharing, updating of data and information privacy.

Management of assessment data involves organization (accessing, processing and governing of data), storage of data, data ownership, operational cost/expenditures, data and information sharing, and tackling the challenges of data governance, privacy and security to ensure that the objectives of the education is achieved. Assessment data is the information gathered to accurately reflect how a student is achieving the curriculum expectations in a subject or course. The assessment data in an ODL institution is a Big Data considering the large number of students that register for programs/courses in ODL institution (the volume); the variety of courses offered; the velocity or increasing rate at which the data is being generated and the veracity or differing quality of data sources. All these characteristics of assessment data pose challenges to the data, it's processing and management. The assessment of ODL students is usually: on the cognitive, attitude/behavioral, social and emotional aspects of learning.

In NOUN, the data generated on the students' assessment has the characteristics of Big Data, such as volume, variety and velocity, veracity and value. The data poses a big challenge because of the different data generating resources and devices. It's not easy determining, retrieving,

processing and integrating the data. The data is spread across all the courses in the different disciplines and are in various forms (variety). Some of the data collected from the centres cannot be trusted and utilized to make critical decisions (veracity): some evaluators award marks arbitrarily in some courses like seminar and project works, because they do not use the recommended templates for mark allocation or have no relevant experience (Scriven, 2012). There are also problems of hardware compatibility and issues of conflicting course codes; missing results from centres, unreliable scores from centres to the desk officers, wrong identification of courses and matriculation numbers. All these are challenges of Big data. That is why the study is carried out in NOUN to investigate how the assessment data (Big Data) generated from the post-graduate ODL students is managed, identify the challenges encountered in managing the assessment data and how they are being tackled. The study is important to help evaluators know the nature of the Big Data and understand the problems.

Purpose of the Study

The purpose of this study is to examine the management of assessment data in ODL institutions in Nigeria. Specifically,

1. To investigate how Assessment Data is being managed (in terms of organization, storage and analysis for effective decision making) in ODL institutions. and
2. To identify the challenges encountered in managing the assessment data (Big Data) generated.

Research Questions

1. How are the assessment data managed in ODL institutions in Nigeria?
2. What are the challenges encountered in managing the assessment data (Big Data) generated on students.

Review of Literature

Management of assessment data is concerned with decision-making and actions on the assessment of students. In this context, it involves organization (accessing, processing and governing of data), storage of data, data ownership, operational cost/expenditures, data and information sharing, and tackling the challenges of data governance, privacy and security. The process of organizing determines the tasks to be performed, the tools and technology required. It

involves establishing framework authority and responsibility among and between the people that will utilize the resources. Storage of data refers to the act of storing data. It could be any device used for deposit, retention, and retrieval of computed data, especially a hard disk/floppy disk or online in the Net (Cloud saving).

NOUN has eight Faculties and almost all the faculties run undergraduate and post-graduate programs in education, sciences, law, arts, postgraduate diploma and others. The university has up to 400,000 registered students; including the active and inactive ones (Nduba & Sule, 2017). NOUN has up to 78 study centres in the country. The NOUN, school of post-graduate studies runs post-graduate programs and the post-graduate students take exams when they are ready for it (Sheme, 2017a). The university generates large volume of data on the students' assessment scores. The Directorate of Management Information Systems (MIS) developed e-examination application platform (Module Object Oriented Distance Learning Environment- MOODLE); which they use to organize the questions and prepare them for exams. After the exams, scores are generated across all the learners and uploaded to the database for processing and storage. The data in the platform include all the courses from individual students over many semesters and years, scores obtained and data about specific activities in the university.

Big Data (BD) is an evolving term that describes any voluminous amount of structured and unstructured data (Gara, 2018). The overwhelming volumes of Big Data make it difficult for IT managers to capture, store and analyze it. Doug (2001) classified Big Data into the "Three Vs": Volume, Variety and Velocity. He stated that the excessive volumes create storage issues; the variety of data formats make it difficult to sort and process data; the velocity or the speed at which data is received and transforms, is another IT management challenge. Other characteristics of BD are: Veracity, which is about data quality, untrustworthiness and sources; variability, and value (Gandomi and Haider, 2015). Data processing and analyses has their own challenges, these starts from capturing the data to interpreting and presenting the end results. Akerkar and Zicari (2013) grouped the challenges of BD into three main categories, based on the data life cycle: data, process and management challenges. The Data challenges relate to the characteristics of the data itself (e.g. data volume, variety, velocity, veracity, volatility). The Process challenges are related to series of 'how techniques': how to capture data, integrate data and transform data, and how to provide the results. While the Management challenges cover the issues privacy, security,

governance and ethical aspects. Furthermore, to sort through data, so that valuable information can be constructed, human expertise and talents are required to leverage BD and it proves to be another challenge (Sivarajah, Muhammad, Zahir & Vishanth, 2017).

Methodology

Exploratory research design was adopted for the study and National Open University of Nigeria (NOUN) was used for study. The population of the study was all the post graduate students and the HODs in the eight faculties in NOUN, the directorates of Management Information System (MIS) and Examinations and Assessment. The sample was drawn from three of the faculties in the liaison office in Lagos. It consisted of 4 HODs of the different departments that run post-graduate programs and the staff of MIS and DEA departments of the university and the post-graduate students whose assessment data were examined. Two research questions guided the study. The instruments for data collection were oral interview, and NOUN news reports. The faculty staff (HODs) were interviewed on the types of assessment data generated on the post-graduate students; and the staffs of MIS, EA and ICT departments were interviewed on the management of the assessment data, and students' assessment data was observed. The available reports in the NOUN news gave documentary evidence that also supported the discussions of the results. The results were presented in tables for visibility. The data collected from the interview and news reports were analyzed qualitatively to answer the research questions.

Results

Research question 1: How is the Assessment data (Big Data) managed in ODL institution in Nigeria?

Tables 1 below, showed the responses from the interview and news report on; how the Institution is managing the assessment data. The findings revealed that the Assessment Data is being properly managed in NOUN. There are 10 items in the table and the institution is managing all the aspects of assessment data, using IT infrastructure, Big data application platform (MOODLE web platform) and Human resource experts to support the application and infrastructure.

The Table 1: How NOUN is managing the assessment data generated for Students

S/N	Management of Assessment Data	Management Strategies
1	Capturing of data/ acquisition	-Use of IT infrastructure; Big Data application platform (MOODLE); Human resources (technical experts) supports the application
2	Data storage	-Cloud storage/saving – using IT application/tools; Database: the MOODLE web platform and Human resources (MIS and EA staff) program the application.
3	Data analysis	- IT system log analysis and Use of Big Data web platform and - Human resources (the subject experts/lecturers) support
4	Search of data	- Use of IT application; Big Data web platform and Human resources support
5	Sharing of data/ Transfer	- Use IT applications to distribute assessment data to Faculties. - Human resources (technical and subject experts) support
6	Data Interpretation and Visualization	- Use IT infrastructure/tools; Big Data application platform & Human resources (technical experts) support
7	Updating of data	MIS use Big data application platform and Human resources (technical experts) support
8	Information privacy/Security	- Use of Big Data application platform and Human resources (technical experts) support. NOUN disengaged the services of the outsourced vendors to ensure integrity, accountability, data security and privacy.
9	Data ownership	The directorates of MIS and EA of the university are controlling and ensuring data accuracy.
10	Data governance,	Use of Big Data application and Human resources support (technical experts and lecturers) to ensure the quality of data harvested and analyzed from the pole of datasets.

Research Question 2: What are the challenges encountered in managing the assessment data (Big Data) generated on students?

Table 2 below, showed the responses from the interview and information from the NOUN news report on; the challenges encountered in managing the Assessment Data. The findings revealed that challenges are encountered in managing the assessment data. There are 12 items in the table and all of them were encountered by NOUN, but the institution tackles the challenges using different management strategies.

Table 2: The challenges encountered in managing the Assessment data in NOUN

S/N	The Assessment Data challenges	Description of the challenge and how it is tackled by the institution
1	Volume (increased size of data)	Is a major challenge as there is enormous influx of students into the university but NOUN is still opening new centres to increase the carrying capacity.
2	Velocity- the increasing rate of data generation	The data comes with the urgency and requisite to manage the rate which results in either creating new data, errors or duplicating the existing data. But NOUN handles it.
3	Variety of courses/ diverse forms of data.	There are issues of conflicting course codes and missing scores, wrong number. NOUN has the human resources experts to handle it.
4	Veracity- differing quality of data source	Some of the data collected from the centres cannot be trusted and utilized to make critical decisions because of inconsistency in data and un-trusted source of data but NOUN is handling it using quality assurance.
5	Value- extracting knowledge from the large data.	There are cases of omission of names but the institution uses the subject experts (lecturers) in harvesting the data, to prevent omissions and make value judgment on the results.
6	Operational Cost	It is very high but NOUN is coping with the operational cost as they have disengaged the outsourced vendors.
7	Lack of human capacity or operations	The institution employed more staff both academic and technical experts
8	Inadequate personnel with analytical skills	The institution overcomes the challenge by training the ICT, MIS and EA staff.
9	Application Platform functioning capacity	It is a challenge but the MOODLE e-Exam platform functioning capacity is good and the institution trained technical staff to support the application.
10	lack of adequate infrastructures and tools	This is not a major challenge because the university has enough computational infrastructures and tools.
11	Hardware compatibility with server	The problem of system compliance occurs with the Automated mark attendance register but the institution provides hard wares to support it.
12	Missing results	These are challenges but NOUN tackles it by using envelop system and printing of exam booklet according to faculty colour.

Discussion

Research question one sought to investigate how assessment data is managed in ODL institution. The findings from the NOUN news revealed that the institution developed web platform to help eliminate some of the Big data challenges such as: capturing/collecting and acquisition of data, data storage, data analysis, search of data, sharing/distribution and transfer of data, data interpretation and visualization, updating of data, information privacy/security, data ownership and governance. This is in line with Hashem et al (2015), Sivarajah et al (2017) and Yi et al (2014) who stated that effective governance of BD by organizations is essential to ensure quality of analysed data, internet economy and data security. According to Ben-Hirki (2017) NOUN created e-Examination platform (an innovation) to stop outsourcing services and curtail the expenses. The Vice Chancellor (V.C) of NOUN in Sheme (2017b) also stated that NOUN took ownership of data management by disengaging outsourced vendors' in data management

and services to ensure higher security, speedier data management, more effective control and management of information assets. The institution created the Directorate of Management Information System (MIS) that handles the entire NOUN portal for greater internal accountability and security.

Research question two sought to identify the challenges encountered in managing the assessment data generated. The finding on volume is in line with Jiang, Chen, Qiao, Weng, & Li, (2015) who stated that the large datasets (in terms of size and complexity) and the ability to process them remains a critical challenge for data processing applications and database management systems. The finding in velocity (item 2) is in line with Chen et al (2013) who stated that the challenge of velocity results in either creating new data or updating the existing data. Sivarajah et al, (2017) also stated that Value is an essential feature of Big data and has to do with challenge of internet economy, because on the course of managing data there is valuable information and omission of data. Regardless of the number of dimensions used to describe BD, Abawajy (2015) stated that organizations still face challenges of storing, managing and predominantly extracting value from the data in a cost effective manner. The finding in veracity (item 4) is also in line with Akerkar and Zicari (2013) who stated that there are challenges of coping with biases, doubts, fabrications and misplaced evidence in data and using it for analysis.

The findings on how NOUN is tackling the assessment data (BD) challenges were supported by the documentary evidence in NOUN news, as follows: Ben-Hirki (2017) stated that the directorate of MIS is still sourcing for the best technology available to improve on the new application and are building the capacity of the staff of ICT and EA departments by training them on the operations of the web application and how to deploy it. The issue of missing results according to Edozie (2017) is being tackled by using envelop system and printing of exam booklet according to faculty colour.

Conclusion

ODL institutions such as NOUN generate vast amount of data on large number of students that register for programs. Consequently, they are faced with Big Data challenges because of the volume, variety, velocity and veracity of the data. There are also challenges of accessing, processing, storage and governing of the Big Data. ODL institutions require efficient analytical

problem-solving computer programs (algorithms) to process the vast streaming data. The cost of processing the data and other operational expenditures of the study center are sensitive issue that may also impact in the way ODL institutions adopt and implement technological solutions.

Implications/ Recommendations

The management of ODL institutions must organize their resources (the lecturers, facilitators, technical experts and the facilities) and determine the type of persons and platform required to do the task of processing their assessment data.

They are to manage the issues of privacy, ownership and governance of data by being independent and self-sufficient. They should not engage outsource service for the assessment data because of security reasons and cost implication.

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