International Journal of Innovative Research in Education, Technology & Social Strategies
p-ISSN: 2465-7298 | e-ISSN: 2467-8163
Volume 6, Number 1 March, 2019
IJIRETSS

Survey of the Challenges Confronting the Application of Big Data in Nigerian Higher Education

[1]Anikweze, C. M., [2]Ugodulunwa, C. A. & [3]Mainoma, H. M
[1&3]Faculty of Education, Nasarawa State University, Keffi, Nasarawa State, Nigeria
[2]Faculty of Education, Federal University, Ndufu-Alike Ikwo, Ebonyi State, Nigeria

Abstract

The thrust of the study was to assess the readiness of personnel in higher education institutions in North Central geo-political zone of Nigeria to benefit from the advantages of Big Data assessment. Three research questions and four null hypotheses facilitated the study. Cross-sectional survey design was implemented for the investigation. Multistage stratified random sampling procedure was adopted to select a sample size of 350 lecturers in public tertiary institutions trichotomized into universities, polytechnics and colleges of education. Stratification ensured the inclusion of male and female staff in varied faculties and disciplines. A 30-item structured questionnaire for data collection developed by the researchers covered issues such as access to ICT infrastructure, involvement in Big Data assessment and challenges of big data assessment. Descriptive statistics were used to answer research questions while t-test and ANOVA inferential statistics were used for testing null hypotheses. Findings show that lecturers are ready to benefit from the advantages of Big Data assessment particularly for managing students' enrolment, tests and examination records, and even financial matters but for the challenges surrounding the application of big data including issues of data capture, data source, storage, analysis, search, sharing, networking, visualization, privacy, querying and updating. Recommendations include the need for the governments of Nigeria to improve budgetary provisions to higher education institutions to facilitate domestication of Big Data.

Keywords: *Big data assessment, Data capture, Analysis, Visualization, Privacy, Querying and updating*

Corresponding Author: Anikweze, C. M.

Background to the Study

Big data is currently attracting interest in higher education institutions probably because it holds a great promise in providing an opportunity for educational institutions to use their information technology resources strategically to improve the quality of education and enhance students' completion rates, improve their resilience as well as performance. Big data refers to data sets that are too large and complex that traditional data processing applications cannot handle. The use of big data analysis techniques for addressing contemporary challenges facing higher education is a current trend that requires attention of the academia. However, research into big data in higher education is limited despite growing interests in exploring and revealing the value of the increasing data within higher education institutions (Görnerup, Gillblad, Holst & Bjurling, 2013). As concluded by Dnuggets (2018), following a recent survey, the key benefits of assessing the value of Big Data to organizations include improved and timely access to decision-making information, greater transparency, scalability and better change management. The need to explore the potentials of Big Data analytics for addressing contemporary challenges facing higher education in Nigeria motivated this study.

The concept of 'big data' might not be completely novel to policy makers in Nigerian education. For instance, Anikweze (1992) used 'big data' supplied by the State Primary Education Commissions and the various Ministries of Education in Nigeria to project the plausibility of implementing the national policy on the Nigeria Certificate in Education (NCE) becoming the minimum entry qualification into the teaching profession in Nigeria. Moreover, many teachers at various levels of education might be familiar with handling bulky data emanating from their involvement in handling large classes and taking the rigours of scoring their test scripts. However, in practicality, not a few lecturers in Nigerian tertiary education institutions can claim full insight into the sophistication involved in the assessment and analysis of voluminous and complex data sets. There persists what Okereke (2014) described as skill gaps consequent upon rapid technological advancement. To compound the challenges are the cost implications of handling Big Data analytics.

Akinnagbe and Baiyeri (2011) in their analysis of the training needs of lecturers for ICT skills enhancement revealed that lecturers were not skilled in slides preparation and presentation, spreadsheets preparation, and data analysis using computer software. Therefore, the management of complex data emanating from students' enrolment, tests and examination records, and even financial matters had always been done either haphazardly or with great strains and stresses, what with endemic paucity of ICT infrastructure and associated relevant software. Furthermore, Big Data should be processed in a platform that can handle the variety, velocity, and volume of data by using a family of components that require integration and data governance (Mules, 2016). Few personnel of the Nigerian tertiary education institutions are really familiar with these processes. Hence the challenges confronting the application of Big Data in Nigerian Higher Education could be expected to be monumental and intimidating. However, it is possible that the scare could be only in one's imagination since there was no empirical evidence known to the researchers concerning the involvement of lecturers in handling Big Data. On the other hand, the advances in information and communication technology (ICT), and the level of digitalization and computer applications

that are steadily on-going, both within the higher institutions in Nigeria and most especially in commercial companies and financial institutions might probably erase the researchers' impressions about the challenges confronting the application of Big Data. A survey research offers a relatively quick way of collecting information (quantified data) on the issue under investigation.

Notwithstanding the low access to higher education in Nigeria consequent upon problems of carrying capacity, poor infrastructural facilities, inadequate public financing, and economic constraints imposed by labour market failure manifested in low absorptive capacity of the economy, the student enrolment into the universities, polytechnics and colleges of education in Nigeria has continued to grow by leaps and bounds over the last three decades. Ajayi and Adeniji (2009) related the phenomenal growth in enrolment leading to hysterical expansion to the irresistible pressure from population explosion at the lower levels of the educational system consequent upon the federal government's policy of universalization of education. However, irrespective of any shortcomings, stakeholders particularly employers expect high quality outputs from the tertiary education institutions. The warranted expectation seems to put more burden and pressure on the Nigerian tertiary education system. Furthermore, as rightly observed by Daniel (2015) the institutions of higher education are operating in an increasingly complex and competitive environment. Aside of being constantly under increasing pressure to respond to national and global economic, political and social changes such as the growing need to provide quality and adequate manpower in certain disciplines, higher education institutions are expected to ensure that the quality of learning programmes are both nationally and globally relevant.

A pertinent issue for botheration is that the decisions required for dealing with the complex and challenging higher education governance are made without recourse to vast sources of data sets that have been accumulating over time. Higher education data when properly analyzed can play a vital role in deciding how certain contentious issues could be addressed (Marsh, Maurovich-Horvat & Stevenson, 2014).Also Murumba and Micheni (2017) posit that it is absolutely important for universities to use Big Data Analytics in order to deliver the very best of learning environments for the good of society. Apart from using data to provide insight into the often contested nature of higher education governance, as the Academic Staff Union of Universities (ASUU) does when negotiating salaries and allowances with the federal government, Gibson (2017:1) believes that fine-grained data captured during digital learning could assist stakeholders "to gain highly detailed insight into student performance and learning trajectories as required for personalizing and adapting curriculum as well as assessment". Daniel (2015) suggests that IT analytics could be employed to cover usage and performance data that help with monitoring required for developing or deploying technology, developing data standards, tools, processes, organizational synergies and policies. The conviction is that IT analytics can integrate data from a variety of systems such as student information, learning management and alumni systems, as well as systems managing learning experiences outside the classroom.

UNESCO (2006) maintains that Education Management and Information Systems(EMIS) are designed to collect and analyze data on the educational system to improve planning, resource allocation, monitoring, policy formation and decision making. But there could be the challenges associated with upgrading existing databases, making analytics easy for end users, the complexities of software and data integration, and data management involving data capturing, manual updating of databases and storage (Dnuggets, 2018). Trucano (2006) identified the two formidable challenges confronting EMIS in Nigeria to be connected with "establishing effective working relationships between three management layers" (federal, state and local government)and the "issues of capacity and commitment" which are part of the common indices of developing countries. Nevertheless, Burns (2016) insists that Big Data has come of age and State policymakers, university leaders, and entrepreneurs should necessarily set new standards and expectations for data in this new era. State regulators and auditors should equally begin to clarify some basic compliance standards for data collection, management, security, interoperability, privacy, and more, the humungous costs notwithstanding (Samiddha & Ravi, 2016).

However, new data-management techniques are inevitable for handling big data. Kellen, Reektenwald and Burr (2013) acknowledge that the thickness of data and the difficulty in bending them into shape has constituted a perennial impediment for organizations, requiring a class of people with specialized knowledge and skill to bring data together from different sources, combine them, analyze them, and find patterns previously hidden. Among the lecturers in Nigerian higher education institutions, new knowledge and new skills are imperative both for analyzing dig data and for working with interdisciplinary teams of colleagues that understand programming languages as well as the cognitive, behavioral, social and emotional perspectives on learning. There is the need for a new horizon of professional knowledge (Gibson, 2012).

In advanced economies, there is no doubt that assessing the value of Big Data is loaded with tremendous advantages which include improved and timely decision-making based on information distilled from voluminous and complex data sets with great transparency and scalability with a focus to change management for the better. In Nigeria, however, the paucity of ICT infrastructure coupled with low-level computer literacy, particularly among employees in higher education institutions; seem to compound the challenges of treading the rugged paths of Big Data assessment and utilization. The purpose of this study was to assess the readiness of lecturers in higher education institutions North Central geo-political zone of Nigeria to benefit from the advantages of Big Data assessment.

Research Questions

Three major questions were addressed in the investigation, namely:

1. To what extent do lecturers in tertiary institutions in North Central Nigeria have access to ICT infrastructure for involvement in big data assessment as moderated by gender and status?
2. What are the major challenges confronting the use of Big Data as perceived by lecturers in higher institutions in North Central Nigeria?

3. To what extent are the lecturers, segregated by sex and status, involved in handling big data?

Hypotheses

Based on the research questions, the following null hypotheses were formulated and tested at the -05 level of significance:

1. **H_o1:** There is no significant difference between male and female lecturers' access to ICT infrastructure in Big Data Assessment in tertiary institution in North Central Nigeria.
2. **Ho2:** There is no significant difference between male and female lecturers on involvement in Big Data Assessment in tertiary institution in North Central Nigeria.
3. **H_o3:** There is no significant difference in the status/rank of lecturers and Access to ICT infrastructure in Big Data Assessment in tertiary institution in North Central Nigeria.
4. **$H_0$4:** There is no significant difference in the status/rank of lecturers and involvement in Big Data Assessment in tertiary institution in North Central Nigeria.

Method

Research Design

Cross-sectional exploratory survey design was adopted for the investigation. The target population consisted of the academic staff in universities, polytechnics and colleges of education in the six States of Benue, Kogi, Kwara, Nasarawa, Niger and Plateau plus the Federal Capital Territory that constitute North Central Nigeria. In this zone, there are 55 institutions consisting of 20 universities, 18 polytechnics and 17 colleges of education (See the Appendix). In terms of proprietorship, 19 are owned by the federal government, 24 by State governments while 12 belong to private proprietors including faith-based organizations. However, only the public institutions were involved in the study.

Participants

The estimated population of lecturers in all the institutions is 15,000. Multistage stratified random sampling procedure was adopted to select a sample size of 350 lecturers in public tertiary institutions trichotomized into universities, polytechnics and colleges of education in the three randomly selected States of Nasarawa, Plateau and the Federal Capital Territory. Stratification ensured inclusion of male and female staff in varied faculties and disciplines.

Instrument

A 30-item structured Likert scale for data collection was developed to cover issues such as availability of ICT infrastructure, perceptions about Big Data and challenges including data capture, data source, storage, analysis, search, sharing, networking, visualization, privacy, querying and updating. The instrument was validated by three experts in measurement and evaluation who were requested to appraise the items in the questionnaire in terms of relevance, clarity, accuracy and consistency in supplying needed data, comprehensiveness of the scope and appropriateness for the stated purpose using the 5-point scale. The obtained rational validity index based on the logical consensus of experts was 0.87. We further sought

for the construct validity and reliability of the instrument through pilot-testing with a sample of 30 lecturers within the scope of the study but outside the selected sample. Analysis using Cronbach alpha yielded 0.83 coefficient of internal consistency.

Data Analysis

Descriptive statistics were used to answer the research questions while t-test and ANOVA inferential statistics were used for testing null hypotheses. The outcome of the study expectedly provides empirical information on the readiness of higher education institutions in Nigeria to benefit from the advantages of Big Data assessment particularly for managing students' enrolment, tests and examination records, and even financial matters. Findings will also inform the governments through the regulatory agencies on the need to improve budgetary provisions to facilitate domestication of Big Data.

Results

Research Question One: To what extent do lecturers in tertiary institutions in North Central Nigeria have access to ICT infrastructure for big data assessment as moderated by gender and status?

For this research question, the obtained frequencies of the respondents were transformed into numerical scores with which weighted mean and standard deviation for each item on the questionnaire was computed. Data for answering this research question are portrayed in Table 1.

Table 1 portrays the lecturers' access to ICT infrastructure by status or rank and by gender. The result reveals that the mean score for professors' access to ICT was 32.06; senior lecturers' access to ICT ($\overline{x}$ = 31.00), lecturer's I access to ICT ($\overline{x}$ = 33.05), and below lecturer I was ($\overline{x}$ = 31.64).

Table 1: Distribution of lecturers on access to ICT infrastructure by Status and by gender

Variables	Categories of Lecturers	N	Mean	Std. Deviation	Std. Error	95% Conf. Interval Lower Bound	Upper Bound
Access to ICT Infrastructure by Status	Professor	32	32.0625	4.37690	.77373	30.4845	33.6405
	Senior Lecturer	88	31.0000	3.80864	.40600	30.1930	31.8070
	Lecturer 1	79	33.0506	3.91545	.44052	32.1736	33.9276
	Below Lecturer 1	151	31.6490	4.92097	.40046	30.8577	32.4403
	Total	**350**	**31.8400**	**4.43645**	**.23714**	**31.3736**	**32.3064**
Access to ICT Infrastructure by Gender	Male	221	31.6516	4.89535	.32930	31.0026	32.3006
	Female	129	32.1628	3.50845	.30890	31.5516	32.7740
	Total	**350**	**31.8400**	**4.43645**	**.23714**	**31.3736**	**32.3064**

With regard to gender segregation of the lecturers' access to ICT infrastructure, the result shows male access to have $\overline{x}$ = 31.65, while the female access scored $\overline{x}$ = 32.16. This shows a mean difference of 0.51 between male and female lecturers on access to ICT infrastructure for

big data analysis ($\overline{x}$=32.16 - $\overline{x}$ = 31.65 = 0.51), with the female lecturers having more access to ICT infrastructure.

Research Question Two: What are the major challenges confronting the use of Big Data as perceived by lecturers in higher institutions in North Central Nigeria?

The responses of participants to the items on the questionnaire were organized into frequencies and percentages under a dichotomy of Agreement and Disagreement as presented in Table 2. Findings from the study reveal most of the challenges confronting the use of Big Data Analysis in higher institutions. The result shows that 56.3% of the respondents agreed that factorial analysis of data is a major problem, 63.7% confessed that they have difficulty in integrating big data from different sources and 54.5% also agreed that information from big data are not for decision making in their institutions. The result further shows that 76.4% of the respondents identified lack of ICT infrastructure as a challenging problem, while 77.1% affirm that higher institutions lack opportunities for training on use of big data for decision making.

Table 2: Distribution of respondents' perception on the major challenges confronting use of Big Data

Items on Challenges of Big Data Assessment	Agree	Disagree	Mean	S.D.
I have no idea of what Big Data means	171 (48.8%)	179 (51.2%)	3.03	1.39
Sophisticated statistical analysis is disgusting to me	141 (41.1%)	203 (59%)	2.78	1.16
I prefer qualitative research but I am ready to learn quantitative analysis	228 (65.2%)	97 (27.2%)	3.59	3.29
The greatest challenge I have with Big Data assessment is with storage and privacy	214 (51.4%)	130 (47%)	3.17	1.08
I enjoy the ease of processing data from survey research	286 (81.6%)	60 (16.4%)	3.84	.950
My experience in processing multivariate data is very woeful	158 (45.1%)	122 (55.1%)	2.91	1.24
I can handle any computation of voluminous students' exam data	169 (48.8%)	176 (49.7%)	3.07	1.17
My problem is with factorial analysis of data	194 (56.3%)	137 (38.9%)	3.20	1.23
We lack infrastructure for capturing and processing large amounts of data	267 (76.4%)	77 (22.5%)	3.66	1.04
Information from big data are not for decision making in my institution	191 (54.5%)	150 (43.1%)	3.21	1.09
We lack opportunities for training on use of big data for decision making abut students in my institution	270 (77.1%)	80 (22.9%)	3.74	1.10
There is non-availability of big data quality assessment framework for use in my institution	264 (74.5%)	86 (23.7%)	3.70	1.08

Findings from the study also reveal that 74.5% of the respondents agreed that there is non-availability of big data quality assessment framework. 59% disagreed that sophisticated statistical analysis is disgusting and 65.2% agreed that they prefer qualitative research to

quantitative research that involves inevitable statistical analysis but are however, ready to learn quantitative analysis. About 81% of the respondents agreed that there exists a gap between acquiring sophisticated software and making effective use of it.

Research Question Three: To what extent are the lecturers, segregated by sex and status, involved in handling big data?

Descriptive statistics for answering this research question are portrayed in Table 3. The result shows that the mean score for professors' involvement in big data as $\overline{x}$ = 39.81; senior lecturers' involvement as $\overline{x}$ = 41.13, lecturers' I involvement as $\overline{x}$ = 40.75, and others below lecturer I in status as $\overline{x}$ = 40.86.

The study also shows marked gender difference on involvement in big data assessment (Male $\overline{x}$ = 42.14 and Female $\overline{x}$ = 38.52). With a distinctive mean difference of 3.62, male lecturers are more involved in big data assessment than female lecturers.

Table 3: Distribution of Lecturers' on Involvement in big Data Assessment by Status and by Gender

Variables	Category	N	Mean	Std. Dev	Std. Error	95% Conf. Int. for Mean Lower Bound	Upper Bound
Involvement of lecturer's in Big Data by Status	Professor	32	39.8125	2.59575	.45887	38.8766	40.7484
	Senior Lecturer	88	41.1250	4.29063	.45738	40.2159	42.0341
	Lecturer 1	79	40.7468	7.43255	.83623	39.0820	42.4116
	Below Lecturer 1	151	40.8609	4.23956	.34501	40.1792	41.5426
	Total	**350**	**40.8057**	**5.03762**	**.26927**	**40.2761**	**41.3353**
Involvement in Big Data by Gender	Male	221	42.1403	4.83484	.32523	41.4993	42.7812
	Female	129	38.5194	4.54681	.40032	37.7273	39.3115
	Total	**350**	**40.8057**	**5.03762**	**.26927**	**40.2761**	**41.3353**

The study further reveals from the mean scores that low status lecturers among the samples are more involved in big data assessment than thev do have access to ICT infrastructure in their institutions (Involvement $\overline{x}$ = 40.81> Access $\overline{x}$ = 31.84).

Hypotheses Testing

H_o1: There is no significant difference between male and female lecturers' access to ICT infrastructure in Big Data Assessment in tertiary institution in North Central Nigeria.

This hypothesis was tested by computing the t-test for independent samples of participants' responses on access to ICT infrastructure and involvement in Big Data dichotomised by gender. This result is portrayed in Table 4.

The result in table 4 shows that there is a significant mean difference between male and female lecturers on access to ICT infrastructure and big data analysis. The result on table 4 also shows that from the independent samples t-test that there was no significant difference [N = 350, t = -1.04, df = 348, p = .299 (p>.05)] between male and female lecturers on access to ICT infrastructure(s) for Big Data analysis. The first null hypothesis [H_o1] was therefore not rejected since p value >.05) reveals that there is no significant gender difference on access to ICT and Big Data.

Table 4: Independent samples t-test of lecturers' access to ICT and their Involvement in Big Databy gender

		Levene's Test for Equality of Variances		**t-test for Equality of Means**						
		F	**Sig.**	**t**	**df**	**Sig. (2-tailed)**	**Mean Difference**	**SE Diff.**	**95% Conf. Inter Lower**	**Upper**
Access to Infrastructure	Equal variances assumed	12.510	.000	-1.040	348	.299	-.51121	.49150	-1.4779	.45549
Involvement in Big Data		.098	.754	6.908	348	.000	3.62089	.52419	2.58991	4.65187

Ho2: There is no significant difference between male and female lecturers on involvement in Big Data Assessment in tertiary institution in North Central Nigeria.

Findings from Table 4 above reveal Male Mean of 42.14 with SD of 4.83 and Female Mean of 38.52 with SD of 4.55. These data were subjected to t-test of difference between means as shown in Table 5 above. The result reveals that there is a significance difference [N = 350, t = 6.90, df = 348, p = .000 (p<.05)] in the involvement of male and female lecturers in the use of big data for research and analysis. The second null hypotheses [H_o2],was therefore rejected since p – value reveals that there is a significance difference. The implication of the findings from the study therefore reveals that male lecturers are show more interest when it comes to involvement in Big Data Assessment in tertiary institution in North Central Nigeria.

H_o3: There is no significant difference in the status/rank of lecturers and Access to ICT infrastructure in Big Data Assessment in tertiary institution in North Central Nigeria.

Findings from the study on table 5 shows that from the Analysis of Variance (ANOVA) that there is a significant difference [N = 350, F = 3.192, df(3,346), p = .024 (p<.05)] between status of lecturers on access to ICT infrastructure in handling of Big Data assessment and analysis. The hypotheses [$H_0$4]was therefore rejected since p – value (p<.05) reveals that there is a significant difference.

Table 5: ANOVA table for Lecturers' Status on Big Data Analysis in North Central Nigeria

		Sum of Squares	Df	Mean Square	F	Sig.
Access to ICT Infrastructure	Between Groups	184.970	3	61.657	3.192	.024
	Within Groups	6684.070	346	19.318		
	Total	6869.040	349			
Involvement in Big Data	Between Groups	41.272	3	13.757	.540	.655
	Within Groups	8815.516	346	25.478		
	Total	8856.789	349			

One implication of the observed significance difference on access to ICT infrastructure between lecturers by status is that professors and senior lecturer are at advantage compared to their junior colleagues and assistant lecturers that are in the academic ranking.

$H_0$4: There is no significant difference in the status/rank of lecturers and involvement in Big Data Assessment in tertiary institution in North Central Nigeria.

Findings from the study as revealed by Table 5 further shows that there is no significant difference [N = 350, F = .540, df(3,346), p = .655 (p>.05)] between status of lectures and involvement in the handling of big data assessment and analysis. The hypothesis [$H_0$4]was therefore accepted since p – value (>.05) reveals that there is no significant difference. The findings from the study show that even though there is no significant difference in involvement of lecturers in big data analysis, yet professors and senior lecturers are at advantage end compared to assistant lecturers that are in the low academic ranking.

Discussion

Evidence from the study suggests that the readiness of lecturers in higher education institutions in North Central zone of Nigeria to benefit from the advantages of Big Data assessment is confronted with monumental challenges. The major challenges include the scare of factorial analysis of data, difficulty in integrating big data from different sources, lack of infrastructure for capturing and processing large amounts of data, lack of opportunities for training on use of big data for decision making, non-availability of big data quality assessment framework, disgust for sophisticated statistical analysis, and skill gap for utilizing sophisticated software. These challenges are in agreement with the views of Kellen, Reektenwald and Burr (2013) and Dnuggets (2018). The prohibitive cost implications of acquiring the software and the cost of storing such humungous amounts of data corroborate the position of Samiddha and Ravi (2016).

The quest for research undertaken by academia has led to the development of new, innovative and sophisticated software for research and development. In discussing issues about the Big Data analytics concepts and some existing techniques and tools, this study revealed that there is a wide gap in access and involvement of Big Data among lecturers in higher education institutions in North Central Nigeria. This finding confirms the views of Akinnagbe and Baiyeri (2011) on training needs lecturers for ICT skills.

The study revealed poor involvement of lecturers in handling of Big Data, as about 81% of the participants in the study agreed that there exists a gap between acquiring sophisticated software and making effective use of it. This confirms the existence of skill gap observed by Okereke (2014). This deplorable situation is irrespective of status or rank. Indeed, the younger lecturers are more involved than the professors that seem to find it difficult imbibing digital technologies. It is not only the quantity of data, but also the complex processing techniques which make its applications both intimidating and obsessive. This is in contradistinction to the assertion of Marsh, Maurovich-Horvat and Stevenson (2014) as corroborated by Murumba and Micheni (2017) that it is absolutely important for universities to use big data analytics in order to deliver the very best of learning environments for the good of society. Findings from this study suggest that possibilities for using big data to link research to education exist, but are achievable only when disgust for sophisticated statistical analysis has been overcome.

Result from the study reveals that male lecturers in tertiary institutions in North Central Nigeria show more interest and are more involved in big data assessment than their female counterparts. As noted by United Nations (2014), variations in ICT access and usage by men and women suggest the need for special attention to gender issues with a view to promoting gender equality and fully utilizing a country's human potential. Accordingly, the United Nations conference on trade and development concluded that the policy implication of gender disparities in access to and use of ICTs, especially for developing countries, is the inevitability of special interventions to ensure that most women will not benefit as much from the information society as men. For tertiary education institutions in Nigeria, such intervention becomes a necessity.

Conclusion

In advanced economies, there is no doubt that assessing Big Data is loaded with tremendous advantages which include improved and timely decision-making based on information distilled from voluminous and complex data sets with great transparency and scalability with a focus to change management for the better. In Nigeria, however, the investigation revealed a paucity of ICT infrastructure coupled with low-level computer literacy, particularly among lecturers in higher education institutions. This seems to compound the challenges of treading the rugged paths of Big Data assessment and utilization. Evidence from the investigation suggests that many lecturers in universities, polytechnics and colleges of education in the North Central geo-political zone of Nigeria do not engage in much of big data handling. There are prohibitive problems and challenges to confront such as poor ICT infrastructure, skill gap for dealing with sophisticated statistical analyses, and intimidating cost implications. Many participants indicated willingness to learn but opportunities for capacity building seem to be slim due to poor funding of the institutions.

Recommendations

Based on findings from this study, the following recommendations are proffered:

1. Lecturers should try to conquer the phobia of the stress involved in processing one billion rows of data. It is expected that with the acquisition of more insight into the use of sophisticated software and more detailed models for statistical analysis, much benefits would be derived from big data management.

2. Institutions should allow liberal access to available ICT infrastructure to lecturers including enhancing their social network on campus by connect to students and fellow staff with intent to improve interactions that enhance social integration issues and access to self-service information.
3. There is the need for universities and other higher education institutions to set aside competition and embrace collaboration. As argued by Burns (2016), sharing best practices, and even de-identified data, will allow institutions to tap into new insights about how to help struggling students.

References

Akinnagbe, O. M. & Baiyeri, K. P. (2011). Training needs analysis of lecturers for information and communication technology (ICT) skills enhancement in Faculty of Agriculture, University of Nigeria, Nsukka. *African Journal of Agricultural Research*, *6* (32), 6635-6646, 26; DOI: 10.5897/AJAR11.1233

Anikweze, C. M. (1992). *The feasibility of NCE becoming the minimum qualification for Teachers in Nigeria,* Unpublished National Commission for Colleges of Education (NCCE) submission to the 1993 Joint Consultative Committee of Education

Burns, B. (2016). Big data is coming of age in higher education. Retrieved on 8th May 2018 from https://www.forbes.com/sites/schoolboard/2016/01/29/big-datas-coming-of-age-in-higher-education/#74678aa41c41

Daniel, B. (2015). Big Data and analytics in higher education: Opportunities and challenges. *British Journal of Educational Technology*, 46 (5), 904 – 920. Doi: 10.111/bjet.12230

DELL™/Intel® (ND). *Education data management (EDM).* Retrieved on 19th Nov. 2012 from http://content.dell.com/us/en/gen/k-12-solutions-featured-solutions-education-data-management

Dnuggets, K. (2018*). Big data assessment – key business drivers, expected benefits and common challenges.* https://www.kdnuggets.com/2014/06/big-data-assessment-business-drivers-benefits-challenges.html

Gibson, D. (2012). Game changers for transforming learning environments. In F. Miller (Ed.) *Transforming learning environments: Strategies to shape the next generation (advances in educational administration),* 16, 215–235. Bingley: Emerald Group Publishing Ltd. doi: 10.1108/S1479-3660(2012)0000016014.

Gibson, D. (2017). Big data in higher education: Research methods and analytics supporting the learning journey. *Technology, Knowledge and Learning*, 22 (3), 237 – 241.

Görnerup, O., Gillblad, D., Holst, A., & Bjurling, B. (2013). *Big data analytics: A Research and Innovation Agenda for Sweden*. The Swedish Big Data Analytics Network.

Kellen, V.; Reektenwald, A. & Burr, S. (2013). Applying Big data in higher education: A case study. *Data Analytics & Digital Technologies.* Retrieved on 10th February 2018 from https://www.cutter.com/article/applying-big-data-higher-education-case-study-400836

Marsh, O., Maurovich-Horvat, L., & Stevenson, O. (2014). *Big data and education: What's the Big Idea.* Big Data and Education conference. UCL .

Mules, G. (2016). Big Data Fundamentals. Retrieved on 6th March 2018 from https://archive.bigdatauniversity.com/courses/big-data-fundamentals/

Murumba, J. & Micheni, E. (2017). Big data analytics in higher education: A Review. *The International Journal of Engineering and Science (IJES) 6* (6), 14-21; ISSN (e): 2319 – 1813 ISSN (p): 2319 – 1805; DOI: 10.9790/1813-0606021421 www.theijes.com, p. 14

Okereke, V. E. (2014). Rapid technological advancement and skill gaps challenge to training technical education teachers in higher education in Nigeria. In Bolarin, T. A. & Obianuju, Q. (Eds.): *Higher Education and its Challenges in contemporary Nigeria*, 103 - 109. Lagos: Toptune Educational Publishers

Samiddha, .M. and Ravi, S. (2016). Big data – concepts, applications, challenges and future scope. *International Journal of Advanced Research in Computer and Communication Engineering*, 5 (2), 2319 - 5940. IJARCCE; ISSN (Online) 2278-1021

Trucano, M. (Editor infoDev) (2006). *Education management information systems: A short case study of Nigeria, infoDev Working Paper #5.* http://www.infodev.org/en/Publication.503.html

UNESCO (2006). Data collection and education management information systems (EMIS), Chapter 34 in *Section 6 Management Capacity*. Paris: International Institute for Educational Planning. http://www.iiep.unesco.org/fileadmin/user_upload/Research_Highlights_Emergencies/Chapter34.pdf

United Nations (2014). *Measuring ICT and gender: an assessment - Report prepared for the Partnership on Measuring ICT for Development. New York and Geneva: United Nations conference on trade and development*. Retrieved on 11th July 2018 from http://unctad.org/en/PublicationsLibrary/webdtlstict2014d1_en.pdf