

# **Big Data Generated By Examination Bodies In Nigeria: Any Alternative Purposes?**

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## **ABSTRACT**

There are different Examination Bodies in Nigeria, each with its own mandate. The major ones are West African Examinations Council (WAEC), National Examinations Council (NECO), National Business and Technical Examinations Board (NABTEB) and Joint Admissions and Matriculation Board (JAMB). Each body endeavours to fulfill its mandate; but in doing this year-in, year-out, large volumes of data are being generated. These constitute BIG DATA. Thus, for each body, and for each year, large volumes of data are generated. For each of WAEC, NECO and NABTEB, over one million candidates' examination scores in about eight subjects are generated in their Senior Secondary Certificate Examinations. In all the subjects, scores are generated with at least two test formats - objective and essay. The science and technical subjects have additional practical components. JAMB on its own generates BIG DATA in its Unified Tertiary Matriculation Examination (UTME) in four subjects for each of its over one million candidates every year. While each of WAEC, NECO and NABTEB uses the generated BIG DATA as 'assessment of learning' for achievement yardstick and certification, JAMB uses its own BIG DATA as 'assessment of learning' for selection and placement purposes in tertiary educational institutions. The basic question raised in this Paper, then, is: beyond the primary purposes of achievement yardstick, selection, placement and certification served by the BIG DATA generated every year by the examination bodies, are there other alternative purposes that these BIG DATA can serve? This Paper explores the creation of National Big Data Bank where yearly generated BIG DATA from examination and similar bodies are banked. These can then be subsequently retrieved, analysed, triangulated, regressed, factored and or path-analysed to study and predict patterns, trends, conglomerations, growth and development of individuals, groups,

states/nations, curriculums, programmes, etc. This underscores additional utility of BIG DATA in Nigeria.

## **INTRODUCTION**

Big data refers to extremely large data sets that may be analyzed to reveal patterns, trends, and associations, especially relating to human behaviours and interactions. The concept of “Big Data” is used to describe the volume, variety, and velocity of the data generated with information and communication technologies (ICTs) and other sources. Big data is a phenomenon of data usage closely linked to the "Information Age" or the use of information technology (Heudecker, 2013; Alejandro, 2013). The three key words that define big data are in terms of volume, variety and velocity. In terms of volume, the data involved in research has increased from terabytes to petabytes and is moving onto exabytes. Thus, the findings thereof may be more embracing, trusted, reliable and valid compare to findings from the usual small data. Then in terms of velocity, big data does not only depend on how fast data are accumulated, but also takes cognizance of how fast some of the data already accumulated are changing. So the researcher has real time data for assessment. Also the data has variety in that big data is continually evolving (Daniel, 2015).

In Nigeria, the various examination bodies carry out examinations for both internal and external candidates every year, generating huge data running into several millions. Other sources may include web searches, sensors, commercial transactions, social media interactions, audio and video uploads, and mobile phone GPS signals (Alejandro, 2013). The big question, which is the concern in this Paper is: apart from using the data generated by the examination bodies in Nigeria for assessment and

certification, what alternative uses are there for such data? Thus, the researchers will explore such alternatives in the study as well as making possible recommendations.

## **NATURE AND STRENGTH OF BIG DATA**

To understand the nature and strength of Big Data, some facts and figures about Big Data are fundamental. According to Josh (2012), it is estimated that every minute email users send more than 204 million messages; Google receives over 2,000,000 search queries; Facebook users share more than 684,000 pieces of content; consumers spend more than US \$270,000 shopping on web; Twitter users send over 100,000 tweets where more than 570 new websites are created, and Instagram users share 3,600 new photos. All these sources of information will contribute to reach 35 Zettabytes of data stored by 2020 (Eaton, Deroos, Deusch, Lapiz, & Zikopoulos, 2012). Also the data turnover in examination bodies in Nigeria is growing geometrically and there is need to explore alternative uses for it.

Because of the humongous data involved in big data assessment, the techniques of data mining are usually employed. Data Mining is defined as extracting information from huge sets of data. In other words, we can say that data mining is the procedure of mining knowledge from data. Data mining has attracted a great deal of attention in information industry in recent years due to the wide availability of huge amounts of data and the imminent need for turning such data into useful information and knowledge especially in assessment. The information and knowledge gained can be used for applications ranging from business management, production control, and market analysis, to engineering design and science exploration and educational policy (Han & Kamber, 2000).

Actually, there is a huge amount of data available in the educational sub-sector. These data are of no use until they are converted into useful information. It is necessary to analyze this huge amount of data and extract useful information from them. Extraction of information from huge data is not the only process performed in data mining; data mining also involves other processes such as data cleaning, data integration, data transformation, pattern evaluation and data presentation (Tutorial Points Ltd, 2014).

Big Data could be used in any sphere whatsoever given that this large quantity of data can be harnessed to the advantage of the researcher and serve the essence of the research conducted. Big data can be applied to increase data visualization. Organizations worldwide are slowly and perpetually recognizing the importance of big data analytics. Business experts should have the opportunity to question and interpret data according to their business requirements irrespective of the complexity and volume of the data. In order to achieve this requirement, data scientists need to efficiently visualize and present these data in a comprehensible manner. Giants like Google, Facebook, Twitter, EBay, Wal-Mart etc. do adopt data visualization to ease complexity of handling data. Data visualization has shown immense positive outcomes in such business organizations and education (Samiddha & Ravi, 2016).

Big data also find good use in healthcare. The healthcare field generates an enormous amount of data every day. Thus, when these data are mined, this may provide medical researchers and practitioners to put it to work in real life, to benefit people. The solutions developed from big data may prevent the onset of disease, improving diagnosis and enhancing quality of care. Big Data solutions can help the industry acquire, organize

and analyze these data to optimize resource allocation, plug inefficiencies, reduce cost of treatment, improve access to healthcare and advance medical research.

Particularly in education, Big Data has the future to change not just research, but also education in general. Big Data can support the classic educational system, helping teachers to analyze what students know and what techniques are most effective for each. In this way, also teachers are able to learn new techniques and methods about their education work (West, 2012). In this regard, technologies such as data mining and data analytics can provide a fast feedback to students and teachers about their academic performance. He concluded that in this way, collective and big scale data can predict which student needs more help from the education system, avoiding the danger of failure or drop out. This has as a result to find pedagogic approaches that seem most effective with particular students and special needs (West, 2012).

## **EXAMINATION BODIES AND BIG DATA IN NIGERIA**

The various examination bodies in Nigeria are trusted with different mandates; and in carrying out these statutory mandates, they generate data running into tens of thousands, and most times in millions. Every year, the Joint Admissions and Matriculation Board (JAMB), for instance, conducts entrance examination into higher educational institutions in Nigeria. The body generates humongous data sometimes difficult to store and manage. The 2016 JAMB report showed that about 1,503,931 candidates participated in the 2016 Unified Tertiary Matriculation Examination (UTME), conducted by JAMB, while 1,652,825 participated in 2018. Each of these candidates wrote this examination in four subjects chosen from over fifteen different subjects,

depending on the proposed programmes to be offered in the tertiary institutions of interest. Certainly, the accumulation of such quantum of scores for such number of candidates in so many subjects every year no doubt passes for big data; and the accumulation is also on the increase. The tertiary institutions, by law, use these UTME scores to process admissions, and select from the teeming applicants into them. The relevant, perhaps disturbing, question here is: apart from using them for the placement of candidates in the various institutions, what else could these huge volumes of data be used for? What alternative uses are there for government, institutions, researchers, etc.?

Another examination body in Nigeria where big data are generated is the West Africa Examinations Council (WAEC). The body runs two examinations every year, one for internal (in-school) candidates in March/April, and the other for external (out-of-school) candidates in January/February. The two examinations are conducted in virtually all the school subjects. More than one million in-school candidates, and more than ten thousand out-of-school candidates, write the Senior School Certificate Examinations (SSCE), as the examinations are so called, during the March/April and January/February examination periods respectively. Each candidate writes the examination in at least eight subjects. In releasing the results from these examinations, the Council usually gives a breakdown analysis of the comparative performance of the various States in the country, and the candidates' performance subject-by subject, among other statistics. It is to be imagined the quantum of Big Data that WAEC generates every year for each candidate, school, subject, State, and for the nation at large. The rhetorical question also follows: beyond the usual use of the results of these examinations for certification, and, perhaps,

for placement in higher educational institutions, could there be any other alternative purposes that these big data from WAEC could serve?

With similar mandate as WAEC, the National Examinations Council (NECO), exclusively owned by the government of Nigeria, conducts two Senior School Certificate Examinations (SSCE) in the country. For the statistics on the June/July 2017 examination (which is for in-school candidates), a total of 1,051,472 candidates sat for the examinations in Nigeria and other countries. The November/December out-of-school examination of the Council also records more than ten thousand candidates every year. Candidates in each of these examinations also write the examination in at least eight subjects. NECO also conducts National Common Entrance Examinations (NCEE) into Unity Schools in the country. She also conducts Basic Education Certificate Examination (BECE) for graduating students of Basic Education (Junior Secondary schools). Again, it is to be imagined the quantum of data generated by NECO every year. Again, the questions props up: beyond these primary uses of the big data generated by NECO, can there be other alternative uses?

National Business and Technical Examinations Board (NABTEB), another public examination body in Nigeria, is charged with the responsibility of conducting examination on business and technical subjects in business-related and technical-related subjects for in-school candidates in technical-oriented colleges in Nigeria. Every year, the Board registers over 40,000 candidates (45,088 in 2017) for the National Business Certificate/National Technical Certificate examinations in over fifteen technical/business/craft subjects, and candidates write the examinations in their chosen subjects at Ordinary Craft and Master Craft levels. Like its counterparts (WAEC &

NECO), NABTEB generates large volumes of (big) data every year. Beyond the primary purposes of the results from NABTEB-conducted examinations, which are largely certification and placement, can these data volumes serve other worthy purposes?

## **PROPOSED ALTERNATIVE USES**

From the legion of data rolled out as generated by various examination bodies in Nigeria, we can honestly propose that, apart from extracting candidates' scores to be announced or presented to the candidates as "pass" or "fail", and issuing certificates in that direction, the big data generated by these examination bodies could be used for other purposes to improve the education system and critical educational policies. Big Data analytics in education can be transformative, altering the existing processes of administration, teaching, learning, academic work, contributing to policy and practice outcomes and helping to address contemporary challenges facing education. The utilization of Big Data depends on the application of a particular data model (whether it is descriptive, relational or predictive), and the utility of each leads to better decision making. Some of these alternative uses are:

### **PREDICTION OF PERFORMANCE**

The predictive analysis of the pool of big data generated by examination bodies as presented in line with their core mandate can provide institutions with better decisions and actionable insights based on data. Predictive analytics aims at estimating likelihood of future events by looking into trends and identifying associations about related issues and identifying any risks or opportunities in the future. By so doing, researchers and the examination bodies could reveal hidden relationships in data that might not be obvious by

merely presenting candidates' results at the end of each examination (Ben, 2014). It can also be used to look at candidates' projection which may be useful for policy and infrastructural development to cope with the growing trend as may be found from the data. It can help teachers look at predicted pass rate for a particular subject and content in the examination and also directly link such with geographical location for instance. Several predictions and projections could emerge from big data analysis of the examination bodies if properly harnessed.

### **DESCRIPTION OF OUTCOMES**

The descriptive analysis of big data generated by examination bodies, like any other descriptive analytics, aims at describing and analyzing historical data collected on candidates, teaching, research, policies and other administrative processes of the bodies. In doing so, the examination bodies can identify patterns from samples to report on current trends such as candidates' enrollment trends, rate and taxonomy of examination malpractice, performance trends according to subjects, location, gender, and general progressions into higher degrees. This could also provide the bodies with an opportunity to analyse transactional and interactional data about teaching, learning and research to identify discernible trends and patterns that are likely to trigger important dialogue on current and future issues (Ben, 2014).

### **PRESCRIPTION OF COURSE OF ACTION**

Prescriptive analysis using big data technique will help examination bodies assess their current situations and make informed choices on alternative course of events based on valid and consistent predictions. They can check their items, examination procedures, process of scoring and interpretation, and finally result presentation to the public to

determine what better they can do to improve the system. This will combine analytical outcomes from both descriptive and predictive models to look at assessing and determining new ways to operate to achieve desirable outcomes while balancing constraints in their administration (Ben, 2014). According to Basu (2013), prescriptive analysis of big data enables decision makers to look into the future of their mission's critical processes and see the opportunities (and issues) as well as presents the best course of action to take advantage of that foresight in a timely manner.

### **Creation of National Data Bank – Proposal**

It is the proposal in this Paper for the establishment of National data Bank where the Big data generated by the nation's examination bodies could be fed into for storage, management, processing and retrieval when necessary. Most of the examination bodies are owned by the federal government of Nigeria; thus, they are agents of government, and therefore agents of the State. The data they generate in the course of executing their mandate are by-products for the State. A National Data Bank, established, funded and managed by government through an agent would serve as a national repository of vital information/data of significant and strategic portion of the country's population, the youths. With data on NCEE, BECE and SSCE from NECO, data on SSCE from WAEC, and data on UTME from JAMB, the nation will be blessed with a repository of longitudinal information on more than 80% of the youth bracket of our population. This is so because almost every youth in Secondary (High) school (some of whom entered the school through NCEE) would normally write SSCE conducted by WAEC or NECO, or write both, and a substantial percentage of these do write UTME of JAMB. The Management of the bank, through a mandate by government, can integrate this quantum

of Big data to discover and predict patterns or trends for individuals, communities, States geo-political Zones, schools, institutions and the entire Nation State. Data in such national bank could be regressed and triangulated for individuals across time and used for intelligence mapping and personality mapping and integrated academic and personality profiles. Analyses and projections from the Big data in the proposed bank can also bring about educational growth and development patterns, provide input for curriculum planning and development, make rational estimates of the voting strength of the youths, and many other analytics and projectiles from the bank for the good of the Nation generally, and the educational system in particular.

### **Conclusion and recommendations**

The evolution of Big Data as a concept, and the attention it is attracting in the research community is really phenomenal. Characteristics and potentials of Big data are really fascinating. Operations of examination bodies in Nigeria show clearly that they have been generating big data year in, year out for their own consumption and usage. Apart from serving the primary purposes of certification and facilitating placement in higher educational institutions in the nations, the big data generated and accumulated by examination purposes can serve other worthy purposes if well harnessed and channeled through a national data bank. Based, on this conclusion, the following recommendations are proffered:

- (i) Examination bodies in Nigeria should build capacity among their staff members on how to make more effective use of the big data they are generating.

- (ii) The leadership of Nigerian nation should harness all the resources and potentials in the quantum of big data generated by examination bodies by establishing National Data Bank for the storage, management and retrieval of such data.
- (iii) Universities, research institutions and such bodies should build capacity and stimulate their staff's and students' interests in research into Big Data.

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