Journal of Centre for Distance & e-Learning
(JCDeL), Vol. 3, No. 1, 2024
ISSN: 1595-5362
https://cdeljournal.unn.edu.ng

BIG DATA ANALYSIS IN EDUCATIONAL MEASUREMENT: EDUCATORS' INSIGHT

Nnaji, A.D.[1], Ibrahim, Y.[2], Ugwuanyi, C.S.[3], Agah, J.J.[4] & Madu, B.C.[5]
Department of Science Education, University of Nigeria, Nsukka
Corresponding Author: ***Nnaji, A. D.*** *anayo.nnaji.92400@unn.edu.ng*
https://orcid.org/0009-0002-1635-7525

Abstract

Big data analysis in measurement of educational constructs is paramount in the academic environment, especially since a wide range of data forms can be obtained in a single measure of students' achievement. To this end, the present study sought to assess teachers' awareness, application and challenges in implementing big data analysis in educational measurement. The researchers adopted a descriptive survey research design for the study. Three research questions were addressed in the study. The population of the study was 128 lecturers from Kaduna State College of Education, from which a sample of 125 lecturers were drawn for the study using a multistage sampling procedure. The instrument for data collection was titled "Big Data Awareness, Application and Challenges in Educational Measurement Questionnaire" (BDAACEMQ). The Cronbach Alpha reliability index of the instrument was 0.81. The result showed that teachers are not aware of the potential benefits of big data analysis in educational measurement as such applying it was rare, also some challenges were identified to impede the implementation of big data analysis in educational measurement. The study concluded that teachers' awareness of the benefits of big data encourages its application in educational measurement, and recommended among others that school administrators should adopt big data analysis to ensure a more reliable educational measurement.

Keywords: *Teachers' Perception, Big Data Analysis, Educational Measurements, Reliability, Digital Technologies, Educational Constructs, Multidimensional Measures*

Introduction

Big data analysis in measurement of educational constructs is paramount in the academic environment, especially since a wide range of data forms can be obtained in a single measure of students' achievement. Most educational measures capture a wide variety and forms of data which hold potentially interesting information that can be useful in estimating the educational value and the overall performance of students in schools. A large amount of data flows in and out of the educational system, and the relevance of such measures cannot be de-emphasized. Big data is one of the many digital technologies alongside cloud computing and artificial intelligence which has crept consistently into the educational sector and holds great potentials for educational measurement. Diebold (2012); and Kvartalnyi (2023) believe that the term "Big Data", credited to John Mashey, in the mid-1990s, summarizes the analysis of the structure, use, extraction and learning of vital information from a data set which cannot be ordinarily handled with traditional software, to help predict tendencies, discover new trends based on the demands of the modern world.

Various scholars have defined big data from a myriad of viewpoints. Mukherjee and Show (2016); Esomonu, Esomonu and Eleje (2020); and Swargiary (2024) defined big data as gargantuan bulk of extensive and complex set of data which overwhelm the capturing and

capacity of traditional data-processing tools. According to Kitchin and McArdle (2016), big data analysis connote sieving of valuable information from enormous quantities of structured, semi-structured and unstructured data created in real-time. This view aligns with the view of Laney cited in Swargiary (2024), who pointed to volume, variety and velocity as the main frame that characterizes such data harvested from real world scenarios for big data analysis. By this, one can deduce that big data analysis encapsulate deductions gleaned from enormous data in real-time available at high speed in a variety of forms and scales. In this study, big data is viewed as an array of large volumes of distinct educational data forms and types available at high-speed request through modern technology devices. Big data analysis connote the application of statistical techniques such as clustering and regression among others to uncover patterns, trends, connections, similarities and associations inherent in large amounts and a variety of data sets from the learning milieu to inform decisions. In classrooms, the conceptualization of big data analysis is that of humongous volume of educational information which can be harnessed from a lump of data sets.

Big data analysis has found usefulness in many walks of life, including the financial sector, business, marketing, manufacturing, healthcare and governance, among others. Due to the huge risk involved in the banking, insurance and securities sector, big data is used to monitor financial market activities, detect banking fraud, minimize money laundering and identify illegal trade activities; this is achieved by analysing customer data based on behaviour on social media, GPS-enabled devices, and CCTV footage, among others (Banu, 2022; Rana, Bansal, & Gupta, 2022; Ellili, et al., 2023; Nobanee and Ellili, 2023). Big data analysis has also been proved effective in the manufacturing industry for operational efficiency (Eastin, Brinson, Doorey & Wilcox, 2016), health and medicine for tracking the history of a disease and patience (Byeon, 2021), crime and fraud detection (Herland, Khoshgoftaar, & Bauder, 2018), governance (Arumugam & Bhargavi, 2019), and education among others. Due to the large volumes of boundless information which teachers have to deal with in the classroom, the analysis of such data becomes a subject of famous concern due to the immense educational benefits such enormous data transactions holds in learning spaces.

In education, the wave of big data has followed the administration of learning and management systems and facilitated the tracking of students' attendance, behaviour, responses to learning activities, and progress, among others. According to Xin, Shu-Jiang, Nan, ChenXu, and Dan (2022), big data involves the recording and storage of various documents and behavioural activities of students by various terminals, to improve the objectivity and authenticity of evaluation and significantly reduce the running costs of the evaluation process. In this way, the progress of each student can be monitored in a more nuanced way to inform learning, promote effective personalized instructions tailored based on information on students' prior knowledge and determine what instructional techniques are more effective for each student. West (2012) already pointed out that big data analysis may overrun dependence on continuous test performances which Oguguo et al. (2024) further highlighted that a large variety of students' information can be mined from already available data from previous tests and those sourced from other internet of things (IOT) devices. Such sources can provide valuable information about students' demographics, specific subjects of interest, aspirations, behavioural classification, and several other variables which can be used to measure students' progress and as well, measure teachers' performance and effectiveness to ensure a pleasant experience for both students and teachers in schools.

The advent of big data technologies has been popularized with many benefits, especially in optimizing education practices, and promises a great help for teachers. With information from big data processing, Aytaç and Bilge (2020) highlighted that teachers can have access to up-to-date training tools that facilitate the choice of appropriate teaching methods and educational models to ensure a smooth content delivery. Big data, according to Oguguo et al. (2024) also provides teachers with informed basis for decision about teaching resources and the best learning environment that will engage students and enhance learning. Macfadyen, Dawson, Pardo and Gaševic (2014) pointed that the collection of educational data helps teachers in educational institutions to understand students' needs and behaviours, and is divisive for adaptive learning. Such data according to Picciano (2014), is used to analyse the environment, performance, motivations and needs of students in order to provide personalized training tailored to students' needs.

The analysis of big data provides teachers with an understanding of students' learning process. Lu (2020) asserts that the analysis of big data allows teachers to keep track of each student's level of progress, and why progress may fail, if not so that appropriate remedial actions can be implemented in real time. The aim is to obtain sufficient information by analysing their performance, identify where they have the greatest difficulties and supply help to overcome such challenges. The analysis of big data provides prompt data and measures which sufficiently addresses the lacuna in the student's learning experiences towards effective target interventions for the adaptive learner, according to Li, Huang, and Zhou (2018). Big data analysis can provide valuable information for understanding behavioural patterns of students by monitoring attendance, and continuously recording students' mood, responses and engagements in academic activities, and performance, among others. According to Khan, Liu, Shakil and Alam (2019), this data can be obtained through various media devices; recording cameras that capture everything that happens in the classroom from different angles, with the aim of capturing the children's facial expressions, speech, vocabulary, gestures, among others. Big data analysis can also provide information for predicting cases of academic and social disorders among students. In this way, teachers, psychologists and educators will be able to act quickly and anticipate a major problems and provide adequate assistance. Furthermore, big data analysis can predict changes in learning patterns, prior to actual occurrence. This informs teachers about each student's situation for early intervention to reduce casualties and drop-out rates.

Such measures are usually multifaceted and possibly hold more information than the scope of the human mind. Educational measurement is an important aspect of pedagogy and a vital means to make sense of educational value to gain insight for evaluating educational endeavors (Nworgu, 2015). Consequently, educational measures are not as specific as the case in measures of physical quantities but a means to quantify a blend of physical qualities, and psychological and educational qualities of a person. Unlike specific physical measures, such as weight, height, and age, educational measures are complicated due to the psychological dimensions, such as intelligence, abilities, and personality which are often inferred, according to Kolluri (2021). Therefore, educational measurements account for different forms of data in a single measure.

Educational measurements have been described as a complex procedure which requires articulating and valuing each dimension of the assessed into a single quantifier. Educational measurement is a product of testing and has existed from ancient times. According to Chikwe (2021), the importance of educational measurement to determine the extent of learners' mastery,

competency, skills, knowledge, and ability against the expected at any level of education to provide evidence for educational decisions. Educational measurement aims to provide insight to students' learning and the associated behavioural changes that have occurred due to instruction, and uncovers the shortcomings of instruction. Ajabor (2023) suggest that most educational measures have previously been largely devoted to the measurement of cognitive learning alone. However, Nworgu (2015) pointed out that an increasing number of educational measures have been devised for other affective educational constructs in relation to achievements; such include attitudes, appreciation, problem-solving, and critical thinking among others. This dimension expands the scope for understanding what educational measurement connotes.

Different scholars have defined educational measurement from their viewpoints, however none has eliminated the place of quantifying academic achievements. According to Nworgu (2015), educational measurement covers efforts geared towards quantifying the efforts of an educational intervention. These efforts can involve a myriad of means and procedures in order to cover what should be assessed. Similarly, James Bradfield cited in Adom, Mensah and Dake (2020); and Kolluri (2021) defined educational measurement as the process of assigning numerical values to whatever is been assessed as a basis for educational accomplishments. Ajabor (2023) defined educational measurement as the paramount educational importance which assigns numerical values to systematically explain educational features. Educational measurement in this study is viewed as the process of assigning number or symbolic weights to quantify students' academic efforts or characteristics on a trait relative to the goals of instruction. It constitute testing, scaling and appraising of the educational process and outcomes, as well as the interpretation of scores.

The data from orthodox measures, in the hands of the teacher may not be encompassing of the complexity of the learning domains due to man's limitations. Although, no single test is omnibus, in principle all important educational outcomes are considered measurable and ought to be measured. An important educational outcome has to make an observable difference, such that under some circumstances, a student who has more of the educational characteristic must behave differently from a student who has less of it (Kolluri, 2021). According to Al-Zou'bi (2021), the large volume of important educational data available from the classroom has necessitated the current era of learning devices which are capable of holding large volumes of data and making the same available through several channels on the Internet of Things (IoT). The analysis of this data can be an effective means for providing insights into educational outcomes that help educators make informed decisions. Moreover, the challenging need to analyze this large volume of data paves the platform for machines to learn from such big data, according to Islam (2019).
Utilizing large complex datasets is increasingly becoming the trend in educational measurements, especially in the current artificial intelligence age, to draw insights for improving student outcomes. The implementation of big data analytics in education involves tools that enable educators and administrators to analyze vast amounts of information derived from student interactions, performance metrics, attendance records, engagement levels, assessments, demographic data and even social media interactions (Lin, Zhou, Wang, & Wang, 2024). These vast amount and dimensions of data require technological tools and software specifically designed for analyzing big data in educational settings and to enhance the efficiency of educational measurements. Platforms like Moodle and Canvas are learning management systems (LMS) which collect extensive data on student interactions with the content of instruction. These LMS track metrics such as time spent on tasks, quiz scores, and participation in discussions. The

data generated in LMS are exposed to data analytics tools such as Tableau and Power BI which allow educators to easily visualize complex patterns in the datasets to inform decisions (Taylor & Charran, 2023). The integration of these tools with LMSs presents a comprehensive view of student performance. Predictive Analytics Software like IBM Watson Education use machine learning algorithms to predict student outcomes based on historical data. This helps identify at-risk students early on so that interventions can be implemented without futile effort. Natural Language Processing (NLP) technologies analyze text-based data from essays or discussion forums to assess student understanding and engagement levels. Generally, these tools provide immediate feedback on student performance as well as other non-cognitive composites of learning through automated grading systems and analytics dashboards (Baig, Shuib & Yadegaridehkordi, 2020). This way, areas needing improvement is highlighted to facilitate formative assessments and further tailor instruction to meet the specific needs of each student based on identified learning patterns (Li & Jiang, 2021). Adaptive learning technologies can typically be used to adjust content delivery based on real-time performance analytics.

Studies on big data for educational purposes appears to be scanty in most developing countries, unlike in the first word countries where technology is more advanced (Lin, Zhou, Wang, & Wang, 2024). Assertive from Oguguo et al. (2024), one can deduce that the essentials of big data anchors on the quality and relevance of the information extracted or mined from such data. However, since data from most educational measurements are multidimensional and capable of inferring other constructs outside the purpose it was designed and collected for, and suits the comprehensive nature of big data, the researcher is concerned about the level of awareness and application of big data in educational measurements. The essential role of big data in education is to provide access to quality data from which information can be extracted to improve the education process and improve educational outcomes. Hence, the study x-rayed the following research questions:

1. To what extent are teachers aware of the potential of big data analysis in educational measurement?
2. To what extent do teachers apply big data analysis in educational measurement?
3. What challenges do teachers face in big data analysis in educational measurement?

Methods

This study adopted the descriptive survey research design. Descriptive survey research design according to Nworgu (2015) is one in which a characteristic is studied on a selected proportion of the population as a representative of the entire population. The study was carried out in Kaduna State College of Education. The college was chosen due to the reliance on consistent paper-and-pencil measurement of students' performance which could have possibly result in the exclusion of some vital students' data that which may tangible for improving learning outcome in the college. The College comprises seven schools, of which five schools have students enrolled in 24 departments. These include: School of Science Education comprises seven departments (Biology, Physics, Chemistry, Mathematics, Physical and Health Education, Integrated Science, and Computer Science); School Art and Social Science Education comprises six departments (Social Studies, Economics, Geography, Christian Religious Knowledge, History and Islamic Studies); School of Languages Education comprises of four departments

(English, Theater Arts, French and Hausa); School of Early Childhood Education and Primary Education Studies comprises three departments (School of Early Childhood Education, Adult Education and Primary Education Studies); School of Vocational Studies comprises four departments (Agricultural Science, Technical Education, Fine Arts and Business Education); while Schools of Education, and General Studies Education provide educational services to students in other departments.

The population of the study was made up of all 182 (96 males and 86 females) lecturers in the Kaduna State College of Education. This population is consisted of 27, 26, 25, 26, 27, 25 and 26 lecturers in School of Science Education, School of Art and Social Science Education, School of Languages Education, School of Early Childhood Education and Primary Education Studies, School of Vocational Studies, School of Education, and School of General Studies Education respectively (Academic Registry Unit, Kaduna State College of Education). The sample size for the study was 125 lecturers in Kaduna State College of Education. Multistage sampling procedure was used to select the 125 lecturers who took part in the study. First, simple random sampling technique was used to draw five Schools from the seven Schools in the college in order to give equal opportunity for each School to be included in the sample. Secondly, disproportionate stratified random sampling technique was used to draw 25 lecturers from each of the five selected Schools in the college (125 lecturers in all).

The instrument for data collection is questionnaire developed by the researchers from literature and titled “Big Data Awareness, Application and Challenges in Educational Measurement Questionnaire” (BDAACEMQ). The questionnaire consists of three clusters with 10 item statements in each cluster (30 item statements in all). All item statements in clusters A and B were rated with a four-point Likert response option (Very High Extent, High Extent, Low Extent and Very Low Extent; rated 4, 3, 2 and 1 respectively for positively worded statements and reversed for negatively worded statements). The item statements in cluster C were also rated with a four-point Likert response option (Strongly Agree, Agree, Disagree and Strongly Disagree; rated 4, 3, 2 and 1 respectively for positively worded statements and reversed for negatively worded statements). The instrument was designed to elicit data to answer the research questions posed in the study. The maximum obtainable score for each respondent was 120, while the minimum obtainable score was 30. The instrument was validated by three experts and the reliability of the instrument was determined through Cronbach Alpha reliability index to be 0.81 for overall and 0.78, 0.83 and 0.87 for clusters A, B and C respectively, after pilot testing. The questionnaire was distributed by five research assistants who were briefed prior to the study about the purpose and modalities of the study to ensure uniformity. The administration of the instrument followed the consent of the deans of the sampled schools to proceed with the study, and retrieved after completion for data analysis. The data from the study was analysed using mean and standard deviation obtained from SPSS v.25. A criterion mean of 2.50 was adopted to interpret the output from the analysis, as the mean of the response options.

Results

Findings from the analysis of collected data are presented in tables in line with the research questions posed to guide the study.

Research question one: To what extent are teachers aware of the potential of big data analysis in educational measurement?

Table 1: ***Extent to which Teachers are Aware of the Potentials of Big Data Analysis in Educational Measurement***

S/N	Item Statement	N	$\bar{X}$	SD	Decision
1.	I am familiar with big data analysis in educational measurements.	125	2.17	1.08	Low Extent
2.	I have attended professional development sessions on big data analysis in educational assessment.	125	2.44	1.03	Low Extent
3.	I read research articles that demonstrate the potential benefits of using big data analysis in educational measurements.	125	2.54	1.28	High Extent
4.	I have learned to apply big data analysis tools in measuring students' progress in the classroom.	125	2.48	1.09	Low Extent
5.	I am aware that big data analysis can improve the accuracy of educational measures.	125	2.46	1.10	Low Extent
6.	Educational measures are more reliable with the analysis of big data.	125	2.31	1.08	Low Extent
7.	I collaborate with big data analysts to understand potential benefits of educational measurements.	125	2.26	0.99	Low Extent
8.	Measuring educational constructs using big data analysis can diagnose students' learning challenges.	125	2.49	1.06	Low Extent
9.	Big data analysis evolves the role of teachers in measuring educational constructs.	125	2.52	0.79	High Extent
10.	Big data analysis enhances teachers' capability in measuring educational constructs.	125	2.58	0.81	High Extent
Cluster Mean		**125**	**2.42**	**0.38**	**Low Extent**

Key: $\bar{X}$ *= Mean, SD = Standard Deviation*

The result in Table 1 shows that teachers are aware of the potentials of big data analysis in educational measurement to a low extent judging from the obtained cluster mean of 2.24 which is below the benchmark mean of 2.50. The standard deviation of 0.38 is low indicating a

low level of variation in the responses of lecturers implying that most lecturers are aware of the potentials of big data analysis in educational measurement only to a low extent. However, responses show a high extent of lecturers reading research articles that demonstrate the potential benefits of using big data analysis in educational measurement ($\bar{X}$ = 2.54, SD = 1.28), big data analysis evolves the role of teachers in measuring educational constructs ($\bar{X}$ = 2.52, SD = 0.79), and the role of big data analysis in enhancing teachers' capability in measuring educational constructs ($\bar{X}$ = 2.58, SD = 0.81). More so, the least of the mean responses in the first cluster was noted with teachers' familiarity with big data analysis in educational measurements ($\bar{X}$ = 2.17, SD = 1.08).

Research question two: To what extent do teachers apply big data analysis in educational measurement?

Table 2: ***Extent to which Teachers Apply Big Data Analysis in Educational Measurement***

S/N	Item Statement	N	$\bar{X}$	SD	Decision
1.	I incorporate big data analysis into my lesson plan to inform instructional support.	125	2.34	0.95	Low Extent
2.	I am able to analyze big data for improving students' learning.	125	2.58	1.17	High Extent
3.	I collaborate with school administrators and other teachers to interpret results of big data analysis for improving measurements of educational constructs.	125	2.07	1.14	Low Extent
4.	I track students' progress using evidence from big data analysis.	125	2.10	1.04	Low Extent
5.	I have implemented interventions based on insights from educational big data.	125	2.50	1.15	High Extent
6.	I use information from big data to identify students' learning trends for improved instruction.	125	2.80	0.61	High Extent
7.	I ensure the safety of information derived from big data analysis in the classroom.	125	2.54	0.95	High Extent
8.	I communicate big data findings to students, parents and other educational stakeholders.	125	2.06	1.03	Low Extent
9.	I apply the findings of big data analysis to interpret educational measures.	125	2.46	0.93	Low Extent
10.	I use information from big data analysis to increase the confidence in educational measurements	125	1.96	1.06	Very Low Extent
Cluster Mean		**125**	**2.34**	**0.31**	**Low Extent**

Key: *$\bar{X}$ = Mean, SD = Standard Deviation*

The result in Table 2 shows that teachers apply big data analysis in educational measurement to a low extent judging from the obtained cluster mean of 2.34 which is below the benchmark mean of 2.50. The standard deviation of 0.31 is low indicating a low level of variation in the responses of lecturers implying that most lecturers apply big data analysis in educational measurement only to a low extent. However, responses show a high extent of lecturers being able to analyze big data for improving students' learning ($\bar{X}$ = 2.58, SD = 1.17), implemented interventions based on insights from educational big data ($\bar{X}$ = 2.50, SD = 1.15), use information from big data to identify students' learning trends for improved instruction ($\bar{X}$ = 2.80, SD = 0.61), and ensure the safety of information derived from big data analysis in the classroom ($\bar{X}$ = 2.54, SD = 0.95). More so, the least of the mean responses in the cluster was noted with teachers' use of information from big data analysis to increase the confidence in educational measurements ($\bar{X}$ = 1.96, SD = 1.06), which pointed to a very low extent based on the mean score recorded.

Research question three: What challenges do teachers face in big data analysis in educational measurement?

Table 3: ***Challenges Teachers Face in Big Data Analysis in Educational Measurement***

S/N	Item Statement	N	$\bar{X}$	SD	Decision
1.	Big data analysis software is expensive to access.	125	2.53	1.14	Agree
2.	Unstable internet services confound access to big data for educational measures.	125	2.86	0.46	Agree
3.	Internet data subscriptions required to download big data for analysis of educational measures are expensive.	125	2.72	0.74	Agree
4.	It is challenging to justify inferences on current educational measures from previously stored records of big data.	125	2.69	0.56	Agree
5.	The complexities of using different data sources and formats for big data analysis in educational measurement require special technological training and expertise.	125	2.71	0.74	Agree
6.	Technological gadgets used for big data analysis are expensive.	125	2.64	0.60	Agree
7.	Authenticating the source of data used for big data analysis can be challenging.	125	2.86	0.51	Agree
8.	Ethical concerns and data privacy issues are serious problems for big data analysis in educational measurements.	125	2.98	0.48	Agree
9.	Lack of facilities for storage and handling of big data confound the implementation of big data analysis in educational measurements.	125	2.83	0.53	Agree
10.	The outcome of big data analysis may not align with curriculum standards and learning objectives.	125	2.90	0.48	Agree
Cluster Mean		**125**	**2.77**	**0.23**	**Agree**

Key: *$\bar{X}$ = Mean, SD = Standard Deviation*

The result in table 3 shows that teachers agree with the challenges of implementing big data analysis in educational measurement judging from the obtained cluster mean of 2.77 which is above the benchmark mean of 2.50. The standard deviation of 0.23 is low indicating a low level of variation in the responses of lecturers implying that most lecturers agree with the challenges of implementing big data analysis in educational measurement. However, responses show that lecturers agree more that "ethical concerns and data privacy issues are serious problems for big data analysis in educational measurements" ($\bar{X}$ = 2.98, SD = 0.48). More so, the least of the mean responses in the cluster was noted that "technological gadgets used for big data analysis are expensive" ($\bar{X}$ = 2.64, SD = 0.60). However, the highest deviation in the cluster was noted that "big data analysis software is expensive to access" ($\bar{X}$ = 2.53, SD = 1.14).

Discussion of Findings

The findings show that teachers in the college of education are not aware of the potentials of big data analysis in educational measurements. Strengthened by the low deviation in the responses pointed to the fact that they may have been misinformed on the potentials of big data analysis in educational measurements. This may be so due to the low emphasis on digital technologies in measuring educational constructs in our schools. This may also have been plausible due to the poor funding of teacher education programmes in the country which has miscued world best practices in educational measurements from being adopted in teacher education in colleges of education. The findings of this study brings to bare the findings of Abtew and Endebu (2023) that big data analytics has the potential to improve teacher training. Also, the findings of the study agrees with Kim, Byeon, Kim, Cho and Lee (2020); Amadosi (2021); Xin, Shu-Jiang, Nan, ChenXu and Dan (2022); and Nobanee and Ellili (2023), to the extent that the awareness of the potentials of big data analysis is key to its crave for application, especially in the sense of educational measurement.

The findings of this study also shows that teachers in the College of Education rarely apply big data analysis in educational measurements. This is buttressed by the low deviation in the responses which indicates that teachers are not motivated to indulge in big data analysis in educational measurements, due to low incentives and support for acquiring the required big data facilities. This may be so due to the low tone of policies that encourage the measurement of educational constructs in our schools based on big data. Also, ethical and privacy concerns in the study area might be among the factors that limit the application of big data analysis in educational measurements, since it is cultural to conceal private information of individuals in the region. The findings of this study align with the findings of Li, Huang and Zhou (2018); Khan, Liu, Shakil and Alam (2019); Aytaç and Bilge (2020); and Lu (2020), to the extent that the application of big data analysis is essential to encourage its application in educational measurement.

The findings show that teachers face some challenges in implementing big data analysis in educational measurements. The low deviation in the responses pointed to the fact that there is wide consensus in teachers' perception on the challenges teachers face in implementing big data analysis in educational measurements. This may be so because implementing big data analysis in measuring educational constructs in schools requires a commitment of finances to purchase the required software and technological devices required for the analysis of big data in the measurement of educational constructs. The poor funding of the educational sector among others

in the country may be another plausible reason why the findings of this study turned out so. The findings of this study are in line with the findings of Fan, Han and Liu (2013); Rawat and Yadav (2021); Jornitz, et al (2021), who identified challenges associated with the implementation of big data analysis in educational measurement.

Contribution to Knowledge and Educational Implication

The findings of this study show that college of education teachers are scantily aware of the potential benefits of big data analysis and scantily apply it in educational measurement. This points to the need for more targeted efforts in raising the awareness of teachers in colleges of education on the potential benefits of integrating big data analysis in educational measurement. This will equip teachers with the necessary information on the essence and skills of applying big data analysis in educational measurement. Also, the findings of the study highlights challenges which may impede teachers' capacity in implementing big data analysis in measuring educational constructs in the classroom. When such challenges are well managed and the teachers well informed and encouraged, big data analysis is likely to positively affect the reliability and validity of educational measurement.

Conclusion and Recommendations

Measurement of educational constructs is a paramount aspect of educational transactions. It is a means by which evidence of achievement is collected and weighed against predetermined goals. However, teachers require appropriate information to raise their awareness about the potential benefits of big data analysis in educational measurement. Likewise, the awareness will strengthen a need for application of big data analysis in educational measurement. Big data analysis is highlighted to hold huge prospect for the improvement of the quality of educational measures. In conclusion, the findings of this study show that teachers are sparingly aware of the potentials of big data analysis in educational measurement, and rarely apply big data analysis in educational measurement. However, teachers have been found to face challenges with the implementation of big data analysis in educational measurement. To achieve the objectives of educational measurement, teachers have to be supported to indulge in big data analysis in educational measurement. Based on the findings of the study, it is recommended that:

1. School administrators should organize in-service trainings for teachers on the potential benefits of big data analysis in educational measurement.
2. School administrators should furnish their schools with big data facilities and tools to help teachers apply big data analysis in educational measurement.
3. The government should support in subsidizing internet data subscription costs and provide big data devices for the purpose of facilitating the application of big data in educational measurement in schools.
4. The government should organize general awareness campaigns in schools to sensitize students, teachers and educational stakeholders on the role, benefits and challenges of big data analysis in educational measurements.
5. Educational policy makers should consider developing policies that address ethical concerns and data privacy issues as it pertains to big data analysis in educational measurements.

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