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TEACHERS' KNOWLEDGE OF BIG DATA APPLICATION AS CORRELATE OF THEIR CLASSROOM ASSESSMENT PRACTICES IN SECONDARY SCHOOLS

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Abstract

The study examined teachers' knowledge of big data application as correlate of their classroom assessment practices in secondary schools. The study adopted correlational research design. The sample of the study comprises of 209 teachers drawn from 1,241 teachers in Nsukka Education zone of Enugu state through simple random sampling by balloting with replacement. The 1,241 teachers were obtained from the 110 registered secondary schools in Nsukka education zone out of with 30 (10 private and 10 public) schools were randomly sampled. Teachers Knowledge of Big Data Questionnaire (TKBDQ) and Classroom Assessment Practice Questionnaire (CAPQ) were used for data collection. Each of the instruments was made up of 25 items. The TKBDQ elicited information of teachers' knowledge of Big Data while the CAPQ elicited information on teachers' classroom assessment practices. The instruments were validated by three experts in Measurement and Evaluation from University of Nigeria, Nsukka. The instruments were administered to the teachers and were collected immediately through direct delivery technique. The first research question was answered using linear regression analysis while research questions 2, 3, and 4 were analyzed using multiple regression. Hypothesis one was tested using t-test while hypotheses 2 and 3were tested using the t value for interaction obtained from Hayes Process Macro. Hypothesis 4 was also tested using the f value obtained from Hayes Process Macro, all at 0.05 level of significance. The findings of the study show that there is a significant, high and positive (.840) relationship between teachers' knowledge of big data application and their classroom assessment practice. Gender, school type and teachers' area of specialization does not significantly moderate the relationship between teachers' knowledge of big data application and their classroom assessment practice. The following recommendations were made among others; teachers should be furnished with students' data from the admission records so that they can tailor their teaching and assessment processes to improve the students' academic achievement. Teachers should be furnished with the data regarding students' performances from the first day in school, this will enable them understand the areas of students' strengths and areas of possible improvements.

Key words: Assessment, Big Data, Classroom Assessment Practices, Gender, School type and Teachers Area of specialization

Introduction

One of the fundamental principles of assessment is the need for ongoing, systematic collection of meaningful data from a variety of sources which will help in creating a comprehensive assessment plan. This can be possible by using valuable and efficient sources of meaningful assessment data within academic programs. Nazar (2022) identified various types of data to be considered include formative and summative; qualitative and quantitative; direct and indirect; and performance-based, perceptual and demographic. The assessment of student learning should be assessed during the course or the curriculum (formative assessments) as well as at the end of the course or curriculum (summative assessments). In the educational world, the shift from summative assessment to formative assessment to inform and modify teaching and learning process becomes imperative (Sorensen, 2018); hence large amount of data concerning students are required from various sources to achieve this target. Big data provides this opportunity for researchers and educational stakeholders.

Big data play significant role in the ongoing educational revolution in the world. It is a field of study in which data scientists and engineers analyze data structure, learn and use massive data that traditional software cannot cope with (Esomonu, Esomonu & Eleje, 2020). Extracting necessary information from large data sets industries predicts tendencies, learn human behaviour and make better decisions or create new solutions to satisfy the demands of the modern world (Nazar, 2022). This revolution has enabled educationists to revisit the traditional educational imperative. This implies a rethinking of such assessment procedures that would enable them gather data from the classroom interaction of students, teachers learning materials and the learning environment as a whole and the operation of Big Data in education is about in-depth analytics of the educational system. This includes the measurement, collection, analysis, and presentation of structured and unstructured data of huge volumes about students and the educational environment. Such insights help understand the most relevant features of the functioning and development of the learning system (De Mauro, Greco, & Grimaldi, 2013).

With the effect of corona virus pandemic, remote learning has gained a widespread of learners. The traffic of online courses growing exponentially, people goggle e-learning, students' install software to do their homework and have it checked online. Nowadays, any kind of information can be kept in the cloud storage and the amount of digital information is growing at unbelievable speed. It is estimated that by the year 2025, there will be 163 xetta bytes of data. Several studies have been carried out on the significant roles of big data in education assessment, Bamiah, Brohi and Rad (2018) provided an in-depth view of big data technology, advantages, implications and challenges in the educational assessment. The study presented that big data is useful in analyzing, detecting and predicting learners' behaviour, risk failures and result to improved learning outcome as well as ensures high quality academic programmes. Tulasi (2013) assessed the significance of big data in higher education and reported that the value of big data in education is a reformation adventure and it improves teaching and learning processes. Esomonu, Esomonu and Eleje (2020) assessed big data in Nigeria: identification, generation, and processing in the opinion of the experts. The study reported that there is a major problem in generating and processing big data and there is a low awareness of experts on the need for big data in

assessment. Alghamdi and Alghamdi (2019) carried out a study on enhancing performance and educational data using Big Data and Hadoop. The study reported that big data with Hadoop provides effective results in education industry. Archana and Kishore (2018) assessed the role of big data in education sector and reported that educational institutions are yet to utilize big data to the maximum possible extent.

The aim of the study was to determine teachers' knowledge of big data application as correlate of their classroom assessment practices in secondary schools. The specific objectives of the study were to determine;

1. the relationship between the knowledge of big data application and teachers' classroom assessment practice?
2. the relationship between the knowledge of big data application and teachers' classroom assessment practice as moderated by gender?
3. the relationship between the knowledge of big data application and teachers' classroom assessment practice as moderated by school type?
4. the relationship between the knowledge of big data application and teachers' classroom assessment practice as moderated by area of specialization?

The study was guided by the following research questions:

1. What is the relationship between the knowledge of big data application and teachers' classroom assessment practice?
2. What is the influence of gender on the relationship between the knowledge of big data application and teachers' classroom assessment practice?
3. What is the influence of school type on the relationship between the knowledge of big data application and teachers' classroom assessment practice?
4. What is the influence of area of specialization on the relationship between the knowledge of big data application and teachers' classroom assessment practice?

The following hypotheses were tested at 0.5 level of significance:

1. There is no significant relationship between the knowledge of big data application and teachers' classroom assessment practice.
2. There is no significant influence of gender on the relationship between the knowledge of big data application and teachers' classroom assessment practice
3. There is no significant influence of school type on the relationship between the knowledge of big data application and teachers' classroom assessment practice
4. There is no significant influence of area of specialization on the relationship between the knowledge of big data application and teachers' classroom assessment practice.

METHODOLOGY

The study adopted correlational research design. Correlational research design according to Nworgu (2018) is a type of research design that seeks to establish the relationship among variables in a study. This design is suitable for the study is suitable for the study because the study established the relationship between teachers' knowledge of big data application and their classroom assessment practices in secondary schools. The sample of the study comprises of 209 teachers drawn from 1,241 teachers in Nsukka Education zone

of Enugu state through simple random sampling by balloting with replacement. The 1,241 teachers were obtained from the 110 registered secondary schools in Nsukka education zone out of with 30 (10 private and 10 public) schools were sampled. Teachers Knowledge of Big Data Questionnaire (TKBDQ) and Classroom Assessment Practice Questionnaire (CAPQ) were used for data collection. Each of the instruments was made up of 25 items.

The TKBDQ elicited information of teachers' knowledge of Big Data while the CAPQ elicited information on teachers' classroom assessment practices. The instruments were validated by three experts in Measurement and Evaluation from the department of science education, University of Nigeria, Nsukka. Reliability coefficient of 0.87 and 0.92 were obtained for the TKBDQ and CAPQ respectively using Cronbach alpha reliability estimate. The researcher took an official permission from the school heads and scheduled time for staff meeting in which at the end of the meeting, the instruments were administered to the teachers and were collected immediately through direct delivery technique. The first research question was answered using linear regression analysis while research questions 2, 3, and 4 were analysed using multiple regression. Hypothesis one was tested using t-test while hypotheses 2 and 3were tested using the t value for interaction obtained from Hayes Process Macro. Hypothesis 4 was also tested using the f value obtained from Hayes Process Macro, all at 0.05 level of significance.

RESULTS

Research Question One

What is the relationship between teachers' knowledge of big data application and their classroom assessment practice?

Table 1: regression analysis of the relationship between the knowledge of big data application and teachers' classroom assessment practice

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	t	Sig
1	.840[a]	.705	.704	8.72326	22.264	0.000

The result in table 1 shows that the correlation coefficient (R) of .840 was obtained for the relationship between teachers' knowledge of big data application and their classroom assessment practice. The result shows that there was a high and positive relationship between teachers' knowledge of big data application and their classroom assessment practice. Coefficient of determination (R^2) of .705 was obtained, which means that 71% of the classroom assessment practice of secondary school teachers was due to their knowledge of Big Data application. The result also shows that a t-value of 22.264 with an associated probability value of .000 was obtained. The associated probability value of .000 is less than 0.05 level of significance set as benchmark for taking decision. This is an indication that there is a significant relationship between the teachers' knowledge of big data application and their classroom assessment practice.

Research Question Two

What is the influence of gender on the relationship between the teachers' knowledge of big data application and their classroom assessment practice as moderated by gender?

Table 2: regression analysis of the influence of gender on the relationship between the knowledge of big data application and teachers' classroom assessment practice

R	R Square	Std Error	T	p-value
.840	.706	.081	.292	.770

The result in table 2 shows that the correlation coefficient (R) of .840 was obtained for the influence of gender on the on the relationship between teachers' knowledge of Big Data application and their classroom assessment practice. The result shows that there was a high and positive relationship between teachers' knowledge of big data application and their classroom assessment practice as moderated by gender. Coefficient of determination (R^2) of .706 was obtained, which means that 71% of the classroom assessment practice of secondary school teachers was due to their knowledge of Big Data application. The result also shows that a t-value of 2.292 with an associated probability value of .770 was obtained. The associated probability value of .770 is greater than 0.05 level of significance set as benchmark for taking decision. This is an indication that there is no significant relationship between teachers' knowledge of big data application and their classroom assessment practice as moderated by gender

Research Question Three

What is the influence of school type on the relationship between the knowledge of big data application and teachers' classroom assessment practice?

Table 3: regression analysis of the influence of school type on the relationship between the knowledge of big data application and teachers' classroom assessment practice

R	R Square	Std Error	t	p-value
.840	.706	.083	-0.11	.992

The result in table 3 shows that the correlation coefficient (R) of .840 was obtained for the influence of school type on the relationship between teachers' knowledge of Big Data application and their classroom assessment practice as moderated by school type. The result shows that there was a high and positive relationship between teachers' knowledge of big data application and their classroom assessment practice as moderated by school type. Coefficient of determination (R^2) of .706 was obtained, which means that 71% of the classroom assessment practice of secondary school teachers was due to their knowledge of Big Data application. The result also shows that a t-value of -0.11 with an associated probability value of .992 was obtained. The associated probability value of .992 is greater than 0.05 level of significance set as benchmark for taking decision. This is an indication that there is no significant relationship between teachers' knowledge of big data application and their classroom assessment practice as moderated by school type.

Research Question Four

What is the influence of area of specialization on the relationship between the knowledge of big data application and teachers' classroom assessment practice?

Table 4: regression analysis of the influence of area of specialization on the relationship between the knowledge of big data application and teachers' classroom assessment practice

R	R Square	Std Error	F	p-value
.841	.707	.060	164.541	.602

The result in table 4 shows that the correlation coefficient (R) of .841 was obtained for the influence of area of specialization on the relationship between teachers' knowledge of Big Data application and their classroom assessment practice. The result shows that there was a high and positive relationship between teachers' knowledge of big data application and their classroom assessment practice as moderated by teachers' area of specialization. Coefficient of determination (R^2) of .707 was obtained, which means that 71% of the classroom assessment practice of secondary school teachers was due to their knowledge of Big Data application. The result also shows that an F-value of 164.541 with an associated probability value of .602 was obtained. The associated probability value of .602 is greater than 0.05 level of significance set as benchmark for taking decision. This is an indication that there is no significant relationship between teachers' knowledge of big data application and their classroom assessment practice as moderated by teachers' area of specialization.

Discussion of Findings

The result of the findings shows that there was a high and positive relationship between teachers' knowledge of big data application and their classroom assessment practice, there is a significant relationship between the teachers' knowledge of big data application and their classroom assessment practice. The study further revealed that there was a high and positive relationship between teachers' knowledge of big data application and their classroom assessment practice as moderated by gender, school type and teachers' area of specialization and there is no significant relationship between teachers' knowledge of big data application and their classroom assessment practice as moderated by gender, school type and teachers' area of specialization. The findings of the study are in agreement with the findings of Bamiah, Brohi and Rad (2018) that big data is useful in analyzing, detecting and predicting learners' behaviour, risk failures and result to improved learning outcome as well as ensures high quality academic achievement. The study also agrees with the report of Tulasi (2013) that the value of big data in education is a reformation adventure and it improves teaching and learning processes. The study is also in concordance with the report of Esomonu, Esomonu and Eleje (2020) reported that there is a major problem in generating and processing big data and there is a low awareness of experts on the need for big data in assessment.

Conclusion

Based on the results of the study, it was concluded that there is a significant, high and positive relationship between teachers' knowledge of big data application and their classroom assessment practice. Gender, school type and teachers' area of specialization does not significantly moderate the relationship between teachers' knowledge of big data application and their classroom assessment practice.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. Teachers should be furnished with students' data from the admission records so that they can tailor their teaching and assessment processes to improve the students' academic achievement.
2. Teachers should be furnished with the data regarding students' performances from the first day in school, this will enable them understand the areas of students' strengths and areas of possible improvements.
3. There should be proper documentation of students' qualitative and quantitative data, which will provide overall information for understanding the students' characteristics and how they learn best.

References

Achara, R. P. N., & Kishore, B. (2018). Role of big data in education sector: A review. *International Journal of Advances in Science Engineering and Technology, 6*(1), 121-123.

Bamiah, M. A., Brohi, S.N., & Rad, B.B. (2018). Big Data Technology in Education: Advantages, implementations, and challenge

Black, P., &Wiliam, D. (2018). *Classroom assessment and pedagogy. Assessment in Education:*
Principles, Policy and Practice, 25(6), 551–575.
https://doi.org/10.1080/0969594X.2018.1441807

De Mauro, A., Greco, M., & Grimaldi, M. (2016). A formal definition of Big Data based on its essential features. *Library Review*.

Demchenko Y, Grosso P, de Laat C, Membrey P. (2013) Addressing Big Data issues in scientific data infra- structure. *In International conference on collaboration technologies and systems (CTS)*. IEEE Computer Society.

Eme, I. O., & Anyadike, N. (2013). *Security challenges and security votes in Nigeria 2008-2013 Kuwait Chapter of Arabian Journal of Business and Management Review. 2*(8), 20-32.

Esomonu, N. P. M., Esomonu, M. N., & Eleje, L. I. (2020). Assessment big data in Nigeria: identification, generation and processing in the opinion of the experts. *International Journal of Evaluation and Research in Education, 9(*2), 345-351.

I. C. Achumba, Ighomereho, M. O. Akpor-Robaro (2013). Security, *Challenges in Nigeria and the implication for business activities and sustainable development. Journal of Economics and Sustainable Development, volume 4,* issue 2Posted: 2013

Mikalef, P., Pappas, I. O., Krogstie, J., & Giannakos, M. (2018). Big data analytics capabilities: a systematic literature review and research agenda. *Information Systems and e-Business Management*, *16*(3), 547-578.

Nazar, K. (2022). Use of Big data in Education Industry: History, Benefits and Examples. Retrieved from: https://inoxoft.com/blog/impact-of-big-data-on-education-history-benefits-and-examples/

Nworgu, B. G. (2015). *Educational measurement and evaluation: Theory and practice (2nd ed.)*. Nsukka: University Trust Publishers

Saggi, M. K. and Jain, S., 2018. A survey towards an integration of big data analytics to big insights for value-creation. *Information Processing and Management*, 54 (5), 758-

790.

Sorensen, A. (2018). Planning History and Theory: Institutions, comparison, and temporal processes. In C. Hein (Ed.), *Routledge Handbook of Planning History*. London, New York: Routlege.

Tulasi, B. (2013). Significance of big data and analytics in higher education. *International Journal of Computer Applications,68*(14), 21–23. https://doi.org/10.5120/11648-7142.

Xu, L. D. & Duan, L. (2019). Big data for cyber physical systems in industry 4.0: A survey. *Enterprise Information System, 13*(1), 1-22. DOI: 10.1080/17517575.2018.1442934

Yassine, A., Singh, S., Hossain, M. S., & Muhammad, G. (2019). IoT big data analytics for smart homes with fog and cloud computing. *Future Generation Computer Systems*, *91*, 563-573.

Zheng, M., & Bender, D. (2019). Evaluating outcomes of computer-based classroom testing: Student acceptance and impact on learning and exam performance. *Medical Teacher, 41*(1), 75–82.