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Impact of E-Learning on College of Education Lecturers' Knowledge of Quantitative Data Analysis in SPSS

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ABSTRACT

E-learning is becoming the courseware in this global digital era transforming how learning takes place. Regardless of distance and time, e-learning is becoming unstoppable with its synchronous and asynchronous mode of instructional presentation. This study investigated the impact of e-learning on lecturers' knowledge of quantitative data analysis in SPSS at the Federal College of Education (Special) Oyo State, Nigeria. A descriptive survey research design was adopted in the study. A total number of one hundred and fifty (150) lecturers were selected through simple random sampling techniques for the study. Purposive sampling was used to select the school that was adopted for the study. Three (3) Research questions were generated and answered in this study. Data collected from the sampled population employing a questionnaire were analyzed using simple percentages and mean scores to answer the three research questions. The results of the findings revealed that e-learning is an important platform accessible and utilized by college lecturers. The findings also revealed that lecturers gained knowledge in data analysis in SPSS through an e-learning platform as it serves as a research and leisure tool which provides various opportunities to many people worldwide, particularly college of education lecturers.

ARTICLE INFO

1. INTRODUCTION

E-learning started in the 1990s as a result of explaining learning thoroughly through technical advances. The outbreak of Coronavirus in 2019 (COVID-19) that led to the shutting down of most global activities and advancing technology gave rise to the adoption of e-learning by countries around the world. As a result of this pandemic and technological advancement, more attention was directed to studying through the pedagogy of e-learning. E-learning resources contribute to the sustainable development of the nation since the timely and effective provision of useful information can assist libraries in the provision of information which is very critical to the development of the various sectors in the nation (Adebayo *et al*., 2018). E-learning is seen as distance learning which involves the use of varieties of technology and the internet to communicate, share ideas, access information, and share knowledge from instructors to learners (Llupar *et al*., 2022; Estrellan *et al*., 2021; Nafsi & Maryanti, 2022; Pratiwi & Rahman, 2021). Igbokwe *et al*. (2020) through the use of varieties of technology and the internet limitless source of information can be unraveled.

Quantitative research is simply the process of gathering and interpreting numerical data. In addition to identifying trends and averaging data, hypotheses can be formulated, causality can be examined, and findings can be extrapolated to greater populations. Numbers and figures are used for the collection and analysis of data in a quantitative research approach. Imperatively, the quantitative research approach can be described as scientific which uses statistical data for the description and analysis of research. Consequently, it saves the invested time and effort of the researcher in describing the result. Data which are in the form of numbers, percentages, and measurable figures can be calculated and conducted easily by a computer through the use of a Statistical Product and Service Solution (SPSS) there by reducing a lot of energy and resources. The main purpose of undertaking quantitative research is to quantify a hypothetical situation with numbers or figures. It is usually carried out on computers using techniques of quantitative analysis.

Hrastinski (2008) categorized E-learning into two categories namely: Synchronous e-learning and Asynchronous e-learning. Synchronous e-learning is the conventional method of learning with the virtual presence of a tutor and learner at a stipulated time in a virtual classroom or distance online education. On the other hand, asynchronous e-learning is described as an unconventional method of learning that happens through the online platform without the virtual presence and real-time interaction.

Data Analysis is simply a process in which gathered data is inspected, cleaned, transformed, and modeled with the main goal of discovering useful information, suggesting conclusions, and recommending and supporting decision-making. Data analysis has multiple facets and approaches, encompassing diverse techniques under a variety of names, in different fields. According to Start (2006) data analysis is described as the process of converting the gathered data into meaningful information. The process involves different techniques such as modeling to reach trends, relationships, and therefore conclusions to address the decision-making process. Data analysis into six main methods; namely: Descriptive Data Analysis, Exploratory Data, Inferential Data Analysis, Predictive Data Analysis, Explanatory or Causal Data Analysis, and Mechanistic Data Analysis.

SPSS can easily perform basic statistical functions. These functions include descriptive statistics which can be used to determine the variance, frequency, etc. There are also advanced functions which include analytic statistics, bivariate statistics, predictions for numerical outcomes, and predictions for identifying groups. In SPSS data can be rearranged, and renamed and groups can be edited severally. Thereafter, SPSS processes the data

sequentially. After the data has been processed, it is possible to export the results you have achieved to another program. The interpretation is mainly based on the user's level of knowledge. In terms of compatibility of software, SPSS has all the advantages over other statistical packages because it runs on Windows, macOS, and LINUX platforms. SPSS is a program that is designed to handle a large set of data with multiple variables associated with its Ong and Puteh (2017) confirm SPSS usage by most educational and non-educational institutions due to its user-friendly features.

The data analysis is often done systematically to ensure adequate evaluation of data to make statistical inferences. The absence of this statistical software will render most scientific or social science data non-progressive to knowledge that can guide decision-making. Also, statistical tools such as SPSS help to precipitate research findings from proper analysis of data, thereby preserving the data's integrity. Again, data analysis can be used to validate research findings in cases where integrity issues are suspected.

Although SPSS is a powerful statistical software package that can be used maximally in data transformation, regression analysis, analysis of variance, multivariate analysis of variance, analysis of covariance, t-tests, non-parametric tests, time series, design and analysis of experiments, spatial analysis, survival analysis, dimension reduction, reliability, factor analysis, correspondence analysis, neural network, correlation, and others there are still it is still some limitations to using SPSS for qualitative data analysis and most importantly it is not yet included in the Nigeria educational curriculum but it included severally on e-learning platforms and mostly available for instructors, teachers, lecturers and many other researchers for the gain of knowledge.

The main purpose of this study is to investigate the impact of e-learning on lecturers' knowledge of quantitative data analysis in SPSS at the Federal College of Education (Special), Oyo State Nigeria. Specifically, the study considered the following points: (i) determined the level of accessibility to e-learning among lecturers in the Federal College of Education (Special), Oyo State, Nigeria; (ii) established the level of utilization of e-learning for quantitative data analysis among lecturers in Federal College of Education (Special), Oyo State, Nigeria; and (iii) investigated any significant difference in the data analysis of lecturers who utilized e-learning and those who did not.

In this study, the following research questions were formulated: (i) To what extent does e-learning accessible to lecturers at Federal College of Education (Special), Oyo State, Nigeria?; (ii) At what rate do lecturers utilize e-learning to gain knowledge in quantitative data analysis at the Federal College of Education (Special), Oyo State, Nigeria?; and (iii)Is there any significant difference in data analysis of lecturers who utilized e-learning for quantitative data analysis in SPSS and those who did not?

The following two hypotheses were formulated.
(i) **$H0_1$**: There is no significant association between the accessibility of e-learning and lecturers' knowledge of data analysis at the Federal College of Education (Special), Oyo.
(ii) **$H0_2$**: There is no significant association between the utilization of e-learning and lecturers' knowledge of data analysis at the Federal College of Education (Special), Oyo.

2. METHOD

This study employed a survey design. The research population for this research comprises 150 lecturers in the Federal College of Education (Special), Oyo State, Nigeria. The sample for this study was made up of thirty (30) lecturers each from 5 schools in Federal College of Education (Special), Oyo, Nigeria. The schools include the School of Education, School of Special Education, School of Secondary Education -Languages, School of Secondary Education

-Vocational and Technical Education, and School of Early Childhood Care, Primary and Adult & Non-Formal Education. So total population of this study comprises 150 respondents. The researcher structured a questionnaire titled: "Impact of e-learning on the College of Education lecturers' knowledge of quantitative data Analysis in SPSS Questionnaire (IECELKQDAS)" which was used to collect data from the respondents. The (IECELKQDAS) were validated by three experts. The (IECELKQDAS) was administered to a similar group at Emmanuel Alayande College of Education Oyo State Nigeria over some time outside the study area to ascertain its reliability and the result was collated to ascertain the suitability of the research instrument for the actual participants. Cronbach's Alpha reliability method was used to check the reliability of the instrument and the output from SPSS data was 0.750. This, therefore, enabled the researcher to carry out the study. The data collected were analyzed using frequency counts and mean scores. A mid-point of 2.5 was taken as the acceptance criterion for the positive response. This implied that questionnaire items with a mean score of 2.5 and above denote "agreed" while questionnaire items with a mean score below 2.5 denote "disagreed''. Presentation of the result was done using the frequency tables. The research hypothesis one and two were tested using chi-square.

3. RESULTS

3.1. Research Question 1: To what Extent does E-Learning Accessible to Lecturers at Federal College of Education (Special), Oyo State, Nigeria?

Table 1 shows that the respondents agreed that they are aware that there is broadband for staff use in the College. They have access to e-learning platforms right from their offices in the college. They have access to the e-library and College Board band and also, and they find it easy to access the e-learning platform with their Android phones/laptop through WIFI with mean scores of 3.11, 2.95, 2.55, and 2.53. However, they disagreed that they only have access to e-learning whenever they subscribed for data with a mean score of 2.33.

Table 1. The mean of the extent e-learning is accessible to lecturers at FCES Oyo State Nigeria.

ITEMS	SA	A	D	SD	EF	EFX	X	XD	DEC
I am aware that there is broadband for staff use in this College of Education	102	23	18	7	150	249	3.11	2.55	Agreed
I only have access to e-learning whenever I subscribe for data.	101	31	12	6	150	187	2.33	1.28	Disagreed
I have access to an e-learning platform right from my office in the college.	73	43	23	14	150	236	2.95	1.20	Agreed
I have access to the college e-library and College broadband	80	41	15	14	150	204	2.55	1.25	Agreed
I find it easy to access e-learning with my Android phone/laptop through WIFI	65	45	25	15	150	202	2.53	1.11	Agreed

3.2. Research Question 2: At What Rate do Lecturers Utilize E-Learning to Gain Knowledge in Quantitative Data Analysis at the Federal College of Education (Special), Oyo State, Nigeria?

Table 2 shows that the respondents agreed that they use e-learning to gain knowledge in quantitative data analysis. They participate often in online seminars to know more about the SPSS package and use e-learning but do need not to stress themselves knowing the SPSS package. Also, they agreed that e-learning exposes them to a wide range of resources on the

SPSS package. Moreso, e-learning provides them with opportunities to collaborate with other educators who are also learning about SPSS with mean scores of 2.84, 2.9, 2.56, and 2.8 respectively. While other respondents disagreed that they use e-learning only to gain knowledge in their subject area but prefer contracting data analysis to experts in SPSS. They also disagreed that erratic power supply prevents them from everyday use of e-learning finally they use e-learning to improve their teaching only in school with mean scores of 2.39, 2.36, and 11.4 respectively.

Table 2. The frequency table of lecturers' utilization of e-learning to gain knowledge in quantitative data analysis in SPSS.

ITEMS	SA	A	D	SD	EF	EFX	X	XD	DEC
I use e-learning only to gain knowledge on their subject area but prefer contracting data analysis to experts.	52	58	23	17	150	191	2.39	1.12	Disagreed
I use e-learning to gain knowledge in quantitative data analysis	71	49	17	13	150	227	2.84	1.17	Agreed
I participate often in online seminars to know more about the SPSS package	82	24	21	23	150	232	2.90	1.19	Agreed
The erratic power supply prevents me from everyday use of e-learning.	51	19	17	63	150	189	2.36	1.13	Disagreed
E-learning exposes me to a wide range of resources on SPSS, including online courses, tutorials, and articles.	26	20	37	67	150	205	2.56	1.12	Agreed
I use e-learning to improve my teaching only in school.	40	28	37	45	150	130	11.4	3.40	Disagreed
E-learning also provides me with opportunities to collaborate with other educators who are also learning about SPSS	45	30	47	28	150	226	2.80	1.16	Agreed

3.3. Research Question 3: Is There Any Significant Difference in the Data Analysis of Lecturers Who Utilize E-Learning for Qualitative and Quantitative Data Analysis in SPSS and Those Who did Not?

Table 3 shows that the respondents agreed that: they learned skills in quantitative data analysis in SPSS. Thus, they do data analysis in SPSS by themselves, and they make use of descriptive statistics such as mean, median, and standard deviation in quantitative data analysis in SPSS. Also, they make use of frequency tables in data analysis in SPSS. They also agreed whenever they face difficulty with data analysis in their research work, they collaborate with experts in SPSS online with mean scores of 3.16, 2.84, 2.9, and 2.95. On the other hand, other respondents disagreed that SPSS Experts in data analysis always help them out in quantitative data analysis, watching video clips on YouTube is not enough to carry out data analysis and E-learning enables them to train students on data analysis in SPSS. And finally, they disagreed that they have no interest in carrying out quantitative data analysis on their own with mean scores of 2.35, 2.44, 2.36, and 2.33.

Table 3. Result data.

ITEMS	SA	A	D	SD	EF	EFX	X	XD	DEC
SPSS Experts in data analysis always help me out in quantitative data analysis	46	24	52	28	150	188	2.35	1.13	Disagreed
I learned skills in quantitative data analysis in SPSS so I do data analysis by myself.	96	20	25	9	150	253	3.16	1.30	Agreed
Watching video clips on YouTube is enough to carry out data analysis	55	35	40	20	150	195	2.44	1.12	Disagreed
I make use of descriptive statistics such as mean, median, and standard deviation in quantitative data analysis in SPSS	71	49	17	13	150	227	2.84	1.17	Agreed
I make use of frequency tables in data analysis.	78	23	27	22	150	232	2.90	1.19	Agreed
E-learning enables me to train my students in data analysis in SPSS.	51	19	17	63	150	189	2.36	1.13	Disagreed
I have no interest in carrying out quantitative data analysis on my own	101	31	12	6	150	187	2.33	1.28	Disagreed
Whenever I face difficulty with data analysis in my research work, I collaborate with experts in SPSS	73	41	19	17	150	236	2.95	1.20	Agreed

3.4. Hypothesis 1

Table 4 shows that there is a significant association between the accessibility of e-learning and lecturers' knowledge of data analysis because the calculated chi-square value ($X2cal$ =22.367) is significant at P<0.05. Therefore, Ho1 (null Hypothesis) was rejected.

Table 4. Chi-square table for significant association between the accessibility of e-learning and lecturers' knowledge of data analysis.

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	22.367[a]	12	0.034
Likelihood Ratio	24.001	12	0.020
N of Valid Cases	500		
a. 0 cells (.0%) have an expected count of less than 5. The minimum expected count is 8.60.			

* Significant at P<0.05

3.5. Hypothesis 2

Table 5 shows that there is a significant association between utilization of the e-learning and lecturers' knowledge of quantitative data analysis because the calculated chi-square value ($X2cal$ =59.524) is significant at P<0.05. Therefore, Ho2 (null Hypothesis) was rejected.

Table 5. Chi-square table for significant association between utilization of the e-learning and lecturers' knowledge on data analysis.

Chi-Square Tests			
	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	59.542[a]	12	0.000
Likelihood Ratio	62.417	12	0.000
N of Valid Cases	500		
a. 0 cells (.0%) have an expected count of less than 5. The minimum expected count is 5.80.			

4. DISCUSSION

The first research objective investigates the level of accessibility of e-learning among lecturers at the Federal College of Education (Special) Oyo State, Nigeria. This objective was accomplished in **Tables 4** and **5**. The result under the tested hypothesis shows that there is a significant association between accessibility to e-learning and lecturers' knowledge of data analysis because the calculated chi-square value (X2cal =22.367) is significant at P<0.05. Realizing the wide spread of e-learning, the lecturers and researchers now have access to e-learning. The second research objective was to establish the level of utilization of e-learning among lecturers at the Federal College of Education (Special), Oyo State Nigeria. This finding shows that there is a significant association between the utilization of e-learning and lecturers' knowledge of data analysis because the calculated chi-square value (X2cal =59. 524) is significant at P<0.05. This result agrees with the learning through the web (see https://hdl.handle.net/11299/213219) where the listed benefits of e-learning based entails learning and training over the web. In conclusion, the third research objective attempts to assess the difference in the data analysis between lecturers who utilize e-learning to gain knowledge in quantitative data analysis in SPSS and those who did not. However, the result of this finding aligned with Bala (2016) who claimed that the emergence of several data analysis programs like SPSS involving various critical tasks of social science research has become simplified through social media.

5. CONCLUSION

Based on the findings of the study, it should be noted that e-learning is an important platform of communication as well as a research and leisure tool. The reason is that it provides many opportunities to many people around the world and particularly lecturers at Federal College of Education (Special) Oyo state, Nigeria in different ways. It was discovered that lecturers at Federal College of Education (Special) Oyo State, Nigeria have access to e-learning and gained knowledge in the area of quantitative data analysis in SPSS. The increasing use of e-learning due to the influx of digital tools has caused a fundamental change in the way's students learn today. E-learning has a great effect on lecturers' knowledge of data analysis. E-learning is advantageous in the sense that it gives access to a wide range of resources. It can also provide lecturers with opportunities to collaborate with other educators who are also using SPSS. This can help lecturers to share ideas and to learn from each other's experiences. This can help lecturers learn about the different features and functions of SPSS and develop their skills in using the software. Based on the findings, the following recommendations were made: (i) Management of colleges of education should organize seminars aimed at updating lecturers on the right use of e-learning for data analysis; (ii) Lecturers in colleges of education should give assignments to students that will stimulate effective use of the e-learning platform for academic purposes and improvement for their final year research analysis; (iii) Proper training on e-learning use should be provided to the lecturers to accelerate access to different electronic sources of information and support their research; (iv) More computers with internet connectivity should be provided to increase the lecturers' access to e-learning. Lecturers should be equipped with both internet basics and information literacy skills; (v) The government or the school management should make provision for computers. Also, standby generators and Uninterrupted Power supply (UPSs) should be made available for the computer laboratory in colleges.

Quantitative research approaches and methods represent different research strategies and differ in their theoretical, epistemological, and ontological issues. The use of any approach depends on the researchers' method of data collection and analysis. The successful Software of any field in research work is SPSS which is a perfectly adequate tool for entering data, creating new variables, performing exploratory data analysis, and performing formal statistical analysis.

SPSS statistical tool should therefore be studied and practiced by researchers to be abreast with the necessary skills needed for the analysis and interpretation of data. This study has made significant findings on the impact of e-learning on lecturers' knowledge of Quantitative data analysis in SPSS. But the study has not focused on mixed methods in e-learning research analysis using SPSS. These issues are suggested for further study. Several limitations, however, exist with the use of SPSS, including:

(i)   It is expensive to have a full version of any SPSS, but to have a trial version is easy to get.

(ii) Many researchers use to contract their analysis out to experts in SPSS and as a result, they may face some challenges in their interpretations of findings.

(iii) Tests, factor analysis, cluster analysis, principal components analysis, chi-square analysis, and more. Some very advanced statistical tests are as of 2023 not yet implemented in the education curriculum.

6. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. The authors confirmed that the paper was free of plagiarism.

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