

*Full Length Research Paper*

# Computer software data analysis skills required for capacity building of university lecturers for effective educational research

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Received 5 August, 2015; Accepted 28 September, 2015

The study was carried out to identify the computer software data analysis skills required for capacity building of university lecturers for effective educational research. Three research questions and one null hypothesis were formulated, to guide the study. The survey research design was adopted for the study and a structured questionnaire was used for data collection. Data obtained from 220 Lecturers of the faculties of education in University of Nigeria, Nsukka and Nnamdi Azikiwe University, Awka were studied and analyzed. The study revealed computer, communication and math competency skill needs of the lecturers for effective data analysis in educational research using computer software. It was therefore recommended that administrators of the universities should organize regular training and retraining sessions for their lecturers on the identified areas of need to build up their capacity in the use of computer software for efficient educational research especially in the 21<sup>st</sup> century.

**Key words:** Computer software, data analysis, educational research, capacity building, skills.

## INTRODUCTION

The academic world is mostly all about researches and the use of research findings for informed decision making and enhancement of human living. According to Archibong et al. (2010), the principal role of the university revolves around three key functions; namely, advancement of knowledge through research, dissemination of knowledge through teaching, and community service. The achievement of these objectives, to a large extent, depends on the academic staff because of the critical role they play in the educational process. The authors further stated that how effectively an academic staff performs in the above-mentioned functions is often the core basis for

promotion in Nigerian universities. Promotion of an academic staff from a lower rank to a higher one is an indication that the staff has shown evidence of scholarship and effective performance in all the criteria for promotion as stipulated by the universities policy.

In view of the policies that guide universities, one of the major academic staff objectives as regards promotion is research and publication of papers or articles. Research is a general term which covers all kinds of studies designed to find responses to worthwhile questions by means of a systematic and scientific approach (Alzheimer Europe Office, 2009). According to Lodico et al. (2010),

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educational research refers to a variety of methods in which individuals evaluate different aspects of education including student learning, teaching methods, teacher training and classroom dynamics. It encompasses many different studies all of which attempt to better understand and improve the learning and educational process. There are many different ways to carry out research but roughly speaking there are two main approaches, namely qualitative and quantitative. Qualitative studies concentrate mainly on words and meanings and aim to capture the richness and complexity of human experience, whereas quantitative studies involve recording information obtained from participants in numerical form to enable statistical analysis of the findings and the generalization of those findings to the wider population. The former and the later can be referred to as empirical research or studies. Empirical research methods as opined by Moody (2002) are a class of research methods in which empirical observations or data are collected in order to answer particular research questions which are primarily used in academic research, and can also be useful in answering practical questions.

In carrying out empirical studies in the 21<sup>st</sup> century, the role of information technology in collection and analysis of data has been very tremendous. Computers have the capability to store and handle large amounts of information and hence it has been claimed that using computer based data analysis techniques can enhance learners' skills in many aspects of data handling. According to Banner and Albarran (2009), Computer Assisted/Aided Qualitative Data Analysis (CAQDAS) is the use of computer software to aid qualitative research such as transcription analysis, coding and text interpretation, recursive abstraction, content analysis, discourse analysis, and grounded theory methodology. The use of such software offers an efficient means of managing and organizing data while supporting rigorous data analysis. The authors further assert that the advantages of using the software include being freed from manual and clerical tasks, saving precious time, managing huge amounts of qualitative data, having increased flexibility, and having improved validity and audit ability of qualitative research.

In order to carry out research that is qualitative, data analysis must be accurate. Data analysis is the science of correctly collecting data, assessing it for trustworthiness, extracting information from it, and presenting it in a comprehensible informative way. These skills are vital to institutions and will also enable the researcher to extract, manipulate and maintain data in the real-world ways in which it arises. Data analytical skills are no longer considered a specialized skill. For any academic and indeed institution looking to build a management career, the importance of analytical skills cannot be overstated. It is critical to build skill sets pertaining to the

understanding, management, analysis, and interpretation of vast volumes of data from multiple sources (JobBuzz Blog, 2013).

According to Rahim et al. (2008), research data often remain unanalyzed and unpublished due to incompetency in statistical software usage. Lack of planning before data collection has severely impaired the quality of research. Again, many researchers in academic institutions are not skilled in the usage of statistical software, and most of the data analysis is done through the employment of a bio-statistician, who most times exploits them monetarily, compromises the confidentiality and increases their dependency. This is not healthy for the academic research in its entirety. It therefore calls for capacity building of the academic staff especially lecturers in the effective use of computer software for data analysis in educational research. Capacity building is a conceptual approach to development that focuses on understanding the obstacles that inhibit people, governments, international organizations and non-governmental organizations from realizing their developmental goals while enhancing the abilities that will allow them to achieve measurable and sustainable results. It is an ongoing process through which individuals, groups, organizations and societies enhance their ability to identify and meet development challenges. Capacity building is a planned development of or an increase in knowledge, output rate, management, skills, and other capabilities of an organization through acquisition, incentives, technology, and/or training (Business Dictionary, 2013).

Consequently, to engage in qualitative capacity building in data analysis, the requirements of data analysts should be considered. Wright (2010) stated that the general requirements in research analysis include computer skills, communication abilities and math aptitude. Computer skills are required because so much of the analysis work is either retrieved from a computer or entered into software on a computer. Databases and spreadsheets are regularly worked with, and creation of reports with word processing software is usually done. Sometimes, software is created and programs that will analyze data are written. Therefore, for one to do well in data analysis, excellence in computer skills is required. Furthermore, it is common in research analysis to write reports, commentaries, briefs and summaries that provide information about the findings from researches. According to Wright (2010), the summaries and briefs must be detailed, concise and accurate. The results are commonly discussed with small groups or departments. Often, the analyses are presented at conferences, seminars or schools institutions and organizations to share details of their findings. Ray (2010) concurred with this by stating that oftentimes, the result of research and analysis comes in the form of jargon-filled reports and complicated graphic representations. There is need to

sum up and interpret the findings without leaving out important features. This requires a certain expertise in the field, a comfort in translating technical terms into plain language, and the ability to answer questions about the findings. Math competency is another requirement in data analysis where raw statistics are often worked with and conclusions have to be drawn. Ray (2010) pointed out that for a research work to be meaningful and useful, one must be detail oriented and competent in math. Part of the job is being able to tabulate and present information in graphs and spreadsheets, and working with numbers from surveys and data in the form of statistics. A researcher should be able to understand which mathematical operations are relevant and then be able to apply the solutions. There is then need for excellence in math skill and proficiency at working with statistics (Wright, 2010). However, the fact that many academics still display incompetency in the use of these computer software based data analysis skills, making them to employ the services of bio-statisticians who exploit them and may not provide accurate result as desired by the researchers, gave rise to this study which sought to determine the computer software data analysis skills required for capacity building of university lecturers for effective educational research.

### Specific objectives

Specifically, the study attempted to determine:

1. The computer skill needs of university lecturers in the use of computer software data analysis for effective educational research.
2. The communication skill needs of university lecturers in the use of computer software data analysis for effective educational research.
3. The math competency needs of university lecturers in the use of computer software data analysis for effective educational research.

### Research questions

The following research questions guided the study:

1. What are the computer skill needs of university lecturers in the use of computer software data analysis for effective educational research?
2. What are the communication skill needs of university lecturers in the use of computer software data analysis for effective educational research?
3. What are the math competency needs of university lecturers in the use of computer software data analysis for effective educational research?

### Hypothesis

There is no significant difference in the mean responses of lecturers from the universities on the computer software data analysis skills required for capacity building of university lecturers for effective educational research.

### METHODS

The study adopted the survey research design and was carried out in Anambra and Enugu states of Nigeria. A population of 262 lecturers consisting of 97 lecturers from the Faculty of Education, Nnamdi Azikiwe University, Awka and 165 lecturers from the Faculty of Education, University of Nigeria, Nsukka was used for the study. A structured questionnaire was developed from the literature reviewed to obtain data for the study and was face validated by three experts knowledgeable in computer software data analysis. The Cronbach alpha technique was used to determine the internal consistency of the questionnaire items which yielded a co-efficient of 0.94. The scale for the questionnaire was Highly Needed (HN), Averagely Needed (AN), Slightly Needed (SN), and Not Needed (NN) with weightings of 4, 3, 2, and 1 respectively.

Data obtained from 220 Lectures from the faculties of education were analyzed and studied. The weighted mean was used to answer the research questions, while t-test statistic was used to test the hypothesis. A cut off point of 2.5 was used to determine the capacity building needs of university lecturers for efficiency in computer software data analysis. The standard deviation was used to determine the closeness or otherwise of the responses of the respondents to the mean. Any item with a low standard deviation indicated that there were less variations in the responses of the respondents, indicating that the mean values of the items were valid. The null hypothesis of no significance was tested using the t-test statistic at a probability level of 0.05, and was accepted for any item whose significant probability is greater than the significant probability level (0.05), while rejected if less.

### RESULTS

Data collected for the study are presented in Tables 1 – 3.

#### Research question 1

*What are the computer skill needs of university lecturers in the use of computer software data analysis for effective educational research?*

The data for answering the research question and testing the hypothesis are presented in Table 1

The data presented in Table 1 revealed that all the items had their mean values ranged from 2.43 – 3.69 which is above the cut- off point of 2.5, indicating that the items are computer skill needs of university lecturers in the use of computer software data analysis for effective educational research. The data in the table further showed that the responses of the lecturers varied

**Table 1.** Respondents mean scores and t-test analysis on the computer skill needs of lecturers in the use of computer software data analysis for effective educational research.

S/N	Computer skills	X	SD	t-cal	Sig	Results	
						Research questions	Ho
1.	Create text documents using word processors	2.43	0.49	2.57	0.01	Not Needed	S
2.	Input raw data in the right format into a statistical software	3.69	0.46	4.64	0.00	Needed	S
3.	Utilize databases to generate/access data	3.69	0.43	4.64	0.00	Needed	S
4.	Utilize Spreadsheets to generate/access data	3.46	0.75	7.27	0.00	Needed	S
5.	Present data in a tabular form	3.54	0.75	4.28	0.00	Needed	S
6.	Represent data graphically using a software	3.62	0.63	6.79	0.00	Needed	S
7.	Declare variables of data collected in a data analysis software	3.62	0.49	2.57	0.01	Needed	S
8.	Create presentation slides of research findings	3.46	0.75	7.27	0.00	Needed	S
9.	Utilize research findings presentation technologies	3.54	0.49	6.71	0.00	Needed	S
10.	Write simple data analysis computer programs	3.15	0.77	1.34	0.18	Needed	NS

X -Mean response of lecturers; SD – Standard Deviation; t-cal- Calculated t value; Sig – Significant value of each item; H<sub>0</sub> – Decision on Hypothesis tested on each item; S – Significant; NS – Not Significant.

**Table 2.** Respondents mean scores and t-test analysis on the communication skill needs of lecturers in the use of computer software data analysis for effective educational research.

S/N	Communication skills: Ability to:	X	SD	t-cal	Sig	Research questions	Ho
12.	Interpret graphical data analysis results	3.31	0.72	4.76	0.00	Needed	S
13.	Interpret tabular data analysis results	3.25	0.59	0.00	1.00	Needed	NS
14.	Discuss research reports accurately	3.23	0.69	3.64	0.00	Needed	S
15.	Interpret descriptive statistical analysis results	3.54	0.64	8.91	0.00	Needed	S
16.	Interpret computer software output of comparison of mean software	3.31	0.72	0.86	0.39	Needed	NS
17.	Interpret results from different statistical tools analyses	3.23	0.58	0.36	0.72	Needed	NS
18.	Interpret qualitative research analysis	3.46	0.64	5.11	0.00	Needed	S
19.	Write seminar presentation documents	3.08	0.73	1.13	0.26	Needed	NS
20.	Write summaries of research reports	3.23	0.69	4.28	0.00	Needed	S
21.	Interpret computer software reliability analysis results	3.15	0.53	3.15	0.00	Needed	S

X -Mean response of lecturers; SD – Standard Deviation; t-cal – Calculated t value; Sig – Significant value of each item; H<sub>0</sub> – Decision on Hypothesis tested on each item; S – Significant; NS – Not Significant.

more on the ability to write simple data analysis computer programs (SD = 0.77) than on the ability to utilize databases to generate/access data (SD = 0.43)

Table 1 further revealed that nine items had their significant probability less than 0.05, showing that the null hypothesis of no significance was rejected for those items, while it was accepted for item 10 whose significant probability was greater than 0.05  
Research question 2

*What are the communication skill needs of university lecturers in the use of computer software data analysis for effective educational research?*

The data for answering the research question and testing the hypothesis are presented in Table 2.

Table 2 revealed that all the items had their mean values ranged from 3.08 – 3.54 which is above the cut-off point of 2.5, indicating that the items are communication skill needs of university lecturers in the use of computer software data analysis for effective educational research. Furthermore, the table showed that the responses of the lecturers varied more on the ability to write seminar presentation documents (SD = 0.73) than on the ability to interpret computer software reliability analysis results (SD = 0.53).

Data in Table 2 further revealed that seven items had

**Table 3.** Respondents mean scores and t-test analysis on the math competency needs of lecturers in the use of computer software data analysis for effective educational research.

S/N	Math Competencies: Ability to:	$\bar{X}$	SD	t-cal	Sig	Research questions	Ho
22.	Obtain descriptive statistical results	3.15	0.53	3.15	0.00	Needed	S
23.	Obtain inferential statistical results	3.31	0.61	3.47	0.00	Needed	S
24.	Compare means of data	3.31	0.61	5.78	0.00	Needed	S
25.	Access the right statistical tools to use in a data analysis software	3.46	0.64	3.66	0.00	Needed	S
26.	Determine which statistical tool to use to analyze any given data	3.54	0.64	3.66	0.00	Needed	S
27.	Utilize the right statistical tools when the need arises in a data analysis software	3.31	0.61	1.02	0.31	Needed	NS
28.	Identify variables and manipulate them to produce informative results.	3.08	0.62	6.08	0.00	Needed	S
29.	Identify constants and use them appropriately in a data analysis software	3.31	0.72	2.90	0.00	Needed	S
30.	Analyze qualitative data	3.62	0.49	9.96	0.00	Needed	S
31.	Discover when results are likely to be faulty	3.31	0.99	6.50	0.00	Needed	S
32.	Conduct reliability tests using a software	3.62	0.50	2.57	0.11	Needed	NS
33.	Convert tabular computer software data analysis results into graphs and vice versa.	3.23	0.69	0.29	0.77	Needed	NS
34.	Prepare spreadsheets that can generate results when data is keyed in.	3.23	0.69	0.29	0.77	Needed	NS

their significant probability less than 0.05, showing that the null hypothesis of no significance was rejected for those items, while it was accepted for the remaining four items significant probabilities were greater than 0.05.

#### Research question 3

*What are the math competency needs of university lecturers in the use of computer software data analysis for effective educational research?*

The data for answering the research question are presented in Table 3.

Table 3 revealed that all the items had their mean values ranged from 3.08 – 3.62 which is above the cut-off point of 2.5, indicating that the items are math competency needs of university lecturers in the use of computer software data analysis for effective educational research. Data in the table further showed that the responses of the lecturers varied more on the ability to analyze qualitative data (SD = 0.49) than on the ability to discover when results are likely to be faulty (SD = 0.99).

Table 3 further revealed that nine items had their significant probability less than 0.05, showing that the null hypothesis of no significance was rejected for those items, while it was accepted for the other three items whose significant probabilities were greater than 0.05.

## DISCUSSION

Findings on research question 1 revealed 10 computer skill needs required for capacity building of university lecturers in the use of computer software data analysis for effective educational research. These computer skill needs include ability to: input raw data in the right format into a statistical software, utilize databases to generate/access data, utilize spreadsheets to generate/access data, present data in a tabular form, represent data graphically using a software, declare variables of data collected in a data analysis software, create presentation slides of research findings, utilize research findings presentation technologies, and write simple data analysis computer programs. This finding is in consonance with Wright (2010) who stated that computer skills are required because so much of the analysis work is either retrieved from a computer or entered into software on a computer. Databases and spreadsheets are regularly worked with, and creation of reports with word processing software is usually done. Basic computer skills are the initial set of skills required for effective use of computer software in data analysis. This is because they are needed to input the raw data that the software will work on. Researchers and indeed academics should be competent the use of these skills for effective educational research.

Data in Table 2 revealed 11 communication skill needs of university lecturers for capacity building in the use of computer software data analysis for effective educational research. These communication skills include ability to: write up research reports using a software, interpret graphical data analysis results, interpret tabular data analysis results, discuss research reports accurately, interpret descriptive statistical analysis results, interpret computer software output of comparison of mean software, interpret results from different statistical tools analyses, interpret qualitative research analysis, write seminar presentation documents, write summaries of research reports, and interpret computer software reliability analysis results. Ray (2010) had earlier stated that oftentimes, the result of research and analysis comes in the form of jargon-filled reports and complicated graphic representations. There is need to sum up and interpret the findings without leaving out important features. According to Wright (2010), the summaries and briefs of research findings must be detailed, concise and accurate. Communication skills enable readers of research reports to clearly understand the interpretations given to the results of educational researches.

Findings on research question 3 identified 13 math competency needs of university lecturers for capacity building in the use of computer software data analysis for effective educational research. Among the competencies identified are the ability to: obtain descriptive statistical results, obtain inferential statistical results, compare means of data, access the right statistical tools to use in a data analysis software, determine which statistical tool to use to analyze any given data, utilize the right statistical tools when the need arises in a data analysis software, identify variables and manipulate them to produce informative results, identify constants and use them appropriately in a data analysis software, analyze qualitative data, discover when results are likely to be faulty, conduct reliability tests using a software, convert tabular computer software data analysis results into graphs and vice versa, and prepare spreadsheets that can generate results when data is keyed in. Ray (2010) pointed out that for a research work to be meaningful and useful, one must be detail oriented and competent in math. Part of the job is being able to tabulate and present information in graphs and spreadsheets, and working with numbers from surveys and data in the form of statistics.

Data from the hypothesis tested in the study, revealed that there were no significant differences in the mean rating of the responses of lecturers from the universities on one computer skill, four communication skills, and three math competencies required for capacity building of university lecturers for effective educational research, while in nine computer skills, seven communication skills and nine math competencies, the hypotheses was rejected. The implication of these findings is that for the

eight items where the hypotheses was accepted, despite the differences in the institutions and the condition of training of the lecturers, their opinions were not significantly influenced on the eight computer software data analysis skills required for capacity building of university lecturers for effective educational research. The opinions of the lecturers were however, significantly influenced on 25 computer software data analysis skills, implying that there may be variations in the computer software data analysis skills needs of the lecturers for effective educational research.

## Conclusion

University lecturers are usually involved in researches especially for educational purposes and for their promotions. In order to meet up with these responsibilities in the 21<sup>st</sup> century, data collected through researches are analyzed using computer software data analysis software. However, many academics are deficient in the skills required to handle data analysis using software. Hence, they fall prey to so called “data analysts” who exploit them monetarily and compromise the confidentiality in their studies. Consequently, this study identified university lecturers’ skill needs in basic computer skills, communication skills and math competency skills. These skill needs identified are necessary for capacity building of the lecturers to ensure effective utilization of computer data analysis software for effective educational research.

## RECOMMENDATIONS

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

1. The administrators of the universities should organize regular training and retraining sessions for their lecturers on the identified areas of need to build up their capacity in the use of computer software for efficient educational research especially in the 21<sup>st</sup> century.
2. The lecturers should engage themselves in self development programmes based on the identified capacity building needs on the use of computer software for efficient educational research.

## Conflict of Interests

The author has not declared any conflicts of interest.

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