

Attitudes of Nigerian Undergraduates towards Statistics and their Perceived Competence in the Use of Computer Statistical Packages for Data Analysis

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Abstract

Research plays a significant role in human existence. Statistics also form an integral part of educational research. In contemporary society, Computer Statistical packages make data analysis easier, faster and accurate. This study investigated the attitudes of Nigerian undergraduates towards Statistics and their perceived competence in the use of computer statistical packages for data analysis. In finding solutions to the problem of this study, two research questions were raised and three hypotheses generated. Descriptive research design of the survey type was the design upon which the study was anchored. Two hundred (200) final year education undergraduates of Adekunle Ajasin University, Akungba Akoko, Ondo State, Nigeria were randomly selected for the study. A questionnaire was the instrument for data collection. Both Descriptive and Inferential Statistics were used for data analysis. Findings revealed that majority of Nigerian undergraduates have moderate attitudes towards statistics and are moderately competent in the use of computer statistical packages for data analysis. It was recommended that lecturers should devise means of making Statistics course more enjoyable and less threatening to the students. Computer Statistical packages should also be taught as a course in Nigerian universities.

Keywords: Attitudes, Statistics, Statistical, packages, Data, analysis, undergraduates

Introduction

Research is the process in which knotty problems are solved in an attempt to push back the frontiers of ignorance thereby advancing the frontiers of knowledge. Research plays significant roles in human existence. Research made the improved

conditions in human life today possible. According to Agbayewa and Adodo (2008), some of the roles which educational research plays include: the advancement of knowledge, increasing understanding of educational phenomena, providing solutions to educational problems, improvement of educational practices and bringing about overall development and progress. While stressing further the importance of research, Hassan (1995) opined that if individuals remain ignorant of research, they may impede scientific, educational and even social development and endanger national survival.

Statistics is a veritable tool in research activities. According to Duyilemi and Duyilemi (1999), statistics has become a scientific and analytic method of collecting, organizing, analyzing and presenting data. It is already a very effective channel of communication to all and sundry.

According to Pajares (1996), Bandura (1997) and Gal, Ginsburg and Schau (1997), attitude towards statistics influences a person's statistical behaviour inside and outside classroom and their willingness to attend statistics courses in the future. In addition, Schau (2003) further pointed out that positive attitudes towards statistics would help students to understand that statistics is useful for their professional and personal lives and students can be trained to understand and use statistics. Students with negative attitudes towards statistics would not like attending statistics class, thus performing poorly in statistics examination and would not be able to use statistical knowledge for his research analysis. Researchers do not agree on the attitude of students towards statistics. Some researchers reported positive attitude of students towards statistics (Noraidah, Hairulliza, Hazura & Tengku-Meriam, 2011), others reported moderate level (Mira-Khalisa & Siti-Mistima, 2017; Noraidah, Hairulliza, Hazura & Tengku-Meriam, 2011; Rosli, Maat, & Rosli, 2017). However, Cahyawati, Wahyudin and Prabawanto (2018) in a study revealed that gender of students has no much influence on their attitude towards statistics.

There are seven stages in any scientific or educational research as encapsulated by Nworgu (2006). They are: identifying and defining the problem; reviewing the literature; formulating research questions and hypotheses; designing a study to collect the necessary data; collecting pertinent data for answering the research questions; analyzing the data to answer the research questions and test the hypotheses; and drawing necessary inferences or conclusions based on the analysis.

Out of these seven steps outlined by Nworgu in the conduct of empirical research in education, analysis of data is one of the major processes that demand the use of computer. Others are decisions that could be made exclusively by the researcher without the aid of computers. According to Bandele (1998), human problems requiring statistical computations have become complex. The evolution of modern technology, he stated, the explosion of specific knowledge of computer appreciation and the expected conclusion from modern researches put the traditional data analysis techniques behind. Some of the disadvantages of the traditional data analysis as observed by Bandele (2002) are: it is crude and laborious, it is slow, it is prone to

avoidable error, it is not suitable for handling large data, it has no repetitive algorithm, it is not flexible, it makes verification of answer difficult, and it is obsolete.

Statistical knowledge and competence in the use of computer statistical packages for data analysis are intertwined in educational research. Before any researcher can operate computer statistical packages for data analysis, he must be well versed in statistics up to intermediate level. These researchers observed that many of the Nigerian undergraduates have lukewarm attitude to statistics, as a result they contract out the analysis aspect of their research work in the final year. Positive attitude towards statistics is quite germane to the ability of students utilising computer statistical tools. Mahmud and Zainol (2008) posited that students with weak background in statistics are always having difficulty in applying relevant and appropriate statistical tools for their study. Although, Yusuf and Balogun (2011); Bichi, Embong and Rashid (2017) were of the view that students are competent in the use of ICT and its resources, however, Bichi et al (2017) indicated the influence of field of study of students on their perceived competence in the use of ICT resources.

Against this background information, the thrust of this paper therefore is to examine the attitudes of Nigerian undergraduates towards statistics and their perceived competence in the use of computer statistical packages for data analysis. More specifically, the study sought to determine the influence of field of study on the Undergraduates' attitudes towards statistics and their perceived competence in the use of computer statistical packages for data analysis.

Research Questions

In finding solutions to the problems of this study, the following research questions were raised:

1. What is the level of Nigerian undergraduates' attitudes towards statistics?
2. What is the level of Nigerian undergraduates' perceived competence in the use of computer statistical packages for data analysis?

Research Hypotheses

The following hypotheses were formulated to guide the study:

Ho1: There is no significant influence of undergraduates' field of study on their attitudes towards statistics.

Ho2: There is no significant influence of undergraduates' field of study on their perceived competence in the use of computer statistical packages for data analysis.

Ho3: There is no significant relationship between undergraduates' attitudes towards statistics and their perceived competence in the use of computer statistical packages for data analysis.

Methodology

Descriptive research design of the survey type was the research design upon which this research work was anchored. The entire one thousand three hundred and forty

five (1,345) final year undergraduates of the Faculty of Education, Adekunle Ajasin University, Akungba Akoko, Ondo state, Nigeria in 2017/2018 academic session formed the population for the study. Two hundred (200) final year education undergraduates were selected as a sample for this study using stratified random sampling technique. One hundred of the respondents were from science education while the other one hundred were from non-science education.

The only instrument for data collection was a researchers-developed four point-likert type, structured questionnaire titled “Attitude Towards Statistics and Computer Statistical Packages for Data Analysis Competence Questionnaire (ASCAQ)”. The questionnaire was divided into three sections. Section A of the questionnaire sought personal information of the undergraduates. Section B was used to seek information on the undergraduates’ attitude towards statistics. It contains 12 items. Some of the items on this section are: “I always enjoy statistics,” “statistics should be taught throughout undergraduate levels. Section C contains 13 items and it was focused on undergraduates’ perceived competence in the use of computer statistical packages for data analysis. Some of the items on this section are: “I can locate and run Statistical packages”, “I can use Statistical packages for data analysis”. The instrument was face and content validated by two experts in the area of Test and Measurement, Adekunle Ajasin University, Akungba Akoko, Ondo State. The response options and the corresponding scores for the questionnaire are Strongly Agree (4); Agree (3); Disagree (2) and Strongly Disagree (1). The reliability of the instrument was established using Cronbach alpha method. The reliability coefficients of 0.84 and 0.78 were obtained respectively for attitude towards statistics section and competence in the use of computer statistical packages for data analysis section of the questionnaire.

Data obtained were analyzed using Statistical Package for Social Science (SPSS) version 20.0. Descriptive statistics such as mean, frequency counts, simple percentage and standard deviation were used to answer the two research questions, while independent t-test and Pearson Product Moment Correlation statistics were used to test the hypotheses. Mean and standard deviation of the responses to Sections B and C of the questionnaire were calculated. One standard deviation was added and subtracted from the mean to arrive at the range of scores for high, moderate and low.

Presentation of results

Research Question 1: What is the level of Nigerian undergraduates’ attitudes towards statistics?

To answer this research question, the mean and standard deviation of the students’ responses to Section B of the questionnaire (attitude towards statistics) were calculated as 32 and 9 respectively. Since Section B contained 12 items, structured on 4-points likert format, the maximum and minimum obtainable marks were 48 and 12 respectively. The maximum and minimum marks obtained were 46 and 12 respectively. One standard deviation was added and subtracted from the mean (32 ± 9)

to arrive at High, Moderate and Low levels of attitudes towards statistics; result is presented in Table 1.

Table 1: Descriptive statistics showing students’ attitude towards statistics

Level	Range	N	Percentage (%)
High	41 – 46	36	18
Moderate	24 – 40	124	62
Low	12 – 23	40	20
Total		200	100 %

The result was further summarized as shown in Figure 1.

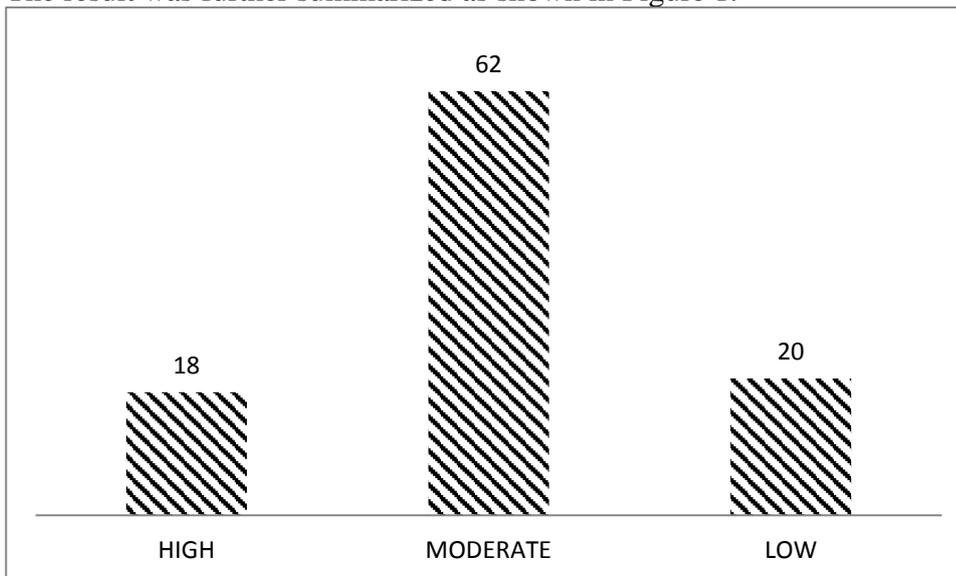


Figure 1: Bar chart showing level of undergraduates’ attitude towards statistics

From Table 1 and Figure 1, it can be observed that 36 (18%), 124 (62%) and 40 (20%) of the undergraduates have high, moderate and low levels of attitudes towards statistics respectively. It can therefore be said that majority of the students have moderate attitudes towards statistics as a course.

Research Question 2: What is the level of Nigerian undergraduates’ perceived competence in the use of computer statistical packages for data analysis?

To answer this research question, the mean and standard deviation of the students’ responses to Section C of the questionnaire (perceived competence in the use of computer statistical packages for data analysis) were calculated as 31 and 8 respectively. It contained 13 items structured in 4-point likert format. The maximum and minimum marks obtainable were 52 and 13 respectively. The maximum and minimum marks obtained were 46 and 13 respectively. One standard deviation was later added and subtracted from the mean (31 ± 8) to arrive at the High, Moderate and Low levels of competence in the use of computer statistical packages for data analysis. Result is presented in Table 2.

Table 2: Descriptive statistics showing the level of students’ perceived competence in the use of computer statistical packages for data analysis

Level	Range	No. of students	Percentage (%)
High	39 – 49	38	19
Moderate	24 – 38	129	64.5
Low	13 - 23	33	16.5
Total		200	100 %

The result was further summarized as shown in Figure 2.

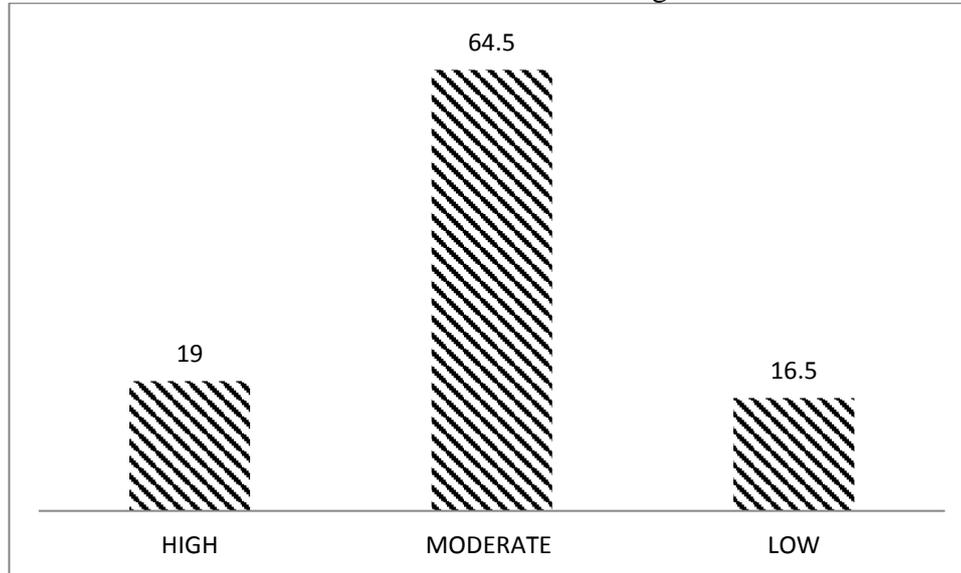


Figure 2: Level of undergraduates’ perceived competence in the use of computer statistical packages for data analysis

From table 2 and Figure 2, it can also be observed that 38 (19%), 129 (64.5%) and 33 (16.5%) of the undergraduates have high, moderate and low competence in the use of computer statistical packages for data analysis respectively. More specifically, majority of the students perceived themselves as having moderate level of competence in the use of computer statistical packages for data analysis.

Testing of the Hypotheses

Ho1: There is no significant influence of undergraduates’ field of study on their attitudes towards statistics.

To test this hypothesis, the mean and standard deviation of the data obtained from Science and Non-Science education undergraduates on their attitudes towards statistics were compared and subjected to t-test statistics. The results are as shown in Table 3.

Table 3: t-test showing difference in the attitude of Science and Non-Science education undergraduates on their attitudes towards statistics

Variables	N	Mean	SD	df	t-cal	p-value	Decisions
Science students	100	32.4	8.8	198	0.425	0.672	Not significant
Non-science students	100	31.17	8.5				

P>0.05

From Table 3, the value of t-calculated is 0.425 and p-value is 0.672. Since the p-value is greater than 0.05, the hypothesis that there is no significant influence of undergraduates' field of study on their attitudes towards statistics is hereby upheld at 0.05 level of significance. This shows that undergraduates field of study has no significant influence on their moderate level of attitude towards statistics.

Ho2: There is no significant influence of undergraduates' field of study on their perceived competence in the use of computer statistical packages for data analysis.

To test this hypothesis, the mean and standard deviation of the data obtained from Science and Non-Science education undergraduates on their perceived competence in the use of computer statistical packages for data analysis were compared and subjected to t-test statistics. The result is as shown in Table 4.

Table 4: t-test showing difference in the perceived competence of Science and Non-Science education undergraduates on the use of statistical packages for data analysis

Variables	N	Mean	SD	df	t-cal	p-value	Decisions
Science students	100	31.5	8.6	198	0.346	0.729	Not significant
Non-science students	100	31.1	6.8				

P>0.05

From Table 4, the value of t-calculated is 0.346 and p-value is 0.729. Since the p-value is greater than 0.05, the hypothesis that there is no significant influence of undergraduates' field of study on their perceived competence in the use of computer statistical packages for data analysis is hereby upheld at 0.05 level of significance. This shows that undergraduates field of study has no significant influence on their moderate level of perceived competence in the use of computer statistical packages for data analysis.

Ho3: There is no significant relationship between undergraduates' attitudes towards statistics and their perceived competence in the use of computer statistical packages for data analysis.

To test this hypothesis, undergraduates' responses to Section B (attitude towards statistics) and Section C (perceived competence in the use of computer statistical packages for data analysis) of the questionnaire were correlated using Pearson Product Moment Correlation; the result is shown in Table 5.

Table 5: Correlation table showing relationship between students' attitude towards statistics and their perceived competence in the use of computer statistical packages for data analysis

Variables	N	Df	r cal	p-value
Attitude towards statistics Competence in the use of statistical packages	200	198	0.511	0.00

P<0.05

From Table 5, the value of r calculated is 0.511 and p value is 0.00. Since p value is less than 0.05, the hypothesis earlier stated that there is no significant relationship between undergraduates' attitudes towards statistics and their perceived competence in the use of computer statistical packages for data analysis is hereby rejected at 0.05 level of significance. This shows that there is a relationship between attitude towards statistics and competence in the use of statistical packages for data analysis.

Discussion of Findings

Finding from research question 1 revealed that majority of Nigerian undergraduates have moderate attitude towards statistics as a course. This finding is in line with the findings of Rosli, Maat and Rosli (2017) in which it was revealed in their own study that postgraduate students' attitude and statistical anxiety were both at moderate levels. The similarity between these two studies is that the class of degrees obtained at undergraduate levels will determine students' admission into postgraduate studies. Students' attitude towards statistics at postgraduate level would still be a reflection of their attitude at undergraduate level. This finding did not support the findings of Noraidah, Hairulliza, Hazura, and Tengku-Meriam (2011) in which it was revealed that undergraduates have positive attitude towards statistics. Perhaps the reason why there were variations could be that their results were interpreted as positive and negative attitudes. It could also be attributed to the six dimensions of attitude investigated in their studies, where students have negative attitudes in 3 dimensions of attitude and positive attitudes in the other 3 dimensions. Whereas, the present study presented students attitude towards statistics as high, moderate and low. More so, the present study did not distinguish among the six dimensions of attitude towards statistics.

Findings from research question 2 indicated that majority of Nigerian undergraduates are moderately competent in the use of computer statistical packages for data analysis. This finding corroborates the earlier findings of Yusuf and Balogun (2011), which found out that teachers-in-training were fully competent in the use of

computer word processing packages in which less than 40% of the teachers-in-training were fully competent and confident users of computer spreadsheet packages. The teachers-in-training claimed they need further training on spreadsheet packages. The only reason why the two studies are similar could be that the subjects used in the two studies were education undergraduates.

Finding from hypothesis 1 revealed that there was no significant influence of field of study on students' attitude towards statistics. The moderate level of attitude towards statistics displayed by the undergraduates was not peculiar to students in a particular course of study alone; it cuts across all students in various fields of studies in education, be it science or non-science. This finding is in line with the findings of Noraidah et al (2011) who found out that attitudes towards statistics was not significantly different based on the field of study. The finding also supported the finding of Cahyawati, et al. (2018) who also found out that there were no significantly different attitudes in all attitudes dimension between the science and social science fields of study except for the value dimension. The resulting minor contrast of this study to Cahyawati, et al. (2018) could be that the six dimension of attitude were not separated on this study.

Findings from hypothesis 2 revealed that there was no significant influence of field of study on students' perceived competence in the use of computer statistical packages for data analysis. This finding is at variance with the finding of Bichi et al (2017) who found out that there was a significant difference in the postgraduate students' perceived competence in using ICT resources between science-based and non- science based undergraduates. The source of variation could be that in the Bichi, et al. (2017) study, students' competence in the general use of ICT resources was examined, whereas in this study, competence in the use of computer application packages for data analysis was examined.

Findings from hypotheses 3 clearly showed that there was a significant relationship between attitudes towards statistics and perceived competence in the use of statistical packages for data analysis. This finding corroborates the finding of Mahmud and Zainol (2008) who found that those with little background in statistics had difficulty in identifying the relevant and application of statistical tools for their study. The only explanation for this is that if a student is having positive attitude towards statistics, he will be highly motivated and eager to use it in other areas.

Conclusion

It can be concluded from this study that majority of Nigerian undergraduates have moderate attitudes towards statistics and are moderately competent in the use of computer statistical packages for data analysis. Students' field of study does not influence their attitude towards statistics and their level of competence in the use of computer statistical packages for data analysis.

Recommendations

Based on the findings of this work, it was recommended that:

- 1) statistics should be taught as a course in all levels of undergraduate programme.
- 2) computer application packages should also be taught to students as a course.
- 3) Since attitude towards statistics is related with competence in the use of computer statistical packages, lecturers should device means of making Statistics course more enjoyable and less threatening to the students.

References

- Agbayewa, J. O. & Adodo, S. O. (2008). *Research Methods in Education*. Akure, Ondo State: Stebak Books & Publishers.
- Bandele, S. O. (1998). Computer utilization in educational research and evaluation. *Journal of Educational Research and Evaluation*, 2(1), 58-64.
- Bandele, S. O. (2002). Basic concepts of measurement required for data analysis and interpretation. In S. O. Bandele, R. Seweje & M. F. Alonge (Eds.), *Educational Research: A Comprehensive Approach*. Ado-Ekiti, Nigeria: Green Line Publishers.
- Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York: Freeman.
- Bichi, A. O., Embong, R. & Rashid, A. B. (2017). Nigerian post-graduate students' attitude and perceived competence in using ICT resources for research purpose. *Journal of Nusantara Studies*, 2(2), 224-230.
- Cahyawati, D., Wahyudin, & Prabawanto, S. (2018). Attitudes towards statistics and achievement between students of science and social fields. *Infinity Journal of Mathematics Education*, 7(2), 173-182.
- Duyilemi, B. O. & Duyilemi, A. N. (1999). *A Short Course in Educational Research*. Ondo, Ondo State: Dubeno Nigeria Publishers.
- Gal, I., Ginsburg, L. & Schau, C. (1997). Monitoring attitudes and beliefs in statistics education. In I. Gal & J. B. Garfield (Eds.), *The assessment challenge in statistics education* (pp.37-51). Voorburg, Netherlands: IOS Press.
- Hassan, T. (1995). *Understanding Research in Education*. Ogba-Ikeja, Lagos: Merrifield Publishing Company.
- Mahmud, Z. & Zainol, M. S. (2008). Examining post-graduate students' perceived competency in statistical data analysis and their attitudes towards statistics. *International Journal of Education and Information technologies*, 1(2), 79-86.
- Mira-Khalisa, R. & Siti-Mistima, M. (2017). Attitude towards statistics and performance among post-graduate students. The 18th International Conference on Position Annihilation, Volume 1847.
- Noraidah, S., Hairulliza, M. J., Hazura, M. & Tengku-Meriam, T. W. (2011). Students' attitude towards statistics course. *Procedia-Social and Behavioral Sciences*, 18, 287-294.
- Nworgu, B. E. (2006). *Educational Research Basic Issues and Methodology* (Second and enlarged edition). Nsukka: University Trust Publishers.
- Pajares, F. (1996). Self-efficacy beliefs in academic settings. *Review of Educational Research*, 66(4), 543-578.

- Rosli, M. K., Maat, S. M. & Rosli, R. (2017). Students' attitude and anxiety towards statistics: A descriptive analysis. *Research on Education and Psychology*, 1(1), 47-56.
- Schau, C. (2003). Students' attitudes: The other important outcome in statistics education. Paper presented at the Joint Statistical Meeting of the American Statistical Association, San Francisco, CA.
- Yusuf, M. O. & Balogun, M. R. (2011). Student-teachers' competence and attitude towards information and communication technology: A case study in a Nigerian university. *Contemporary Educational Technology*, 2(1), 18-36.