PRACTICAL STATISTICAL PACKAGE FOR SOCIAL SCIENCES (SPSS) TRAINING AND RESEARCH COMPETENCE AMONG STUDENTS AT THE UNIVERSITY OF NAIROBI (LOWER KABETE CAMPUS)

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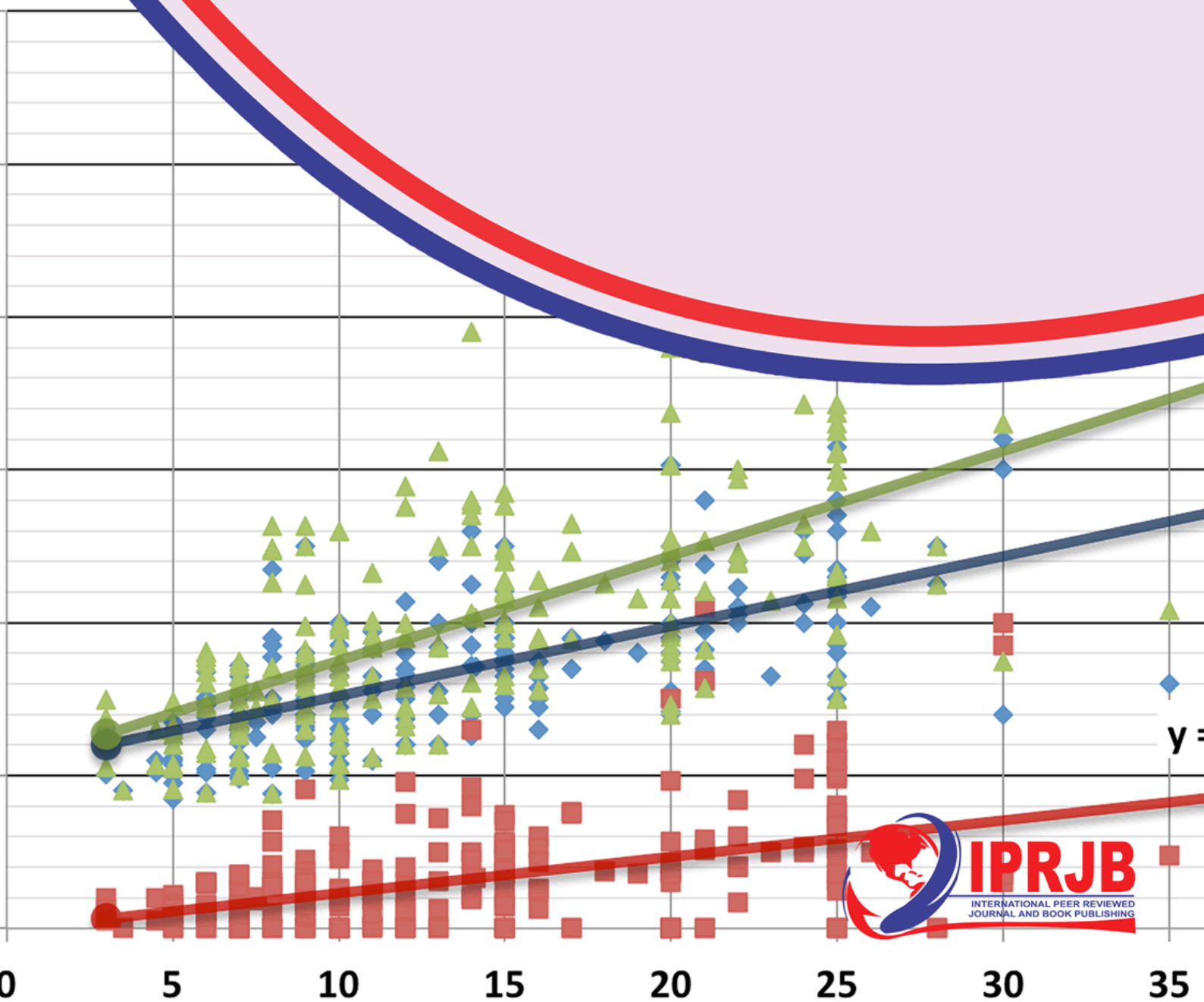
PRACTICAL STATISTICAL PACKAGE FOR SOCIAL SCIENCES (SPSS) TRAINING AND RESEARCH COMPETENCE AMONG STUDENTS AT THE UNIVERSITY OF NAIROBI (LOWER KABETE CAMPUS)

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Abstract

Purpose: The purpose of the paper is to assess the effectiveness of the practical SPSS training on students' research competency among undergraduate and postgraduate students at the University of Nairobi, Lower Kabete Campus.

Methodology: A causal research design was used to establish the relationship between practical SPSS training and research competence of students. The target population was 160 students and a census was adopted. A questionnaire was administered at the end of the training to capture the pre and post training experience and test the effectiveness of the training. The analysis of the data was conducted through descriptive and inferential statistics. In particular, frequencies, means, standard deviations and paired t-test were used.

Results: The post training evaluation results reveal that majority of the respondents had low knowledge in data entry, descriptive statistics, regression and correlation analysis, parametric and non-parametric analysis, and journal article extraction and publication. Results also reveal that the level of knowledge significantly increased after the training. This is supported by the paired t-tests conducted on each aspect of training.

Unique Contribution to Theory, Policy and Practice: It was recommended to the campus management that frequent trainings should be organized at the convenience of the campus. It was suggested that university should consider supporting the training financially or the students to be requested to pay a token fee to make the training sustainable. Other financing approaches to enhance sustainability included having the consultant seeking funding from the National Research Fund. It was suggested that the training be made compulsory for all students undertaking Business Research Methods and points to accrue once they attend the training. The results were useful in theory building as they validated the efficacy of practical training pedagogical approaches.

*Key words***:** *SPSS, Practical Training, Research Competence, Students*

1.0 INTRODUCTION

Possession of research skills is necessary for students pursuing postgraduate studies (Kimani & Simba, 2017; Doyle, 2017). Research skills are also crucial at the workplace now that we are in the "BIG DATA" age. At a macro level, improved research skills imply increased research and innovation, all of which are important for achievement of Vision 2030. Linking

research education at postgraduate level with industry needs through practical training is crucial in demonstrating the academic-industry nexus (Ogolla & Kimani, 2016).

However, statistics, a course that is required for most of college, undergraduate and postgraduate degree courses, is feared by many. Doyle (2017) in an attempt to assess the college students attitudes and perceptions towards statistics, noted that statistics can often be seen as a daunting course, especially for those who feel that mathematics is not their strongest subject. Students begin to dislike the course before even starting and this can carry on throughout the entire course. Similar opinions have been suggested in Lester (2016); Kimani, Guyo and Rotich (2017); Kimani, Iravo and Waititu (2017) and in Kimani and Simba (2017). To address the anxiety and fear of statistics, pedagogical approaches/modes of delivery have been suggested to include both theory and practical training.

Sheikh (2013) notes that both practical and theoretical experiences go hand in hand and each has their own importance. Both theoretical knowledge and practical skills are necessary to master a field. Theoretical learning gives the guidance to the mind and mind guides our body to convert that theoretical learning into practical performance. Theoretical knowledge is good but it is of no use if it is not put to practice. Statistical Package for Social Sciences (SPSS) is a widely used program for statistical analysis in social science. It is also used by market researchers, health researchers, survey companies, government, education researchers, marketing organizations and data miners (Wellman, 1998). The original SPSS manual has been described as one of "sociology's most influential books" for allowing ordinary researchers to do their own statistical analysis. In addition to statistical analysis, data management (case selection, file reshaping, creating derived data) and data documentation (a metadata dictionary is stored in the data file) are features of the base software (Dnuggets, 2013).

Haughton and Kelly (2015), Lester (2016), Doyles (2017) assessed the attitudes and perceptions of students towards statistics. The mentioned studies also examined the influence of demographic, course related factors and learning approaches to students attitudes in statistical courses. However, the mentioned studies did not make reference to the use of SPSS software. Studies by Jatnika (2015) attempted to assess attitudes of students in applying SPSS. However, none of the mentioned studies, conducted a pre and post training analysis to assess the statistical competences of students while using SPSS software. This presents a methodological gap.

Studies that have attempted to assess the influence of practical SPSS training on statistical competency using a pre and post training analysis include Kimani and Simba (2017) who conducted a study on the effectiveness of practical SPSS training on students research competence among 38 postgraduate students, enrolled at Jomo Kenyatta University of Agriculture and Technology, Mombasa Campus. Pre-training findings indicated that the students had low competence while post training evaluation indicated that the students' competence significantly increased. The results implied that practical SPSS training plays an important role in improving the research competence of postgraduates and this goes a long way in enhancing improved academic research output. Similar findings were echoed in Kimani, Guyo and Rotich (2017) and in Kimani, Iravo and Waititu (2017). The current paper differs from the above studies from a contextual standpoint as it focuses on undergraduate and postgraduate students at the University of Nairobi.

2.0 METHODOLOGY

The facilitation team for the SPSS training workshop prepared an early schedule to guide the activity day i.e. 22nd February 2017 SPSS training. The university through the Finance and Investment Students Association (FISA) partnered with Finstock Consulting to assess the training needs of the students regarding the use of SPSS software. The student attendance was quite impressive. The event began with student registration for the workshop and installation of SPSS software in the computers allocated for the SPSS training workshop. Officers from Finstock Consulting led the efforts to install the SPSS software as part of the initial preparation for the workshop. Various speakers, including the lead Finstock Consultant and FISA president highlighted the agenda for the SPSS training workshop. The Finstock Consultant discussed the basic aspects encountered when using SPSS software. The topics included data entry for direct and imported values; descriptive such as various frequency tables, graphs, charts and cross tabulations; different tests for determining normality, such as Skewness, kurtosis, graphical test, and Smirnov Kolmogorov test. Further discussions also dwelt on regression and correlation topics such as F statistic, R^2, OLS coefficients, formulation of null hypothesis and interpretation of P-values and t-statistics.

A causal research design was used to examine the effect of practical training on student's statistical competence. A target population of 160 students was identified and a census was adopted. A pre and post training questionnaire was used to collect data from the students. Specifically, the pretraining questionnaire was administered at the start of training to capture the demographic details and competencies of the students. The post training evaluation questionnaire was administered at the end of the training using the help of the consulting team.

The SPSS training workshops aimed to impart statistical analysis skills among the undergraduate and postgraduate students using SPSS and other statistical software. This would help them to apply SPSS software in their academic projects and writing their thesis. The facilitators of the SPSS training workshop had to first establish the number of students who had knowledge on the use of SPSS software and those who lacked any prior exposure in using the software. To achieve this, they administrated questionnaires to the university students (a total of 160 students participated in the training). A post training evaluation questionnaire was also administered after the Finstock consultants had taken the students through the first and second sessions of their discussions on SPSS software. Pictures description of the workshop is described below;

Picture 1: Undergraduate and Postgraduate students during the training

Picture 2: Finstock Consulting Trainer illustrating a point

Picture 3: Students keenly following the process

Picture 4: Trainer (dressed in black) doing a "walk around" to assist

3.0 REPORT ON PRE-TRAINING EVALUATION

The participants were requested to indicate their level of education and whether they had any experience in using SPSS prior to this training. Furthermore, the students were requested to indicate whether they had basic knowledge of SPSS (ability to work with SPSS) at the beginning of the training.

3.1 Student Level of Education

The students were requested to indicate their level of education (Undergraduate or postgraduate). The results are presented in figure 1.
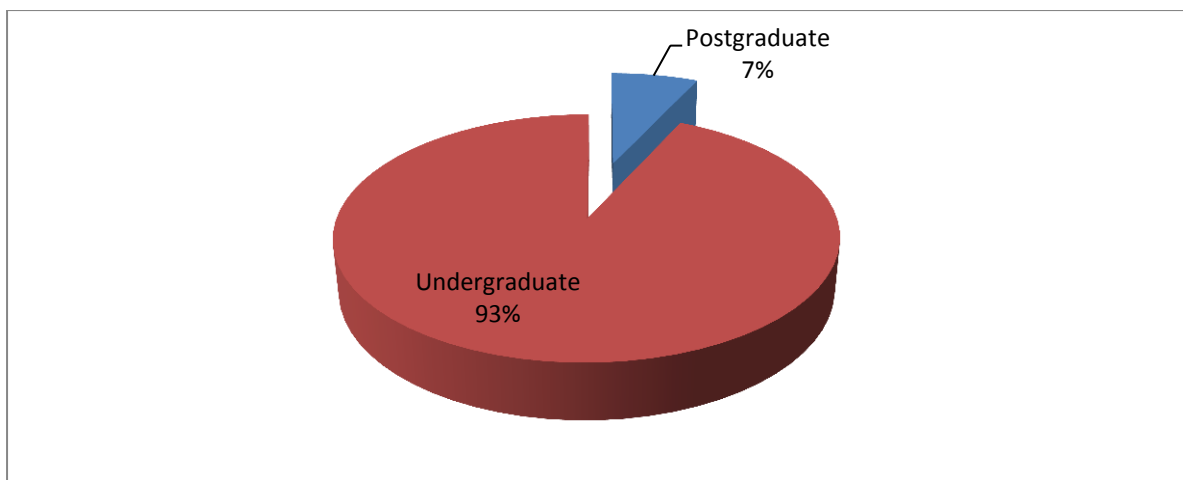

Figure 1: Students' Level of Education

Out of the students who responded to the questionnaire, 7% were post graduate students while 93% were undergraduate students. This shows that majority of the participants were undergraduate students. This could be explained by the fact that the Finance and Investment Students Association had managed to ensure that their membership, who are mostly undergraduate students, to attend the training.
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3.2 Prior use of SPSS Software

A question was posed to assess whether students possessed basic SPSS knowledge used to analyze data. The results are presented in the figure 2.
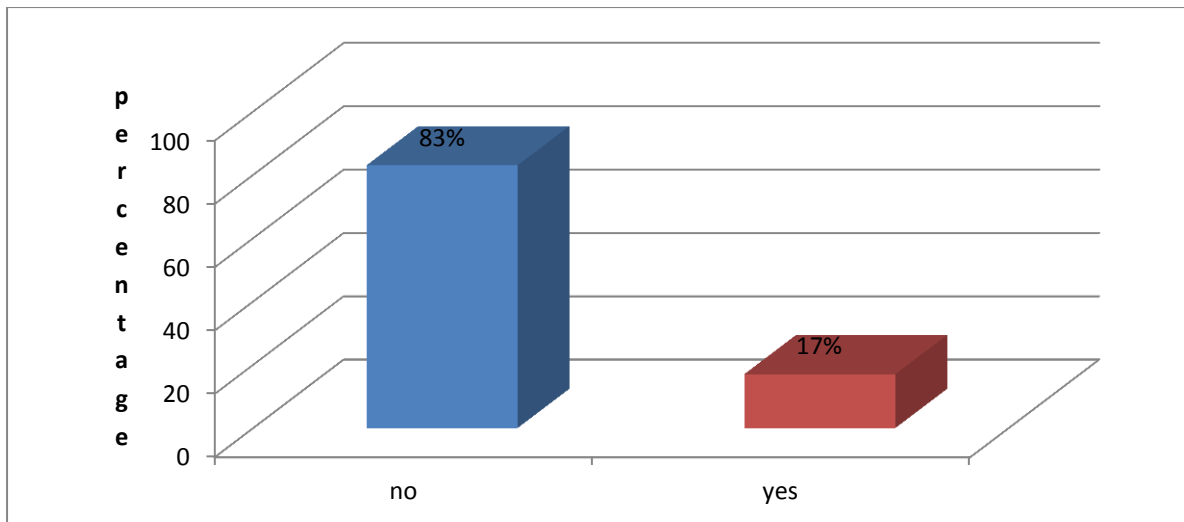
Figure 2: Prior use of SPSS software

The results reveal that the majority (83%) of students had not used the SPSS software previously. Only 17% of student had used SPSS software prior to the training. Most students also admitted that they could not use any other statistical software -Stata, Eviews, SAS, and R. In addition, undergraduate students were less proficient with statistical analysis software compared to the post-graduate students. This could be explained by the fact that postgraduate students may have had more opportunities to participate in such trainings. In addition, this shows that there is a need for statistical skills at both undergraduate and postgraduate levels.

3.1.3 Extent of Basic Knowledge of SPSS (Ability to input data into SPSS)

Ability to input data in SPSS was used as the basic parameter to test whether students possess SPSS analysis skill. The results are presented in the figure 2.
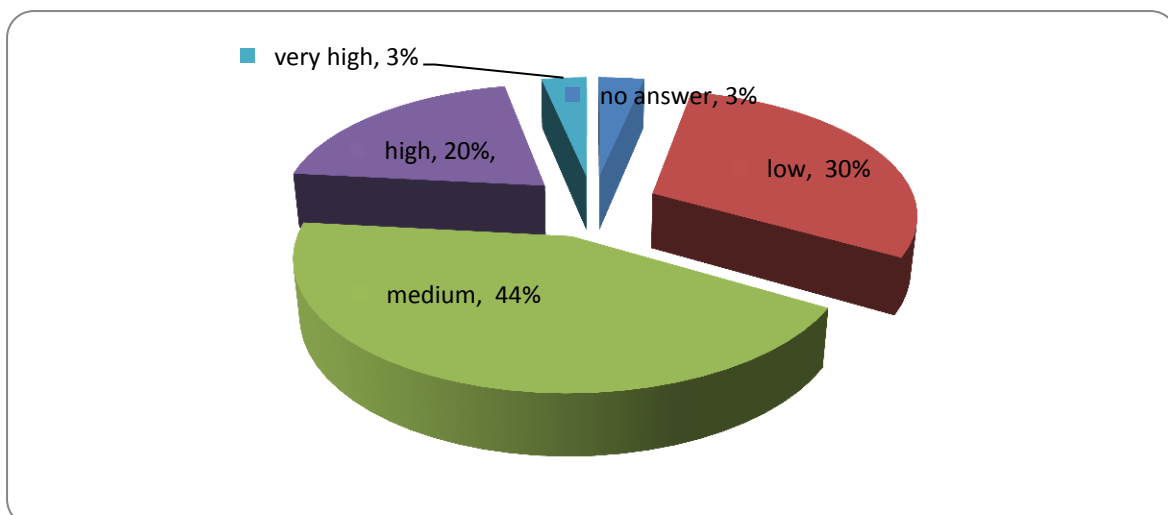

Figure 3: Ability to input data into SPSS

The results of overall knowledge of SPSS in training indicated that that 44 % of the student had medium skills, 30% low, 20% high, and only 3% very high skills. This implies that majority of workshop attendants had a dire need for hands-on statistical training.

4.0 POST TRAINING EVALUATION

A questionnaire was administered to the participants after the training. The participants were requested to rate their understanding and knowledge of data analysis aspects namely,

- Data entry before and after training
- Descriptive analysis before and after analysis,
- Regression and Correlation before and after analysis
- Applicability of SPSS Training to course work

The responses from the students were analyzed using means, standard deviations frequencies and presented using bar graphs.

4.1 Understanding and Knowledge of Data entry before and after Training

The workshop attendants were requested to rate their understanding and knowledge of data entry before and after training. The results were presented in Figure 4.

Data entry before and after training

	very low	low	medium	high	very high
Data entry Before Training	60	13.3	13.3	10	3.3
Data entry After Training	3.3	3.3	43.3	30	20

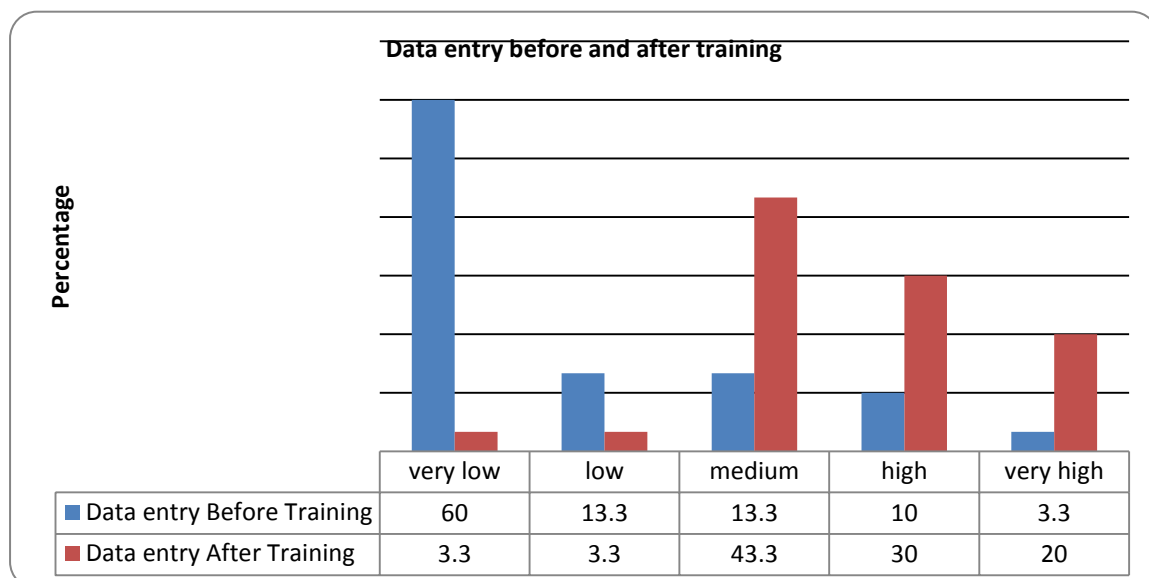**Figure 4: Understanding and knowledge of data entry before and after training**

The results presented in the figure indicated that 73.3% (60% +13.3%) of the workshop attendants had low or very low ability to input data into SPSS before the training. However, 50% (30%+ 20%) reported a high ability to input data after the training. These findings imply that the training on data entry was effective.

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Inferential statistics were conducted to support the descriptive results. In particular, a paired t-test was employed. Table 1 shows the results.

Table 1: Paired t-test for Understanding and knowledge of data entry before and after training

Paired Samples Statistics (n=160)	Training aspect	Mean	Std. Deviation	mean difference	t stat	P value	conclusion
Pair 1	Your ability to input data in SPSS-Before Training	1.83	1.206	-1.733	-6.031	0.000	There is a significant difference in knowledge before and after training-
Pair 2	Your ability to input data in SPSS-After Training	3.57	1.073				This implies that the training on data entry was effective

Inferential results in Table 1 revealed that there is a significant difference in knowledge before and after training. This implied that the training on data entry was effective.

4.2 Understanding and knowledge of descriptive statistics before and after training
The workshop attendants were requested to rate their understanding and knowledge of descriptive statistics before and after training. The results were presented in Figure 5.

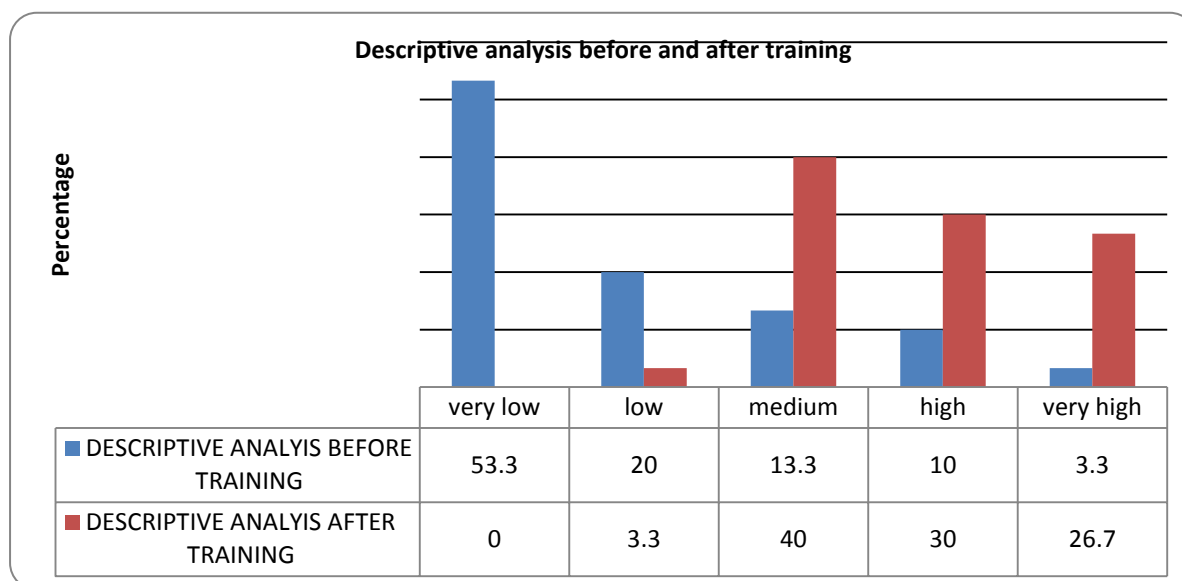| Descriptive analysis before and after training	very low	low	medium	high	very high
DESCRIPTIVE ANALYIS BEFORE TRAINING	53.3	20	13.3	10	3.3
DESCRIPTIVE ANALYIS AFTER TRAINING	0	3.3	40	30	26.7

Figure 5: Understanding and knowledge of descriptive statistics before and after training

The results presented in the figure indicated that 73.3% (53.3% + 20%) of the workshop attendants had low or very low knowledge of descriptive statistics before training. However, after training, 56.7% (30%+26.7%) of the respondents indicated that they had high knowledge of descriptive statistics. These findings imply that the training on descriptive statistics such as generation and interpretation of means, standard deviations, and the associated frequency tables, graphs and charts was effective.

Inferential statistics were also conducted to support the descriptive results. In particular, a paired t-test was employed. Table 2 shows the results.

Table 2: Paired t-test for understanding and knowledge of descriptive statistics before and after training

Paired Samples Statistics	Training aspect	Mean	Std. Dev	Mean difference	t stat	P value	Conclusion
Pair 1	Ability to conduct descriptive statistics-Before Training	1.90	1.185	-1.833	-5.633	0.000	There is a significant difference in knowledge before and after training. This implies that the training on descriptive statistics was effective
Pair 2	Ability to conduct descriptive statistics-After Training	3.73	1.081				

Inferential results in Table 2 revealed that there is a significant difference in knowledge before and after training. This implied that the training on descriptive statistics was effective.

4.3 Understanding and knowledge of regression and correlation analysis before and after training

The workshop attendants were requested to rate their understanding and knowledge of regression and correlation before and after training. The results were presented in Figure 6.
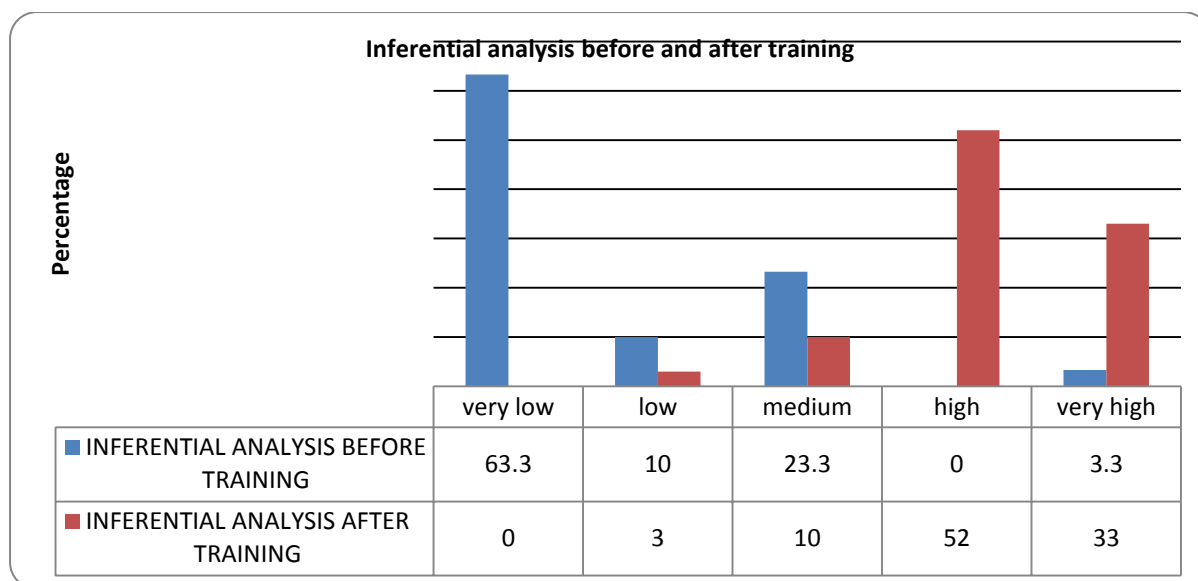
	very low	low	medium	high	very high
■ INFERENTIAL ANALYSIS BEFORE TRAINING	63.3	10	23.3	0	3.3
■ INFERENTIAL ANALYSIS AFTER TRAINING	0	3	10	52	33

Figure 6: Understanding and knowledge of regression and correlation analysis before and after training

The results presented in the figure indicated that 73.3% (63.3% + 10%) of the workshop attendants had low or very low knowledge of regression and correlation before training. However, after training, 85% (52% + 33%) of the respondents indicated that they had high knowledge of regression and correlation. These findings imply that the training on regression and correlation was effective.

Inferential statistics were conducted to support the descriptive results. In particular, a paired t-test was employed. The table below shows the results.

Table3: Understanding and knowledge of regression and correlation analysis before and after training

Paired Samples Statistics	Training aspect	Mean	Std. Dev	Mean difference	t stat	P value	Conclusion
Pair 1	Ability to do regression and correlation- Before training	1.70	1.055				There is a significant difference in knowledge before and after training
Pair 2	Ability to do regression and correlation- After Training	3.30	1.205	-1.600	-4.997	0.000	This implies that the training training on regression and correlation was effective

Inferential results in Table 3 revealed that there is a significant difference in knowledge before and after training. This implied that the training on regression and correlation was effective

4.4 Overall knowledge of SPSS analysis before and after training

The workshop attendants were requested to rate their overall knowledge of SPSS before and after training. The results were presented in Figure 7.
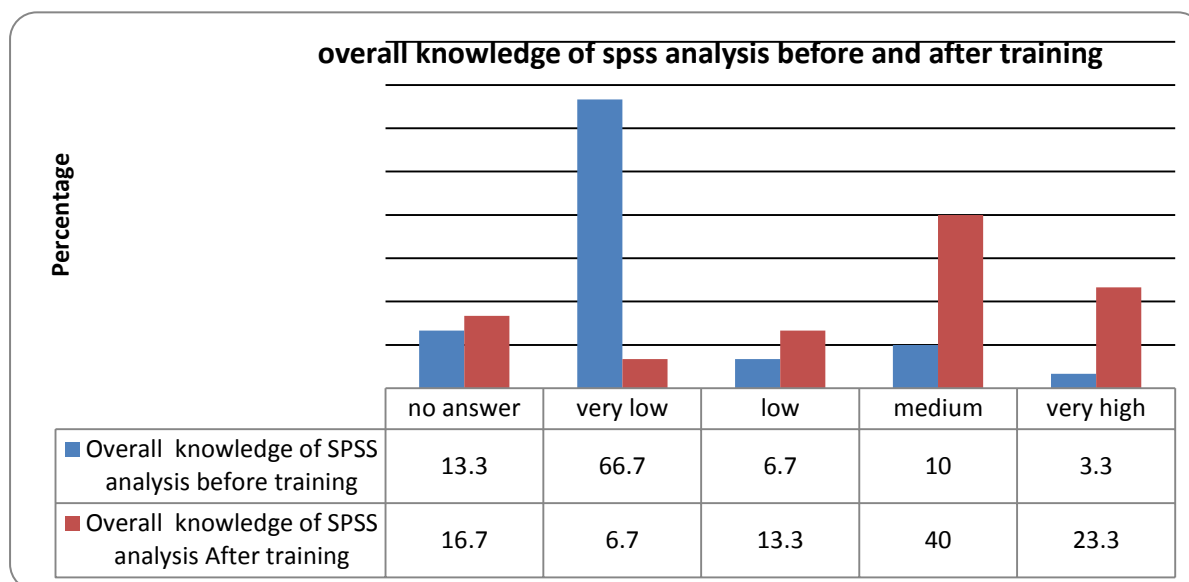

overall knowledge of spss analysis before and after training	no answer	very low	low	medium	very high
Overall knowledge of SPSS analysis before training	13.3	66.7	6.7	10	3.3
Overall knowledge of SPSS analysis After training	16.7	6.7	13.3	40	23.3

Figure 7 Overall knowledge of SPSS analysis before and after training

The results presented in the figure indicated that 80% (13.3% + 66.7%) of the workshop attendants had low or very low knowledge of SPSS analysis before the training. However, after training, 63.3 % (40%+23.3%) reported to have high knowledge of SPSS analysis. These findings imply that the Overall training on SPSS was effective.

Inferential statistics were conducted to support the descriptive results. In particular, a paired t-test was employed. Table 4 shows the results.

Table 4: Overall knowledge of SPSS analysis before and after training

Paired Samples Statistics	Training aspect	Mean	Std. Dev	mean difference	t stat	P value	conclusion
Pair 1	Overall knowledge of the SPSS in this training-Before training	1.27	1.048	-1.971	-1.200	0.000	There is a significant difference in knowledge before and after training This implies that the Overall training on SPSS was effective
Pair 2	Overall knowledge of the SPSS in this training-After Training	2.47	1.383				

Inferential results in Table 4 revealed that there is a significant difference in knowledge before and after training. This implied that the overall training on SPSS was effective.

The workshop attendants were asked to rate the relevance of the SPSS training to course work. Majority (63.3%) indicated that the training was relevant to their course work. In particular, the training was useful in understanding Business Research Methods course and also useful in the research project which required an understanding of descriptive and inferential statistics. In addition, the workshop attendants were requested to rate the ability of the consultants (Finstock Consulting) to deliver the SPSS training. Results revealed that majority (87%) of the trainers (Finstock Consulting) were effective in delivering the SPSS training.

5.0 SUMMARY OF KEY FINDINGS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary of Key Findings

Pre-training evaluation results revealed that there was widespread interest by both undergraduate and postgraduate students to learn how to analyze data by use of SPSS software. Descriptive results show that majority of respondents had no prior knowledge of SPSS. In addition, majority were familiar to basic SPSS to a low extent implying that there is a dire need to train undergraduate and post-graduate students on SPSS basics. The post training evaluation results revealed that majority of the respondents had low knowledge in data entry, descriptive statistics, regression and correlation analysis. Results also reveal that the level of knowledge significantly increased after the training. This was supported by the statistically significant paired t-tests conducted on each aspect of training.

Finally, majority of the respondents indicated that the training was relevant to their course work. The findings implied that the overall training on SPSS was effective. Workshop attendants also rated the trainers from Finstock Consulting as being effective in delivering the SPSS training.

5.2 Conclusions

The report concludes that there was widespread interest by both undergraduate and post-graduate students to learn how to analyze data by use of SPSS software. There is a need for continued training in statistical software's. The hands-on training methodology is effective in improving understanding of spss data entry, descriptive statistics, regression and correlation analysis. The training is relevant to students course work especially in relation to understanding the Business Research methods course and also in carrying out research work. Students would attend future levels of SPSS trainings if organized. The training workshops are useful for imparting vision 2030 relevant skills. This is because ingraining statistical research skills to students ensures that they are competence to carry out research that would change outcomes in agricultural sector, health sector, education sector, energy sector, just to mention but a few. Quality research implies that productivity is improved once the research output is disseminated and implemented by households. An increase in productivity is one of the source of economic growth, according to economic literature. Economic growth of over 10% per annum as stipulated under Vison 2030 may be achieved this way.

5.3 Recommendations

The recommendations given may influence practice, policy and theory as follows;

5.3.1 Recommendation for Practice

The report recommended that undergraduate and post-graduate students in public and private universities should be trained on SPSS since it is relevant to their course work.

5.3.2 Recommendation for Policy

The report recommended that the university can consider; that for the sustainability of the trainings, either the Finance and Investments Students Association is supported financially by the campus or by sponsors so that they can be giving a token of appreciation to the trainers after training. In the event that is impossible, the students should be requested to pay a token fee. In the event that the later option is tenable, it is further proposed that the students should pay to a paybill provided by Finstock Consulting to avoid adding an administrative burden to the campus. Furthermore, it is recommended that any financial burden to the university and to students can be avoided if the consultant requests for funding from the National Research Fund to facilitate the practical trainings.

It is also recommended that the training can be made compulsory for all students undertaking Business Research Methods and points should accrue once they attend the training. This will be similar to points that accrue for CPD hours when accountants attend trainings or when points accrue for students who undertake attachments. This will ensure maximum attendance and benefit by students.

5.3.3 Recommendation for Theory Building

The report recommended that the trainings workshops can be used to test pedagogical theories which establish the right mix of training techniques. That is, the right mix of theoretical and hands on data analysis training approaches. As noted in literature, the mix of both theory and practice in learning improves the learning experience. Futures studies should attempt to cover research gaps not addressed in this study. For instance, studies should attempt to establish if practical training in other statistical softwares such as STATA, EVIEWS, EXCEL, R improve the statistical mastery and research competence of students. A comparative study between private, public universities and constituent colleges should also be conducted to understand whether the challenge in statistical modelling using softwares is unique to the type of institution. Furthermore, a study to understand the efficacy of the training at different stages of learning, say at the beginning of the semester, in the middle of the semester when undertaking the Business Research Methods course or after course work but just before the data analysis segment of the research work should be undertaken. This would enable proper timing of the training and hence improve the efficacy.

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