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A Quasi-Experimental Study on the Use of SPSS: An Aid to Obtain a Reliable Research Paper Among Grade 12 Senior High School Learners

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Abstract. This research was undertaken to analyse the use of Statistical Package for Social Sciences (SPSS) software by adopting a quasi-experimental design in determining the substantial difference between the assessment results of both groups-controlled and experimental group. This research was carried out by the researcher to promote the use of the software or any statistical software to ameliorate the computer-skills of the learners as well as to provide an efficient method in the teaching-delivery particularly in teaching Practical Research 2 for the senior high school students. With the use of a quasi-experimental design and having identified the G-12 EIM students as participants for the experiment using purposive sampling, the researcher was able to successfully introduce the treatment to the experimental group. Using McNemar Test, a type of non-parametric tests, results were accurately analysed which revealed a significant difference between the pre-test and post-test scores suggesting that the treatment introduced significantly influenced their scores.
Keywords: EIM, Statistical Package for Social Sciences

1. Introduction

The children of the twenty-first century are increasingly prepared to bring knowledge and abilities to solve issues, make sense of information, and know how to acquire and assess evidence to make judgments." Improving such skills is central to STEM and

The effective strategies and interventions made by individuals, professionals and alike stem from research. Research paves way for finding new insights, facts and answers to questions. The use of software like the Statistical Package for Social Sciences (SPSS) allowed researchers to come up with concrete and reliable results, making it more efficient. Especially when it comes to quantitative research wherein it requires meticulous analysis in determining the statistical treatment that will be employed in the research paper.

Data analysis and interpretation are two of the most crucial and time-consuming part in writing a research paper. Wherein the data collected must be carefully analyzed using appropriate statistical treatment followed by a well-thought interpretation of results. These processes may cause additional anxiety on the part of the students especially if traditional methods were used. It is therefore equally important to make sure that the learners are fit in conducting and in doing their research paper.

On a study by Abun et.al. (2017) he mentioned that the students have a positive attitude and a high intention to conduct research in the future. Additionally, the results also showed that the students need to acquire knowledge and skills through both theory and practice which will sustain their excitement and intention to conduct research. Additionally, this is further supported by another research study which suggest that research teachers may devise new strategies to lessen students' anxiety towards research (Roxas, 2020). This suggestion was also consonant with that of another research study by Gallos (2022) suggesting that senior high school teachers must consider how to make research more appealing to pupils.

With this, the researcher deemed it necessary to have the grade 12-Electrical Installation Management (EIM) Senior High School (SHS) students of Iligan City East National High School (ICENHS) be the participants of this quasi-experimental research. Further, the literature supported the SPSS tool that the researcher prepared in addressing concerns on statistical treatment.

It may seem apparent that the use of statistical software in data analysis is more convenient than using the traditional method-manual computation. However, it should be noted that no research has been done on ICENHS to support the latter. This prompted the researcher to conduct this research and with the help of the results, proper intervention be crafted to enhance and ensure that the results of the research done by the students are reliable.

2.Literature Review

To give clarity on the nature, context, and purpose of this study, related papers, studies, journals and literatures from the internet and libraries were studied and summarized in this paper.

Milovanovic and Perisic (2020) exclaimed that the analysis of data in the SPSS program is of great importance for obtaining adequate research results, but also for presenting the results in a precise way. Further, the researchers emphasized that data analysis can be extremely important in many scientific fields that require the presentation of results obtained by applying some of the statistical methods. Similarly, the researcher is convinced as to the usefulness of employing SPSS in the field of research. Therefore, teaching it to the students will surely prove beneficial not only to them but also to everyone else.

In another study conducted by Bala (2016) wherein his study aimed at throwing light on the revolutionary contribution of SPSS in current social sciences research. He mentioned that the package enabled the researchers to obtain statistics ranging from simple descriptive numbers to complex analyses of multivariate matrices along with plotting the data in histograms, scatter plots, and other ways. Additionally, the SPSS has reduced the requirement for researchers to be able to undertake several of the calculations that are needed for applied math analyses.

Additionally, results of a study conducted by Counsell and Cribbie (2020) supported the importance of building more positive attitudes toward statistical software to help maximize students' module performance in undergraduate statistics modules. Further, the results also highlighted the fact that students were able to generally rate statistical software as being useful or necessary in psychology.

Similarly, the researcher in this context utilized SPSS as the statistical software used by the participants. The conduct of discussion and introduction on the basic concepts as well as the hands-on practice on the use of SPSS were strategically observed during this research undertaking.

In a study conducted by Rahman and Muktadir (2021) they emphasized the importance of using statistical software and SPSS is one of them. They exclaimed that SPSS could conduct all major tests required for quantitative data analysis in the field of social sciences.

Further, social researchers deemed it essential to use SPSS as a tool for quantitative data analysis.

In this study, the researcher also utilized SPSS as the primary statistical software used as an intervention. The basic use of the software was introduced to the participants for a period of three weeks, the topics discussed during that period are shown on table 1 on the succeeding pages.

The researcher chose SPSS among other statistical software for its ease of use, user-friendly features and popularity. According to Masuadi et.al (2021), SPSS was found to be the most widely used statistical software throughout the whole study period. The study also found SPSS to be mostly used for observational and experimental studies compared to that of the other statistical software-Review Manager and Strata.

The latter was further supported by a research study of Rahman & Muktadir (2021) in which they emphasized the need for accuracy and perfection in data representation in quantitative data analysis for its creators to make it not only feature-rich but user-friendly as well. They added that SPSS has the quality of digging deeper into analyst's data and making it much more efficient instrument than other available spreadsheets, databases, or standard multi-dimensional tools. Accordingly, SPSS statistics excels at drawing conclusions and predictions of user data.

3. Methodology

3.1 Research Design

The researcher utilized a quasi-experimental design. This design was used since the nature of selecting the sample was done under non-probability sampling. Additionally, quasi-experimental design allowed the researcher to manipulate the experimental group by allowing them to utilize the use of SPSS in analyzing and interpreting the results. Further, this design allowed the researcher to identify how the treatment-SPSS, impacted the participants' efficiency.

3.2 Sample Participants and/or other Sources of Data and Information

The participants of this study were the Grade 12-EIM Senior High School (SHS) students of Iligan City East National High School. The participants were chosen primarily because they have been exposed to quantitative research. Moreover, these participants were already taught how to manually compute for the Pearson's- r correlation, which was the statistical tool used in the conduct of this experiment.

Sampling Technique

The researcher made use of a purposive sampling design since the nature of this study was to gauge whether the treatment employed by the experimental group was efficient. Further this sampling technique is highly appropriate to ensure that the participants were not altered during the experiment.

Research Instrument

The researcher made use of a fully adopted assessment found in the Practical Research Module, a learning module used by all secondary public schools across the country to facilitate in teaching the subject for Senior High School Students called Practical Research-Quantitative Research. This assessment tool already underwent expert scrutiny no less than by the Department of Education since this was a tool published by the said Department and has been utilized nationwide and by all Senior High School grade 12 students. Further, the assessment tool used by the researcher covered the topic of Pearson-r moment correlation. This was intentionally picked by the researcher since the formula and the process on how to solve for r (correlation coefficient) was already taught by the

researcher himself to the students. Thus, the students were already familiar with the formula as to the purpose and interpretation of its results.

3.3 Data Gathering Method

Data Collection Procedures

Before conducting the experiment, the researcher made sure that consents from the students and their parents were properly placed. Also, the students were informed as to the purpose, benefits and risks of the experiment that they were about to participate in. After the orientation, the participants were then divided into two groups-controlled and experimental group, the groups were then scheduled as to when they will take the pre-test and post-test exams. Details about the exam was not disclosed to maintain confidentiality and reliability of the instrument as well as to ensure that the result was not influenced. A pre-test was then conducted to both groups, after which the introduction of the treatment-the use of SPSS, to the experimental group was carried out. While lecture on Pearson r-moment correlation was given to the controlled group. After which, a post-test was then performed by both groups. After the experiment, debriefing was then performed by the researcher which marked the end of the experiment. Appropriate statistical treatments were then performed by the researcher to ensure that the results were accurate.

Ethical Issues

In compliance with the Data Privacy Act of 2012 and the Republic Act 7610: Special Protection of Children Against Abuse, Exploitation, and Discrimination Act. Personal information and other relative information that would jeopardize the identity of the participants were held with the utmost confidentiality. Phone numbers, name of their Facebook account, and other means of communication were subject to anonymity. Proper information dissemination was initiated by the researcher before the conduct of the study.

3.4 Data Analysis Plan

The test of normality was initialized by the researcher to determine the type of statistical approach. With the use of the Statistical Package for Social Sciences, the Shapiro-Wilk test was run. The results revealed a $p=.000<\alpha=.05$, thereby rejecting the null hypothesis and accepting the alternative hypothesis that the data were not normally distributed. With this result of normality, it was only appropriate that non-parametric tests be used in this research study.

Aside from the measures of central tendency, the Mcnemar test was also used by the researcher to ensure that the analysis and interpretation of data were valid and accurate which was also recommended after the researcher's consultation of a statistician. The latter was an alternative statistical tool to determine the difference between variables. Additionally, this toll was utilized since the nature of the data was binary (scores were either 0 or 50). Such scoring was used by the researcher since the design of the assessment was purely based on the output. Further, the process of obtaining the correct output involved primarily both manual or traditional computation-controlled group and computer-generated result using SPSS-experimental group.

4.Results and Discussion

Guidelines of activities allow students to practice knowledge about science (e.g., The researcher made use of the Statistical Package for the Social Sciences (SPSS) to analyze the data gathered.

Table 1 showed the result of the Pre-Test of the controlled and experimental group. The results revealed that the experimental group had higher pre-test mean score (controlled group $\bar{x} = 4.17$; experimental group $\bar{x}=5.56$).

Table 1. Pre-Test result of the controlled and experimental group

Group	N	Mean	Std. Dev.	Exact Sig.(2-sided)
Controlled Group	36	4.17	14.01	1.00
Experimental Group	36	5.56	15.93	
Total	72			

Additionally, with reference to the p-value ($p=1.00 > \alpha=.05$), this suggest that there is no significant difference between the pre-test scores of the controlled and experimental group. This might be due to due to some factors: first, the manual process in solving for the correlation coefficient is tedious which prevented them from finishing on time. The second factor that might have caused this is that, both controlled group and experimental group were prohibited to review look at their notes. Lastly, the formula to solve for the correlation coefficient was not provided. Prior knowledge as one of the factors previously stated was supported by a study conducted by Hattan e.t.al. (2023) which suggested that prior knowledge is a crucial component to help maximize learning and understanding from text and should not be diminished in conversations that focus predominantly on knowledge.

Table 2. Post-Test result of the controlled and experimental group

	Group	N	Mean	Std. Dev.
Post-Test	Controlled Group	36	13.89	22.71
	Experimental Group	36	31.94	24.35
	Total	72		

Table 2 showed the result of the post-test scores of the controlled and experimental groups. The results revealed that the experimental group had a higher mean ($\bar{x} = 31.94$) compared to that of the controlled group's mean rank ($\bar{x} = 13.89$). This suggests that the experimental group performed better compared to the controlled group. The only plausible explanation as to why the experimental group outperformed the controlled group was that because of the treatment that was introduced by the researcher. The treatment was introduced to the experimental group after the conduct of the pre-test and during the experiment proper whereas the controlled group did not receive any treatment, rather they continued with the experiment and answered the assessment tool that was fully adopted by the researcher using the traditional method in solving for the correlation coefficient-using the statistical formula. This result was further supported by a study conducted by Fortes et.al (n.d.) wherein the results of their analysis highlighted the students' positive perception regardless of their overall performance and the failure rate was reduced from 34% with traditional teaching to only 14% with the inclusion of technology. Further, in another study conducted by Tiamuh (2020) revealed that significant effects favoring technology use were associated with the use of multiple learning tasks (e.g. assignments, problem solving, lab exercises, etc.)

Table 3. Result of McNemar Test

Group	N	Mean	Std. Dev.	MacNemar Test (Exact Sig.)
Controlled Group	36	13.89	22.71	0.35
Experimental Group	36	31.94	24.35	
Total	72			

Table 3 showed the result of the McNemar test which revealed a significant result based on the p-value ($p= 0.35 < \alpha=.05$). This implies that the post-test scores of the two groups: controlled group and experimental group, were significantly different. This further implies that the intervention introduced by the research significantly affects their scores. This

result is further supported by a study conducted by Soleh and Yurniwati (2020), they found that there is a significant positive effect on the use of Computer-Based Problem Solving (CBPS) learning methods. This implies that the treatment was able to provide accurate results in a short amount of time when compared to the use of the traditional method of solving for r.

5. Conclusion

The results of this study revealed that the use of SPSS had a significant contribution in ensuring that the results of the analyses were correct. The results further suggested that based on the pre-test and post-test scores, the introduction of the computer-based statistical tool was significantly influential in obtaining a correct answer in the shortest time possible. It was important to highlight that although this study was not able to utilize regression analysis to provide additional statistical support in determining the efficacy of the intervention, the statistical test employed by the researcher in this research undertaking was appropriate as stipulated on the scope of this research undertaking hence, was able to provide sufficient results.

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