



Comparative Analysis of Chemistry Students' Academic Performance in Research Methodology and Final Year Project in Federal College of Education, Zaria

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ABSTRACT

This study analyzed the academic performance of B.Sc. (Ed) Chemistry students in the Research Methodology course and Final Year Project at the Federal College of Education, Zaria, to promote sustainable education. A sample of 141 students was selected using purposive random sampling, and data from the 2013/2014 to 2019/2020 academic sessions were analyzed using SPSS (IBM version 26). Findings showed that students generally performed better in Research Methodology than in their final year projects, though variations existed across sessions. While some differences in performance were significant in specific years, overall statistical analysis indicated no significant difference between the two. The study concluded that Research Methodology instruction should focus on equipping students with the skills needed to complete their final year projects. It recommended integrating key research project elements into Research Methodology teaching to enhance students' research capabilities for sustainable education.

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INTRODUCTION

The overall objective in every chemistry teaching and learning process is to bring about harmonious development of the individual and acquisition of the desired knowledge; values and skills to enable him/her function in a particular way. The process of teaching needs to be supervised for effective teaching-learning process. The syllabus and curriculum system must be given special care and consideration so as to achieve the desired objectives. Thus, when curriculum system is ensured in every school, there will be positive developments that will bring permanent change in the behaviour of the learner signifying that learning has taken place. However, human societies differ in the way they teach their children values, norms and skills, while others impart skills in formal way, through organized system, that is a well-recognized system approved by the Ministry of Education. Others prefer more traditional ways in inculcating

such desired values, notwithstanding the particular society in which learning takes place, and methodology used, a number of variables interact together to bring about a stable and permanent changes in behaviour (Indabawa, 2014; Mani, 2016; Nkiko, 2021).

The course Research Methodology, aim at providing an opportunity for students to establish or advance their understanding of research through critical exploration of research language, ethics, and approaches. The course introduces the language of research, ethical principles and challenges, and the elements of the research process within quantitative, qualitative, and mixed methods approaches. Chemistry students will use these theoretical underpinnings to begin to critically review literature relevant to their field or interests and determine how research findings are useful in forming their understanding of their work, social, local and global environment (Kothari, 2004;

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Creswell, 2018). The course covers all the conceptual and methodological issues that go into successful conduction of research.

The course at chapter three, Research Methodology is designed to introduce 300 level students to the basics of empirical research, to widen their knowledge of various scientific ways of tackling educational problems. It is a compulsory/core course for all B. Sc (Ed) students as a theoretical basis before they embark on their project work which is also compulsory before graduation. The course acquaints students on the mechanism of research writing. The knowledge acquired from research methodology course is preparatory to project writing. Writing a project is always very technical compared to the day to day departmental activities. That is why when an undergraduate student gets to 300 level, the lecturers start engaging them on courses that have to do with project writing and research methodology (Kothari, 2004; Creswell, 2018; Lukman, 2020).

A Final Year Project (FYP) is an academic task that must be accomplished individually (or in a small group of two or three students) by every undergraduate student to obtain the attributions to graduate. Its aim is to demonstrate the skills and knowledge students have acquired in their studies. A final year project is a document that students write during the academic year and submit at the end of the programme (Fadi, 2016; Qin, 2017). Since academic calendar of Tertiary Institutions in Nigeria is not stable and subject to change, it is safer to say final year project proposal is a document that final year students write and submit at their final year programme.

In the Nigeria Tertiary Institutions today, lecturers and teachers always look out for ways to improve the academic performance of students. There have been so many considerations on the factors or causes of the variation in academic performance of students. For the past years, the bone of contention has been centered on teachers' quality, instructional materials, learning environment and seminar to be ways of improving students' academic

performance. But when it comes to final year projects the opposite is always the case (Lukman, 2020). Thus, there is the need to develop in students the skills, interest and processes for project writing. Project writing is a painstaking exercise that systematically addresses the solution to a specified problem of study. It is usually guided by a format and varies from one educational institution to another. However, the basic ingredients are essentially the same. It is often highly regrettable that most students fail to abide by the rubrics of project writing or to give it the maximum attention it deserves (Dorothy, Mars, Josiah, Ibrahim & Ayodele, 2019). Students with high Academic Performance could have either positive or negative research experience similar with those with average and low Academic Performance. The research experience varies for all students regardless of their Academic Performance. Academic Performance of students can be regarded as the observable and measurable behaviour of a student in a particular situation. For example, the Academic Performance of a student in Research Methodology course includes observable and measurable behaviour of student at any point in time during that course. According to Neville (2015) Academic Performance measures the aspect of behaviour that can be observed at a specific period. This can be obtained with the use of either teacher-made test or standardized achievement test developed for school subjects. Thus, the paper investigated the comparative analysis of students' Academic Performance in research methodology course and final year project among B.Sc. Ed. Chemistry students in Federal College of Education (FCE), Zaria.

Statement of the Problem

B.Sc. Ed. Chemistry students should possess thorough knowledge and understanding of research methodology course for improve Academic Performance. It has been observed that for a long period of time, there is a continuous fluctuation in Chemistry students' Academic Performance in the final year project and it has been a source of concern to

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researchers, educators, government and parents because of the great quality that education has on the National Development. The knowledge acquired from research methodology course is preparatory to the final year project. Therefore, one expects students to demonstrate mastery of research methodology course for better Academic Performance in their final year project. It has been observed that Chemistry students are taught research methodology course all year round but sometimes they get poor Academic Performance in final year projects. The teaching of research methodology among Chemistry students could be said to be incomplete, in the sense that maybe the contents within the allotted periods are not completed or were not taught at all. This may be attributed to the issues of lack of proper teaching methodology, periods allotted not sufficient for the coverage of the expected teachings, there are also congested classrooms with students combine in single classes from various departments. At the present times, various measures have been put in place; such measures are employing qualified personnel in teaching the research methodology course, use of instructional materials for sometimes and adopting modern approach to teaching. Despite this effort, the Academic Performance of Chemistry a student in research methodology course and final year project is not improving as indicated from the previous Academic Sessions. Therefore, the aim of this study is comparative analysis of students' Academic Performance in research methodology course and final year project among B.Sc(ed) Chemistry Students in Federal College of Education, Zaria in some academic sessions.

Objective of the Study

The objective of this study is to:

1. Compare the mean Academic Performance of chemistry students in research

methodology course and final year project from 2013/2014 Academic Session to 2019/2020 Academic Session in Federal College of Education, Zaria.

Research Question

The following research question was formulated for answering:

1. Is there any difference Academic Performance of Chemistry Students in Research Methodology course and final year project between 2013/2014 to 2019/2020 Academic Session in Federal College of Education, Zaria?

Hypothesis

The following research hypothesis was formulated for testing at $p \leq 0.05$.

Ho: There is no significance difference in the Academic Performance of Chemistry Students in Research Methodology course and final year project between 2013/2014 to 2019/2020 Academic Session in Federal College of Education, Zaria.

METHODOLOGY

The study employed ex- post facto research design. In this study the Ex post facto design was deemed fit because the study attempts to compare the differences on students' Academic Performance in research methodology course and final year project. Obi (2020) has defined ex- post facto research more formally as that in which the independent variable or variables have already occurred. The analysis therefore was based on pre-existing data.

The population of this study was 1,110 students from School of Science Education in Federal College of Education, Zaria from 2013/2014 to 2019/2020 Academic Session. See table 1.1.

Table 1.1 Population of the Study

S/N	DEPARTMENT	SESSION	NUMBER OF STUDENTS
1.	Biology	2013/2014 – 2019/2020	603
2.	Chemistry	2013-2014 – 2019/2020	141
3.	Integrated Science	2013-2014 – 2019/2020	142

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S/N	DEPARTMENT	SESSION	NUMBER OF STUDENTS
4.	Mathematics	2013-2014 – 2019/2020	104
5.	P.H.E	2013-2014 – 2019/2020	120
Total			1,110

Source: Field Work, 2022

From the entire population of 1,110 students, the researchers used purposive sampling technique to select a sample size of 141 chemistry students as shown in table 1.2. Purposive sampling was used because B. Sc (Ed) Chemistry Students are suited to help the

researchers answer the research question. Purposive sampling was carried out by selecting only chemistry students who are the members of the population that have certain characteristics suited for this study.

Table 1.2: Sample Size of the Study

S/N	SESSION	NUMBER OF STUDENTS
1.	2013-2014	13
2.	2014-2015	19
3.	2015-2016	22
4.	2017-2018	13
5.	2019-2020	74
Total		141

Source: Field Work, 2022

The instruments used for data collection in this study were Students Research Project Result (RPR) and Research Methodology Result (RMR) from 2013/2014 to 2019/2020 Academic Sessions. The range of scores and grading used for both results were as follows: F represents score of 0.00 - 0.99, E represents score of 1.00 - 1.49, D represents score of 1.50 - 2.39, C represents score of 2.40 - 3.49, B represents score of 3.50 - 4.49, A represents score of 4.50 - 5.00.

The researchers officially collected the departmental project and research methodology results of the B.SC(Ed) Chemistry Students from 2013 Academic Session to 2020 Academic Session respectively.

In analyzing data collected for this study, the researchers employed both descriptive statistics of means and standard deviations to answer research question while inferential statistic of t-test was used to test the study hypothesis. The hypothesis was tested at 0.05 level of significance.

RESULTS

Data collected from project and research methodology performances of final year students of Federal College of Education, Zaria, were statistically analyzed. The data were made up of observations over five Academic Sessions. Academic Performance on the two variables for a total of 141 students were involved in the comparative study. The data were analysed with the Statistical Package for the Social Sciences (SPSS), IBM version 26. The results structured along the research objectives and questions of the study. The associated hypothesis was tested along with discussion and summary of the findings.

Research Question: What is the mean Academic Performance of Chemistry Students in Research Methodology course and Final Year Project from 2013/2014 to 2019/2020 Academic Session in Federal College of Education, Zaria? To compare the level of Academic Performances by the students over the five academic sessions, the Academic Performances were computed for

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each of the sessions and compared as indicated in Table 2.1.

Table 2.1: Mean comparison of performances in Project and Research methodology

Session	N	Research			Project			Mean difference
		Mean	Std. Dev.	Std. Error	Mean	Std. Dev.	Std. Error	
2013/2014	13	55.54	10.752	2.982	60.00	13.348	3.702	4.46
2014/2015	19	53.63	11.625	2.667	52.79	19.478	4.469	-0.84
2015/2016	22	61.77	9.739	2.076	63.68	12.006	2.560	1.91
2016/2017	13	60.00	9.832	2.727	62.23	6.099	1.691	2.23
2019/2020	74	52.73	12.446	1.447	44.03	19.601	2.279	-8.7
Total	141	55.19	11.961	1.007	51.43	18.965	1.597	-3.76

Table 2.1 revealed that the mean Academic Performance of students in project during the 2013/2014 session was higher than was obtained in their methodology. The mean difference was 4.46. The mean performance (53.63) in research methodology was higher than that obtained by the students in project (52.79) during the 2014/2015 session. The mean difference was 0.84. Mean performance (63.68) in project was higher in 2015/2016 session than was obtained for the students in research methodology. The mean difference was 1.91. In the 2016/2017 session, mean performance (62.23) in research project was higher than the mean performance (60.00) in research methodology. The mean difference was 2.23. Mean performance in research methodology was higher in 2019/2020 session when compared to 44.03 obtained for project by the students in the session. In the overall, mean performance (55.19) in research methodology was higher than mean (51.43) performance in project. The overall mean difference was 3.76.

Test of Null Hypothesis

The hypothesis formulated to test the significance of the variability observed between the variables were tested with the t-test statistics. The hypothesis was tested here at the fixed probability level of 0.05 ($p \geq 0.05$). The test was carried out as follows:

Ho: There is no significance difference in the mean Academic Performance of Chemistry Students in Research Methodology course and Final Year Project in 2013/2014 to 2019/2020 Academic Session in Federal College of Education, Zaria.

To test this hypothesis, the mean Academic Performances in the two variables (Research Methodology and the Final Year Project) were computed and compared for using the paired samples t-test. The summary of the result is presented in Table 3.1

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Table 3.1: Paired samples t-test on research methodology and project in the selected sessions

Session	Variable	Mean	N	Std. Dev.	Std. Error	t-value	df	p-value
2013/2014	Research	55.54	13	10.752	2.982	0.827	12	0.425
	Project	60.00	13	13.348	3.702			
2014/2015	Research	53.63	19	11.625	2.667	0.150	18	0.883
	Project	52.79	19	19.478	4.469			
2015/2016	Research	61.77	22	9.739	2.076	1.097	21	0.285
	Project	63.68	22	12.006	2.560			
2016/2017	Research	60.00	13	9.832	2.727	0.736	12	0.476
	Project	62.23	13	6.099	1.691			
2019/2020	Research	52.73	74	12.446	1.447	3.281	73	0.002
	Project	44.03	74	19.601	2.279			
Aggregate	Research	55.19	141	11.961	1.007	2.156	140	0.033
	Project	51.43	141	18.965	1.597			

Table 3.1 revealed that difference obtained between the variables was not significant in the 2013/2014 session. The observed t-value was 0.827 obtained at 12 degree of freedom (df) and the p-value was 0.425 ($p > 0.05$). In the 2014/2015, difference between the two variables was not significant. The observed t-value was 0.150 obtained at $df = 18$ and the p-value obtained was 0.883 ($p > 0.05$). In the 2015/2016 session observed variability between the mean performances of the students in the two variables was not significant. The t-value obtained was 1.097 with a p-value of 0.285 ($p > 0.05$) observed $df = 21$. The difference between the two variables in 2016/2017 session was not significant as t-value observed was 0.736 with p-value of 0.476 ($p > 0.05$) obtained at $df = 12$. In the 2019/2020 session, difference between the two variables was highly significant. The t-value obtained at $df = 73$ was 3.281 with a p-value of 0.002 ($p < 0.05$). In the overall aggregate performance, difference between the two variables was statistically significant. The t-value obtained was 2.156 at 140 df and the p-value was 0.033 ($p < 0.05$). These observations implied that the null hypothesis could be rejected on the basis of difference between the two variables in 2019/2020 session and the overall aggregate but could not be rejected on the basis of performances in 2013/2014, 2014/2015, 2015/2016 and 2016/2017 sessions respectively.

DISCUSSIONS

This study used a comparative approach to investigate B.SC(Ed) Chemistry Students' Academic Performance in Research Methodology course and Final Year Project at the Federal College of Education, Zaria. The study found that mean performance of students in project during the 2013/2014 session was higher than was obtained in their research methodology. The study found that Academic Performance in Research Methodology was generally higher than that obtained by the students in most of the sessions. In the overall, mean academic performance in Research Methodology was found to be higher than mean academic performance in Final year Project. The study found that difference obtained between the variables was not significant from the 2013/2014 to 2016/2017 Academic Sessions. The study found difference between the two variables in the 2019/2020 Academic Session to be significant. The findings here are in consistent with Creswell, (2018; Ogom, 2018) who opined that Chemistry Students should use theoretical underpinnings to begin to critically review literature relevant to their field or interests and determine how research findings are useful in forming their understanding of their work, social, local and global environment. The finding of this study also is in consistent with that of Ortiz, Angel, Susana & Raquel, (2012; Lukman, 2020) who explained that knowledge acquired from research methodology course is in preparatory for project

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writing and that writing a project is always very technical compared to day-to-day departmental activities, the author attributed to why when an undergraduate students get to 300 level, the lecturers start engaging them on courses that have to do with project writing and research methodology.

The finding of the study is in consistent with that of (Karine, Dianne & Deborah, 2012; Dorothy, Mars, Josiah, Ibrahim & Ayodele, 2019) who reported that most students fail to abide by the rubrics of project writing or to give it the maximum attention it deserves and that students with high Academic Performance often have either positive or negative research experience similar with those with average and low Academic Performance due to research experience which varies for all students regardless of their Academic Performance.

CONCLUSION

From the analysis of the data and result of the tested hypothesis, the researchers wish to conclude that: There is no major difference in B.SC(Ed) Chemistry Students' Academic Performance in Research Methodology and Final Year Project in Federal College of Education, Zaria.

RECOMMENDATIONS

Based on the findings of the analyzed data from the study, the researchers wish to recommend that:

1. All required means involved in research project should always be included in the teaching and learning of research methodology for final students in the College for sustainable education.
2. The teaching of research methodology should always be focused on ability to accomplish project by students in their final year project for sustainable education.

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