

EFFECT OF PEER TUTORING STRATEGY ON ACADEMIC PERFORMANCE IN SEPARATION TECHNIQUES AMONG SECONDARY SCHOOL CHEMISTRY STUDENTS IN KANKIA ZONAL EDUCATION QUALITY ASSURANCE KATSINA, NIGERIA

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Abstract

This study investigated “Effect of Peer Tutoring Strategy on Academic Performance in Separation Techniques among Secondary School Chemistry Students in Kankia Zonal Education Quality Assurance, Katsina State, Nigeria”. The study has two objectives, two research questions and two null hypotheses at 0.05 level of significance. The study adopted quasi-experimental design involving pretest and posttest control-experimental group. The population of the study consists of 834 SSII students from nine public secondary schools in Kankia Zonal Education Quality Assurance. Two sample schools were selected using purposive sampling technique. 142 students formed the sample of the study using intact classes of SSII students. The instrument Chemistry Performance Test (CPT) was validated by experts at Chemistry Department, Umaru Musa Yar'adua University Katsina with reliability coefficient, $r = 0.74$. Research questions were analysed using descriptive statistics of mean and standard deviations while null hypotheses were tested using t-test independent sample at $p < 0.05$ level of significance. Results revealed that there are significant effect of treatment on students' academic performance in chemistry ($p < 0.05$) and no significant effect of gender on students' level of performance in Chemistry ($p > 0.05$). It was concluded that peer-tutoring teaching strategy is effective in enhancing students' academic performance and gender friendly in Chemistry.

Keywords: Peer tutoring, academic performance, chemistry

Introduction

Chemistry as one of the science subject has made significant contributions toward the national development. According to Akpan (2016), chemistry is the study of matter and the changes that matter undergoes. Chemistry is a very important science subject in senior secondary school curriculum worldwide. It is a core subject for medical science, textile technology, Agriculture science, synthetic industry, printing technology, pharmacy and chemical engineering. As important as the subject and in spite of the efforts of both federal and state governments to encourage chemistry education, students still shun the subject (Jegede, 2016), also, observed that most students fear chemistry and hence they see chemistry as difficult to understand, which also leads to the poor academic performance.

Furthermore, details analysis of senior secondary chemistry students' performance in Nigeria from 2015 to 2019 indicated persistent failure in chemistry. For instance, of the total number of 171,232 candidates who registered and sat WAEC in 2015, only 40,582 students representing 23.7% passed the subject (chemistry) at credit level. In 2016, there is decrease in number of passes as only 20.7% scored credit and above. Even though the percentage of pass at credit level rises sharply to 36% in

2017, the performance decreases to 33.5% in 2018 and 25.3% in 2019. Academic performance refers to the scores of tests or examinations given at the end of a lesson, unit, term, session, year or programme such as weekly test, mid-term test, termly examination or first school leaving examination.

Peer tutoring is one of the teaching strategies that involves pairing students together to learn or practise an academic task tutored by another student. The pairs of students can be of the same or differing abilities and/or age range. Peer tutoring encompasses a variety of instrumental approaches including cross-age tutoring, Peer Assisted Learning Strategies (PALS), and reciprocal peer-tutoring (RPT). It was reported by Zakari (2019) that, peer tutoring instructional strategy improves students' academic performance better than the conventional method, Jonas (2014) further revealed that gender had no influence on students' performance when peer tutoring and conventional methods were used for teaching instruction. However, Ndirika (2017) revealed no statistically significant difference in the performance scores of students taught using peer-tutoring and those taught using lecture method. Olatoye and Adekoya (2016), noted that some methods of conveying knowledge (like conventional approaches such as lecture and recitation) tend to be relatively ineffective on the students' ability to master and then retain important concepts. This situation is so discouraging realizing the fact that chemistry is a core science subject that Nigeria Universities Commission (NUC) prescribes a pass at credit level before admitting students into any science based course at the university level. By implication, a number of students who are willing to study medicine, pharmacy, engineering and other related disciplines are losing chance as a result of poor performance in chemistry. To address this gap, the researcher used peer-tutoring and observe whether or not its application improve students' academic performance in Separation Techniques. It is in view of this that this research set to investigated the effect of peer-tutoring teaching technique on performance in Separation Techniques of secondary school chemistry students in Kankia Zonal Education Quality Assurance, to see whether it will improve the students' performance or otherwise.

Objectives of the Study

The following objectives are set to guide the study, which are to;

Determine the difference between the mean academic performance scores of students taught chemistry using peer tutoring and their counterparts taught using lecture method.

Find out the difference between the mean academic performance scores of male and female students taught chemistry using peer tutoring.

Research Questions

The following research questions were raised to guide the study:

1. What is the difference between the mean academic performance scores of students taught chemistry using peer-tutoring and their counterparts taught using lecture method?
2. What is the difference between the mean academic performance scores of male and female students taught chemistry using peer-tutoring and their counterpart taught using lecture?

Null hypotheses

The following null hypotheses guided the study at $P \leq 0.05$ level of significance:

H01: There is no significant difference between the mean academic performance scores of students taught chemistry using peer-tutoring and their counterpart taught using lecture method.

H02: There is no significant difference between the mean academic performance scores of male and female students taught chemistry using peer-tutoring and their counterpart taught using lecture method.

Methodology

The study adopted quasi-experimental and control group design involving pre-test, post-test and posttest. Peer tutoring formed the experimental group, while the traditional lecture formed the control group sampled through balloting.

The population of the study covers a total number of 881 SSII Chemistry students from 9 SSS in Kankia Zonal Education Quality Assurance, Katsina State. A total of 142 SSII Chemistry students formed the sample of the study.

The instrument used for this study was adapted from WAEC and NECO past questions; Chemistry Performance Test (CPT). The instrument comprised 50 multiple choice items using separation techniques concept as a topic in SS II syllabus.

The validity of the instrument was achieved by presenting the instrument to two lecturers with PhD qualification in the Department of Education and two from chemistry Department of Umaru Musa Yar'adua University, Katsina and language Education specialist and three Chemistry teachers at secondary school level with minimum qualification of BSc. (Ed) degree. Observations and subsequent corrections made by the validators were effected by the researcher leading to the final development of the instrument.

Test retest was used to determine the reliability of the instrument at an interval of two weeks in one of the schools which is part of the study population, but not part of the study sample. From the results obtained the reliability coefficient of 0.74 was established.

At the beginning, a pre-test was administered to equate the two groups prior to administration of treatment. After this, the experimental group was exposed to peer-tutoring technique while the control group was exposed to lecture method for eight weeks period. Immediately after treatment and teaching period, the same instrument used in pre-test was administered as post-test to determine whether there is change in performance of the students and post post-test to determine the level of retention.

The responses of the CPT were considered using the marking scheme. Each correct response carried 2.0 marks with a maximum of 100 marks. Probability level $p \leq 0.05$ was used for retaining or rejecting the stated hypotheses. The scores obtained from Chemistry Performance Test (CPT) provided the data for testing the hypotheses 1-4. All research questions were answered using mean and standard deviations, while all the null hypotheses were tested using independent sample t-test.

Results

The following results were obtained from the analyses of both the research questions and hypothesis.
Answering Research Questions

Research Question One:

What is the mean Performance scores of the experimental and control groups in posttest and post posttest?

Table 1: Mean and Standard Deviation of Pretest and Posttest Performance of Experimental and Control Group

Group	N	Mean	Std. Deviation	Std. Error Mean	Mean Difference
Pretest					
Experimental	68	45.09	7.598	0.921	-0.22
Control	74	45.31	7.780	0.917	
Posttest					
Experimental	68	74.75	8.376	1.023	9.03
Control	74	65.72	9.201	1.084	

The Table 1 shows that experimental group has a pre-test mean score of 45.09 and Standard Deviation of 7.598 while the control group has a pre-test mean of 45.31 and standard deviation of 7.780 with a mean difference of -0.22. At post-test, experimental group has a performance score of 74.75 and standard deviation of 8.376 while the control group has a performance score of 65.72 and standard deviation of 9.201 with a mean difference of 9.03. The mean score of the experimental group is slightly less than the mean of control group at pre-test. However, the performance score of the experimental group is greater than the performance score of the control group at post-test. This answered the research question number one which sought to find out the mean performance scores of the experimental and control groups before and after treatment.

Research Question Two:

What is the mean Performance score of male and female student’s in the experimental group before and after treatment?

Table 2: Mean and Standard Deviation of Pretest and Posttest Scores of Male and Female Students in the Experimental Group

	Gender	N	Mean	Std. Deviation	Std. Error Mean	Error Mean Difference
Pretest	Male	50	45.20	7.698	1.089	0.42
	Female	18	44.78	7.519	1.772	
Posttest	Male	50	74.40	8.495	1.201	-1.36
	Female	18	75.76	8.182	1.984	

Table 2 presents Mean and Standard Deviation of pretest and posttest Performance of male and female students in experimental group. From the results, male students in the experimental group has a pretest mean score of 45.20 and standard deviation of 7.698 while the female students has a pretest mean score of 44.78 and standard deviation of 7.519. The male students pretest score is slightly higher than the female students pretest score with a mean difference of 0.42. At posttest, the male students have a performance score of 74.40 and standard deviation of 8.495 while the female students has a Performance score of 75.76 and standard deviation of 8.182. The female students’ Performance score is slightly higher than the male students’ performance score with a mean difference of -1.36. This answered the research question number three which sought to establish mean Performance score of

male and female students in the experimental groups before.

Hypotheses Testing

This section analysed data using statistical tool to test the four (4) null hypotheses formulated for the study using inferential statistics of independent sample t-test at 0.05 level of significance.

Hypothesis one:

H01: There is no significant effect of treatment on student’s performance in chemistry.

Table 3: Independent t-test of Pretest and Posttest (Performance) of Experimental and Control Group

	Group	Mean	Mean Difference	T	df	p-value	Decision
Posttest	Experimental	74.75	9.03	8.227	138	.000	Reject H0
	Control	65.72					

The Table 3 presented independent t-test analysis of posttest scores of Experimental and Control Groups. The t-value calculated is 8.227 and p-value obtained was 0.000 which is less than 0.05. This means that, the observed difference between the experimental and control groups at the posttest is significant in favour of the experimental group; an indication of effect of the treatment (peer tutoring) on students’ performance in chemistry. Therefore, the null hypothesis which states that, there is no significant effect of treatment on student’s performance in chemistry is rejected.

Hypothesis two:

H02: There is no significant difference in chemistry performance of male and female students in the experimental group.

Table 4: Independent t-test of Chemistry Performance of Male and Female Students in the Experimental Group

	Gender	Mean	Mean Difference	T	df	p-value	Decision
Posttest	Male	74.40	-1.36	-0.577		0.566	Retain H0
	Female	75.76					

The Table 4 presented independent t-test analysis of posttest scores of male and female students in the Experimental Group. The t-value calculated is -0.577 and p-value obtained is 0.566 which is greater than 0.05. This also means that, the observed difference between the male and female at the posttest is not significant, an indication of equivalence effect of peer tutoring on male and female students’ performance in chemistry. Therefore, the null hypothesis which states that, there is no significant difference in chemistry performance of male and female students in the experimental group is retained.

Discussion of Findings

Findings of this study agree with that of Zakari (2019) which revealed that, peer tutoring instructional strategy improves students' academic performance better than the conventional method, and that of Jonas (2014) further revealed that gender had no significant effect on students' academic performance when peer tutoring and conventional methods were used for teaching instruction. However, the findings of this research is not in line with the findings of Ndirika (2017) whose study investigated the effect of peer-tutoring teaching strategy on academic performance of Biology students in Umuahia Education Zone, the results showed that there was no statistically significant difference in the performance scores of students taught using peer-tutoring and those taught using lecture method. Furthermore, findings of this research also showed that, the treatment (peer-tutoring) has no significant effect on gender in student's academic performance in Chemistry, this implies that the treatment does not depend on gender to be effective. This is in line with the findings of Jonas (2014) which revealed that gender had no influence on students' performance when peer tutoring and conventional methods were used for teaching instruction.

Conclusion

Based on the findings of this research, the following conclusions were drawn:

Using peer-tutoring teaching strategy in teaching Chemistry concepts is effective in enhancing students' academic performance in Chemistry.

Peer-tutoring teaching strategy improves students' academic performance and revealed no significant effect of gender on students' academic performance.

Recommendations

In view of the above, the following recommendations were made.

Teachers should be encouraged to use peer-tutoring teaching strategy in teaching suitable topics in chemistry.

Curriculum planners should emphasize the use of peer-tutoring teaching strategy in teaching Chemistry concepts as it has no significant effect on students' gender.

References

- Akpan, E.U.U. (2016). Critical and Emerging Issues in Science, Technology and Mathematics Education in Nigeria. A lead Paper at a Conference of Colleges of education academic staff union, Gindiri.
- Jegade, S. A. (2016). Students' Anxiety towards the Learning of Chemistry in some Nigerian Secondary Schools. *Educational Research Review*, 2, 193-197.
- Jonas, T. K. (2014). Effects of Reciprocal Peer Tutoring on Mathematics and School Adjustment: A Component Analysis. *Journal of Educational Psychology* 84, 331 –339.
- Ndirika, M. C. Etal (2017). Peer Tutoring Teaching Strategy and Academic Performance of Secondary School Biology Students in Umuahia Education Zone, Nigeria. *IOSR Journal of Research & Method in Education (IOSR-JRME)*. X, (7)e-ISSN: 2320–7388,p-ISSN: 2320–737, Issue 3 Ver. II (May - June 2017)., PP 72-78
- Olatoye, R. A., & Adekoya, Y. M. (2016). Effect of Project Based, Demonstration and Lecture Teaching Strategies on Senior Secondary Students' Performance in an Aspect of Agricultural Science. *International Journal of Educational Research and Technology*, 1 (1), 19-29.
- Zakari.(2019). Effects of Peer-tutoring and Concept Mapping Teaching Techniques on Academic Performance of Senior Secondary School Chemistry Students in Katsina State, Nigeria. Unpublished Ph.D. Thesis, Department of Educational Foundation and Curriculum, ABU Zaria.