

Effects of Peer Mentoring on Basic Science Undergraduates' Learning Outcomes in South-West, Nigerian Universities

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Abstract: *The study examined the effects of Peer Mentoring Teaching Strategy (PMTS) on Basic Science undergraduates' learning outcomes in some universities in South-West, Nigeria. The study adopted a pretest, posttest, control quasi-experimental design. The sample for the study was 32 undergraduates in Basic science selected from two Universities in South West, Nigeria. Simple random sampling technique was used to select two states out of the six states in South-West, Nigeria and the two Universities used in this work. To ensure that only the Basic Science Undergraduates were used in the study, purposive sampling technique was adopted in their selection. The instrument used for the study was a self-constructed 20 item multiple choice performance test titled "Basic Science Undergraduates' Performance Test" (BSUPT). Face and content validity of the instrument were ensured and the reliability was determined using Kuder-Rechardson formula 21 (Kr_{21}). The instrument was administered on the sample and the data collected were analyzed using descriptive an inferential statistics. The outcome of the analysis showed that the use of Peer Mentoring Teaching Strategy enhances the performance and retention of the students in Basic Science. Based on the findings, it was recommended that Peer Mentoring Teaching Strategy should be used in the teaching of Basic Science at the undergraduate level.*

Keywords: *Peer Mentoring, Undergraduates, Performance, Retention, Learning outcomes, Basic Science.*

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I. Introduction

Basic Science in the context of Nigerian University Commission (NUC) comprises of three main science subjects (Biology, Chemistry and Physics). Though, integrated, but at the undergraduate programmes in Basic Science, each main subject of core sciences are given distinct in-depth and rich consideration. Basic Science is designed in a way whereby its pre-requisites are the basic knowledge of Biology, Chemistry and Physics taught at the secondary level in which every Basic Science student is expected to be grounded in the knowledge of the three core sciences. Notwithstanding, individual differences in students and their biasness in one or two of the science subjects do reflect in their performances in Basic Science (Ari and Deniz in Kubat, 2018). Due to the integrated nature in Basic Science, there is need for the lecturer-in-charge to provide adequate and relevant learning strategies for every learner irrespective of their individuality and biasness to have equal benefits and perform equally (Nazimaddin; 2014; Kubat; 2018).

Students' intelligence and ability to assimilate effectively differs from one aspect of Basic Science to the other. In order to overcome such differences among the students should be adopted in the teaching of the course. One of the such learning strategies is Peer mentoring. Peer Mentoring Teaching Strategy is believed by researchers to have potentials that could give better and equal academic learning outcomes to all students in Basic Science irrespective of their biasness (Lev, Kolassa and Bakkem, 2010; Kubat; 2018). This study therefore was designed to investigate the effects of peer mentoring on students' learning outcomes in Basic Science.

Mentoring is a situation where a senior person or mentor provides information, advice and emotional support to a junior person or student over a period of time (Lev, Kolassa and Bakkem, 2010). The mentor is typically older and definitely more experienced in the institutional context and draws upon his experience to guide and support the mentee's efforts to advance within that same context (Collier, 2017). Peer mentoring is a relationship between a more academically sound students and a less academically sound student with the aim of helping the weak to improve in academic performance and capability (Irby, 2014; Flores and Estudillo, 2018). It is a relationship between people who are at the same academic stage in which one person has more experience than the other in a particular domain and can provide support as well as knowledge and skills transfer. Mentoring may be a one-on-one relationship or one to a group. An effective mentor is reliable, patient, respectful, trustworthy and a very good listener and facilitator. When peer mentoring is well organized and managed, students or mentees gain access to transformational experiences (Bunting and Williams, 2017).

Peer mentoring in the context of this work, identified the biasness and weakness of each Basic Science student through the use of a pretest to determine areas of individual's concern in the three aspects of the Basic Science. Those that were more knowledgeable in an aspect were assigned to mentor those that were less privileged. This was done for a period of time. The mentor and the mentee were availed the copies of the learning objectives and guidelines. At the end of the exercise, a posttest was carried out on the students to ascertain the effects of the strategy on students' performance in Basic Science.

II. Statement Of The Problem

Basic Science programme at the undergraduate level is an integration of the three core science subjects. Most students find it difficult to understand and assimilate all the contents in the three aspects of the Basic Science. This was found to be responsible for the average performance recorded in the past years in the course. Due to students' biasness and choice of subjects at the secondary school level, some are scared of some aspects of Basic science; therefore, such ones are not performing to expectation at the overall. To eliminate the biasness among Basic Science students in certain aspects of the course, PeerMentoring Teaching Strategy was adopted in this study and the effects of the strategy were determined on the performance and retention level of the students.

RESEARCH QUESTIONS

The following research question was raised in the study:

1. Is there any difference in the pretest mean scores of the experimental and control groups?

RESEARCH HYPOTHESES

The following research hypotheses were formulated and analyzed:

1. There is no significant difference between the posttest mean scores of experimental and control groups
2. There is no significant difference between the retention mean scores of experimental and control groups

III. Methodology

The design used in the study was a pretest-posttest, control, quasi-experimental research. The sample used was 32 Basic Science undergraduates selected from two Universities in South-West, Nigeria. Simple random sampling technique was used in the selection of the two states out of the six states in South-West, Nigeria and also in the selection of the two Universities used in this study. Simple random sampling technique was also used to select the University for the experimental group while the second University became the control group. Purposive sampling technique was used in the selection of the 18 Basic Science students in the experimental group and the 14 Basic science students in the control group. All the first year undergraduates offering Basic science in the Universities selected were used for the study. The instrument used for the study was a self-constructed 20 item multiple choice performance test titled "Basic Science Undergraduate Performance Test" (BSUPT). Each item in the instrument was scored 5 marks giving a maximum of 100 marks. Face and content validity of the instrument were ensured and its reliability was carried out by administering the instrument to 10 Basic Science students outside the sampled Universities for this study. The data collected were analyzed using Kuder-Reichardson formula 21 (Kr_{21}). The reliability coefficient obtained was 0.87 at 0.5 level of significance. The instrument was administered on the experimental and control groups prior to the treatment to obtain their pretest scores. Experimental group was thereafter given the treatment for a period of eight weeks out of the twelve weeks designed for the study. At the experimental stage, pretest scores were used to determine the weak areas of each student. Those that performed better in certain aspects were made to be mentors to those whose performance were low in the same aspect. The mentors were given orientation on what to do and what being a mentor means. After ascertaining that the mentee had mastered the contents on certain aspects, the mentor proceeds to the next content. The choice of the mentor was based on the best performance on each aspect. This made the position of a mentor rotational as the situation demanded. The control group was left to the conventional teaching strategies of their lecturer throughout the eight weeks. The same curriculum was given to the two groups for the period.

After the eight weeks, posttest was administered on the two groups to determine their posttest mean scores. To determine the retention ability of the students, the BSPT was re-administered on the two groups after four weeks from the posttest period. The study lasted 12 weeks. The data collected were subjected to statistical analysis to determine the students' performance and retention in Basic Science.

IV. Results

Descriptive analysis

Question 1: Is there any difference in the pretest mean scores of the experimental and control groups?

Table 1: Descriptive analysis of the difference in the pretest mean scores of the experimental and control groups

Group	N	Mean	SD	Mean diff.
Experimental	18	49.44	7.09	0.09
Control	14	49.35	6.52	

Table 1 showed that the mean difference in the mean scores of the experimental and control groups was 0.09. This means that there was no difference in the performance of the experimental and control groups before the treatment. They all performed equally. This implies that the two groups were homogeneous prior to the treatment.

Hypotheses testing

Ho1: There is no significant difference between the posttest mean scores of experimental and control groups

Table 2: t-test analysis of the difference between the posttest mean scores of experimental and control groups

Group	N	Mean	SD	df	t	sig
Experimental	18	80.67	8.74	30	10.40	0.000*
Control	14	51.71	6.1			

*p>0.05

Table 2 revealed that the p value was less than the α value. Therefore, the hypothesis was rejected. There was a significant difference in the posttest mean scores of experimental and control groups. Experimental group performed better than the control group after the treatment.

Ho2: There is no significant difference between the retention mean scores of experimental and control groups.

Table 3: t-test analysis of the difference between the retention mean scores of experimental and control groups

Group	N	Mean	SD	df	t	sig
Experimental	18	78.67	8.87	30	9.94	0.000*
control	14	50.57	6.50			

*p> 0.05

Table 3 revealed that the p value was less than the α value. Therefore, the hypothesis was rejected. There was a significant difference in the retention mean scores of experimental and control. Experimental group has better retention ability than the control group.

V. Discussion

The findings of the study showed that there was no difference in the performance of both experimental and control group before the treatment. They all performed equally. This implies that the two groups were homogeneous prior to the treatment.

The findings further revealed that there was a significant difference in the posttest mean scores of experimental and control groups. Experimental group performed better in Basic Science than the control group after the treatment. This implies that the use of Peer Mentoring Teaching Strategy has the potentials in enhancing the students' performance in Basic Science. This finding was in agreement with Collier (2017), Abdulraheem, Yusuf, and Odutayo (2017) and as well as Kubat (2018). They all agreed that Peer Mentoring Teaching Strategy improves students' performance. The reasons for this assertion could be because the mentors and the mentees were very cordial. It is easier to freely and quickly associate with a colleague and build a close relationship than with a superior. They were able to express their minds in the presence of their colleagues.

The findings of the study also revealed that there was a significant difference in the retention mean scores of experimental and control. Experimental group has better retention ability than the control group. This was as a result of the treatment given to the experimental groups. Students exposed to Peer Mentoring Teaching Strategy could retain what they learnt for a long period of time. This was in line with the findings of Nazimuddin (2014), Irby (2014) and as well as Flores, and Estudillo (2018). They all agreed that students exposed to Peer Mentoring Teaching Strategy could perform better and retain what they have learnt for a period of time than their counterparts who were not exposed to Peer Mentoring Teaching Strategy. This could be so because of the fact that both the mentors and the mentees were active learners in the process. Ideas and

discoveries on the concepts learnt emanated from them. Therefore, they can retain what they have learnt longer when the concepts were regurgitated.

VI. Conclusion And Recommendation

The study was able to present peer mentoring as one of the most effective learning strategies for the teaching of Basic Science. It was concluded from the study that the use of peer mentoring has the potentials to enhance students' performance and as well improve their retention abilities. The use of Peer Mentoring Teaching Strategy gave the students an opportunity of cordial interaction with their peers. It provided the avenue for quick acquisition of knowledge in area where they were previously deficient.

Based on the findings, it was recommended that Peer Mentoring Teaching Strategy should be used to teach Basic Science at the undergraduate levels in order to enhance students' performance and retention in the course.

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