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Effect of Peer-Tutoring On Pre-Service Teachers' Performance in Basic Science in Nigerian Colleges of Education

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Abstract

This study investigated effect of Peer Tutoring on pre-service teachers' performance in Basic Science in Nigerian Colleges of Education. The study adopted quasi-experime ntal research design. The sample for the study consists of 124 pre-service teachers was drawn from a total population 1,260 using multistage sampling procedure across six states of the south-west geo-political zone of Nigeria. Two groups were involved in the study: the experimental group and the control group. The pre-service teachers in experimental group were exposed to peer tutoring while the control group was taught with conventional method. Three research instruments were used. They were; Instructional Guide for Peer Tutoring (IGPT), Instructional Guide for Conventional Teaching (IGCT) and Pre-service Teachers' Achievement Test in Basic Science (PTATBS). One general question was raised to guide the study while one null hypothesis was formulated. The results were descriptively analyzed using mean and standard deviation for the general question and inferential statistics of Analysis of Covariance (ANCOVA) was used to test for the hypothesis formulated for the study at 0.05 level of significance. The results showed that peer tutoring has effects on pre-service teachers' performance in Basic Science in Nigerian Colleges of Education as it enhances their academic performance. It was recommended that Basic Science lecturers should embrace the use of peer tutoring in order to facilitate performance of pre-service teachers in Basic Science when they are finally practice as classroom teacher.

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Introduction

There is no doubt that the primary task of a teacher is teaching and his professional goal is to enhance learning effectiveness. The effects of teaching on learning are often beneficial and usually easy to observe. Basic Science is one of the core subjects which enable students to acquire further knowledge and skills. It has a compulsory status in the National Policy of Education, and it is considered important in everyday life.

The Federal government of Nigeria realized the need for National Commission for Colleges of Education (NCCE, 1990). This body is saddled with the responsibility of producing teachers with Nigeria Certificate in Education (NCE) to teach in primary and Junior Secondary Schools. Students who enrolled in this teacher preparation programme and working toward teacher certification are called pre-service teachers. They complete supervised field-based teaching experiences with the support and mentorship of their institution and cooperating teachers. The cooperating teacher works with and encourages the student teacher to assume greater responsibility for instruction and classroom management as the experience progresses. The student teacher begins as an observer and finishes the pre-service teaching experience as a competent professional

Pre-service teachers are expected to acquire adequate knowledge and perform excellently through innovative teaching strategies so as to fulfill the main objectives of establishing the Colleges of Education, which is to produce quality and competent teachers for primary and junior secondary schools. There are various teaching strategies that can be employed in the teaching and learning of Basic Science, these include inquiry method, scaffolding, concept mapping, discussion method, project method, programmed instruction and computer assisted instruction, among others. Despite these various teaching methods, pre-service teachers, according to Marasigan (2018) Pre-service teachers still record low performance in the subject. Hence, there is the need to introduce other innovative teaching approaches that would help pre-service teachers to perform very well as classroom teachers. The researcher is of the view that if the improved teaching strategy such as Peer Tutoring is emphasized in training pre-service teachers, they will master the innovative teaching strategy in the course of their training and find it more convenient to apply when they are in the field practicing as teachers.

Peer Tutoring (PT) could be defined as a learning situation where students take turns acting as the tutors and the tutees for instruction or review of academic material (Ogundola, 2017; Rittschof, 2001; and Ayvazo & Aljadeff-Abergel, 2014). In this case, students exchange roles during tutoring session, both giving and receiving academic assistance while the teacher supervises rather than participate in the intervention. The students dialogue among themselves as each learner acts in response to another. Peer Tutoring (PT) involves students assume the roles of tutor and tutee with the teacher acting as facilitator (Ajuba, 2011 and Moor & Walters, 2014), thus allowing each student to derive the benefits from preparing to teach another student. Students in a PT must provide instruction, evaluation and reinforcement to one another, thereby encouraging mutual assistance and social support for each other. This process transforms learning from a private to a social activity by making learners to be responsible for their learning and that of others. Researches have shown that both tutors and tutees gain immensely from participating in Peer Tutoring (Ogundola, 2017 and Igbo, 2014)). In this process, students function reciprocally as both tutors and tutees. This dual role is beneficial because it enables students to gain from both the preparation and instruction in which tutors are engaged and from the instructions that tutees received (Ajuba, 2013). Also, it increases students' confidence and teachers do not need to spend much time on individual expressions as peer tutoring is applicable to large groups (Naseerali, 2013).

Statement of the Problem

The researcher observed that Basic Science pre-service teachers in recent years have not been doing well during their teaching practice(s) both in pedagogy and in the knowledge of the subject matter. This prompted the researcher to look into the academic performances of Basic Science pre-service teachers in Nigerian Colleges of Education and how they have been taught. The researcher is of the opinion that perhaps if improved teaching strategy such peer tutoring is emphasized and used among other innovative strategies in teaching Basic Science to pre-service teachers, they may likely be familiar with this teaching strategy in the course of their learning and find it more interesting to use when they are in the class. Based on this premises, this study investigated Peer Tutoring on pre-service teachers' performance in Basic Science in Colleges of Education Nigeria.

General Question

Would Peer Tutoring instructional strategy influence academic performance of pre-service teachers in Basic Science?

Research Hypothesis

This null hypothesis was formulated to guide the study and tested at 0.05 level of significance.

Ho: There is no significant difference in the performance of pre-service teachers exposed to Peer Tutoring and Conventional Teaching in Basic Science.

Methodology

The research design adopted in this study was pre-test and post-test control group quasi-experimental design. The sample of 124 pre-service teachers was drawn using multistage random sampling procedure from a total population of 1,260 Pre-service teachers in Nigerian Colleges of Education. This study made use of three instruments which are: Instructional Guide for Peer Tutoring (IGPT), Instructional Guide for Conventional Teaching (IGCT) and Pre-service Teachers' Achievement Test in Basic Science (PTATBS).

Instructional Guide for Peer Tutoring instrument contained sub-heading of description such as topic selection, duration, performance objectives, schedule of activity, selection of tutor, students' activities (peer tutoring), description of activities/briefing, summary, evaluation and assignment (schedule of next classroom activities)

Instructional Guide for Conventional Teaching (IGCT) was constructed by the researcher as treatment for the conventional group. The instrument contained sub-headings of description such, topic, duration and expected performance objectives, the procedure, and content for each lesson, summary of the lesson, evaluation and assignment. The Pre-service Teachers' Achievement Test in Basic Science (PTATBS) consisted thirty multiple-choice objective test items drawn from the topics taught (Component of the Environment II, Dynamics & Carbon Compound). It consisted of two sections with Section A consists of the demographic information such as school (college), name, age, gender, name and mode of entry while section B containing duration, instruction and the test items. The alternatives for the questions range from A to D.

The three research instruments were validated by professionals in Psychology, Test and Measurement and Science Education. Their suggestions, corrections and opinions helped in effecting the necessary modifications in each of the instruments to ensure its suitability for the study. The method of split-half was used to establish the reliability of the Pre-service Teachers' Achievement Test in Basic Science (PTATBS). This involved the administration of the instruments on 40 pre-service teachers outside the sampled area. The result yielded

reliability coefficient value of 0.81 at 0.05 level of significance. The coefficient value obtained was considered statistically high to make the instrument reliable and for use in the study.

Results

General Question

Would Peer Tutoring instructional strategy influence academic performance of pre-service teachers in Basic Science?

In order to answer the question, mean scores relating to academic performance of pre-service teachers in Basic Science before and after being exposed to Peer Tutoring and Conventional Teaching instructional strategies were computed and compared. The result is presented in Table 1.

Table 1: Mean and Standard Deviation of Academic Performance of Pre-service Teachers in Basic Science using Peer Tutoring and Conventional Teaching

Instructional Strategies	N	Pretest		Posttest		Mean Difference
		Mean	SD	Mean	SD	
Peer Tutoring	48	11.46	1.74	26.21	1.91	14.75
Conventional Teaching	41	11.90	1.63	16.80	2.82	4.90

Table 1 showed the mean and standard deviation of academic performance of Pre-service Teachers in Basic Science using Peer Tutoring and Conventional method. The result revealed that before the treatment, the pre-service teachers in Peer Tutoring group had performance mean score of (11.46) while those in Conventional Teaching groups had performance mean scores of (11.90) with mean difference of (0.44) which is marginal. Their measure of variability had a difference of (0.11). After the treatment, the pre-service teachers exposed to Peer Tutoring had performance mean score of (26.21) while those exposed to Conventional Teaching method had performance mean score of (16.80) with mean difference of (9.41). Their measure of variability had a difference of (0.91). This implies that the use of Peer Tutoring influences academic performance of pre-service teachers in Basic Science as Tutoring strategy has the higher mean difference of (14.75) as against the (4.90) for the conventional teaching strategy.

Hypothesis Testing

Ho: There is no significant difference in the performance of pre-service teachers exposed to Peer Tutoring and Conventional Teaching in Basic Science.

In order to test the hypothesis, performance of pre-service teachers exposed to Peer Tutoring and Conventional Teaching in Basic Science were computed and compared for statistical significance using Analysis of Covariance (ANCOVA) at 0.05 level. The result is presented in Table 2.

Table 2: Summary of Analysis of Covariance (ANCOVA) of Performance of Pre-service Teachers Exposed to Peer Tutoring (PT) and Conventional Teaching (CT) in Basic Science

Source	SS	df	MS	F	P
Corrected Model	1955.372	2	977.686	171.500	.000
Covariate (Pretest)	.087	1	.087	.015	.902

Group	1924.832	1	1924.832	337.642*	.000
Error	490.269	86	5.701		
Total	45039.000	89			
Corrected Total	2445.640	88			

***p<0.05**

Table 2 showed the summary of Analysis of Covariance (ANCOVA) of Performance of Pre-service Teachers Exposed to Peer Tutoring (PT) and Conventional Teaching (CT) in Basic Science. The table revealed that computed F-value (337.642) obtained for the group was significant at 0.05 level. Hence, the null hypothesis is rejected; implying that there is significant difference in the performance of pre-service teachers exposed to Peer Tutoring and Conventional Teaching in Basic Science.

In order to determine the effectiveness of the treatment (instructional strategy) at enhancing the performance of pre-service teachers in Basic Science, Multiple Classification Analysis (MCA) was used. The result is presented in Table 3.

Table 3: Multiple Classification Analysis (MCA) of Pre-service Teachers' Performance in Peer Tutoring (PT) and Conventional Teaching (CT) Groups in Basic Science

Grand mean=21.88					
Variable + Category	**N**	**Unadjusted Devn'**	**Eta²**	**Adjusted For Independent + Covariate**	**Beta**
Peer Tutoring (PT)	48	4.33	.80	4.13	.11
Conventional Teaching (CT)	41	-5.08		-4.80	
Multiple R					0.112
Multiple R^2					0.013

Table 3 showed Multiple Classification Analysis (MCA) of Pre-service Teachers' performance in Peer Tutoring (PT) and Conventional Teaching (CT) groups in Basic Science. The table indicated that pre-service teachers exposed to Reflective Teaching strategy had higher adjusted mean score of (21.88) pre-service teachers exposed to Peer Tutoring instructional strategy had higher adjusted mean score of 26.01(21.88+4.13) in Basic Science than their counterparts taught with Conventional Teaching strategy with an adjusted mean score of 17.08 (21.88+(-4.80). This implies that the use of Peer Tutoring strategy is more effective than Conventional strategy for enhancing the performance of pre-service teachers in Basic Science. The treatment accounted for about 80% (Eta^2=0.80) of the observed variance in the performance of pre-service teachers in Basic Science.

Discussion

The findings of this study showed that there was no significant difference in the performance of pre-service teachers in Basic Science before the teaching. The findings established the homogeneity of the two groups involved in study prior to the treatment. In other words, it could be said that the knowledge base line for the study were equal. Consequently, any significant difference recorded afterwards would not be ascribed to

chance, but to the specific treatment applied. It also revealed that mean scores were very low for the two groups (experimental and control groups). This may probably be due to possible ineffectiveness of the conventional strategy of the instruction generally adopted by Basic Science lecturers in the Nigerian Colleges of Education which could not help the pre-service Basic Science teachers to perform better.

The finding of this study indicates that the performance of pre-service teachers in both experimental and control groups in pre-test were low and do not differ statistically. The findings of this study also revealed that the achievement (post-test) mean scores of pre-service teachers in the two groups (peer tutoring and conventional strategies) were significantly different after the treatment. The Peer Tutoring group was more effective strategy than the Conventional strategy.

The superiority of Peer Tutoring may be due to the fact that it had a structured format where pre-service teachers monitored and evaluated one another. That is, pre-service teachers were part of the educational process and were able to prepare instructional materials, plan the lesson, deliver the lesson and receive feedback from peers (Ajuba, 2011), thus allowing each student to derive the benefits from preparing to teach another student. Students in a PT provide instruction, evaluation and reinforcement to one another, thereby encouraging mutual assistance and social support for each other. They functioned both as tutor and as tutee while the teacher acted as a facilitator. Also, the pre-service teachers monitored their academic progress in a group context, setting team goal and managing their own group reward. These assist the pre-service teachers to improve their own academic competence and self-control. It also made the pre-service teachers to be responsible for their actions in the class, monitoring their academic progress rather than being passive learners. The pre-service teachers were at the center of the teaching and learning process. The bulk of the responsibility lied on them with the teacher answering students' questions. The pre-service teachers played the major roles in the classroom setting. These roles developed their self-confidence and made them to possess sense of self-direction and self-control in teaching. It also empowered them to take responsibility for their own action and that of their groups.

Pre-service teachers' better performance in Peer Tutoring may also be due to fact that they worked cooperatively with their peers thereby providing the social context for the pre-service teachers to actively learn and make deeper connections among facts, concepts and ideas. This developed their social and communication skills, increased cooperation and tolerance of one another as pre-service teachers are from diverse background working together to achieve group goal and aspiration. This made learning to be more permanent. The finding agrees with Ibidiran (2017) that pre-service teachers learn better when engage with the information and processes deeply enough to wave the content of the subject matter into their personal views and understanding. The report of Marasigan (2018) is also in line with the performance of pre-service teachers after the post-test which reported a consistent significant relationship between instructional strategy and pre-service teachers' performance. This shows that Peer Tutoring instructional strategy has an influence on the mode of instruction when used.

Findings of the study showed that there is significant difference between Peer-Tutoring strategy and Conventional Teaching strategy probably because pre-service teachers worked cooperatively with their peers thereby providing the social context for the pre-service teachers to actively learn to make deeper connections among facts, concepts and ideas. This developed their social and communication skills, increased cooperation and tolerance of one another as pre-service teachers were from diverse background working together to achieve group goals. This made learning to be more permanent. The pre-service

teachers were active learners in the classroom. They took active part in the planning which makes them to function reciprocally as both tutors and tutees. This dual role is beneficial because it enables students to gain from both the preparation and instruction and delivering of a lesson thereby acquitting them with the role of a teacher. This finding is in agreement with the earlier research results obtained by Pullin & Allen (2014). It also agreed with the submission of Ogundola (2017) that there was significant difference in the achievement of students taught using peer tutoring strategy over the conventional strategy. It also agreed with the submission of Ayvazo, and Aljadeff. (2014) they opined that Peer Tutoring instructional strategy is fruitful and successful because hierarchical atmosphere in the classroom is removed and cordial, friendly and free atmosphere that facilitates learning, since there is no more fear of criticism in the students, blame or punishment from the teacher when they are not coping as the teacher wants.

Conclusion

From the findings of this study, it was concluded that Peer Tutoring is more effective than the conventional method in the teaching of Basic Science as it determines the pre-service teachers' performance in Basic Science in Nigerian Colleges of Education.

Recommendations

Based on the findings of this study, it was recommendations that Basic Science lecturers should embrace the innovative instructional strategies by using Peer Tutoring instructional strategy in order to facilitate performance of pre-service teachers in Basic Science. Also, the strategy should be encouraged among pre-service teachers so that they will find the strategy convenient and easy to use when practicing as a teacher.

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