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Reflective Teaching as Determinant of Pre-Service Teachers' Performance in Basic Science in Nigerian Colleges of Education

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Abstract:

This study investigated Reflective Teaching as determinant of pre-service teachers' performance in Basic Science in Nigerian Colleges of Education. Teachers need to reflect on their teaching goals, in order to achieve desired educational goal of pre-service teachers in Nigerian Colleges of Education. One research question was raised to guide the study and one null hypothesis was formulated and tested at 0.05 level of significance. The study design was pre-test and post-test control group quasi-experimental research with experimental group adopting Reflective Teaching and the control group using the conventional approach. The sample of 124 pre-service teachers was drawn from a total population of 1,260, using multistage random sampling procedure across the six states of the south-west geo-political zone of Nigeria. Three instruments were used. They were; Pre-service Teachers' Achievement Test in Basic Science (PTATBS), Instructional Guide for Reflective Teaching (IGRT) and Instructional Guide for Conventional Teaching (IGCT) to collect relevant data from the pre-service teachers. The data collected were analysed using mean and standard deviation for the research question and inferential statistics of Analysis of Covariance for the hypothesis generated. The result indicates that reflective teaching determines pre-service teachers' performance in Basic Science in Nigerian Colleges of Education.

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Introduction

The importance of a teacher in any educational setting cannot be overemphasized; teachers determine the ultimate quality of education as he transmits the value of education to the learners. It is obvious that for Colleges of Education in Nigeria to produce teachers, who possess knowledge and classroom skills that would remain in the teaching profession and influence students' performance positively. The decline in standard of education in Nigeria seems to be partially attributed to the teachers in the system due to ineffective teaching strategies.

Pre-service are expected to acquire adequate knowledge and perform excellently so as to fulfill the main objectives of establishing the teacher training school, which is to produce quality and competent teachers for primary and junior secondary schools. It has been observed in recent years that pre-service teachers of Basic Science in Colleges of Education in Nigeria most especially in Southwest, Nigeria performed poorly. Teaching methods adopt must align with the subject content and specific outcomes in order to effectively enhance transmission of knowledge and information from the lecturer to the students (pre- service teachers) (Agoro and Akinsola, 2013). In view of this, an innovative method such as Reflective Teaching would help pre-service teachers in the classroom as practicing teacher later in their teaching career.

Reflective Teaching (RT) is a teaching strategy which involves observing what you do in the classroom, thinking about why you do it, with a view to re-strategize for better performance in the classroom (Adedayo, 2014).In order to conduct a profound understanding of the concept of reflection and to formulate the conceptual framework underlining the study, According to Dewey, reflective activity takes place when a person decides to face a baffled, disordered or confused situation in an attempt to resolve or clear-up the situation. Five phases of reflective thought were presented in cyclic forms which are: suggestion, intellectualization, application, mental elaboration and hypothesis testing. The first phase is suggestion. In this phase, the mind heaps up the possible solutions. The idea of what to do to resolve the situation at hand is a guide to the direct action. It is a vicarious and an anticipatory way of acting, a kind of mental appraisal. The second phase is the intellectualization of the difficulty or confusion that has been felt (by direct experience) and considered a problem to be solved, a puzzle that must be put in order. Here, focus is placed more definitely on the conditions that constitute the trouble. The third phase is the application of suggestions one after another as leading idea. Proper insights into these suggestions correct modify and expand the suggestions that originally emanated, resulting into postulation of definite supposition or hypothesis. This hypothesis is then used to initiate and guide observation and other operations in the collection of factual materials. The fourth phase is the mental elaboration of the idea that bothers on pondering on the inferences as to its correctness or appropriateness. The fifth phase is testing the hypothesis. The entire process involve will be significantly tested to take a definite decision. (Ross &Hannay, 1986; Dewey, 1960)

According to (Dada, 2015, Pollard & Tann, 2012, Bailey, 2011 and Gibbs 2014**),** Reflective teaching is a critical examination of our motivation thinking and practice and looking at what you do in the classroom, thinking about why you do it and thinking if it works – a process of self–observation and self-evaluation. It is a means of professional development which begins in our classroom. It is paying critical attention to the practical values and theories which inform everyday action, by examining practice reflectively and reflexively. Teachers need to reflect on their teaching goals, in order to achieve desired educational goals and how these interface with the demographics and abilities of their students. It could be inferred that reflective teaching strategies refers to a deliberate move to allow you think critically of your teaching practice so that your students can maximize their learning. The various definitions of reflective teaching strategy centered on the ability of a skilled teacher to examine his/her beliefs, values and assumptions behind the teaching practice

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. This could be attributed to inappropriate use of instructional strategies to teach them.

The researcher believes that if improved teaching strategy such as Reflective Teaching is emphasized and used among other innovative strategies in training Basic Science pre-service teachers, they may likely familiar with this teaching strategy in the course of their training and find it more convenient to use when they are in the field practicing as teachers. Based on this premises, this study investigated Reflective Teaching as determinant of pre-service teachers' performance in Basic Sciencein Colleges of Education in Nigeria.

Research Question

Would Reflective Teaching 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 Reflective Teaching 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 Reflective Teaching (IGRT), Instructional Guide for Conventional Teaching (IGCT) and Pre-service Teachers' Achievement Test in Basic Science (PTATBS).

There are two categories of packages for Reflective Teaching in this study. The two categories were constructed by the researcher for the use of research assistant in collaboration with the researcher to facilitate the lesson. They were the Instructional Guide (IG) and Teacher's – Self Reflective Package (TSRP). The IG consisted of instructional guide for teaching the selected topics in Basic Science. The second package, TSRP was employed by the teacher after the completion of each lesson encounter. Based on the observation made and recorded by the observer in the last classroom interaction, the teacher evaluated himself and re-strategizes to amend the inadequacies inherent therein against the next classroom interaction.

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). The preliminary part of the instrument dealt with the pre-service teachers' bio-data which include: college, name, age and gender while duration, instruction and the test items formed the second part. 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

Research Question

Would Reflective Teaching 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 Reflective Teaching 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 Reflective Teaching and Peer Tutoring

Instructional Strategies	N	Pretest		Posttest		Mean Difference
		Mean	SD	Mean	SD	

Reflective Teaching	35	11.14	1.40	25.37	1.77	14.23
Conventional Teaching	41	11.90	1.63	16.80	2.82	4.90

Table 1. The result shows that pre-service teachers in the Reflective Teaching and Conventional Teaching groups had performance mean scores of 11.14 and 11.90 respectively in Basic Science prior to treatment. After the treatment, pre-service exposed Reflective Teaching group with a mean score of 25.37 while the students in the Conventional Teaching group had the least mean score of 16.80. This implies that the use of Reflective Teaching influence academic performance of pre-service teachers in Basic Science. Reflective Teaching has the highest mean difference of 14.23

Testing of Hypothesis

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

In testing the hypothesis, performance of pre-service teachers exposed to Reflective Teaching 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: ANCOVA of Performance of Pre-service Teachers Exposed to Reflective Teaching (RT) and Conventional Teaching (CT) in Basic Science

Source	**SS**	**df**	**MS**	**F**	**P**
Corrected Model	1396.216	2	698.108	123.086	.000
Covariate (Pretest)	10.576	1	10.576	1.865	.176
Group	1246.370	1	1246.370	219.752*	.000
Error	414.034	73	5.672		
Total	34533.000	76			
Corrected Total	1810.250	75			

***p<0.05**

Table 2 reveals that the computed F-value (219.752) obtained for the groups with a p value < 0.05 was significant at 0.05 level. The null hypothesis is rejected. This implies that

there is a significant difference in the performances of pre-service teachers exposed to Reflective Teaching and Conventional strategy in teaching Basic Science.

In order to determine the effectiveness of the treatment (instructional strategies) 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 Reflective Teaching (RT) and Conventional Teaching (CT) Groups in Basic Science

Grand mean=20.75					
Variable + Category	**N**	**Unadjusted Devn'**	**Eta²**	**Adjusted For Independent + Covariate**	**Beta**
Reflective Teaching (RT)	35	4.62	.77	4.24	.29
Conventional Teaching (CT)	41	-3.95		-3.60	
Multiple R					0.288
Multiple R^2					0.083

Table 3 indicates that pre-service teachers exposed to Reflective Teaching strategy had higher adjusted mean score of 24.99 (20.75+4.24) in Basic Science than their counterparts taught with Conventional Teaching strategy with an adjusted mean score of 17.15 (20.75+(-3.60). This implies that the use of Reflective Teaching strategy is more effective instructional strategy than Conventional strategy for enhancing the performance of pre-service teachers in Basic Science. The treatment accounted for about 77% (Eta^2=0.77) 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 three groups involved in study prior to the experiment. 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 treatment applied. It also revealed that mean scores were very low for the two groups (one experimental and one control); 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.

From the finding of this study, it could be concluded that the performance of pre-service teachers in both experimental and control group 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 (reflective teaching and conventional

strategies) were significantly different after the treatment. Reflective teaching group was more effective strategy than the Conventional teaching.

The effectiveness of Reflective Teaching recorded may be attributed to the comments and shared views by the observer at the end of each class. This could have assisted them better than their counterparts in the control group. The teacher was able to manage the class through the five targeted classroom behaviours, thought about possible solutions and attempted an action plan to use against the forthcoming class. Also, the teacher thoughts before, during and after the lessons had made him to consult different texts and improvement on the classroom targeted behaviours to re-strategize for better performance in the next classroom session. Therefore, when a learner adopts and employs the appropriate learning strategy to study Basic Science, he is likely to achieve positively (Danjuma, 2015).

The study further showed that there is significant difference in the achievement mean scores of pre-service teachers that were taught with reflective teaching and conventional teaching. The Reflective Strategy group had a higher adjusted mean score of 24.99 in Basic Science than their counterparts taught with Conventional Teaching strategy with an adjusted mean score of 17.15. This implies that the use of Reflective Teaching is an effective strategy for enhancing the performance of pre-service teachers in Basic Science. The improvement recorded by pre-service teachers may be as a result of the reflection and efforts by the teacher on assessment of the topics during classroom session.

This finding is in support of Adedayo (2014) that reflective teaching strategy influences students' performance in science. It also agreed with the findings of Ibidiran (2017) that teacher's roles have positive influence on pre-service teachers achievements.

Conclusion and Recommendation

From the findings of this study, it is established that pre-service teachers' exposure to Reflective Teaching (RT) instructional strategy enhance the teaching of Basic Science in Nigerian Colleges of Education.

Based on the findings of this study, Basic Science lecturers should embrace the use of Reflective Teaching in order to facilitate performance of pre-service teachers in Basic Science and to enhance their professional technic.

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