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Effects of gallery walk teaching strategy on the academic performance of students in basic science concepts in Rivers state

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Abstract

This study examined the effects of gallery walk teaching strategy on the academic performance of students in Basic science concepts in Ikwerre Local government area, Rivers State. The design of the study was quasi experimental design while pre-test post-test non-equivalent groups were used. A sample size of 120 Upper Universal Basic Education students was randomly sampled and allocated to experimental and control groups from three selected junior secondary schools in Ikwerre local government area, Rivers State. The experimental group was taught using the gallery walk teaching strategy while the control group was taught using lecture method. Two research questions and two hypotheses guided the study. Basic science performance test (BSPT) instrument developed by the researcher was used to test students' academic performance. Mean and standard deviation was used to answer the research questions while analysis of covariance (ANCOVA) was employed to test the hypothesis at 0.05 level of significance. The results revealed that students taught basic science concepts using gallery walk teaching strategy had higher academic performance. Gender had no significant influence on the academic performance of students taught Basic science concepts using gallery walk teaching strategy. It was recommended that teachers should adopt gallery walk teaching strategy in the teaching and learning of science especially basic science, because it fosters active participation of students, encourages collaboration, promotes the use of higher order thinking skills like analysis, evaluation and synthesis and reassures students that their voices, ideas, and experiences are valued since students are more likely to share ideas among a non-threatening group of peers.

Keywords: Gallery walk teaching strategy, academic performance, students, basic science concepts

Introduction

Education has been described as the process of transmitting societal norms, values and desirable attributes from one generation to another. Education is the act by which acquisition of knowledge is made possible, and the process by which one realizes ones potential and uses them for self-development and usefulness for one's environment and society. Nwanna-Nzewunwa (2009) ^[13], opined that education makes individuals functional members of the society. This implies that education is vital for children to achieve life goals and societal objectives. Hence, it is the process of acquiring knowledge and understanding which are instruments of desirable change in the society that involves a series of tasks or activities which cannot be accomplished without the process of teaching and learning. The teaching and learning of science are, however, crucial to education at the secondary school level. Observations show that the level of inculcating science concepts in secondary schools in Nigeria has fallen below the standard expectation. Most teachers still adopt the traditional didactic teaching methods and strategies in the teaching and learning of science in Nigerian secondary schools, and these methods and strategies have been defined as unsuitable, boring and depressing Ibe (2004) ^[4] in Nbina (2013) ^[11]. Literature in science education suggests that there are many methods and strategies for teaching science, however for science teaching to be effective, it should be activity-based and student-centered instead of textbook-based or lecture-based (teacher-centered). Vikoo (2003) ^[17] opined that the nature of discipline or subject matter should be considered in selecting teaching methods during instruction. For instance, Gbamanja (1991) ^[5] suggested that modern science is child-centered, activity-based and, therefore, the main approach to teaching it must be through active participation and guided problem-solving approach which will improve the learner's manipulative skills.

For example, in the act of teaching and learning of sciences, when a student successfully completed a task and attained the set objectives of that learning experience, the student is said to have 'achieved'. The primary concern of the formulators of science education policy is to achieve the set objectives; which includes imparting scientific literacy (FGN, 2004) ^[4]. According to Educational Broadcasting Corporation (2004) ^[3], scientific literacy is the act of knowing and understanding the processes of acquiring scientific concepts and processes required for decision-making, participating in civic activities, economic activities, and cultural affairs. The efficient teaching and learning of science as a result of its process should go beyond the teacher-centered didactic teaching method and instructional strategies to activity-oriented student-centered methods. Vikoo (2003) ^[17] opined that the effective teaching of science should involve the use of appropriate teaching methods and strategies which are student-centered and activity-oriented in the delivery of instruction. Hence, Boundless (2015) ^[2] suggested that effective teaching strategies like gallery walk discussion strategy will activate student's inquisitiveness concerning a class topic, involves students actively in learning, acquire critical thinking skills, achieve a lasting and useful classroom discussion and generally achieve objectives of the course contents.

Research evidence suggests that students' poor performance in science based subjects in WAEC and NECO examinations are as a result of some factors; crucial among them is the use of inappropriate teaching methods and strategies in the delivery of instruction. Scientific literacy can be grounded in schools through the use of advanced and creative teaching methods and techniques such as gallery walk discussion strategy (Mark, 2014) ^[9]. According to Mark (2014) ^[9], "gallery walk encourages students to work collaboratively, participate actively in synthesizing important concepts in consensus building, in writing and public speaking". The gallery walk discussion strategy is a teaching technique that is student-based and activity-based, in which the teacher leads the students through the process of providing solutions to instructional objectives as stated in the lesson. Considering the effectiveness of gallery walk discussion strategy in enhancing active participation during instruction, the FGN, (2004) ^[4] in her National Policy on Education in its aim and objectives noted that learners should be given an opportunity to acquire basic practical, manipulative and other operational skills for self-reliance. This suggests that students must be exposed to appropriate teaching methods and instructional strategies that will enhance their academic performance and retention of Basic science concepts.

Statement of the Problem

Research evidence on students' academic performance in both internal and external examinations in science subjects suggests that most science teachers in Nigerian secondary schools still adopt the traditional didactic teaching methods in delivering instruction. These teaching methods have resulted in poor academic performance, lack of interest and low retention of science concepts since they are not activity-oriented and student-centered (Abdul-Raheem, 2011) ^[1]. This, therefore, draws the required attention to the need for a more effective teaching strategy in the delivery of instruction in science subjects, possibly; the gallery walk teaching strategy which is learner-centered. This creative and innovative teaching strategy which is activity-oriented and

learner-centered could be effective in realizing the goals of effective science teaching. However, the problem of this research is to investigate the effects of gallery walk teaching strategy on the academic performance of students in Basic Science concepts.

Aim and Objectives of the Study

The aim of this study is to investigate the effects of gallery walk teaching strategy on the academic performance of students in Basic Science concepts. Specifically, this study intends to achieve the following objectives:

1. To determine the effect of Gallery Walk teaching strategy on students' academic performance in basic science concepts
2. To find out the effect of Gallery Walk teaching strategy on Male and Female students' academic performance in Basic science concepts.

Research Questions

The following research questions guided the study.

1. What is the effect of Gallery Walk teaching strategy on student's academic performance in Basic Science Concepts?
2. What is the effect of Gallery Walk teaching Strategy on Male and Female students' academic performance in Basic Science Concept?

Hypotheses

The following hypotheses were formulated to test the research questions at 0.05 level of significance;

1. There is no significant difference in the academic performance of sampled students taught basic science concepts using gallery walk teaching strategy and those taught using lecture method.
2. Gender has no significant influence on the student's academic performance as measured by their mean performance score

Methodology

Research Design

The design used in this study is Quasi-experimental (pre-test, post-test non-equivalent control group) design to assess the effects of Gallery Walk teaching strategy on the academic performance of students in Basic Science Concepts in Upper Universal Basic Education.

Population of the Study

The population of the study consists of 678 Upper Universal Basic Education students from three selected public Schools in Ikwerre Local Government Area promoted in 2014/2015 academic session.

Sample and Sampling Technique

The sample size used in this study was made-up of one hundred and twenty (120) students from three Upper Universal Basic Education schools in Ikwerre Local Government Area, forty (40) from each school (twenty students from each school served as control while twenty from each of the schools served as the experimental group). Random sampling technique was employed to obtain the sample allocate the groups into experimental and control groups.

Instrument for data collection

The instrument for data collection was a 25-objective test questions; four marks were allocated for each correct answer totaling 100%.

Validation of the Instrument

The instrument for data collection (BSPT) was validated by two senior lecturers in the Department of Curriculum Studies and Measurement and Evaluation, University of Port-Harcourt respectively to ascertain the face and content validity of the instrument. Their inputs were used in the final draft.

Reliability of the Instrument

The reliability of the instrument was ascertained using the test re-test method. Twenty copies of the instrument for data collection (BSPT) were administered to twenty students of the same class who were not used for the study. After three weeks, the same test was re-administered to the same students and data collected. A reliability coefficient of 0.72 was

obtained using Pearson product Moment (PPMC). This indicates that the instrument is 72% reliable

Method of Data Collection

A pre-test was given to all the sample students before the treatment session. After treatment, a post-test of the instrument (BSPT) was administered to ascertain the academic performance of students in the experimental and control groups.

Method of Data Analysis

Mean scores and standard deviation were employed to answer the research questions while analysis of co-variance (ANCOVA) was used to test the hypotheses at 0.05 level of significance.

Results

Research Question 1: What is the effect of Gallery walk teaching strategy on students' academic performance in Basic Science concepts?

Table 1: Mean and Standard Deviation of pre-test and post-test scores of students taught Basic science concepts

| Group | Method/Strategy | N | Pretest | | Post-test | | Mean | % |
|--------------|-----------------|----|---------|-------|-----------|--------|-------|--------|
| | | | Mean | SD | Mean | SD | Gain | Gain |
| Experimental | Gallery walk | 60 | 43.466 | 7.587 | 67.116 | 11.977 | 23.65 | 21.38% |
| Control | Lecture | 60 | 41.083 | 6.967 | 49.383 | 8.961 | 8.30 | 9.17% |

Table 1 shows that the mean pre-test score and standard deviation (SD) of students taught Basic science concepts using the gallery walk teaching strategy were 43.466 and 7.587 respectively.

The mean post-test score and the standard deviations were 67.116 and 11.977 with a mean gain of 23.65 (21.38%). The mean pre-test score and Standard Deviation of students taught Basic science concepts using lecture method were 41.083 and 6.967 respectively. The mean post-test scores and standard deviations were 49.383 and 8.961 with a mean gain of 8.30 (9.17%).

The result clearly indicated that students taught Basic science concepts using gallery walk teaching strategy had higher academic performance.

Research Question 2: What is the effect of gallery walk teaching strategy on male and female students' academic performance in Basic science concepts?

Table 2: Mean and Standard Deviation of male and female students taught Basic science concepts using Gallery Walk teaching strategy

| Gender | N | Pre-test | | Post-test | | Mean | % gain |
|--------|----|----------|-------|-----------|--------|--------|--------|
| | | Mean | SD | Mean | SD | Gain | |
| Male | 30 | 42.000 | 7.194 | 57.033 | 14.883 | 15.033 | 15.17 |
| Female | 30 | 42.550 | 7.556 | 59.466 | 12.61 | 16.916 | 16.58 |

Table 2 shows that the mean, pre-test and standard deviation of male students were 42.000, 7.194 respectively. The mean post-test score and standard deviations were 57.033 and 14.883 with a mean gain of 15.033 (15.17%). The mean pre-test score and standard deviation of female students taught Basic science using gallery walk strategy were 42.550 and 7.556. The mean post-test score and standard deviations were 59.466 and 12.61 with a mean gain

of 16.916 (16.58%). This result indicates that female students taught Basic science concepts using gallery walk teaching strategy had higher academic performance than their male counterpart.

Test of Hypotheses

Hypothesis one

Ho1: There is no significant difference in the academic performance of sample students taught basic science concepts using gallery walk teaching strategy and those taught using lecture method.

Table 3: Summary of ANCOVA on students' academic performance in Basic science concepts. Dependent Variable: POST TEST

| Source | Type III Sum of Squares | df | Mean Square | F | Sig. |
|-----------------|-------------------------|-----|-------------|--------|-------|
| Corrected Model | 9813.293 ^a | 2 | 4906.647 | 44.769 | P<.05 |
| Intercept | 7793.364 | 1 | 7793.364 | 71.107 | P<.05 |
| PRETEST | 379.160 | 1 | 379.160 | 3.459 | P>.05 |
| GROUPS | 8586.743 | 1 | 8586.743 | 78.346 | P<.05 |
| Error | 12823.207 | 117 | 109.600 | | |
| Total | 429804.000 | 120 | | | |
| Corrected Total | 22636.500 | 119 | | | |

Table 3: Shows that gallery walk teaching strategy is significant on the students' academic performance in Basic science concepts as measured by their mean performance score when compared with students taught with lecture method ((F 1, 117) = 78.346, p<.05). Hence, the null hypothesis (Ho₁) was rejected

Hypothesis two

Ho2: Gender has no significant difference on students' academic performance as measure by their mean performance score.

Table 4: Summary of ANCOVA on the influence of gender on students' academic performance in Basic science concepts.
Dependent Variable: POST-TEST

| Source | Sum of Squares | df | Mean Square | F | Sig. |
|-----------------|-----------------------|-----|-------------|--------|-------|
| Corrected Model | 1371.052 ^a | 2 | 685.526 | 3.772 | P<.05 |
| Intercept | 5590.549 | 1 | 5590.549 | 30.759 | P<.05 |
| PRETEST | 1193.418 | 1 | 1193.418 | 6.566 | P<.05 |
| GENDER | 144.502 | 1 | 144.502 | .795 | P>.05 |
| Error | 21265.448 | 117 | 181.756 | | |
| Total | 429804.000 | 120 | | | |
| Corrected Total | 22636.500 | 119 | | | |

The results in table 4 showed that the calculated F-value for gender is 0.795 at the degree of freedom 1 and 117 and probability level 0.374 which is higher than the chosen probability level of 0.05 ((F1, 117) = 0.795, P>0.05). Hypothesis three was accepted. This means that no significant difference exists between the academic performance of male and female students taught using gallery walk teaching strategy.

Discussion of Findings

Effects of gallery walk teaching strategy on students' academic performance in Basic Science Concepts.

Results in table 1 showed the mean, standard deviation and mean gain of students taught Basic science concepts as 67.116, 11.977 and 23.65 (21.38%) respectively. Table 3 shows that the gallery walk teaching strategy is significant in students' academic performance in Basic science concepts. Hence, the null hypothesis was rejected. This indicates that students taught Basic Science Concepts using gallery walk discussion teaching strategy gained more than their counterparts taught using lecture method. The result above agrees with the opinion of Green (2000) [6] that gallery walk teaching strategy enhances students' academic performance as it motivates students to research on issues that interest them and triggers their opinions and ideas rather than receiving information passively from the teacher. However, it also leads to deeper levels of learning because, in order to build on each other's opinion, the students must first understand the contribution of other students in order to respond or add to it. Also, Nwanekezi and Arokoyu (2014) [12] stated that discussion teaching strategy is activity oriented and promotes learning by inquiry, as a result, encourages students learning through active participation which enhances academic performance.

Gender and Academic performance

The result in table 4 showed the mean, standard deviation and mean gain scores of students taught Basic science concepts using gallery walk teaching strategy based on gender and the result in table 4 shows that the F-calculated value of 0.795 is greater than 0.05 the chosen probability. This implies that gender is not a significant factor on the academic performance of students taught Basic science concepts using gallery walk teaching strategy. Hence, the null hypothesis was accepted. This finding agrees with the views of Sunday, Akamnu and Fajemiagba (2014) [15], Kajuru and Kauru (2014) [8] and Oludipe (2012) [14] that no significant difference exists in students' academic performance with respect to gender.

Conclusion

It is obvious that the traditional didactic teaching methods employed in the delivery of instruction led to poor academic performance in science subjects. The use of gallery walk teaching strategy encouraged active participation, collaboration, critical thinking and improved academic performance in the science classroom. This implies that the use of gallery walk teaching strategy helps students improve on their academic performance and acquisition of the science process skills.

Recommendations

The following recommendations are made based on the results of this study.

1. Basic science teachers should use gallery walk teaching strategy in the teaching and learning of science, especially Basic science because it fosters active participation of students, encourages collaboration and the use of effective thinking skills and reassures students that their views, opinions and experiences are regarded; since students are more likely to exchange views among a free team of colleagues.
2. Head teachers, principals, school administrators should allow Basic science teacher use gallery walk teaching strategy since it involves experimentation and demonstration.
3. Basic science teachers should be periodically trained to adopt innovative and creative teaching strategies such as gallery walk that enhances students' academic performance.

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