



COMPARATIVE EFFECTS OF ASSERTIVE QUESTIONING STRATEGY AND PERSONALIZED LEARNING STRATEGY ON BASIC SCIENCE STUDENTS' PERFORMANCE IN UPPER BASIC SCHOOLS IN NIGERIA.

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Abstract

The study examined the comparative effects of assertive questioning strategy and personalized learning strategy on basic science students' performance in upper basic schools in Nigeria. It adopted the quasi - experimental designs specifically the non-randomized control group pre-fist post-test design. The population was 2,674,537 upper basic II students offering basic science. The sample for the study was 310 basic science students drawn from intact classes from nine upper basic schools located in the six geo-political zone of Nigeria. Experimental group were taught with assertive questioning and personalized learning strategy. While the control group were taught with lecture strategy Basic Science Performance Test (BSPT) was used for data collection. The instrument was validated using kuder Richardson formula 20 which gave a reliability of 0.83 mean and standard deviation were used to answer the three research questions while Analysis of Covariance (ANCOVA) was used to test the hypothesis at 0.05 level of significance. The result showed that there is significant difference in the mean performance scores of student taught basic science using assertive questioning strategy and these taught using the conventional strategy ($P=0.000<0.05$). There is significant difference in the mean performance scores of students taught basic science using personalized learning strategy and these taught using the conventional strategy ($P=0.000<0.05$). there is significant difference in the mean performance scores of students taught basic science using assertive questioning strategy and those taught using personalized learning strategy

($P=0.000<0.05$). The study recommended that teachers of basic science should use assertive questioning and personalized learning strategies to enhance the academic performance of their students.

Keywords: Performance, assertive questioning, personalized learning.

Introduction

Science is the bedrock of technological careers. It undeniably the key factor in the development of any nation. Efe and efe (2011) are of the view that science is beneficial in making life useful, meaningful and easy for humanity, despite this importance attached to science, several research reports indicate that students performance in secondary school science subjects is poor. This according to Mohammed (2012) and Afolabi (2013) have be traced to the poor foundation laid in basic science at the junior secondary school level of education, which is prerequisite for science based courses like engineering, medicine, agricultural science and so on.

Basic science is a science subject designed to expose students to scientific and technological knowledge and skills that will assist learners contribute meaningfully to the contemporary world (Ekwueme, Ekon Ezenwa, 2015). This implies that basic science assists the learner in laying a solid foundation for subsequent studies in science technology and engineering. Despite this important and challenging fields of study provided by basic science, students performance remains poor, (STAN report, 2011; Ayodole, 2016; Adekomi, Olugbade, & Sofowara 2016).

Constructivist theory generally suggests that meaningful learning must necessarily involve students integrating new information or knowledge with Pre-existing schema (Ogbaba & Naakaa, 2014). The acquisition of some abstract and difficult science concepts has been observed to present unique and formidable challenges for students, hence poor performance in the subject.

Performance has to do with attainment of set of objectives of instruction in an academic programme (Nwafor, 2009). Okobia (2014) defined performance as the ability to achieve a given tack successfully at a given time. It is completing of goals set by an individual, organization or nation Ekwueme, Ekon and Ezenwa (2015) noted that despite the relevance of basic science in national development, students performance is still poor.

The poor performance in basic science has been accounted for by factors such as poor teaching method (Ayodele, 2016). It is blamed on teacher centered teaching method which is didactic. This therefore, calls on basic science educators to intensify efforts in research in order to proffer solutions to this national disaster. According to Afolabi (2013) teachers should improve their teaching methods in order to enhance understanding and application of basic science amongst students. This calls for a search for one of the positive ways of improving students performance using personalized learning strategy.

Personalized learning refers to practices that tailor the pace and focus of instruction to address the needs and goals of each student (Cavanaghs 2014). Allison (2016) maintained that personalized learning strategy is student centered and task-involving. Personalized learning is sensitive to students interests and areas of academic strength or weakness (Mamany & Bauleke, 2018). The strategy has the potential to increase the student learning and engagement. Literature has shown that personalized learning strategy can enhance students understanding and performance (Lee & Shute, 2010; Patrick, Kennedy & Powell, 2013; Gudivada, 2017; Gross, Tuchman & Patrick, 2018).

The assertive questioning strategy like the personalized learning strategy may enhance students performance in basic science. Literature reveals that a number of empirical studies have been done using assertive questioning strategy on students performance (Elma, 2017; Galata, 2018). Further evaluation of the literature, thus indicates that assertive questionin strategy enhances students performance compared to the lecture method (Oladipo, Arigbabu & Rufai, 2012 Ghodrati, Javakoli, Heydari & Akbarzadeh, 2016). Assertive questioning strategy is a type of instructional technique which the teacher asks the class a thought-provoking question and monitors the students reasoning (Barnabas, 2010). The teacher checks for completion and get a number of answers, the class scrutinizes the answers and the teacher confirms the correctness of the answer and reinforces the individual or group that provides the answer (Oladipo, Avigbabu & Rufai, 2012). In this way learning is affected by the context, belief and interest of the learner. Hence learners are given more latitude in becoming problem solvers, identifying and evaluating problems as well as deciphering ways in which to direct their learning this brings about the search for result oriented methods of teaching basic science which potentially can influence performance of students, since the popular lecture method has not yielded the desired results. Could this trend of

persistent failure be same when assertive questioning strategy and personalized learning strategy are used in teaching basic science to the students?

Research Questions

The following research questions guided the study:

1. What is the difference between the mean performance scores of students taught basic science using assertive questioning strategy and those taught using conventional strategy.
2. What is the difference between the mean performance scores of students taught basic science using personalized learning strategy and those taught using conventional strategy?
3. What is the difference between the mean performance scores of students taught basic science using assertive questioning strategy and those taught using personalized learning strategy?

Hypotheses

They following null hypotheses were tested at 0.05 level of significance;

1. There is no significance difference between the mean performance scores of students taught basic science using assertive questioning strategy and those taught using the conventional strategy
2. There is no significant difference between the mean performance scores of students taught basic science using personalized learning strategy and those taught using the conventional strategy.
3. There is no significant difference between the mean performance scores of students taught basic science using assertive questioning strategy and those taught using personalized learning strategy.

METHODOLOGY

The study adopted the Ausubels (1968) theory of meaningful learning for assertive questioning strategy and the self regulated theory by Zimmerman (2002) for personalized learning. The study was carried out in Nigeria, focusing on schools in the six geopolitical zones of the country. The population comprised 2,674,537 upper basic II students in basic science in the 2019/2020 academic session. The sample comprised 310 basic science II students from nine government schools selected from the

six geo-political zones of the country. Multi-stage sampling techniques was employed in the sampling process. Intact classes were used for the study. The students in the experimental group were taught basic science using assertive questioning strategy and personalized learning strategy while the students in the control group were taught using the conventional method.

An instrument titled Basic Science Performance Test (BSPT) was used for data collection. Basic Science Performance Test (BSPT) is a 25-item questionnaires with a four point scale of strongly Agree (SA) – 4 points, Agree (A) – 3 points, Disagree (D) – 2 points and strongly Disagrees (SD) – 1 point.

Three Lesson plans prepared in line with the principles of assertive questioning strategy, personalized learning strategy and the conventional strategy were used to teach the three groups of students. The reliability coefficient of BSPT was determined using kuder Richardson formular 20 which yielded a reliability of 0.83. mean and standard deviation were used to answer the research question while Analysis of covariance (ANCOVA) was used to test the hypotheses at 0.05 level of significance.

Results.

The results of the study were analyzed and interpreted as follows.

Research Question One

What is the difference between the mean performance scores of students taught basic science using assertive questioning strategy and those taught using conventional strategy.

Table 1: Performance scores of students taught basic science using assertive questioning strategy and conventional strategy

Strategy		Pretest	Post test	Mean gain
Assertive Questioning Strategy	Mean	9.076	24.019	14.94
	N	105	105	
	Std. Dilation	2.604	5.353	
Lecture Strategy	Mean	9.192	10.587	1.40
	N	104	104	
	STD. Deviation	2.604	2.579	
Mean difference				13.54

The mean performance scores of students taught basic science using assertive questioning strategy is 9.076 with standard deviation 2.604 during the pretest and 24.019 with standard deviation 5.353 in the post test. The mean performance scores of students taught using lecture strategy is 9.192 with standard deviation 2.604 during the pretest and 10.587 with standard deviation of 2.579 in the post-test. The mean gain of students taught using assertive questioning strategy was 14.94 and those taught using lecture strategy was 1.40. the difference between the mean gain of students taught using assertive questioning strategy and lecture strategy is 13.54 in favour of assertive questioning strategy.

Research Question Two

What is the difference between the mean performance scores of students taught basic science using personalized learning strategy and those taught using conventional strategy?

Table 2: Performance scores of students taught basic science using personalized learning strategy and conventional strategy

Strategy		Pretest	Post test	Mean gain
Personalized Learning Strategy	Mean	9.081	29.081	20.00
	N	99	99	
	Std. Deviation	2.415	4.568	
Lecture Strategy	Mean	9.173	10.962	1.79
	N	104	.104	
	STD. Deviation	2.601	3.936	
Mean difference				18.21

Table 2 reveals that the mean performance scores of students taught basic science using personalized learning strategy is 9.081 with standard deviation 2.415 during the pretest and 29.081 with standard deviation of 4.568 in the post-test. While the mean performance scores of students taught using lecture strategy was 9.173 with standard deviation of 2.601 in the pretest and 10.962 with a standard deviation of 3.936 in the post-test. The mean gain of students taught using personalized learning strategy was 20.00 while that of students taught using lecture strategy is 1.79. The mean difference between the two groups is 18.21 in favour of the personalized learning strategy.

Research Question Three

What is the difference between the mean performance scores of students taught basic science using assertive questioning strategy and those taught using personalized learning strategy?

Table 3: Performance scores of students taught basic sciences using assertive question strategy and personalized learning strategy

Strategy		Pretest	Post test	Mean gain
Assertive Questioning Strategy	Mean	9.076	24.019	14.94
	N	105	105	
	Std. Deviation	2.604	5.353	
Personalized Learning Strategy	Mean	9.079	29.119	20.08
	N	101	101	
	STD. Deviation	2.395	4.637	
Mean difference				5.10

The Performance scores of students taught basic science using assertive questioning strategy is 9.076 with a standard deviation of 2.604 during pre-test and 24.019 with a standard deviation of 5.353 in the post test. The mean performance scores of students taught basic using personalized learning strategy is 9.079 with standard deviation 2.395 during the pretest with 29.12 with a standard deviation of 4.637 in the post-test. The Table shows that the man gains of students taught using assertive questioning strategy is. 14.94 and personalized learning strategy is 20.08. The difference between the man gains of the students is 5.10 in favour of personalized learning strategy.

Hypotheses One

There is no significance difference between the mean performance scores of students taught basic science using assertive questioning strategy and those taught using the conventional strategy

Table 4 : ANCOVA of performance scores of students taught basic science using assertive questioning strategy and conventional strategy.

Strategy	type 111 sum of squares	DF	Mean Square	F	Sig
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Connected Model	9427.4739	2	4713.736	264.941	.000
Intercept	4702.897	1	4702.897	264.332	.000
pretest	101	1	101	006	.940
strategy	9421.263	1	9421.263	529.552	.000
error	3665.082	206	17.792		
total	75897.000	209			
corrected total	13092.55	208			

Table 4 shows that $F(1,208)=529.532$; $P=0.000 < 0.05$. Thus the null hypothesis is rejected. This implies that there is significant difference in the mean performance scores of students taught basic science using assertive questioning strategy and those taught using the conventional strategy.

Hypotheses two

There is no significant difference between the mean performance scores of students taught basic science using personalized learning strategy and those taught using the conventional strategy.

Table 5: ANCOVA of performance scores of students taught basic science using personalized learning strategy and conversational strategy

Strategy	type 111 sum of squares	DF	Mean Square	F	Sig
Connected Model	16651.975 ^a	2	8325.988	457.378	.000
Intercept	5579.083	1	5579.083	306.480	.000
pretest	456	1	456	.025	.874
strategy	16649.067	200	1664.067	914.597	.000
error	3640.744	203	18.204		
total	99861.000	202			
corrected total	20292.719				

Table 5 reveals that $F(1,202)=914.597$; $P=0.00 < 0.05$. Thus the null hypothesis is rejected. This implies that there is significant difference between the mean performance scores of students taught basic science

using personalized learning strategy and those taught using conventional strategy.

Hypothesis Three

There is no significant difference between the mean performance scores of students taught basic science using assertive questioning strategy and those taught using personalized learning strategy.

Table 6: ANCOVA of performance scores of students taught basic science using assertive questioning strategy and personalized learning strategy.

Strategy	type 111 sum of squares	DF	Mean Square	F	Sig
Connected	1353.586 ^a	2	676.793	26.856	.000
Model	10946.629	1	10946.629	434.370	.000
Intercept	14.700	1	14.700	583	.446
pretest	1339.056	1	1339.056	53.135	.000
strategy	5115.837	203	25.201		
error	51343.000	206			
total	6469.422	205			
corrected					
total					

Table 6 shows that $F(1,205)=53,135;P=0.000<0.05$. Thus the null hypothesis is rejected. This implies that there is significant difference in the mean performance scores of students taught basic using assertive learning strategy and those taught using personalized learning strategy.

Discussion of findings

The finding revealed that there is significant difference in the mean performance scores of students taught basic signs using assertive questioning strategy and those taught using the conventional strategy. This implies that assertive questioning strategy affected students performance in basic science better than the lecture strategy. The findings turned out this way because assertive questioning strategy compels students to be actively involved in the learning process thereby encouraging full participation. This finding agrees with the finding of Elma (2017) and Galata (2018) who established that assertive questioning was a significant predictor as the mean performance of students taught with

assertive questioning strategy was better than those taught with the lecture method.

The finding also reveal that there is significant difference in the mean performance scores of students taught basic using personalized learning strategy and those taught using conventional strategy. This implies that personalized learning strategy has a positive effect on student performance when used in teaching basic science. This finding agree with the finding of Patrick, Kennedy and Powell (2013), Gudivada (2017) and Gross, Tuchman and Patrick (2018) that students taught with personalized learning strategy were more superior in terms of performance than those taught with lecture strategy. Personalized learning strategy when employed as a form of instructional techniques is an avenue where students increase their learning engagement and focus on their areas of strengths during the learning process.

Another finding revealed that is significant difference in the mean performance scores of students taught basic science using assertive questioning strategy and those taught using personalized learning strategy. This implies that assertive questioning strategy and personalized learning strategy affected students performance differently when used to teach basic science at the upper basic level. The finding agree with the finding of Lee and Shute (2010) and Allison (2016) that personalized learning strategy was more effective in enhancing students performance compared to other teaching strategies. In personalized learning strategy, the process begins with having personal and concrete experiences. Personalized learning strategy are particularly useful for skill development because it provides learners with an opportunity to practice their skill and increase students learning engagement. This approach encourage flexibility to support mastery and enable learners to influence how, what and when they learn.

CONCLUSION

The study has proven that both assertive questioning strategy and personalized learning strategy are practical and purposive strategies for enhancing students performance in basic science. The personalized learning strategy is more effective compared to the assertive questioning strategy in enhancing students performance especially in basic science. Therefore the school system in Nigeria needs to recognize that the conventional teaching is ineffective for many students. Effective

alternative strategies like the assertive questioning and personalized learning strategies should be used in teaching basic science.

Recommendations

Based on the findings, the following recommendations were made; Teachers of basic science should use assertive questioning strategy and personalized learning strategy to improve the academic performance of their students. Seminars and workshops should be organized for basic science teachers in lower Basic and upper Basic schools to use assertive questioning strategy and personalized strategy in the class room.

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