International Journal for Social Studies
Available at https://edupediapublications.org/journals

ISSN: 2455-3220
Volume 02 Issue 05
May 2016

Effect of Generative Instructional Strategy on Senior Secondary School Students' Performance in Otukpo Local Government Area of Benue State.

[1]Atsuwe,B.A [2] Anyebe E.N

[1]Lecturer, Department of Science Education, Federal University of Agriculture Makurdi, Benue State Nigeria:

E-Mail:ella4mneuter@yahoo.com

[2]Student, Department of science Education, Federal University of Agriculture Makurdi Benue State Nigeria

Abstract

This study investigated the effects of Generative Learning Strategy on the academic performance of secondary school students in physics in Otukpo LGA of Benue State. The design of the study was quasi-experimental. A total of 824 students from six schools out of all the schools in Otukpo educational area took part in the study. A 25 item, multiple choice "Students Performance Test in Mechanics" (S.P.T.M) was designed by the researcher to collect data. The S.P.T.M. was validated and trial tested to determine its reliability. Two homogeneous groups were composed in each of the six sampled schools. In the treatment, the Experimental group was taught physics using Generative Learning Strategy and the Control group was taught physics using the Lecture Method. The findings showed that Generative Learning Strategy was effective in enhancing students' academic performance in physics. The results showed that, although, there existed a difference in the academic performance between male and female students, which was in favour of the females, the t-test analysis showed that the difference was insignificant. Consequently, it was recommended that the Generative Learning Strategy be employed by teachers to enhance students' academic performance.

Keywords: generative instructional strategy, physics student performance.

INTRODUCTION

Generative Instructional Strategy is a step-by-step instructional strategy, which is based on learners' views and experiences in active classroom activities,(Ogunleye & Babajide, 2011). It is a learner-centered approach whereby pieces of information retrieved from learners' memories on a particular concept, are explained and modified by learners themselves, (Ormrod, 2011). Generative Instructional Strategy allows for individualized form of learning and

empowers learners with the ability to

ISSN: 2455-3220
Volume 02 Issue 05
May 2016

express their personal views. Learners are at the center of the learning process while teachers are facilitators (Ige in ogunleye et al 2011). The major idea of Generative Instructional Strategy is that learners must not only make connection between the content being taught and his prior knowledge but also re-organize them for meaningful explanation. Generative Instructional Strategy is therefore, a model of teaching for comprehension.

The model of Generative Instructional Strategy is a functional model of instruction and not a structural model. As a functional model of instruction, it focuses on the cognitive processes that learners use to comprehend concepts as well as the teaching and instructional procedures useful for increasing comprehension (Ogunleye, 2011). This model states that the process of understanding new concepts involves active learners' generation of two types of meaningful relations. The first type is generating meaningful relation between information to be learned and learners' prior knowledge and experiences. The second type is generating meaningful relation among the parts of the information to be learned. For instance, during instruction the teacher provides ample opportunities for learners to generate their own summaries, explanations, analogies and so on from the materials presented in class. The model of Generative Instructional Strategy involves a process of conceptual change, motivation, attention and metacognition.

Research has shown that the performance and motivation of learners to learn significantly depends on the teaching strategies adopted by teachers (Makgato & Mji, 2012). According to Mwamwenda (2010), the extent to which learners learn depends on their level of motivation which can be stimulated by the nature of the learning environment and the teaching strategy adopted by the teacher. He further argues that the teacher's role is to influence the motivation of learners to learn by using teaching strategies that can impact learners' attitudes towards learning, build on their self-concepts and raise their educational aspirations (Mwamwenda, 2010). Physics as one of the science subject taught in senior secondary schools attracts such condition. Physics remains one of the most difficult subjects in the Nigeria school curriculum according to the Nigeria research and development council (NERDC), (Isola, 2010). However the use of appropriate teaching method could help to curb this problem, according to Akinbola (2011) the selection of appropriate and most effective teaching methods is very important to the success of lesson in Nigeria secondary schools. Akinbobla (2011), affirmed that the changes in the aims and objectives of physics curriculum have not been accompanied by corresponding change in the teachers' educational practices. A critical look at the contents of physics curriculum in Nigeria indicates that the teacher-centred approaches are not relevant and appropriate to promote efficient learning of the content of the programme (Akinbobola 2011). This is more so as instructional strategies adopted by teachers have not solved the problem probably because those strategies have not actually focused on learners as constructors

of their own theories and knowledge. Learners need to be made to construct their own knowledge and ideas in learning because they are the architects of their own learning and constructors of their own ideas and knowledge (Ausubel in Benson 2014). Otherwise, continued use of teacher-centered or teacher dominated strategies would yield nothing but learning by rote thereby making it difficult for students to recall pieces of information from memories. It is against this background that the present study is designed to investigate the effect Generative Instructional Strategy which involves active participation of learners and has the potential of engendering improved Physics achievement. This strategy is credited with the possession of potentials for allowing the self-efforts and abilities of learners through active process leading to good performance in Physics.

Objective of the study

The purpose of this study is to investigate the effect of generative instructional strategy on senior secondary school students' in physics. Specifically, the study sought to investigate:

1. The effect of generative instructional strategy on students' achievement in physics.
2. If there is a difference in the academic performance of male and female students taught physics using generative learning strategy.

Significance of the study

The work will go a long way to help teacher who execute the program to adapt possible strategies that attract student physics choice. Also the work would subject both the government and policy makers of education to review the educational policies to meet the current trend; producing effective, qualitative and competent science who would accomplish the aim and objectives of the National policy on education.

METHODOLOGY

Research Design

This study made use of the quasi-experimental design to make a comparison between the two teaching methods; generative learning strategy and the lecture method. In other words, it made use of the pre-test and post-test control group-experimental model. The study made use of six groups from three schools; two in each school. Thus, in each school one group was designated the experimental group and the other, the control group. The experimental group was taught the physics content using the generative learning strategy and the control group was taught the same physics content using the lecture method. A test of similar contents was administered as post-test to both groups at the end of the treatment. The outcome of the post-test for both groups was compared to ascertain which of the two teaching methods leads to a better academic performance.

Population of the study

The population of this study comprised of all the Senior Secondary School Students that study science subjects in Otukpo Local Government Area of Benue State. The age range of the students in the target population was between 15 and 20 years.

Sample and sampling technique

The purposive sampling technique was used to select six schools with similar characteristics as sample of this study. Through this sampling technique, one all boys school, one all-girls school and four mixed schools were selected. The common characteristics of all these schools that were of interest to the researcher were that; They were schools in which the physics subject is taught;

They were schools in which there was at least a regular physics teacher; They were schools in which their regular physics teachers had at least a bachelor's degree in physics.They were schools in which national examinations, such as W.A.E.C. and N.E.C.O. are conducted. In all the sampled schools, the students in the intact classes of senior secondary school two "A" (SSIIA) were randomly assigned to the control group while those in senior secondary school two "B" (SSIIB) were assigned to the experimental group. Based on this sampling technique, 824 students participated in the study from all the sampled schools; 410 students in the control group and 414 students in the experimental group.

Instrumentation

Students Performance Test in Mechanics (S.P.T.M.) was the instrument used to determine the homogeneity of the two groups. It was designed by the researcher and contained 25 items – 4 options-multiple choice objective test. These 25 items were selected from the content of study (mechanics). The Students Performance Test in Mechanics (S.P.T.M.) was constructed to reflect three categories of cognitive tasks namely; remembering, understanding and thinking.

Data collection

The descriptive-non-parametric statistics were used to answer the research questions. The T-test statistical analysis was used to test the null hypothesis, the level of significance used was P=0.05. Tables were used to present data generated by all the analysis.

RESULTS

A total of 824 S.P.T.M. and answer sheets were administered to the sampled students in each of the 2 tests (pre-test, post-test). All the completed 824 answer sheets were retrieved at the end of each test and data generated from these provided the basis for answering the research questions, using the mean and standard deviation.

Research Hypotheses

There are two research hypotheses formulated for this study which will be tested using t-test as the statistical tool.

Research Hypothesis 1

There is no significant difference in the academic performance of students taught physics using generative learning strategy and those taught using the traditional lecture method. Post-test data for the experimental and control group were analyzed and subjected to T-test analysis. The results of the analysis are shown in table below

ISSN: 2455-3220
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Table 1: T-Test Analysis on the Post-Test Scores of Exp. & Cont. Group.

GROUPS	N	MEAN	STAN. DEV.	DF	$T_{Calc.}$	P	SIGN. LEVEL
EG	414	12.3	2.5	813	7.1	<0.0001	P>0.0001 significant
CG	410	11.0	2.7	813	7.1	<0.0001	P>0.0001 significant

In Table 1, the P-value is less than the significance level of 0.05 and there is a significant difference between the post-test scores of the two groups and this difference is in favor of the experimental group. Thus, the null hypothesis stating that There is no significant difference in the academic performance of students taught physics using the generative learning strategy and the traditional lecture method was rejected in favour of an alternative hypothesis which says that there is a statistically significant difference in the academic performance of students taught physics using generative learning strategy and the traditional lecture method.

Hypothesis 2

There is no significant difference in the academic performance of male and female student taught physics using generative learning strategy. Post-test data for the male and female students in the experimental group were analyzed and subjected to T-test analysis. The result of the analysis is shown in table 4.5.

Table 2 *T-Test Analysis on the Post-Test Scores of male & female in Exp Group.*

GROUPS	N	MEAN	STAN. DEV.	DF	$T_{Calc.}$	P	SIGN. LEVEL
Male	248	12.1	2.4	350	-2.0	0.051	P>0.05
Female	166	12.6	2.5	350	-2.0	0.051	P>0.05

In table 2, the P-value is just greater than the significance level of 0.05. The table also shows that a difference exists between the mean scores of male and female students in the experimental group and this difference is not significant. Thus, the null hypothesis stating that There is no significant difference in the academic performance of males and female students taught physics using the generative learning strategy is not rejected but upheld.

Discussions

In hypothesis one, a test was carried out to determine the effect of generative instructional strategy on students'performance. The result of the findings on research question one which state *How does Generative Instructional Strategy affect the performance of Students in Physics*

A pretest and posttest was given to the students and data was collected. The

ISSN: 2455-3220
Volume 02 Issue 05
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posttest class was divided into the experimental and control group, with the control group taught Physics concept with conventional method and the experimental taught using the generative instructional strategy.It can be inferred from Table 4.1 that, with a mean score of 12.3 in the post-test stage, the experimental group have fared better than the control group whose mean was only 11.0. This means that a clear mean difference of 1.3 does exist between the post-test scores of the two groups and this difference is in favour of the experimental group. Even a consideration of the number of passes (see appendix) shows that more of the students in the experimental performed better as far as test scores are concerned.

Thus, there is a clear difference in the academic performance of students taught physics using generative learning strategy and those taught using the traditional lecture method and this difference is in favour of the experimental group.

The second hypothesis was tested to see if there is a significant difference in the academic performance of male and female student taught physics using generative learning strategy. Under this, research question which state: *What is the difference in the academic performance of male and female students taught physics using generative learning strategy?*The result obtained from this research question shows that female students perform better than their male counterparts slightly, but this difference is not significant.

Conclusion

This study was undertaken to investigate the effect of generative instructional strategy on senior secondary school students' performance in physics in Otukpo Local Government of Benue State.

Based on the findings of this work, it is pertinent to conclude that; students perform better in Physics concept when taught using the generative instructional strategy compared to their counterpart taught using a traditional teaching method. Also, the study shows that there is a difference in the performance between male and female students taught using generative instructional strategy, the female perform better slightly but the difference is insignificant.

Recommendations

With regard to the findings of this research, the following recommendations were made;

1. Teachers of Physics and science subjects alike should adopt the generative instructional strategy in their teaching towards improved students' achievement.
2. Students should be encouraged by Physics teachers to construct their own ideas, identify their conceptions and misconceptions and they should be allowed to correct their own misconceptions with little assistance from the teachers in any science classroom instruction.
3. Students should be given the opportunity to perform all tasks whether simple, complex, specific or general in any science instruction so as to construct their own knowledge, test and evaluate their initial knowledge for conceptual change.
4. Government should organize capacity building programs for secondary school science teachers in the effective use of generative instructional strategy through

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organization of workshop, seminars and conferences.

5. Generative learning strategy should be used to improve the performance of the girl child as well as their enrolment into the physics subject since their good grades will encourage them to stop perceiving it as a difficult subject.

6. Physics teachers should be exposed to workshops and seminars to sensitize them on the use of Generative Instructional Strategy as a means of enhancing students' performance in Physics.

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