EFFECTS OF EXPERIENTIAL LEARNING STRATEGY AND GENDER ON SECONDARY SCHOOL STUDENTS' ACADEMIC PERFORMANCE IN BASIC SCIENCE

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Abstract

This study investigated the effects of experiential learning strategy and gender on secondary school students' academic performance in Basic Science. The purpose of the study was to investigate the effects of experiential learning strategy and the influence of science students' gender on their academic performance. The study adopted pre-test and post-test control group quasi- experimental research design of the survey type. The sample for this study was 30 junior secondary school II Basic Science students in Ekiti State and they were selected through multistage sampling procedure. The research instrument used was Basic Science Performance Test (BSPT) which was given as pre-test and post-test to the respondents. Face and content validity of the instrument were ascertained by experts in Science Education, and Test, Measurement and Evaluation. Test-retest method was used to establish the reliability of BSPT as administered to 20 students outside the normal sample with interval of two weeks and co-efficient correlation value of 0.75 was obtained. Data collected were analyzed using t-test for the hypotheses at 0.05 level of significance. The result showed that science students' performance through experiential learning strategy at post-test was found to be significantly better than that of the control group. The findings also revealed that experiential learning strategy was not gender sensitive. Based on the findings of the study, it was concluded that experiential learning strategy improved students' performance in science subjects. It was therefore recommended that this new instructional strategy should be introduced to the teaching of science subjects at all levels.

Keywords; Science subjects, Basic Science, experiential learning strategy, academic performance, and gender

Introduction

Science and Technology are essential factors for country's growth and development. Science is an integral body of knowledge that aids the acquisition of skills and provision of immediate solution to the societal problems. Science is defined by Omiko (2015) as a quest for meaning or an investigation of natural phenomena. The importance of science in the 21st century cannot be underestimated as it forms the bedrock for any substantial growth economically and technologically in any country of the world.

Science and technology give direction to the modern way of working, communication, connect and transact of businesses. Since technical and scientific

revolution underpin economic advancements, as well as development in all areas of national development; health system, education, infrastructure and commerce.

Science as being developed from the grass root from the foundational level of education to the level of converting it to be a workable knowledge acquired. And so, teaching of Science subjects at the primary or secondary schools should not be viewed down or jettison in as much that such nation or country is aspiring to towards the national development. This could be part of the main reasons why developed countries of the world such as US and Japan achieved their eminence in which they are the leading countries in the production of electronics and automobiles due to the attachment of importance to the teaching of science subjects (Cambell, 2000).

Science teachers are crucial to the teaching of science subjects, because they are the ones to organize and implement curriculum of science subjects from the primary to the University level and science needs to be taught in practical way to avoid students considering its concepts as been abstract. One of the important science subjects is Basic Science.

In Nigeria, Basic Science was formally known as Integrated science which was formally to develop students from ages 6 to 13 years to observe carefully and thoroughly, report completely what is observed organise information acquired, generalizing on the basis of the acquired information and predicting as a result of the generalization, National Policy on Education (FRN, 2014). This subject had been on in both primary and secondary schools.

This science subject was changed both in content by broadened it and the name changed to Basic Science due to the recent educational reforms in Nigeria (FRN, 2007). The subject's curriculum was equipped to equip students with more needed skills than that of integrated science.

Basic Science was designed for Nigerian secondary schools as a panacea to the problems bedeviling science education especially at the junior secondary school level (Oniya, 2018). The programme as stated in national policy on education emphasizes acquisition of skills and development of the spirit of enquiry as opposed to rote learning. It is also to develop acquisition of scientific attitudes rather than accepting scientific facts as a dogma (Adenike & Busayo, 2013).

Basic science could be refers to as the gateway to the teaching and learning of science which is fundamental to the learning of specialized scientific discipline such as Physic, Chemistry, Agricultural Science and Biology (Afuwape, 2013), and these subjects of disciplines form the conceptual science. Therefore Basic Science is the interface between these conceptual science subjects which rebuild Basic Science as the study of science which comprises of biological, physical and chemical sciences in a holistic approach.

National Policy on Education (NPE, 2014) specifies that Basic Science is focused at enabling students to acquire skills of sing models to explain phenomena where appropriate, continuing the process of inquiry when new data do not conform to predictions among other. It is stated clearly that the subject supposed to be presented by the teachers according to the National Policy on Education (NPE, 2007) in a way for the students to be able to gains the concept of the fundamental unity of science (Physics, Chemistry and Biology), gains the commonality of approach of problem of a scientific nature and gain an understanding of the role and function of science in everyday life and the world in which he or she lives.

Despite the utilitarian value of Basic Science and other science subjects to the development of a student towards specialized or conceptual science subjects, national development and human capacity in order to find solution to immediate societal problem so as for a child to be self-reliance to a certain level. The subjects are faced with students' performance that is not encouraging; Lawal, (2018) on his study identified that the performance of students in science subject was alarming going by WAEC results of previous years.

It has also been observed by Omebe and Omiko (2015) that the suggested methods of teaching science subjects have been utilized for several years by the Science teachers and yet the results of the students in both external and internal examinations have not been encouraging.

Furthermore, Omwuakpa & Nwcke (2000) observed that adequate teaching and learning with appropriate use of effective instructional strategy is not taking place very well as far as Science and Technology are concerned in Nigerian schools. The level of performance of science students in both external and internal examinations is not encouraging and this eventually led to low enrollment of students into science courses, Oniya (2018).

Finding solutions to the above existing problems over the years, the effects of new teaching strategies have been investigated; Flipped Instructional Strategies, Abiola and Titilope (2018); Guided Inquiry Oyeniyi, (2019); Activity-Based Approach, Laboratory Instructional Strategies, Puzzle- based Learning Strategies, Generative Instructional Strategy among others, but not so much have been done on experiential Learning Strategy especially to science subjects such as Basic Science which is the subject that serves as interface or treats science holistically.

Experiential Learning Strategies is often referred to as the hands-on or problem-based teaching method. There is a common adage attached to experiential learning, "Tell me and I will forget, show me and I may remember, involve me and I will understand," (Confucius).

Experiential Learning Strategy is an approach to teach a concept with the process of mapping it to the experienced of the learning. Teaching with Experiential Learning Strategy offers the learners the opportunity to acquire skills and

knowledge through first hand experiences, reflect upon those experiences and convert it to functional experiences in daily life situations. The classroom or laboratory can serve as a venue for experiential learning through embedded activities, problem based studies, guided inquiry simulation, experiments or art projects (Wurdinger and Carlson, 2010).

Experiential learning approach encourages different activities where students can reflect, develop skills, knowledge and apply what they have learnt to a new condition in their daily life. It is about learning which depends on the basic skills and accomplishing or acting on more complicated skills in the future. The teaching-learning time can be extended to include off school learning activities and experiences which eventually are being reflected in the transfer of learning tasks into products and performances that constitute the constructed knowledge and skills out of these activities and experiences.

There are some examples that could vividly explain Experiential learning strategy such as going to the zoo to learn about animals through observation, instead of reading about them. Learning in the school farm to learn about photosynthesis instead of demonstration by the teacher in the class or in the laboratory. Hoping on a bicycle to try and learn to ride, instead of listening to your parent explain the concept.

Besides, the effects learning strategy adopted for the teaching of science, learner's characteristics such as gender might also affect students' achievement in basic science practical skills, especially in Nigeria where the traditional attitude of parents to the education of their children is to invest more in the education of boys (Onocha, Okpala and Offorma, 2000).

The critical belief of biological theorists is that gender differences are natural and therefore unalterable (Olubunmi, 2011). It would be right and proper to treat boys and girls in schools differently because their natural inclinations are different roles. Thus, theories were advanced that female excelled in language based subject because of their greater and reasoning abilities yet underperformance in science because of their lower level of innate ability of shape and form factors (Baniface, 2008). Some researchers pointed out that gender plays no significant role in students' academic performance in science subjects while others hold a contrary opinion. The general belief that males achieve better than females in science subjects could be regarded as a myth.

It is in view of this, that the researchers investigated the effects of experiential learning strategy on secondary school students' academic performance in science subjects. Also to determine the effect that gender would have on secondary school students' academic performance in science subjects.

Statement of the Problem

There has being a trend of poor performance of students in Science subjects in both external and internal

examinations despite the efforts being made by towards achieving high level of performance. This could be attributed among others to adoption of inappropriate instructional strategy by science subject teachers and that the conventional teaching strategy seem not meeting the expected outcome in students' performance. As a result of this, Science educators are continually seeking instructional strategies among others that will improve students' performance in Basic Science. There is the need to look at the effect of using novel learner centered methods of instruction in Science subjects. Studies have shown that Computer Simulation Strategy could be used successfully to enhance better performance in Science subjects. It is also empirically cleared that gender could effectively influence the academic performance of students in science subjects.

This study is faced with the problem of verifying the effects of experiential learning strategy on Secondary School Students' Academic Performance in Basic Science. The researcher is also interested to find the effect of gender on academic performance of students in science subjects.

Delimitation of the Study

The study is delimited to the effects of experiential learning strategy and gender on secondary school students' academic performance in Basic Science. It is also delimited to Junior Secondary School II students in Ekiti State and the study is conceptually delimited to Heat Energy and Habitat.

Research Hypotheses

The following null hypotheses were formulated in the course of the study

1. There is no significant different in the post-test mean score of students exposed to experiential learning strategy and conventional method among secondary school students in Basic Science
2. There is no significant difference in the post test mean score of students exposed to experiential learning strategy by gender among secondary school students in Basic Science

Significance of the Study

It is hope that the result of the findings would be significant as the findings will be of benefit to learners, teachers, parents, curriculum planners and the body of knowledge. It will enable the learners to observe the concept in a realistic situation in the classroom by using the model of the concept during teaching. It would be useful to science teachers in all science subjects and at all levels to have the knowledge of empirical frame work for the use of experiential learning strategy which will cater for the gender balancing. It would be an eye opener for the curriculum planner to provide enabling strategies that is gender insensitive for teaching and learning that will enhance scientific attitude in learners which will enable them to contribute to the development of the nation. It would be of benefit to the

parents as the study would be able to achieve the purpose of financing the education of their children.

Methodology

The study design was pre-test and post-test control group quasi- experimental research. The design provided an opportunity for determining how the independent variables combined to influence the dependent variables in the study, hence determined the effectiveness of the treatment. The design permitted the determination of all experimental variables to be generalizable across all levels of the control variables. The population of the study consisted of 1,276 Junior Secondary School II in Ekiti State, they were considered relevant because they were not involved in any external Certificate Examination and therefore they were readily available for the study. The sample for this study was 30 JSS II Basic Science students in Ekiti State and they were selected through multistage sampling procedure. Stage one involved the selection of two Local Government in Ekiti State which were; Ikere and Ado Ekiti Local Government Areas using simple random sampling technique. The second stage involved the selection of one secondary school in each of the Local Government selected using purposive sampling technique putting into consideration the schools that are gender mixed and have University graduate as Basic Science teacher. The third stage involved the use of simple random sampling technique to select 15 students in each of the school selected making 30 respondents. The research instrument used was Basic Science Performance Test (BSPT) which was given as pre-test and post-test to the respondents. Face and content validity of the instrument were ascertained by experts in Science Education, and Test, Measurement and Evaluation. Corrections made were properly incorporated into the instrument to make the final and corrected version. Test-retest method was used to establish the reliability of BSPT as administered to 20 students outside the normal sample with interval of two weeks and co-efficient correlation value of 0.75 was obtained. Data collected were analyzed using t-test for the hypotheses at 0.05 level of significance

Hypotheses Testing

Hypotheses 1

There is no significant different in the post-test mean score of students exposed to experiential learning strategy and conventional method among secondary school students in Basic Science

Table 1: *t-test analysis of the* post-test mean score of students exposed to experiential learning strategy and conventional teaching strategy in Basic Science

Group	N	Mean	Std. Deviation	df	t_{cal}	t_{tab}
Control Group	30	28.97	4.87			

Conventional Group	30	23.07	8.54	58	3.27	1.68

Table 1 revealed that tcal was greater than t-tab. This implies that there was a significant difference between the performance of students exposed to experiential learning strategy and that of conventional method at post-test. Hence, the null hypothesis was not accepted.

Hypotheses 2

There is no significant difference in the post test mean score of students exposed to experiential learning strategy by gender among secondary school students in Basic Science

Table 2: t-test analysis of the post-test mean score of students exposed to experiential learning strategy by gender in Basic Science

Group	N	Mean	Std. Deviation	Df	t_{cal}	t_{tab}
Male	15	24.80	2.46	28	0.59	1.71
Female	15	24.33	1.80			

Table 2 revealed that t-cal is less than t-table. This implies that there was no significant difference between the post-test mean score of students exposed to experiential learning strategy by gender. Hence, the null hypothesis was accepted.

Discussion

The findings revealed that there was a significant difference between the performance of students exposed to experiential learning strategy and that of conventional method at post-test of students in Basic Science. The students exposed to experiential learning strategy performed significantly better than those exposed to conventional method at post-test. This is supported by Wigfield & Eccles, (2019) that experiential learning strategy is motivating and improves students' performance in science subject. This is also in agreement with the claim of Olalekan and Shamila and Yoon, (2017) who ascertain that experiential learning strategy improves academic performance of undergraduates in science courses.

The findings also shown that there was no significant difference in the post test means score of students exposed to experiential learning strategy by gender among junior secondary school Basic Science students. This shows that experiential learning strategy is also gender insensitive. This finding is in support of Gambari et. al. (2012) who stated that if both male and female students are exposed to the same

treatment and given equal opportunity, they will achieve equally academically. This is opposed to Okoro (2011) who claimed that boys can perform significantly better than girls in science subjects.

Conclusion

From the findings of this study, it is concluded that students' exposure to experiential learning strategy resulted to a significant increase in academic performance of students in science also that the strategy is gender insensitive.

Recommendations

Based on the findings of this study, the following recommendations were made:

1. Experiential learning strategy should be adopted to teach science concepts.
2. Pre-service science teachers should be trained on how to make use of the strategy for better performance of their students.
3. Curriculum developers and educational technology specialists should intensify efforts aimed at developing interactive experiential learning strategy
4. It is also recommended that experts in science education should incorporate design features into experiential learning so that science students would be fully immersed in the experiential learning.

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