

IMPACT OF DEMONSTRATION AND DISCOVERY TEACHING METHODS ON STUDENTS' ACADEMIC PERFORMANCE IN SCIENCE SUBJECTS IN SENIOR SECONDARY SCHOOLS IN EKITI STATE, NIGERIA¹Olufunke O. BORIS (Ph. D)²Oke J. AJOGBEJE, (Ph. D)^{1,2}Bamidele Olumilua University of Education, Science & Technology, Ikere (BOUESTI), Ikere Ekiti, Ekiti State, Nigeria

Abstract

The paper examined Impact of Demonstration and Discovery Teaching Methods on Students' Academic Performance in Science Subjects in Senior Secondary Schools in Ekiti State, Nigeria. The research design adopted in the study was survey design of the descriptive research. The population of the study was all Senior Secondary class II (SSII) Science students in all the public senior secondary schools in Ikere Local Government Area of Ekiti State, Nigeria. The sample size of one hundred and twenty (120) respondents was used for the study. Simple random sampling technique was used to select respondents from four (4) public secondary schools in Ikere local government area of Ekiti State. Then, random sampling technique was used to select thirty (30) respondents from each selected secondary schools. Both male and female students were considered for selection. The instrument used for data collection was a self structured questionnaire. The instrument was subjected to validity and reliability mechanism. The reliability coefficient index of the instrument is 0.86. Two null hypotheses were formulated and tested at 0.05 level of significance. The findings of the study revealed that there is significant influence of demonstration teaching method on the academic performance of science student in secondary schools in Ikere local government area, Ekiti State. The findings also revealed that there is significant influence of discovery teaching method on the academic performance of science student in secondary schools in Ikere local government area, Ekiti State. Based on the findings, conclusions and appropriate recommendations were made.

Keywords:

Demonstration, discovery, academic performance, secondary school, Science subjects.

Introduction

Teaching is a systematic process of transmitting knowledge, attitude and skills in accordance with professionals' principles. The choice of a particular method of teaching by the teacher is determined by the number of factors which includes the content to be taught, the objectives which the teacher plans to achieve, availability of teaching and learning resources and the ability and willingness of the teacher to improvise if the conventional teaching aids are not available for the evaluation and follow up of activities to check individual differences of learners (Ndiragu, 2007). Alignment of teaching methods with students needs and preferred learning influence students academic achievement, CHIN and David 2010 specified that teaching should not merely focus on dispensing rules, definitions and procedure for students to memorise but should also actively engage students as primary participant. Asikia 2010 & Adunola (2011) found out in their various studies found out that teachers method of teaching influence poor performance.

Teachers should apply appropriate teaching methods that best suit specific objectives and level exit outcomes. In the field of educational research, questions about how consistent about effectiveness of teaching,

however research on teaching and learning constantly endeavour to examine the extent to which different teaching methods enhance the growth in students learning

Poor academic performance is fundamentally linked with ineffective teaching methods by teachers who impact knowledge to learners (Adunola, 2011). Ayeni (2011) opined that teaching is a process that involves bringing about desirable changes in learners so as to achieve specific outcomes. In other for the method used for teaching to be effective, Adunola 2011 maintains that teachers need to be conversant with numerous teaching strategies that take recognition of the magnitude of complexity of the concepts to be covered.

Review of related literature

Concept of Teacher and Teaching

Teacher definitely play the pivotal role in students' learning and performance of their students. There is no doubt that teachers have a great responsibility to help the student succeed, the student should be assisted to hold and positively discharge the most responsibility (Wenghoisky, 2002). On the other hand teachers' performance in every parameter has a significant impact on students' understanding and performance. For instance if a teacher is effective in teaching, his students would most likely do better in class. If however the teacher is ineffective and inefficient, the students could do much worse. It is also possible that with an ineffective or careless classroom teacher a student could still get an 'A' grade. A student could also fail in a class with a good teacher. These issues are pointless to the extreme symbiotic relationship between the teacher and the learner (Ukoha, 2008). In Nigeria, the teacher has often been blamed for student changing fast with educators. Examining several other factors that are student related or systems. There is no doubt that, various teaching strategies exist and are being used in our classrooms yet poor teaching and learning of science seems to continue unabated. This is the reason it may be necessary to examine which of these available teaching strategies or other issues relating students' learning actually effect the resolution of the problem.

Teacher's instructional methods most prevalent method of teaching has been the talk and chalk (lecture) method. Buttressing this, Ezellora (2004) pointed that most of the time, science is taught to the learners using the descriptive or lecture method instead of hands on approach. The possible ineffectiveness of this approach is strongly supported by persistent poor performance of candidate in public examinations in Nigeria.

A reason for the proceeding difficulty of science teachers in putting their lessons across to learners could be traceable to the fact that they are not properly informed of recent development and equipment with the relevant skills for new methods that showcase best practices. Furthermore some teaching strategies could be more facilitative than others when used in teaching (Ogbeba, 2009; Umoren & Ogong, 2007). A teaching strategy refers simply to an approach, method or a combination of carefully designed classroom interaction that could be followed meticulously to teach a topic, concept or an idea (Olorundare, 2000).

There are however many teaching strategies or methods that a classroom teachers could use. Macmillan English Dictionary (2007) explains innovative approach as a design that is full of new or purposively reconstruction existing ideas e.g. using new or reconstruct already existing ideas, methods equipment, for example, innovative teaching strategies simply implies knowing or identifying and applying a more facilitative (or learning ensured) approach in teaching a named science concept, topic or theme. Consequent implication therefore could be that the strategy itself may not necessarily be new but the issue is using a combination of various teaching strategies that are appropriate for the learners in order to ensure more effective teaching.

The search for innovative teaching strategies borne out of the fact that different situations, teaching topics, learners' cognitive readiness, concepts being taught, skills intended to be developed in learners demand for different teaching approaches to be used. Therefore a teacher who is not aware of a variety of such strategies can either attempt to use them in the first place nor use them adequately. Achor (2007) considers some teaching modes as learner centered, interest arousing and activity oriented. They include conceptual change strategy, concept mapping, field/excursion, guided discovery, experimental/laboratory and demonstration methods. He

added that most are regarded as modes of instruction (teaching strategies) as the teachers are required to employ a number of them while teaching.

Furthermore it has been observed based on previous studies, that the present methods used in teaching sciences in secondary schools in Nigeria do not produce maximum results for the acquisition of science process skills by students (Ibe & Nwosu, 2003) They listed these methods as demonstration skills, lecture, diagnosis, direct observation, field trip, group work, laboratory activities, reading, manipulation, modelling, seminar and programmed instruction (e.g. Computer Aided Instruction, CAI).

Teaching methods refers to the general principles, pedagogy and management strategies used for classroom instruction. Teaching method depends on what fits you, that is, your educational philosophy, classroom demographic, subject area(s) and school mission statement. Teaching theories primarily fall into three categories or approaches: Teacher centered , student- centred, and teacher student -centred methods of teaching.

Teacher- centred approach to learning

Teachers are the man authority figure in this model, students are viewed as ‘empty vessel’s whose primary role is to passively receive information (via lectures and direct testing and assessment). It is the primary role of teachers to pass knowledge and information onto the students. In this model, teaching and assessment are viewed as two separate entities, student learning is measure through objectively scored tests and assessments. Zakaria, Chin & Daud (2010) specifies that teaching should not merely focus on dispensing rules. Definitions and procedures for students to memorise, but should also actively engage students as primary participants. The approach is least practical more theoretical and momorazing tee and Wong 2000

Student centred approach to learning

Teachers serve as an authority figure in this model; teachers and students play an equally active role in the learning process. The teacher’s primary role is to coach and facilitate student learning and overall comprehension of material. Student learning is measured through both formal and informal forms of assessment, including group project, student portfolios, and class participation. Teaching and assessment are connected. Student learning is continuously measured during teacher instruction. Hesson & Shad (2007) is of the opinion that most teachers today apply the student centred approach to promote interest, analytical research, critical thinking and enjoyment among students. Advent of the concept of demonstrating and discovery learning many scholars today adopt this method to enhance active learning. Daluba (2013) opined that for better performance of students the use of activity stimulating and student centered approach like demonstration method instead of depending on the conventional approach like lecture method should be embraced. student centred approach which are more effective are more encouraged because they embrace the concept of discovery learning (Brindley, 2015).

Teacher student interactive method

This teaching method applies the strategies used by both teachers centered and students centered approaches. Research evidenced on teaching approaches maintains that teacher student interactive method is effective in improving students’ academic performance. Walker (2003) states that the discussion with the learning material method when properly used can developed in the students higher learning skills, increased capability for generalization and transfer a sense of relevance of learning and the ability to analyse, synthesise and apply what is learned.

The three main teaching styles in educational pedagogy are direct instruction, inquiry-based learning and cooperation learning. Through these three teaching methods, teachers can gain a better understanding of

how to govern their classroom, implement instruction and connect with their students. Within each of these three main teaching styles are teaching roles or model's. Grasha (1996) explains the five main teaching models: expert, formal authority, personal model, facilitator, and delegator. Which is best viewed through the lens of direct instruction, inquiry based learning, and cooperative teaching.

Direct instruction is the general term that refers to the traditional teaching strategy that relies on explicit teaching through lectures and teacher led demonstrations. Direct instruction is the primary teaching strategy under the teacher centred approach. The teacher is the sole supplier of knowledge and information. Direct instruction is effective in teaching basic and fundamental skills across all content area

Teachers who operate through formal authority are in a position of power and authority because of the exemplary knowledge and status over their students. Classroom management styles are traditional and focus on rules and expectations. Teachers who operate through expert are in possessions of all knowledge and expertise in the classroom. Their primary role is to guide and direct learners through the learning process. Students are viewed solely as the receptors of knowledge and information (empty vessels)

Teachers who operate under the "personal model" style are those who lead by example, demonstrating to students how to access and comprehend information. In this teaching model students learn through observing and copying the teachers process.

Inquiry-based learning is a teaching method that focuses on student investigation and hands on learning. In this method, the teachers primary role is that of a facilitator, providing guidance and support for students through the learning process. Inquiry based learning falls under the student centred approach, the students play an active and participatory role in their own learning process. Inquiry based method is in three forms, facilitator, personal model, and delegator, the facilitators place a strong emphasis on the teacher student relationship, operating under an open classroom model, there is a de-emphasis on teacher instruction and both student and educator undergo the learning process together. Student learning loosely guided by the teacher and is focused on fostering independence, hand on learning and exploration

Delegator act as a resource to students, answering questions and receiving their progress as needed. Teachers play a passive role of students learning. Students are active and engaged participants in their learning. The main goal of a delegator is to foster a sense of autonomy in the learning process.

Cooperative learning refers to a method of teaching and classroom management that emphasize group work and a strong sense of a community. This model fosters students academic and social growth and includes teaching techniques such as 'think pair share and reciprocal teaching. Cooperative learning falls under the student centred approach because learners are placed in responsibility of their learning and development. This method focus on their belief that students learn best when working with and learning from their peers.

Teaching ineffectiveness has been ascribed by various scholars are the result of poor performances most especially in science and the use of the common traditional/conventional way of teaching has not been able to produce good result as expected, therefore the research decided to see which out of this two methods of teaching science will produce the better result in science teaching.

Research Hypotheses

The following null hypotheses were formulated and tested at $P < 0.05$ level of significance:

1. There is a significant influence of demonstration teaching method on the academic performance of science student in secondary schools in Ikere local government area, Ekiti State.
2. There is a significant influence of discovery teaching method on the academic performance of science student in secondary schools in Ikere local government area, Ekiti State.

Methodology

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The research design adopted in the study was survey design of the descriptive research. The population of the study was all Senior Secondary class II (SSII) Science students in all the public senior secondary schools in Ikere Local Government Area of Ekiti State, Nigeria.

The sample size of one hundred and twenty (120) respondents was used for the study. Simple random sampling technique was used to select respondents from four (4) public secondary schools in Ikere local government area of Ekiti State. Then, random sampling technique was used to select thirty (30) respondents from each selected secondary schools. Both male and female students were considered for selection.

The instrument (questionnaire) was divided into two sections A and B. Section A was designed to get information on the bio-data of the respondents which will include: name of schools, class, gender, age in years. While section B was items structured to elicit relevant information on the Impact of Demonstration and Discovery Teaching Methods on Students' Academic Performance in Science Subjects in Senior Secondary Schools in Ekiti State, Nigeria.

The instrument was subjected to validity and reliability test mechanism. The reliability coefficient index of the instrument is 0.86.

The questionnaire was administered on the students with the help of trained research assistants and was collected back immediately.

Two null hypotheses formulated for the study were tested at 0.05 level of significance. The data collected were analysed using Chi-square statistical analysis.

Results and Discussion

Research Hypothesis 1

There is no significant influence of demonstration teaching method on the academic performance of science student in secondary schools in Ikere local government area, Ekiti State.

Table 1: Chi-Square Analysis of Data on the influence of demonstration teaching method on the academic performance of science student in secondary schools in Ikere local government area, Ekiti State.

S/N	Items	YES	NO	X^2_{-cal}	X^2_{-tab}	df
1.	Does the method makes learning real and concrete to you?	80	40	47.98	3.84	1
2.	Does the method eliminate abstractions in teaching to you?	85	35			
3.	Does the method present the class very interesting to you?	97	23			
4.	Does the method bring more clarity into theoretical concepts to you?	100	20			
5.	Does the method make teaching to be effective to you?	87	33			
6.	Does the method encourage the use of instructional materials to you?	98	22			

$P < 0.05$, * S = Significant.

The table 1 above shows that on the average for items 1, 2, 3 and 4, $X^2_{-cal} = 47.98$ where the $X^2_{-tab} = 3.84$. Showing that X^2_{-cal} is greater than X^2_{-tab} value at $p < 0.05$ and $df=1$ (i.e $X^2_{-cal} > X^2_{-tab}$). Therefore, the result is significant (i.e the result shows positive affirmation), showing that there is significant influence of

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demonstration teaching method on the academic performance of science student in secondary schools in Ikere local government area, Ekiti State.

Research Hypothesis 2

There is no significant influence of discovery teaching method on the academic performance of science student in secondary schools in Ikere local government area, Ekiti State.

Table 2: Chi-Square Analysis of Data on the influence of discovery teaching method on the academic performance of science student in secondary schools in Ikere local government area, Ekiti State.

S/N	Items	YES	NO	X^2_{-cal}	X^2_{-tab}	df
1.	Does the method promote creativity in you?	110	10	67.23	3.84	1
2.	Does the method motivate you to learn?	98	22			
3.	Does the method enhance to learn and never forget?	89	31			
4.	Does the method develop problem-solving skills in you?	100	20			

$P < 0.05$, * S = Significant.

The table 2 above shows that on the average for items 1, 2, 3 and 4, $X^2_{-cal} = 67.23$ where the $X^2_{-tab} = 3.84$. Showing that X^2_{-cal} is greater than X^2_{-tab} value at $p < 0.05$ and $df=1$ (i.e $X^2_{-cal} > X^2_{-tab}$). Therefore, the result is significant (i.e the result shows positive affirmation), showing that there is significant influence of discovery teaching method on the academic performance of science student in secondary schools in Ikere local government area, Ekiti State.

Discussion of the findings

From the findings, it was shown that there is a significant relationship exist between discovery method and students academic performance and there is also significant relationship between demonstration method and academic performance. This results are in agreement with Achor (207) which considered some teaching models as learner centred interest arousing and activity oriented. Also, in support of this is Daluba (2013) who said better performance of students the use of activity stimulating and student centred approach like demonstration method instead of depending on the conventional approach like lecture method should be embraced student centred approach which are more effective are more encouraged because they embrace the concept of discovery learning.

Conclusion

The future of our country is in our hand, and knowledge, they say is power. The method used in the process of impacting knowledge determines the extent to which our educational aims and objectives can be achieved. Based on the result obtained in the study teaching method was a great effect on students' academic performance, and from this research Discovery and Demonstration method greatly improve the students' academic performance than the lecture method which was passive and teacher centred. These methods motivate students interest and achievement in their academics.

Recommendations

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Based on the findings, It is therefore recommended that Discovery method and Demonstration method should be used in the teaching of science, this will make teaching to be effective, however the teacher should also increase the knowledge on those methods so that it can be effectively delivered.

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