

CHALLENGES ASSOCIATED WITH TEACHERS ON THE USE OF INNOVATIVE STRATEGIES IN SCIENCE TEACHING IN NIGERIA

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ABSTRACT

This study investigates challenges associated with teachers on the use of innovative strategies in science teaching in Remo north local government area of Ogun state, Nigeria. The study found out the effects of the teacher variables such as qualification, teaching experience and awareness on their utilization of selected twenty (20) innovative teaching strategies. A sample of one hundred (100) science teachers was purposively selected for the study. The study is descriptive in which a survey method was adopted. Two hypotheses were raised to guide the study. The hypotheses were tested using chi-square statistical distribution all at 0.05% level of significance. Based on these findings which include that (1) there is a significant difference between the innovative strategies and lecture method of teaching ($\chi^2 = 39.2$ was greater than its critical value of 9.49 at 5% level of significance), (2) there is a significant difference between the innovative teaching strategies and teachers' utilization ($\chi^2 = 27.36$ was greater than its critical value of 7.28 at 5% level of significance). (3) Most of the practicing teachers in the field are not interested in using the innovative strategies. (4) Most teacher are not trained on how to use these innovative strategies during their teachers training programme, it was recommended among others that workshops, seminars and symposia should be organized for in-service science teachers on the awareness of the innovative teaching strategies with low level of awareness as each of the strategies have specific areas where effective and that in-service training should be organized for teachers on the ways they can effectively put the innovative teaching strategies to use. Qualified teachers should also be posted to schools as they are discovered to be less in number to give room for effective utilization of these strategies. Teacher training institutions should include the list and non-utilized strategies found in this study – specifically, mind map, Vee Mapping, metaphor, concept mapping and Analogy into their curricular packages and make deliberate efforts to get the science teachers acquitted with the use of each of the strategies effectively.

Problem and Justification.

In teaching and learning, the method utilized by the teacher determines to a large extent the level of assimilation of the learners. In spite of diverse methods of teaching that has been discovered over time, teachers still prefer to use the age-long traditional lecture method. Teachers are implored to employ pluralistic method in teaching so as to help the students apply the hands, head and heart knowledge. The concern of this study is to investigate the various challenges associated with teachers in the use of innovative strategies in science teaching.

The research objectives of this research work are to:

- i. Identify the various new innovative strategies in science teaching;
- ii. Identify the extent of the awareness and use of the innovative strategies by science teachers;
- iii. Determine the problems encountered by teachers when using these innovative strategies in science teaching

Review Of Literature

The Nature of Science Teaching

Science is described as an organized body of knowledge; it is also defined as a study of knowledge of the structure and behavior of the natural and physical world, based on facts that can be proved, (Hornby, 2010). Science is a body of knowledge, a way of thinking in the pursuit of an understanding of nature (Abimbola & Omosewo, 2006). The teaching of science in schools in previous decades has been a system in which science was taught as a body of knowledge. Science in such programme was taught for scientist (Yager, 1991).

The nature of science as a body of knowledge, made science to be regarded as knowledge of established fact, which are said to be truth, that cannot be disputed.

Generalization and theories, which are liable to errors and change, are also regarded as integral part of the scientific knowledge. Hence, to be scientifically literate is to be able to distinguish between established facts, which have been supported by strong evidences, and mere speculations, which have no support as established by the scientific community.

The curriculum used for the teaching of science subjects was developed from Sputnik and similar projects. This curriculum emphasized science subjects as a conceptual understanding of unifying themes and major theories. The programmes gave some students an in-depth view of science rather than a mere collection of facts. They were amplified by sub-division of cognitive skills, an emphasis on inquiry skill and recognition of a hierarchy based on bloom taxonomy. The above approach used in teaching made the subject to be difficult to students compared with other subjects. There was little or no reference made to the daily issues experiences by the students in their environment by this teaching approach. In this method, the teacher supplies the answers to the students in the class and during experiments. This nature of science is static.

Science is also investigative in nature, science as a process of investigation, is concerned with the systematic procedures involved in scientific processes, these systematic processes include, questioning; observing; hypothesizing; collecting and interpreting data; theorizing and generalizing. Science as a process of investigation is dynamic as it is an ongoing inquiry process.

According to Daramola (2005), the implication of these scientific nature on the science teaching is that it will enable science teachers to present instructions in a manner that reflect the dual nature of science. It will be wrong for science teachers to use teaching strategies that will present science to students as a bundle of facts in isolated bits. Also whatever aspect of science that presented it as a process of inquiry should be noted as this helps the students in the development of intellectual skills essential for the organization of their thinking, to reorganize and use relevant information in appropriate time.

Objectives of Teaching Science

Ajaja (2011) identified the objectives of teaching science to include:

1. Knowledge of science academic discipline
2. To acquire the skills of scientific method
3. Having clear explanations for societal issues through increasing interest in science literacy and societal goal
4. For personal needs
5. For career awareness.

In Nigeria, science taught in school subjects as the only subject of concern in this study, it is only the objectives of its teaching that are stated. The National Policy on Education in the National Curriculum for Senior Secondary Schools (2009) specified the objectives for science teaching to include:

1. Adequate laboratory and field skills in science
2. Meaningful and relevant knowledge in science
3. Ability to apply scientific knowledge to everyday life in matters of personal and community health and agriculture
4. Reasonable and functional scientific attitudes.

Challenges Associated with the Use of Innovative Strategies in Science Teaching

Many students in primary and secondary schools experience difficulties with the learning of some aspects of the science curriculum. Just as students find difficulties in learning science, teachers equally find difficulties in achieving effective teaching in Nigerian school system. This has created challenges for parents, students, teachers and educationists. Teachers are now faced with the problem of achieving effective teaching that would result to better performances of students in both internal and external examinations.

The method used in teaching by a teacher is very important as this affects the interest in the subject by the students. Supporting this, Mstem in Emaikwu (2012) reported that

teaching method affects the response of students and determines whether they are interested, motivated and involved in a lesson in such a way as to engage in learning.

As at now many teachers in Nigerian schools still use the traditional or lecture method in which teachers talk and students listen and copy notes. The situation is worst at the primary school level where a teacher is made to teach all the subjects in a class irrespective of his area of subject specialization. Due to the paucity of qualified science teachers, many unqualified teachers are made to teach science at the primary school level in Nigeria even when it is not their area of study. During the organized workshops from 2002 to 2013, it was discovered that over 90% of the primary school teachers still use the traditional or lecture method of teaching. One major reason for this situation is because majority of the teachers are not trained science teachers.

Another reason is that the teachers were taught in their school days by unqualified teachers who mainly used the lecture method of teaching and so the teachers of today only copy the way they were taught. The teachers even confessed to these. Supporting these, Okpala and Onocha in Kaka (2007) found that the pattern of interaction between teachers and students in schools was lecture Method.

Ajewole, Ayobasile and Okebukola in Kaka (2007) observed that lecture method is not suitable for the nature of science and the age of the students in schools because it hinders active participation of the learners in the teaching and learning processes. The method has been described as ineffective by researchers and educationists worldwide. This implies that if the teachers do not begin to employ activity -based learning in the science classroom the students may not attain effective learning in science. Then schools will still continue to grope in the darkness of poor performances of our students. Now there are intensive workshops for teachers in Nigeria.

Teaching Strategies and Students' Academic Performance

According to Abimbola (2009), teaching is a process of facilitating students learning through a proper management, by the teacher, of the interrelationships among the student's interests, the content for learning, and the method and materials he or she use in the teaching and learning of the content material.

A teaching strategy refers simply to a combination of carefully designed classroom interactions that could be meticulously followed to teach a topic, concept or idea. A method of teaching is a psychological or systematic way of imparting knowledge to attain the set objectives in learners.

Basically, the teacher controls the instructional process, the content is delivered to the entire class and the teacher tends to emphasize factual knowledge. The teacher delivers the lecture content and the student listen, thus, learning tends to be passive and the learners play a little part in the learning process. Generally, the conventional lecture approach in classroom is of limited effectiveness in the teaching and learning of science in schools.

The use of innovative strategy may not be new, but its' implementation may be out of ordinary in the field of study. It is more than using new technologies; rather, it is an approach to teaching that results in a transformation and educational experiences for the students. It occurs by the design of using methods, practices and techniques beyond the use of new technology and above and beyond normal pedagogical practices resulting in teaching and learning excellence. Most science teachers teach science concepts and topics using wrong method.

According to Akpan (2006), many critics have identified the apparent inability of many students to engage in complex problem solving activities and apply school knowledge to real life problems after the school settings. He further said what science teachers and schools face is a fundamental redefinition of what it means to be a student and a teacher.

Research Design

The research design employed for this study is descriptive in which a survey method was adopted

Population of the Study

The population comprised of Senior Secondary School teachers in all secondary school in Remo North Local Government Area of Ogun State.

Sample and Sampling Techniques

The sample for this study comprised of 100 science teachers in selected Senior Secondary Schools.

Research Instrument

The research instrument for the study includes a well developed questionnaire. The questionnaire was divided into 3 sections. Section A consists of questions on respondent demographic background, Section B consists of list of the innovative strategies, while Section C consists of 20 questions.

Validation of Research Instrument

The validity of the research instruments was determined by the project supervisor and other interested researchers.

Method of Data Collection

The researcher sought permission from the principals of the selected schools to allow their schools to be used for the study. The researcher met with the teachers in groups during their leisure time, asked them if they would be willing to fill the questionnaires after explaining the intent of the questionnaire and the confidentiality of the responses those who consented were given the questionnaires and were asked to read the instructions attached to each section properly before answering the questions. The researcher helped the respondents to clarify areas of ambiguity. The researcher waited for the students to fill the questionnaires before collecting the questionnaires from them in groups so as to reassure them of the confidentiality of their responses. The researcher thanked the teachers for their participation.

Procedure for Data Analysis

The hypotheses formulated in the study was tested using chi-square (X^2) statistical distribution.

DATA ANALYSIS AND FINDINGS

Test of Hypotheses

Hypothesis one

H₁: there is no significant difference between the innovative strategies and lecture method of teaching.

The data used in testing this hypothesis was from the responses to question 1 that is, table 4.6.

Table 4.26: chi-square Distribution

Attribute	O	E	O-E	(O – E) ²	(O – E) ² / E
Strongly agreed	46	25	21	441	17.64
Agreed	34	25	9	81	3.24
Disagreed	12	25	-13	169	6.76
Strongly disagreed	8	25	-17	289	11.56
Total	100	100	60	980	39.2

$$\begin{aligned}
 \text{Degree of freedom} &= (C - 1) (R - 1) \\
 &= (5 - 1) (4 - 1) \\
 &= 4 \times 3 \\
 &= 12
 \end{aligned}$$

Interpretation

From the above table, it can be observed that the computed values are more than the critical values indicating that the observed frequencies differ significantly from the expected frequencies. The null hypothesis was rejected since the calculated value of $X^2 = 39.2$ was greater than its critical value (i.e. 9.49) at 5% level of significance. On this basis, null hypothesis (H₀) is rejected. This means that there is no significant difference between the innovative strategies and lecture method of teaching.

Hypothesis Two

H₂: there is no significant difference between the innovative teaching strategies and teachers utilization.

The data used in testing this hypothesis was from the responses to question 12 i.e. table 4.17.

Table 4.27: Chi- Square Distribution.

Attribute	O	E	O-E	(O – E) ²	(O – E) ² / E
Strongly agreed	28	25	3	9	0.36
Agreed	44	25	19	361	14.44
Disagreed	20	25	5	25	1
Strongly disagreed	8	25	-17	289	11.56
Total	100	100	44	9539	27.36

$$\begin{aligned}
 \text{Degree of freedom} &= (C - 1) (R - 1) \\
 &= (5 - 1) (4 - 1) \\
 &= 4 \times 3 = 12
 \end{aligned}$$

Interpretation

From the above table, it can be observed that the computed values are more than the critical values indicating that the observed frequencies differ significantly from the expected frequencies. The null hypothesis was rejected since the calculated value of $X^2 = 27.36$ was greater than its critical value (i.e. 7.28) at 5% level of significance. On this basis, null hypothesis (H₀) is rejected. This means that there is no significant difference between the innovative teaching strategies and teacher's utilization.

Summary of the major findings.

The findings of the study are summarized below:

- There is no significant difference between the innovative strategies and lecture method of teaching.
- There is no significant difference between the innovative teaching strategies and teachers utilization.
- Most of the practicing teachers in the field are not interested in using the innovative strategies.
- Most teacher are not trained on how to use these innovative strategies during their teachers training programme.

Discussion

The result of the first hypothesis shows that there is no significant difference between the innovative strategies and lecture method of teaching. This is similar to the findings of Ezeliora (2004), who pointed that most of the time, science is taught to the learners using descriptive or lecture instead of hands-on approach. Akinsolu (2010) asserted that availability of qualified teachers determines the performance of students in schools. Wirth and Perkins (2013) indicates that teachers attitude contributes significantly to students attention in classrooms whereas Adesoji and Olatunbosun (2008) illustrated that students attitudes was related to teachers characteristics. Adu and Olatundun (2007) contends that teacher's characteristics (using innovative strategies) are strong determinants of student performance in secondary schools.

The result of the second hypothesis shows that there is no significant different between the innovative strategies and teachers utilization. This is similar to the findings of Ogbeba (2009), who pointed that the poor performance of student in science generally has been blamed on teachers and students because of the inability of most of them to cope with specific challenges associated with teaching and learning of science.

The study found out that the respondents surveyed had high awareness of the selected innovative teaching strategies with the awareness level of 88.0%. Markedly, this puts the average teacher at a vantage position to impart upon students the knowledge of science since he/she has a number of strategies to utilize. This findings aligns with crocker and algina (1986),who asserted in the work that the individual needs of the students cannot be achieved with a standard teaching method as every student comes from different background, possesses different question about things been taught and have different focus towards the environment, there is need for teachers to be aware of different strategies that can bring clarity to what is taught to each student.

Akpan (2006) noted that the present methods used in teaching science in secondary schools in Nigeria do not produce maximum results for the acquisition of science process skills by the students, therefore, Maduabum (1994), Akubuilu (2004) and Achor (2008) suggested the need for the use of multiple teaching strategies including inquiry teaching by all teachers to meet the different learning styles in the classroom. Khurshid and Zahur (2013) discovered that females teachers are more aware and utilize innovative teaching strategies than the male teachers. However, on the contrary, studies by Olagunju & Abiona (2008) revealed that male teachers perception of utilization of instructional materials in teaching is higher than that of the female teachers. This finding is supported by Samba, Achor & Ogbeba (2010) and

Khursid & Zahur (2013) who found that qualified teachers are aware of the innovative teaching strategies than unqualified counterparts.

Conclusion

The major conclusion drawn from this study based on the challenges of the innovative teaching strategies, it is concluded that the level of awareness is high but teachers need to improve in this area as there are some of the strategies that have to be put to use in teaching and learning process. Such strategies include team teaching, concept mapping, analogy, mind mapping, argumentation, etc.

On teachers experience, it is concluded that the experience of the teachers have no effect on the use of the innovative teaching strategies and that both experienced and less experienced teachers have the same attitude towards the use of the innovative teaching strategies. The effect of teacher's qualification on the use of the innovative teaching strategies is investigated to be positive and teachers with Educational qualification are discovered to utilize the selected strategies more than the teachers without any educational qualification. It is further concluded that female science teachers utilize the innovative teaching strategies more than the male science teachers as female teachers are said to be concerned about the academic achievement of their student and also participate more in professional development than the male teachers.

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