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FACTORS LIMITING THE EFFECTIVE USE OF INNOVATIVE SCIENCE TEACHING STRATEGIES IN SENIOR SECONDARY SCHOOLS IN SOUTH WEST, NIGERIA

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ABSTRACT

Using a descriptive survey research design, this study examined and discussed the problems associated with implementing a few chosen innovative twenty scientific teaching practices. All senior high school science instructors in a few chosen states in the southwest of Nigeria made up the study population. A purposively random sample of 622 science teachers drawn from Ekiti, Osun, Oyo and Lagos States were involved in the study. A researcher designed survey questionnaire with reliability coefficient of 0.91 was used to collect data from the teacher respondents. For the purpose of answering the study's research question, frequency counts and percentages were used to analyse the data. Findings of the study revealed the following factors as limiting the effective use of innovative teaching strategies: non-availability of teaching resources, strategies being demanding and stressful, poor motivation for teachers, absence of in-service training for teachers, and students non-commitment to extra effort in science learning. Finally, appropriate recommendations were proffered to enhance the use of innovative strategies in science teaching.

Keywords: Teaching Strategies, Senior Secondary, innovative science, limiting factors

1. INTRODUCTION

Teaching has been described as, the process of transferring values, knowledge, and abilities from one individual (the teacher) to another (the student) and as such teacher should include students as active participants rather than just providing rules, concepts, and processes for them to memorize. (Kayode, et al., 2020). For the learners to have an adequate understanding and grasp of science knowledge, ideas and skills, there is a need for the use of different innovative teaching strategies in imparting the nature of science to them. A design that incorporates many new or purposefully recreated elements of pre-existing concepts, procedures, and tools is considered innovative (Adeleke, et al 2020). Innovative teaching strategies are activity-based and characterized by students sharing some degree of responsibility for decision making in the learning process. Understanding and knowing different innovative teaching strategies would enable teachers to handle different situations, topics, learner's cognitive readiness and concept being taught. However, many teaching strategies shows poor results leading to continuous low performance and enrolment in science subjects at school certificate levels either because a right teaching strategy is used at the wrong time or used inappropriately. This research therefore reveals the number of problems encountered by senior secondary school science teachers when teaching using innovative teaching strategies. Innovation is the application of new and improved knowledge, concepts, procedures, machines, tools, equipment, and facilities to produce new and improved goods, services, and procedures. Innovative teaching strategy is activity based. Activity based teaching strategy is said to be very effective, motivating and interactive by several researchers (Zita, 2020, Mokiwa and Agbenyeku 2019, Oyelekan, Igbokwe and Olorundare 2017). The results of a few academics' studies served as a springboard for several investigations into creative teaching methods. The value of learner-centered teaching strategies in achieving better learning outcomes for students was highlighted by a number of studies (Obikezie, Okpala, and Amobi 2022, Ukala 2018, Abdulwahab, Oyelekan and Olorundare 2016, Lamidi, Oyelekan and Olorundare 2015,

Danjuma 2015, Khairnar 2015, Khurshid and Ansari 2012, Udeani and Okafor 2012, Olatoye and Adekoya 2010), among others. These authors recommended innovative strategies in biology, chemistry, physics or mathematics teaching. The problem limiting the effective use of these innovative strategies in senior secondary school sciences is an area which needs further investigation.

Purpose of the study

The purpose of this study was to examine the problems facing the utilisation of some selected innovative twenty science teaching strategies.

Research Question

The main research question which guided the study is:

What challenges do science teachers face when implementing some selected teaching strategies?

2. METHODS

The study adopted a descriptive design of the survey type for this study. All science instructors working in senior secondary public and private schools in South-West Nigeria made up the study's population. The South-west of Nigeria which comprises Ogun, Osun, Oyo, Ekiti, Ondo and Lagos states. A multi-stage sampling procedure was used to choose the research samples. Simple random sampling technique was used at the initial stage to select four states out of the six states in the South-west zone. The states selected were Ekiti, Lagos, Osun and Oyo. In the second phase, twenty percent (20%) of all senior secondary schools in each of the states that were sampled were chosen using proportionate sampling approaches. Purposive sampling technique was used to select only science teachers while convenient sampling technique was used to select as many science teachers that were available in each of the sampled senior secondary school as at the time of visiting to the selected schools. A total of 652 science teachers were sampled however only 622 of the questionnaire were properly and completely filled and used for the study and analysis.

2.1 Research Instrument

The main research instrument used for the study was a researcher-designed questionnaire titled “Science Teachers’ Utilisation of Innovative Teaching Strategies” survey questionnaire (STUITS). The questionnaire was divided into two sections. Section A sought for science teacher’s personal data such as respondent’s school, gender, subject area, teaching experience and educational qualifications. Section B elicited information on the problem limiting the effective utilization of the twenty (20) identified innovative teaching strategies. It featured an open-ended question asking science teachers to discuss any additional challenges they encountered using cutting-edge teaching tactics, as such as response modes with resources unavailable, a time-consuming strategy, and teachers unfamiliar with the teaching strategy. The instrument was subjected to both content and face validity by five experts all from the Department of Science Education, University of Ilorin.

2.2 Validity and Reliability of Instrument

The reliability of the instrument was determined by administering the instruments to forty (40) science teachers in Ondo state. Cronbach Alpha formula was used to analyse the data collected with the aid of Statistical package for the Social Sciences at 0.05 level of significant and the value was calculated to be 0.91, which showed high internal consistency in the research instrument. Hence the instrument was adjudged to be reliable for the study. Ethical issues relating to participation of the selected science teachers in the study was properly addressed. With the help of three research assistants in three of the states under investigation and the researcher covering a state, the science teachers in the sampled schools were educated and orientated on the characteristic features of the selected innovative strategies. Thereafter, the questionnaires were administered to the teacher respondents.

2.3 Data Analysis

In order to respond to the study's research question, the data were analyzed using descriptive statistics that included percentages and frequency counts. . More so, the qualitative data obtained from open ended questions in the questionnaire were categorised and expressed using descriptive statistics.

3. RESULTS

Research Question 1:

What challenges do science teachers face when implementing some selected teaching strategies?

Table 1: Reasons (1) expressed by science teachers for non-utilizing the selected innovative teaching strategies

INNOVATIVE TEACHING STRATEGY	RESOURCES NOT AVAILABLE	STRATEGY IS TIME CONSUMING	I AM NOT FAMILIAR WITH THE STRATEGY
Activity based instructional strategy	202 (38.8)	280 (53.8)	38 (7.3)
Mind map	146 (26.7)	244 (44.7)	156 (28.6)
Teaching with sense of humour	146 (29.9)	268 (54.9)	74 (15.2)
Personalized system of instruction	148 (30.7)	274 (56.8)	60 (12.4)
Wisely managed classroom technology	232 (46.4)	220 (44.0)	48 (9.6)
Think-pair- share	116 (21.7)	268 (50.2)	150 (28.1)
Jigsaw team work instructional strategy	164 (29.4)	182 (32.6)	212 (38.0)
Z-A approach	126 (22.5)	216 (39.1)	210 (38.0)
Mastery Learning / instructional strategy	152 (30.9)	274 (55.7)	66 (13.4)
Concept formation	136 (27.3)	290 (58.2)	72 (14.5)
Mnemonic-word-Words approach	132 (25.2)	238 (45.4)	154 (29.4)
Online Virtual Laboratories	234 (44)	204 (38.4)	94 (17.7)
Peer tutoring	92 (18.3)	350 (69.4)	62 (12.3)
Hands on Learning/instructional strategy	162 (32.7)	266 (53.6)	68 (13.7)
Brain based strategy	96 (19.4)	322 (64.9)	78 (15.7)
Experiential Learning/instructional strategy	146 (28.9)	298 (58.9)	62 (12.3)
Reciprocal Learning/instructional Strategy	142 (26.4)	286 (53.2)	110 (20.4)
Integrating debate into course assignment	110 (21.2)	332 (64.1)	76 (14.7)
Blended Learning/ instructional strategy	148 (28.1)	262 (49.6)	118 (22.3)
Inquiry based learning/instructional strategy	146 (28.5)	308 (60.2)	58 (11.3)

Table 1 revealed the likely reasons why science teacher failed to utilize each of the selected innovative teaching strategies. The reason varies from lack of knowledge of the innovative teaching strategies, non-availability of resources to time constrain. Furthermore, the qualitative data

obtained from open ended questions in the questionnaire were categorised and expressed as shown in Table 2. Other reasons for non-utilisation of the selected innovative teaching strategies include: strategies been stressful/too demanding, student not ready for true learning, lack of motivation for the instructors/ by students, financial constraint, time allocated to cover syllabus not always enough, inappropriate location of the school environments, failure of government to provide more training for teachers, inconsistence of school calendar, inadequacy in teachers' training, less time given to practical aspect of biology syllabus, obsolete science equipment, inaccessibility of available resource by student, inexperience of teachers, Influence of the community on school, large population of students in a class, inadequate monitoring of teachers by school management board / government, non-challant attitude of teachers, school policies, lack of maintenance of school properties, teacher to student ratio.

Table 2: Reasons (2) expressed by science teachers for non-utilization of teaching strategies

	Frequency	Percent
Unfamiliar with strategies	94	15.2
Non-availability of facilities and infrastructures	37	6.0
Strategies are demanding/stressful	27	4.4
Student not ready for proper learning	29	4.7
Lack of motivation by teachers/ students	23	3.7
Financial constraint	43	7.0
Time frame to cover syllabus	48	7.8
Poor location of the school environment	21	3.4
Failure of government to provide more training for teachers	51	8.3
Instability of school calendar	15	2.4
Inadequacy in training of teacher	17	2.8
Less time given to practical aspect	44	7.1
Obsolete equipment	15	2.4
Inaccessibility of available resource by student	13	2.1
Inexperience of teacher	17	2.8
Community influence	20	3.2
Population of students in a class	15	2.4
Inadequate monitoring from authority	14	2.3
Non-challant attitude of teacher	16	2.6
School policies	26	4.2
Lack of maintenance of school properties	19	3.1
Teacher to student ratio	15	2.4
Total	619	100

4. Discussion

The results of this study showed that the respondents did not effectively use the innovative teaching strategies because they were too demanding or stressful or because they lacked the necessary expertise because they were unfamiliar with the majority of the chosen innovative teaching strategies that were being studied. The costs implication associated with recruiting, hiring, training and retraining teachers were part of the mentioned problem facing the underutilization of Innovative teaching strategy in science teaching. A large percentage of teachers in schools frequently lack training and experience. or educators who are required to exhibit subject matter competence in each area they teach and who teach numerous courses. In this high-turnover environment, this has made teachers' quality and kids' achievement at risk. The effects are most noticeable in rural schools, where there is a greater need for highly skilled and productive instructors. Lack of motivations, lack of interest, low morale were some of the contributing factors hindering teachers from adopting innovative strategies, while some (38.3%) science teachers complained of time constrain required to cover the syllabus due to over loaded curriculum.

5. Conclusions

It was concluded that science teachers' underutilization of innovative teaching strategies was due to: non-availability of instructional resources, financial constraint, lack of training for in-service to teachers, lack of motivation both to teachers and students, strategies too demanding/stressful due to lack of expertise, students not ready for proper learning and because most innovative teaching strategies consume more time than the usual convectional method that is not activity-based.

6. Recommendations

The study's conclusions led to the following recommendations being made:

To increase the awareness of in-service science teachers about the efficacy of teaching with innovative teaching strategies, state governments, educational institutions, and professional associations like the Science Teachers Association of Nigeria (STAN), Teachers' Registration Council of Nigeria (TRCN), Nigeria Education Research and Development Council (NERDC), and Teachers' Registration Council of Nigeria (TRCN) should regularly organize workshops, seminars, and conferences. The state ministry of education should arrange interstate programs and trainings to keep instructors up to date on instructional practices that may be unfamiliar to them. It is advisable for science instructors to become acquainted with the internet in order to stay current with cutting-edge teaching techniques. Modern computer labs and other electronic interactive devices are examples of cutting-edge teaching materials that should be made available to schools by both government and non-governmental organizations. Teachers ought to receive training on how to use these tools so they may bring fresh perspectives to scientific classes, which will ultimately inspire kids to learn. Since the study revealed that the use of most innovative teaching strategies consumed more time than the regular "talk and chalk" method, school managements should allocate more periods on the time table to practical classes so as to give room for coverage of the syllabus. Science textbook authors should thoroughly depict a number of cutting-edge teaching techniques in their updated texts and provide examples of how to apply them, particularly for the techniques that aren't often employed.

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