



Identifying and Remediating Challenges Limiting the Application of Innovative Teaching Strategies for Biology Teaching

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Abstract

The major purpose of the study was to identify and give remedy to the challenges limiting the application of innovative teaching strategies for biology teaching in senior secondary school in Enugu education zone. One research question was posed for the study. Descriptive research design was adopted for the study. The population of the study comprised of 61 senior secondary school biology teachers from 29 senior secondary schools in all the government owned senior secondary schools within Enugu Education zone during 2023/2024 academic session. The sample size of the study was 44 senior secondary school (SSS) Biology teachers drawn from the population. The instrument used for the study was researchers developed questionnaire titled Questionnaire on Challenges Limiting Biology Teachers Application of Innovative Teaching Strategies (QCLBTAITS). The instrument was validated by 3 experts; one from the Department of Biology education Federal College of Education, Umuoze, while the other two are from Research Measurement and Evaluation unit in the department of Science Education, University of Nigeria, Nsukka. Cronbach Alpha formula was used to ascertain the reliability of the instrument which gave an index of 0.77. The data collected was analyzed using mean and standard deviation to answer each of the research question. A mean of 2.5 and above indicated agree while any mean below 2.5 indicate disagree. However, the proposed remedies among others were that pairing of less-experienced teachers with master teachers who already use innovative strategies should be encouraged so as to help other teachers to closely observe, reflect and learn from them. Based on the findings of the study, it was recommended that school management should establish professional learning communities (PLCs) so that teachers can share materials, divide lesson-planning tasks, and observe each other's classes for feedback.

Keywords: Innovative teaching, Challenges in Teaching, Biology

Introduction

Overtime, there has been advancement in innovation at all sectors. Educational sector was not left of these improvements brought by innovation. Thus, in teaching, the application of instructional approach has made a noticeable shift from teacher-centered to innovative teaching strategy. This is because, studies have revealed the impact made by using innovative teaching strategies in enhancing student's achievement, retention, engagement among others (Okechukwu, 2024; Ugwuanyi, Nduji, Elejere & Omeke, 2020). Despite the usefulness of innovative teaching strategies, most teachers have not been utilizing it in their classroom instructions. Thus, these could have led most teacher into engaging the students in the use of traditional teaching method. This might be as a result of

diverse challenges faced by teacher, therefore, limiting their application of innovative teaching strategies in biology teaching. It is on this worry the problem of the study was necessitated.

Biology is a branch of science that deals with the study of life and the natural environment. Biology is an integral science subject which provides contents for students' careers in Medicine, Nursing, Pharmacy, Forestry, Psychology, Genetics among others (Okechukwu, 2024). The objectives of secondary school biology curriculum as stated in the National Policy on Education (FRN, 2014) are; to prepare students to acquire adequate laboratory and field skills in biology, meaningful and relevant knowledge in biology, ability to apply scientific knowledge to every

day's life in matters of personal and community health and agriculture, reasonable and functional scientific attitude. However, Nigeria as a nation is still distressed by diseases, and sicknesses due to ignorance in many aspects of biology (Ukala, 2018). Also, study has shown that there is still inconsistency in students' performance in biology which could be attributed to their lack of understanding of biology concepts (Ihekwoaba, Nzewi, Ifeagwu, Chinweuba-eze & Nduji, 2020). Additionally, the chief west African Examination Report (WAEC), 2019 to 2021 have is that there is high rate of failure in biology. The reasons for this poor performance vary as some think biology has a lot of botanical names while others attributed it to inappropriate application of teaching strategy (Okechukwu, 2024; Jacinta, 2017). Hence, this calls for an investigation on identifying and remediating challenges limiting the application of innovative teaching strategies by biology teachers.

Innovation is the introduction of new things, ideas or a new way of doing things. Thus, innovation in the aspect of teaching is the introduction of new ideas, methods and change in the style of evaluating the outcomes of teaching and learning. According to Gbadamosi (2015), innovative teaching strategy is referred to as a design that is full of new or the introduction of new ideas and methods or purposively reconstructed existing ideas to bring about an effective teaching. In this study innovative teaching strategies is defined as the creative and effective selection of materials, techniques, and assessments to enhance student engagement and foster creativity. Thus, these innovative teaching methods deviate from traditional, teacher-centred approaches by emphasizing student participation and problem-solving.

Innovative teaching strategies focuses primarily on encouraging students to engage more in the learning process. Subramani and Iyappan (2018) argued that not every teaching method is innovative. This is because not all teaching methods can be used to foster creativity, engagement and problem-solving. From literature, there are various teaching methods that are considered innovative, and they include: flipped classroom and think pair share (Ugwuanyi, Nduji, Elejere & Omeke, 2020), project-based learning, and mind mapping (Susilawati, Hernani & Sinaga, 2017), augmented reality and virtual reality, gamification (Kayımbaşioğlu, Oktetin & Hacı, 2016), collaborative learning (Enebechi, 2016) among others. Previous studies have shown how effective these innovative teaching strategies are when compared with conventional or traditional teaching strategies (Ukala,

2018; Adeoye, 2018). Despite the importance of these innovative teaching strategies, it was argued that biology teachers often face certain challenges while utilizing them in their various classroom instructions (Ofeimu & Kolawole, 2017). Hence, the need to identified these challenges and buffer remedies so as to improve the application of innovative teaching strategy.

Challenges are obstacles, difficulties, or demanding situations that require skills to overcome. This means that when a teacher is faced with any challenge, there is need for such teacher to improve his skills so as to mitigate such challenge. In the field of teaching, some of the challenges that could be experienced by a teacher may include; inadequate assessment tools for innovative methods, lack of administrative support, curriculum constraints. Achor (2020) noted that most teacher do not apply innovative teaching strategy in their lesson because they lack of adequately trained professional teachers that are well exposed in the use of innovative teaching methods. Avdeenko (2020) is of the opinion that insufficient time for planning and implementation could pose as a challenge limiting teachers' utilization of innovative teaching. However, studies have shown that most teachers have; negative attitudes toward adapting to a novel mathematics teaching strategy (Nyawira, 2015), weak institutional support in teaching basic science (Ramaila, Zondi & Mavuru, 2025), inconsistent administrative flexibility to sustain the innovative approach (Chikaluma, Opanga, & Nsengimana, 2022). This indicates a gap in research in identifying the challenges limiting the application of teaching strategy in biology teaching. Also, to the best of researchers' knowledge no study has been carried out on this variable of interest using biology teachers in Enugu education zone, Enugu state. It is on this worry that this study became very necessary.

The general aim of the study was to assess the utilization of innovative teaching strategies for biology teaching in senior secondary school in Enugu education zone. Specifically, the study sought to determine:

- the challenges limiting the application of innovative teaching strategies for biology teaching.

The following research questions were posed to guide this study:

- what are the challenges limiting the application of innovative teaching strategies for biology teaching in senior secondary schools in Enugu education zone?

Methods

Descriptive research design was adopted for the study. The area of this study was Enugu education zone, Enugu state, Nigeria. This education zone has 3 LGA; Enugu North LGA, Enugu South LGA, and Isi Uzo. The population of the study comprised of 61 senior secondary school biology teachers from 29 senior secondary schools in all the government owned senior secondary schools within Enugu Education zone during 2023/2024 academic session. The population distribution of education zones is as follow; Enugu North LGA – 21 teachers, Enugu South LGA – 22 teachers, Isi Uzo – 18 teachers.

The sample size of the study was 44 senior secondary school (SSS) Biology teachers drawn from the population. Multi-stage sampling procedure was used in composing the sample size. At the initial stage, simple random sampling technique by balloting with replacement was used to select eight (5) schools from the three LGA's in Enugu education zones. At the end, 15 schools emerged out of the 29 schools in Enugu education zone. This gave a total of 15 schools. At the second stage, simple random sampling technique by balloting with replacement was used to select teachers from the 15 schools, resulting to a total of 44 biology teachers. The instrument used for the study was a 10 item Questionnaire on Challenges Limiting Biology Teachers Application of Innovative Teaching Strategies (QCLBTAITS). The instrument was developed by the

researchers. QCLBTAITS was validated by 3 experts; one from the Department of Biology education Federal College of Education, Umunze, while the other two are from Research Measurement and Evaluation unit in the department of Science Education, University of Nigeria, Nsukka. Cronbach Alpha formula was used to ascertain the reliability of the instrument which gave an index of 0.77.

The researchers recruited the services of research assistants who are postgraduate students of Enugu state university, Enugu. The research assistances were intimated on the purpose of the study. Also, the researchers alongside the research assistants visited the sampled schools to collect the data for the study. At the course of the visit, copies of the instrument were administered to teachers in their respective sampled schools. Ample time for the teachers to respond to the instrument was given. This is to ensured achievement of a good return ratio and help respondents to get a chance to seek clarification on items which proved not clear to answer. Also, the researcher discovered that few respondents miss placed their instrument of which another copy was given to them to fill with enough time also given. Nevertheless, the admiration and collection of instruments from the respondents was done with 2 weeks 3 days. The data collected was analyzed using mean and standard deviation to answer each of the research question. A mean of 2.5 and above indicated agree while any mean below 2.5 indicate disagree.

Results

Mean and standard deviation of challenges limiting the application of innovative teaching strategies for Biology teaching in senior secondary schools

N=44				
S/N	Item Statement	Mean	S.D	Dec.
1	Curriculum constraints	2.57	.974	A
2	Inadequate assessment tools for innovative methods	3.43	.661	A
3	Lack of collaboration among colleagues	2.30	1.116	D
4	Lack of administrative support	3.32	.740	A
5	Lack of interest to integrate innovative methods in teaching and learning	2.70	1.025	A
6	Concerns about classroom management issues while utilizing the innovative methods	2.32	1.095	D
7	Lack of adequate resources like technology, materials	3.39	.689	A
8	Inadequate training and professional development	3.34	.776	A
9	Insufficient time for planning and implementation	3.09	1.030	A
10	Lack of confidence in using new method	2.59	1.019	A
Cluster B		2.90	.4299	A

NB: $\bar{x}$ = Mean; S.D = Standard Deviation; N = Number of Respondents; A = Agree; D= Disagree; Dec. = Decision

The result shows that the mean ratings and standard deviations on the challenges limiting the application of innovative teaching strategies for Biology teaching in senior secondary schools in Enugu education zone on items 1, 2, 4, 5, 7-10 are within the range of ($\bar{x}$ = 2.57-3.39; S.D = .689-1.030). This indicates that the teachers agreed to the item statements on the that challenges limiting the application of innovative teaching strategies for Biology teaching. Also, Biology teacher's responses on items 3 & 6 reveals that they disagree with items on the challenges limiting the application of innovative teaching strategies for Biology teaching with the item statements having the mean response rating and standard deviation ranging from ($\bar{x}$ = 2.30-2.32; SD = 1.095-1.116). However, the grand mean rating of 2.90 indicates that biology teacher agrees that the challenges limiting the application of innovative teaching strategies for Biology teaching are lack of adequate resources, inadequate training and professional development, lack of confidence in using new methods, insufficient time for planning and implementation, among others.

Conclusion

Based on the finding of the study, the researchers concluded that the challenges limiting the application of innovative teaching strategies for Biology teaching are; lack of adequate resources, inadequate training and professional development, among others.

Discussion

The finding of the study showed that the Biology teacher agrees that the challenges limiting the application of innovative teaching strategies for Biology teaching are lack of adequate resources, inadequate training and professional development, among others. The result of this finding could be attributed to teachers limited access to workshops, seminars, or peer collaboration opportunities which can restrict professional growth and the adoption of new strategies. The result here can also be due to lack of clear policies encouraging or supporting innovation in teaching methods can create inertia among educators. The finding of this study is in consonance with that of Kayode (2020) whose study revealed that problems associated with inadequate utilization of the innovative teaching strategies include: non-availability of teaching resources, strategies being demanding and stressful among others. Similarly, Achor (2020) who revealed that the level of teacher awareness of innovative

strategies was high but that only a few of the strategies were being effectively utilized by the teachers, is in agreement with the finding of this study.

Remediating the identified challenges limiting the application of innovative teaching strategies for biology teaching

From the result of the study which indicates that biology teachers lack adequate training and professional development, thus, pairing of less-experienced teachers with master teachers who already use innovative strategies so as to observe, reflect and co-teach other biology teachers. In the same light, incentives should be provided for biology teachers to enroll in short online courses that award recognized certificates together. In every school, biology teachers should be encouraged to meet regularly to share experiences, plan innovative lessons, and solve problems together. Since it has been also indicated that Biology teachers are posed with the challenge of insufficient time for planning and implementation, hence, they can leverage on open educational resources (OER) and curriculum repositories to cut down time spent creating materials from scratch. This can help the teachers easily adapt to an innovative teaching strategy rather than reinvent.

Recommendations

Based on the finding of the study, it was recommended that;

- the government in synergy with the school management should establish professional learning communities (PLCs) so that the teachers can share materials, divide lesson-planning tasks, and observe each other's classes for feedback.

References

- Achor, E. (2020). Teachers' awareness and utilization of innovative teaching strategies in secondary school science in Benue state, Nigeria. https://www.academia.edu/12034243/Teachers_awareness_and_utilization
- Adeoye, O. A. (2018). Integrating multimedia technology into Nigerian classrooms: Challenges and prospects. *Journal of Education and Practice*, 9(8), 19-23.
- Avdeenko, N. (2020). Teachers' beliefs about barriers towards implementation of innovative teaching practices. In *INTED2020 Proceedings* (pp. 1443-1447). IATED.



- Chikaluma, P. H., Opanga, D., & Nsengimana, V. (2022). Contribution of inquiry-based learning to the improvement of biology teaching and learning. *The International Journal of Science, Mathematics and Technology Learning*, 29(2), 29.
- Enebechi, R. I. (2016). *Effects of two instructional scaffolding strategies on secondary school students' achievement and interest in biology* (An Unpublished Ph.D. Thesis). University of Nigeria, Nsukka, Enugu State, Nigeria.
- Gbadamosi, A. F., (2015). *Biology teachers' awareness and utilization of innovative teaching strategies in Oyo south senatorial district, Nigeria* (Unpublished Thesis), Department of Science Education, University of Ilorin, Ilorin, Nigeria.
- Ihekwoaba, C. C., Nzewi, U. M., Ifeagwu, N. A., Chinweuba-eze, V. O., & Nduji, C. C. (2020). Improving students' achievement in Biology: The use of peer tutoring. *European Journal of Training and Development Studies (EAJ-EJTDS)*, 7(5), 1-15.
- Jacinta, A. O. (2017). Inquiry method and student academic achievement in biology: Lessons and Policy Implications. *American-Eurasian Journal of Scientific Research*, 6(1), 28-31.
- Kayımbaşioğlu, D., Oktekin, B., & Hacı, H. (2016). Integration of gamification technology in education. *Procedia Computer Science*, 102, 668-676.
- Kayode, O. O. (2020). Biology teachers' awareness and utilization of innovative teaching strategies in senior secondary schools in southwest, Nigeria. <https://uilspace.unilorin.edu.ng/items/54e7504b-e43d-4c13-bcf9-24e52598e096>
- Nyawira, W. J. (2015). *Challenges facing teachers in utilizing instructional resources when teaching Mathematics in public secondary schools in Nairobi County, Kenya* (Unpublished Masters' Thesis). <https://ir-library.ku.ac.ke/bitstreams/12958ff1-49c0-4840-be2f-965e1809304b/download>
- Ofeimu, J., & Kolawole, B. O., (2017). Teacher quality as determinant of students' academic performance in secondary schools in Edo south senatorial district of Nigeria. *British Journal of Education*, 5(13), 19-30.
- Okechukwu, B. (2024). *Efficacy of two computer-based multimedia lesson delivery approaches on secondary school Biology students' interest, achievement and retention in federal capital territory* (Unpublished PhD Dissertation). University of Nigeria, Nsukka, Enugu state.
- Ramaila, S., Zondi, S. M., & Mavuru, L. (2025). Pedagogical strategies employed by teachers in township schools for teaching meiosis and genetics with improvised resources. *Journal of Teaching and Learning*, 19(1), 236-260.
- Subramani, P. N., & Iyappan, V. (2018). Innovative methods of teaching and learning. *Journal of Applied and Advanced Research*, 3(1), 20.
- Susilawati, A., Hernani, H., & Sinaga, P. (2017). The application of project-based learning using mind maps to improve students' environmental attitudes towards waste management in junior high schools. *International Journal of Education*, 9(2), 120-125.
- Ugwuanyi, C. S., Nduji, C. C., Elejere, U. C., & Omeke, N. E. (2020). Effect of flipped classroom and think pair share strategy on achievement and retention among senior secondary school Physics students. *International Journal of Science: International Journal of Sciences: Basic and Applied Research (IJSBAR)*, 52(2), 136-148.
- Ukala, G. (2018). Utilization of innovative teaching strategies for biology teaching in senior secondary school. *African Journal of STM Education (AJSTME)*, 4(1), 30-37.