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BIOLOGY TEACHERS' AWARENESS AND UTILIZATION OF INNOVATIVE TEACHING/LEARNING STRATEGIES IN SECONDARY SCHOOLS OF OBIO/AKPOR, RIVERS STATE, NIGERIA

MARTHA IJOK ADIBE NJOKU (PhD)
Department of Biology
Ignatius Ajuru University of Education, Rumuolumeni, Port Harcourt
Rivers State, Nigeria
martha.njoku@iaue.edu.ng

ABSTRACT

This study investigates Biology teachers' awareness and utilization of innovative teaching/learning strategies in secondary schools in Obio/Akpor local government area, Rivers State. The study was guided by four research questions and one hypothesis. A descriptive research of the survey type was adopted for the study. A sample of seventy eight (78) Biology teachers was purposively selected for the study. A questionnaire was designed to collect data from the respondents and a reliability index of 0.86 was obtained using Cronbach Alpha. Mean and standard deviation were used to answer research questions while t-test was used to test the null hypothesis at 0.05 level of significance. The findings of the study revealed that Biology teachers in Obio/Akpor local government area were highly aware of the selected innovative teaching/learning strategies, but do not utilize the innovative teaching/learning strategies. Gender had no significant influence on the Biology teachers' level of awareness of the innovative teaching/learning strategies. The study concluded that Biology teachers' level of awareness was high, however, utilization was low. This implies that the Biology students will be denied the benefits attached to use of innovative teaching/learning strategies. The study recommended that utilization of peer tutoring, peer-led team learning, flipped learning and project-based learning strategies should be encouraged.

Keywords: Innovative, Peer Tutoring, Utilization, Flipped Learning, Awareness, Peer Led Team Learning.

Introduction

In any society, Education is a tool for growth and progress because it doesn't only impact knowledge, skill and the right type of values, but also builds human capital which breeds, drives and set technological innovation and economic growth. The driving force of change towards sustainable development in any nation is education. The purpose of education is not only to make students literate but also to improve their knowledge, self-sufficiency and their ability to think rationally (Okebukola 2015).

In Nigeria, the National Policy on Education (FRN, 2014) clearly spells out the objectives of science teaching from pre-primary to tertiary level. Specifically, at the secondary level, it entails equipping students to live effectively in our modern age of science and technology. The global

change in science curriculum arising from knowledge explosion and new wave in science and technology development demands for qualitative science teaching. Science Education consists of learning by acquiring and developing conceptual and theoretical knowledge through scientific inquiry and problem solving (Njoku & Edori, 2022). Furthermore, it is one of the areas in the wider world, which shapes and molds the character of the 21st century especially in technologies which has greatly influenced the way we think and live.

From the range of evidence in the science education literature and studies by Awodi (2013), Akpan (2014), Madu (2014), Okebukola (2015), it was clear that science education in Nigeria faced numerous problems that need to be addressed. Such problems include the inability of students to engage in complex problem solving activities and also the inability of Nigerian students to apply school knowledge to real life problems in work place. The problems need to be addressed so that the goal of equipping students to live efficiently in our modern ages of science and technology as well as the acquisition of appropriate skills, mental, physical and social abilities and competences to live in and contribute to the development of the society, as formulated in the Nigeria National Policy on Education (FRN, 2014) is achieved.

Buseri (2015) contends that to meet up with the rapid scientific progress in technology requires the presence of well-trained, efficient, knowledgeable and skillful teachers who are versatile in discharging their duties and responsibility. It is not just enough to teach science for the sake of knowledge but for acquisition of skills. Factors which contribute to the preceding situation are many but the most important of them is the method of teaching. The persistent poor performance of student in the sciences especially Biology at senior school certificate level (Ogbeba et al., 2014). Owning to this statement, an assumption that most Nigerian secondary schools teachers especially those taking Biology, possibly do not make use of diverse forms of teaching strategies to be able to adjust and tackle some specific difficulties associated with the teaching and learning of Biology by both the teacher and student respectively. In other words, it implies that teachers are knowledgeable in science content but not in pedagogical aspects. Ezeliora (2014), pointed that most of the time, science is taught to the learners using descriptive or lecture method instead of hands-on approach. Biology is defined as the basic science that deals with the study of living things, it attempts to understand the teeming diversity of life on earth, a diversity of level we are all part of (Adegbite, 2013).

The teaching of Biology is very important because the knowledge of Biology helps in improving the quality of life, as it helps to solve many societal problems relating to health, poverty, food shortage, crop production and environmental conservation. The learning of Biology in real life context is necessary for personal development and also, the development of scientific and technological world. In any research work in Biology Education, more attention is placed on science education; this is because Biology is one of the various subjects that explain science and also in Nigeria, Biology is the general basic science subject.

An innovative approach is referred to as a design that is full of new or purposively reconstructed existing ideas. This explanation means the use of new or reconstructed existing ideas, methods and equipment or to combine various teaching strategies to develop a new one. Innovation in science education is increasingly needed in order to foster greater scientific literacy. Innovation is the introduction of new things, ideas or a new way of doing things. Ikeobi (2014)

defined innovation as the introduction of something new at any point in time and that to be innovative is to break new grounds. Innovation in Biology is therefore the introduction of new ideas and methods, accompanied by an equally new change in the style of evaluating the outcomes of Biology learning.

In an attempt to ensure result oriented Biology delivery in schools, Akubuilo (2015) suggested the use of activity-oriented strategies such as peer-tutoring, project-based learning, cooperative learning, constructivism, demonstration, thinks and do, use of analogy and many others. Thus, research in Science Education in Nigeria has continued to seek better ways of teaching Biology in order to improve academic performance of students (Okebukola, 2015). A teaching strategy is a carefully design classroom interaction that could be meticulously followed to teach a concept, topic or idea. This brings out the idea of having numerous strategies. The need of innovative strategies in teaching Biology is borne out of the fact that different situations- teaching topics, learners' cognitive readiness, concept being taught, skills intended to be developed in learners, demands for different teaching approaches. Therefore, a teacher who is not aware of a variety of such strategies can neither attempt to use them in the first place or use them accurately. For instance, Achor (2018) considered some teaching modes as learners centered, interest arousing and activity oriented. These include; peer tutoring, project-based learning, peer-led team learning, flipped learning, co-operative learning strategy, field trip, inquiry-based, experimental and demonstration methods. He added that most of these are regarded as modes as teachers are required to employ a number of them while teaching.

Researchers have argued that many Nigerian Students do not possess the depth of knowledge or skills to assure either personal life success or national economic competence (Akpan, 2014). A major concern of most of these critics also the apparent inability of these students to engage in complex problem solving activities and apply school knowledge to real life problems in work place settings. Therefore, teacher needs to be aware of different teaching strategies that are more effective and efficient in the teaching of topics and concepts.

The sources of gender differences in educational outcomes have been the subject of considerable study and debate. One particularly contentious issue involves the possible role played by biological differences between males and females. One hypothesis is that male and female teachers have unique biases with respect to how they engage students in the classroom, similarly, cognitive process theories (Jones & Dindia, 2014), suggest that teachers may subtly communicate that they have different academic expectations of boys and girls.

Gender is the division of people into two categories, “male” and “female”. Through interaction with caretakers, socialization in childhood, peer pressure in adolescence, and gendered work and family roles women and men are socially constructed to be different in behavior, attitudes and emotions. The gendered social order is based on and maintains these differences (Borgatta & Montgomery, 2014). The issue of gender differences is paramount to educational researchers nowadays. There had been divergent views and reports as to the comparative ability of male and female in human endeavors, especially in education. Fauth (2014) also noted that women have been found to be more concerned than men about the academic achievement of students and participate more in professional growth activities.

On teaching strategies, studies by Olagunju and Abiona (2009) in Anyanwu and Alafiatayo (2016) revealed that male teachers' perception of utilization of instructional materials in teaching is higher than that of the female teachers. Khurshid and Zahur (2013) discovered that female

teachers are more aware and utilize innovative teaching strategies than the male teachers. From these studies, there are no conclusive statements on the gender and teachers' awareness of the innovative teaching/learning strategies, investigated by the researchers and the studies cited above. As such, this study investigates the interaction effects of teachers' gender on the awareness of the innovative teaching/learning strategies to determine whether its effect had any significant influence or not.

Previous researches identified the method adopted for teaching and learning any science subject as a major factor contributing to the low interest and poor performance in those subjects. This brings about the need for other instructional plans that will make students to be more interested in learning and also heighten their performance (Ajaja 2013, Gbadamosi, 2013, Oyelekan et al, 2017). Researchers in Biology have studied on various innovative teaching/learning strategies like, peer tutoring, peer-led team learning, flipped learning, field trip, project-based learning, co-operative learning, use of analogy, constructivism, computer assisted instruction and how they can be used to improve the learning and teaching of science in general and Biology in particular (Njoku et al., 2020; Udeani & Okafor 2015). Most of the researchers studied the effectiveness of the new teaching strategies generally and compared them to conventional strategies, without taking account of and examining the awareness of in-service teachers on the existence of these strategies, the level of awareness and the degree of application of the ones they are aware of.

Four research questions guided the study: 1. What is the level of awareness of peer tutoring and peer-led team learning strategy by the Biology teachers? 2. What is the level of awareness of flipped learning and project-based learning strategy by the Biology teachers? 3. What is the level of utilization of peer tutoring and peer-led team learning strategy by the Biology teachers? 4. What is the level of utilization of flipped learning and project-based learning strategy by the Biology teachers? One null hypothesis was postulated for this study: There is no significant difference in the awareness of the innovative teaching/learning strategies by male and female Biology teachers.

This study was geared towards Biology teachers' awareness and utilization of innovative teaching/learning strategies, which are; peer tutoring, peer-led team learning, flipped learning and project-based learning strategy, its awareness and utilization among the Biology teachers as well as the interaction effect of teachers' gender on the awareness of the innovative teaching strategies.

Literature Review

The concept of innovative teaching is actually based on the constructivism learning theory. Constructivism theory of learning was propounded by Jean Piaget in 1972. Constructivism is a learning theory that emphasizes the active role of learners in building their own understanding. Rather than passively receiving information. Learners reflect on their experiences, create mental representations, and incorporate new knowledge into their schemas. A number of teaching strategies are principled on the constructivism learning theory which mostly involves a form of guided discovery in which the teacher avoids direct instruction and attempts to lead students through questions and activities to discover, discuss, appreciate and verbalize the new knowledge. Activities encouraged by constructivist include experimentation, visualization, research project, peer tutoring, field trip, peer-led team learning, films and class discussion. Constructivist views of

learning are in consonance with empirical findings concerning the inadequacy of traditional teaching approaches in developing and changing students' fundamental science understanding.

Tyler et al (2014) further stressed that conceptual change approaches to teaching took their cue from the realization that the learning of major science ideas involves the transformation of often well-developed informal conceptions rather than the simple implantation of ready- made science insights. Given the diversity of learners and the views expressed in many classrooms, the science teachers' role needs to be more about managing the construction of knowledge between participants (Barbosa, et al., 2014). It was advocated that teachers need to look beyond the 'utility argument' of the subject so as to see what aspects of sciences are needed to enrich lives with an understanding of people and the universe. Appropriate choice of teaching strategies could help to bring this to realization. Biology teacher's awareness of innovative teaching/learning strategies form the basis for its utilization.

In a study conducted by Gbadamosi (2013) on Biology teachers' awareness and utilization of innovative teaching strategies in Oyo south senatorial District of Nigeria. 25 teaching strategies were deliberated upon. The sample for the study comprised of three hundred Biology teachers randomly and purposively selected. Data was collected using a researcher designed questionnaire. Data collected were analysed using the percentage, Spearman Rho Rank Order Correlation Coefficient and mean statistics. The study revealed that, majority of the Biology teachers in Oyo South Senatorial District were aware of the selected innovative teaching strategy and the level of utilization of the teaching strategies was also high.

Khurshid, and Zahur (2013) examined the extent to which teachers are aware and utilize innovative teaching strategies in both private and public secondary schools. 100 secondary schools' teachers from various private and public schools in Islamabad were randomly sampled. In the study 16 selected teaching strategies were used to analyze teachers' awareness and its utilization in classrooms settings. Results show that level of teachers' awareness and utilization of innovative strategies was high.

Oyelekan, et al (2017) worked on science teachers' utilization of innovative teaching strategies in instructing senior school science subjects. An aggregate of two hundred and fifty six Biology, Chemistry and Physics teachers were selected from secondary schools in East, South and west Local Government Areas of Ilorin, Nigeria to form the sample for the study, using stratified random sampling technique. Data was obtained using a researcher-designed validated questionnaire. Results showed that out of the thirty six selected teaching strategies, most science teachers frequently utilized only two, while the rest were rarely used.

A study on the production and utilization of material resources in Biology education in South West Nigerian Secondary Schools by Olagunju and Abiona (2009) cited in Anyanwu and Alafiatayo (2016) revealed that male teachers' perception of utilization of instructional materials in teaching is higher than that of the female teachers. Khurshid and Zahur, (2013), discovered that female teachers are more aware and utilize innovative teaching strategies than the male teachers. However, the studies were inconclusive, hence, this study investigated the effect of gender on the awareness and utilization of innovative strategies.

Kayode (2020) carried out a study on Biology teachers' awareness and utilization of selected innovative teaching strategies in senior schools in South-west, Nigeria. A descriptive research of the survey type was adopted for the study. Nine research questions and six hypothesis guided the study. The findings of the study were that: Biology teachers (98.0%) are highly aware of

the selected innovative teaching strategies; less than half (44.0%) of the teaching strategies were frequently utilized by Biology teachers; the least utilized strategies were the ZA approach (15%), Jigsaw (15.5%), Mnemonic word-words approach (21.5%) and Mind map (25.3%); gender had no significant influence on either the Biology teachers' level of awareness or on their utilization of teaching strategies, and problems associated with inadequate utilization of the innovative teaching strategies include: 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 needed. The study concluded that Biology teachers' level of awareness of innovative teaching strategies was high, however, utilization was low.

Gbadamosi (2013) carried out a study on Biology teachers' awareness and utilization of innovative teaching strategies in Oyo South Senatorial District, Nigeria. The study was guided by six research questions and three hypotheses. A sample of three hundred (300) Biology teachers was purposively and randomly selected for the study. The study was a descriptive research of the survey type, the instrument used to gather the data for analyses was a researcher designed questionnaire known as the Innovative Teaching Strategies Questionnaire (ITSQ). The findings revealed that the Biology teachers in Oyo South Senatorial District were highly aware of the selected innovative teaching strategies with the percentage of awareness being 88.0%. The level of utilization of the strategies was high, as 88.0% of the strategies were highly utilized. There is difference in the level of utilization by gender ($t=3.042$, $p< 0.05$) with female teachers having a higher utilization of the innovative teaching strategies than the male teachers.

Apochi & Okpaje (2022) investigated science teachers use innovative teaching methods in FCT senior secondary Schools, Abuja. Descriptive survey research design was adopted for the study. A sample of 242 was selected from the population of science teachers using simple random sampling technique. Findings of the study revealed that the extent to which science teachers in FCT senior secondary schools use innovative teaching methods was high. It was also found that there was no significant difference between male and female Science Teachers' use of innovative methods of teaching.

Samuel, (2020) carried out a study on chemistry teachers' awareness and application of innovative instructional strategies in the teaching of chemistry in Anambra state, Nigeria. The study adopted a descriptive research design. Results chemistry teachers are aware of the existence of innovative teaching strategies and they also apply it in their daily teaching. Gender has no influence on awareness of innovative strategies. Female teachers have a higher application of innovative strategies than the male teachers. Teachers' experience showed inverse relationship of application of innovative teaching strategies.

Oyelekan et al, (2017) carried out a study aimed at examining science teachers' utilization of innovative teaching strategies in teaching senior school science subjects in Ilorin, Nigeria. The study adopted a descriptive research design. Three research questions and two hypothesis guided the study. Results showed that out of the thirty six (36) selected innovative teaching strategies, most science teachers frequently used only two (2), while the rest were rarely used.

Nkok (2022) carried out a study on the Interaction Effect of Gender and Teaching Method on Student's Interest, Achievement and Retention in Sexual Reproduction in Plant. The research designed used in the study was Quasi-experimental design, the sample size was 178 students 84

females and 94 males). Three research questions were asked and three null hypotheses formulated and tested at 0.05level of significance. Two instruments employed for the study were Plant Reproduction Interest Inventory (PRII) and Plant reproduction Achievement Test (PRAT) and the validity indices were 0.88 and 0.81 respectively. The findings of the study revealed that there is no significant interaction effect of Computer Simulation Strategy and Conventional Teaching Method and gender on students' interest, with p-value of 0.963, no significant interaction effect of gender and teaching Method on students' achievements with F-ratio = .533and p-value of 0.466 and there was no difference in the interaction effect of both sexes with teaching strategies on students' retention score with F-ratio 1.666and p-value of 0.199. It was concluded that the males and females have not responded to the treatment differently, hence, gender is not a factor in designing the intervention. Based on the results of the findings, it was recommended among others that Computer Simulation teaching Strategy should be employed in teaching Biology in Secondary Schools in Niger state.

Research Method

The area of the study is Obio-Akpor local government area, situated within Rivers State, South-south geopolitical enclave of Nigeria. Obio-Akpor is a local government area in the metropolis of Port Harcourt, one of the major centres of economic activities in Nigeria, and of the major cities of the Niger Delta, located in Rivers State and the biggest local Government Area in Rivers state, Nigeria. The local government area covers an area of 311km^2 and according to the National Population Commission of Nigeria, the estimated population of Obio-Akpor is over a million people. This makes it one of the populous local government area in Rivers State. Obio-Akpor local government area is regarded as an urban area as it houses the major urban districts in the state including Elelenwo, Choba, Oro Igwe, Ozuoba, Rukpokwu, Rumueme, Rumuigbo, Rumuokwuta, Rumuodara, Rumuokoro, Rumuokwu, Rumuomasi and Woji. Due to the high level of urban development it is populated with more individuals (teachers and students inclusive).

The population of the study consisted of all Biology teachers in senior secondary schools in Obio-Akpor local government area, Rivers state. The total number of Biology teachers in public schools were estimated to be 78. The sample for the study comprises of 78 Biology teachers teaching in public schools. Purposive sampling technique known as Census was adopted for the study. The instrument used in the study for data collection is a research questionnaire titled, Biology Teachers' Awareness and Utilization of Innovative Teaching/Learning Strategies Questionnaire (BTAUOITLSQ). The researcher used BTAUOITLSQ to collect data from Biology teachers. The questionnaire had 5 sections A, B, C, D and E. Section A dealt with the demographic details of the Biology teachers. Section B elicited information on the Biology teachers' level of awareness of peer tutoring and peer-led team learning strategy. Section C elicited information on the Biology teachers' level of awareness of flipped learning and project based learning strategy. Section D elicited information on the Biology teachers' level of utilization of peer tutoring and peer-led team learning strategy. Section E elicited information on the Biology teachers' level of utilization of flipped learning and project-based learning strategy.

The population of the study consist of all Biology teachers teaching in senior secondary schools in Obio-Akpor local government area, Rivers state. According to a digest from the department of statistics, Rivers state Ministry of Education, there are about 13 government owned schools in Obio-Akpor local government area. The total number of Biology teachers in public schools were estimated to be 78. The sample for the study comprises of 78 Biology teachers

teaching in public schools. Purposive sampling technique known as Census was adopted for the study.

The instrument used in the study for data collection is a research questionnaire titled, Biology Teachers' Awareness and Utilization of Innovative Teaching/Learning Strategies Questionnaire (BTAUOITLSQ). The researcher used BTAUOITLSQ to collect data from Biology teachers. The questionnaire had 5 sections A, B, C, D and E. Section A dealt with the demographic details of the Biology teachers. Section B elicited information on the Biology teachers' level of awareness of peer tutoring and peer-led team learning strategy. Section C elicited information on the Biology teachers' level of awareness of flipped learning and project based learning strategy. Section D elicited information on the Biology teachers' level of utilization of peer tutoring and peer-led team learning strategy. Section E elicited information on the Biology teachers' level of utilization of flipped learning and project-based learning strategy. The instrument had a respond mode of Strongly Agree, Agree, Disagree and Strongly Disagree. The instrument was validated by three experts in science education to ensure that it contained the required questions needed to answer the research questions and to test the hypothesis. The reliability of the instrument was determined by administering the instrument to twenty (20) Biology teachers who were not part of the sample for the study but have similar characteristics as those in the study. Cronbach Alpha was used to determine internal consistency of items and the reliability value obtained is 0.86, which showed high internal consistency in the research instrument. Hence the instrument was adjudged to be reliable for the study. The questionnaire was administered to Biology teachers in public schools. The teachers were given orientation on the importance of the research work by the researcher. The administration of the questionnaire was done by the researcher in person. The instruments were collected and retrieval was on the same day, they were administered. Mean and standard deviation were used to answer the research questions and t-test was used to test the hypothesis 0.05 level of significance.

Results

Research Question 1: What is the level of Awareness of Peer Tutoring and peer-led team learning strategy by Biology Teacher?

Table 1: Mean and standard deviation showing the level of awareness of peer tutoring and peer-led team learning strategy by Biology teachers

S/N	ITEMS	MEAN	STD. DEV.
1.	The curriculum recommends peer-tutoring teaching strategy in teaching Biology	3.08	1.06
2.	Biology teachers are aware that peer-led team learning facilitates learning	3.52	0.67
3.	Peer-led team learning aids better understanding when used for teaching and learning Biology	3.74	0.44
4.	Peer-tutoring promotes students interest in Biology learning	3.16	0.86
5.	Knowledge is more retained in the use of peer-led team learning	2.94	0.89

Table 1 present results on the level of Awareness of Peer Tutoring and peer-led team learning strategy by Biology Teachers. All the items had a mean above the criterion mean 2.50. This implies that Biology teachers are aware of Peer Tutoring and peer-led team learning strategy.

Research Question 2: What is the level of Awareness of Flipped learning and project-based strategy by Biology Teachers?

Table 2: Mean and standard deviation showing the level of aware of flipped learning and project-based strategy by Biology Teachers

S/N	ITEMS	MEAN	STD. DEV.
1.	Teaching and learning is made easier with both flipped learning strategy	3.76	0.45
2.	Project based learning strategy helps students apply knowledge in solving real life problems	3.24	0.81
3.	The use of flipped learning strategy makes teachers spend more time in teaching in teaching Biology	3.02	1.02
4.	Students develop independent learning skill when taught with project-based learning strategy	3.06	0.84
5.	Biology teachers create more engaging lesson when flipped learning strategy is adopted for teaching	2.98	0.89

Table 2 presents results on the level of awareness of flipped learning and project-based strategy by Biology teachers, it could be observed that all the items had a mean above the criterion mean 2.50 which implies that Biology teachers are aware of flipped learning and project-based strategy.

Research Question 3: What is the level of utilization of peer tutoring and peer-led team learning strategy by Biology Teachers?

Table 3: Mean and standard deviation showing the level of utilization of peer tutoring and peer-led team learning strategy by Biology Teachers

S/N	ITEMS	MEAN	STD. DEV.
1.	Biology teachers pair students in groups while teaching	2.00	0.63
2.	Students are grouped with their peer leaders during Biology lessons	2.20	0.98
3.	Biology teachers merge students to enhance learning	1.80	0.75
4.	Students are allowed to source for answers to questions during Biology lessons	1.40	0.49
5.	Students apply Biology concepts when interacting with their peer-groups	2.20	1.17

Table 3 presents results on the level of utilization of peer tutoring and peer-led team learning strategy by Biology Teachers. Based on the results, Biology teachers do not utilize peer tutoring and peer-led team learning strategy as all the items had criterion mean below 2.50.

Research Question 4: What is the level of utilization of flipped learning and project-based learning strategy by Biology Teachers?

Table 4: mean and standard deviation showing the level of utilization of flipped learning and project-based learning strategy by Biology Teachers?

S/N	ITEMS	MEAN	STD. DEV.
1.	Biology teachers give students materials to review before the lesson	1.60	0.49
2.	Teachers allow students to learn theoretical information at home and practice them in the classroom	1.20	0.40
3.	Students are encouraged to design their own inquires and organize their research in order to gain more knowledge	1.60	0.80
4.	Students are given the opportunity to work intensively over extended periods of time to bring about realistic presentations and findings	2.00	0.90
5.	Students are encouraged to pursue content own and demonstrate their new understanding through a variety of presentation modes	1.40	0.49

Table 4 above present's results on the level of utilization of flipped learning and project-based learning strategy by Biology teachers. It could be observed that all the items had a mean below the criterion mean 2.50 which implies that Biology teachers do not utilize flipped learning and project-based learning strategy.

HO1: There is no significant difference in the awareness of innovative teaching/learning strategies by male and female Biology teachers.

Table 5: t-test analysis on difference in the awareness of innovation teaching/learning strategies by male and female Biology teachers

Gender	N	Mean	Std.dev	Df	t-cal	Sig	Decision
Male	41	35.2	1.45				
				76	0.42	0.07	NS
Female	37	36.8	1.47				

From Table 5, the result revealed that t-cal was 0.42 and a p-value of 0.07 was recorded at df = 76. Since the p-value of p=0.07 is greater than 0.05, it implies that there is no significant difference in the awareness of innovative teaching/learning strategies by male and female Biology teachers. Thus, the null hypothesis that says there is no significant difference is not rejected.

Discussion of Findings

The study comprehensively focused on the awareness and utilization of four (4) innovative teaching/learning strategies by Biology teachers in Obio-Akpor local government area, Rivers State, with special emphasis on the role of gender on teachers' level of awareness of these innovative teaching/learning strategies. In order to achieve these, data were gathered from a sample of seventy eight (78) teachers using a designed questionnaire.

Table 1 Present results on the level of awareness of peer tutoring and peer-led team learning strategies by Biology teachers. All items had a mean above the criterion mean 2.50 which

implies that Biology teachers are aware of peer tutoring and peer-led team learning strategies. The findings concur with the previous study of Kayode (2020), whose study concluded that even though many teachers were aware of different innovative teaching strategies, only few of these strategies were effectively put to use.

Table 2 Presents results on the level of awareness of flipped learning and project-based learning strategies by the Biology teachers. It was observed that teachers were aware of flipped learning and project-based learning strategies, as all items had a mean above the criterion mean 2.50. The findings contradicted the previous study of Gbadamosi (2013), whose study reported that most Biology teachers were highly aware of the innovative strategies. The noticeable difference between the finding of the present research and that of Gbadamosi (2013) may be due to difference in geographical location as well as the novelty of the innovative teaching/learning strategies that was been investigated in the present research work.

Table 3 Presents results on teachers' level of utilization of peer tutoring and peer-led team learning strategies. It was observed that all items were below the criterion mean 2.50 which implies that teachers do not utilize peer tutoring and peer-led team learning strategies. The Findings contradicted the previous studies of Apochi & Okpaye (2022) and Samuel, (2020), whose findings showed that teachers use of innovative methods was high and they also apply it in their daily teaching. The noticeable difference between the finding of the present research and that of Apochi & Okpaye (2022) and Samuel, (2020) may be due to difference in geographical location as well as the novelty of the innovative teaching/learning strategies that was been investigated in the present research work.

Table 4 Shows results on teachers' level of utilization of flipped learning and project-based learning strategies. All items were below the criterion mean 2.50 which implies that teachers do not utilize flipped learning and project-based learning strategies. The findings agree with the previous study of Oyelekan et al (2017) whose studies revealed that teachers rarely use innovative strategies during their lessons.

Table 5 Presents results on the interaction effect of Teachers' Gender on the Awareness of Innovative Teaching/Learning Strategies. It was revealed that there was no significant difference in the awareness of Innovative teaching/learning strategies by male and female Biology teachers. The findings agree with the previous study of Nkok (2022) whose studies showed that interaction effects as gender and teaching strategies were not statistically significant.

Conclusion

The focus of the research was to determine Biology teachers' awareness and utilization of innovative teaching/learning strategies in senior secondary schools in Obio-Akpor local government area. The data collected were analyzed using mean and standard deviation and t-test Statistics. Variable considered were teachers' awareness, teachers' utilization and teachers' gender. The result of the study shows that Biology teachers' level of awareness was high, even though the teachers barely utilized the innovative teaching/learning strategies they were aware of. There was no significant difference between male and female Biology teachers in their level of awareness of innovative teaching/learning strategies. This means that both male and female Biology teachers ' level of awareness were the same.

In summary, when teachers are aware of and effectively utilize innovative teaching/learning strategies, students benefit from increased engagement, critical thinking, creativity, collaboration, personalized learning experiences, technological proficiency, and overall

academic success. Additionally, teachers themselves experience professional growth and development, leading to a more dynamic and effective educational environment. Without the use of a teaching strategy, teachers would be aimlessly projecting information that doesn't connect with learners or engage them, learning will not be very effective and also students will be denied the benefits that comes with the use of innovative teaching/learning strategies for teaching and learning.

Recommendations

The following recommendations were made based on the findings of this study:

1. Since Biology teachers are aware of peer tutoring and peer-led team learning strategies, these strategies should be incorporated into their teaching process.
2. Biology teachers should make conscious plans on how to utilize flipped learning and project-based learning strategies.
3. Since the Biology teachers are already familiar with the innovative teaching/learning strategies; workshops, seminars and symposia should be organized for in-service Biology teachers as this will help them learn how to effectively utilize the strategies.
4. The difference in the awareness of innovative teaching/learning strategies by male and female Biology teachers was statistically insignificant, therefore every Biology teacher should make use of the four learning strategies investigated in this study.

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