DEPLOYMENT OF EFFECTIVE INNOVATIVE METHODS FOR MANAGEMENT OF TEACHING AND LEARNING IN THE 21st CENTURY CLASSROOM IN SECONDARY SCHOOLS IN ANAMBRA STATE

By

AKUDO, FLORENCE UKAMAKA (Ph.D.)
Mobile Phone NO.: 08036661864; Email: makudos@yahoo.com
Department of Educational Management and Policy
Nnamdi Azikiwe University, Awka, Anambra State

and

EZIUZO, GLORIA OLACHUKWU (Ph.D.)
Email: gloriaeziuzo@gmail.com; Mobile Line: 07030555694
Department of Educational Management and Policy
Nnamdi Azikiwe University, Awka, Anambra State

ABSTRACT

This study examined the extent of deployment of effective innovative methods for management of teaching and learning in the 21st century classroom in public secondary schools in Anambra State. Three research questions guided the study. A descriptive survey research design was adopted in the study. Population for the study comprised 5,674 teachers from 259 public secondary schools located within the 6 education zones in Anambra State. Sample size for the study constituted 567 teachers from 130 public secondary school within the 6 education zones in Anambra State selected at 10% from the entire teacher population using the stratified random sampling technique. The instrument for data collection was a researchers-developed 21-item questionnaire titled: "Deployment of Effective Innovative Methods for Management of Teaching and Learning Questionnaire (DEIMMTLQ)", which was equally structured on a 4-point scale of Very High Extent (VHE), High Extent (HE), Low Extent (LE) and Very Low Extent (VLE) in order to answer the three research questions. The questionnaire was validated by two experts. Reliability of the instrument was established through a pilot-test on a sample of 15 teachers from three public secondary schools in Enugu State. The scores obtained after the pilot test were measured using Cronbach Alpha statistics which gave coefficient reliability value of 0.88, 0.84 and 0.78 for the three clusters respectively. The mean score rated at 2.50 and standard deviation was used to analyze data. Findings of the study revealed, among others, that the extent of deployment of such innovative methods as the crossover innovative method, project-Based Learning (PBL)innovative method and the use of technology innovative method for management of teaching and learning in the 21st century classroom in public secondary schools in Anambra State were all to a low extent. From the findings, recommendations were

proffered and among them included that, teachers should avail themselves of the opportunities provided by these innovative methods in improving the management of teaching and learning. Thus, principals through their instructional supervision should encourage teachers to deploy the crossover innovative method to a high extent for management of teaching and learning in the 21st century classroom in public secondary schools in Anambra State.

Keywords: Effective Innovative Methods, Teaching, Learning, 21st Century Classroom.

INTRODUCTION

Education is one of the most important investments a country can make in its future. It is a powerful agent of change, which improves health and livelihoods, contributes to social stability and drives long-term economic growth. Education is essential instrument and a great tool to the success of every one of the **17 sustainable development goals**(**Global Partnership for Education**, 2022).Education is perhaps one of the most important activities that an individual can take part in, which allows the individual to expand his or her mind in order to uncover the secrets of the universe, as well as, all of those closer to home. Hence, the relevance and role of education in different nations of the world including Nigeria cannot be overemphasized. Education seen as an instrument 'par excellence' which is important for national transformation, nation-building and human empowerment. It is a powerful agent for social change and socio-economic development in the society (Federal Republic of Nigeria, FRN, 2014). Secondary education which students receive after basic/primary education act as an agent of social change for national development in areas of social, economic, political, cultural and religious spheres of life. Secondary education however is provided to students (that is, the learners) through the secondary schools which prepares them for higher education and useful members of the society. The usefulness, importance and role of secondary schooling has been indicated through the goals and objectives of secondary education in the National Policy on Education by Federal Republic of Nigeria (FRN, 2014, p.17).

The goals and objectives which makes secondary schooling vital in this 21st century cannot be effectively achieved without devising effective innovative methods for management of teaching and learning activities in the public secondary schools including those in Anambra State. The 21st century is known as the technological age in which the computer and other digital technologies has become popular and most efficient for teaching and learning in the classroom. Teaching and learning in the classroom during this 21st century must focus on adoption of effective innovative methods that will equip students with the necessary skills and competences needed in the society at this time. The Think Strategic group (2019) opined that education including schooling (which incorporates teaching and learning) in the 21st century is all

about giving students the skills they need to succeed in this new world, and helping them grow the confidence to practice those skills. With so much information readily available to them, 21st century skills focus more on making sense of that information, sharing and using it in smart ways. Therefore, the four most important 21st century skills required to be inculcated into secondary school students as indicated by the Think Strategic group (2019) include the skills of; Creativity, Critical thinking, Communication and Collaboration. Other skills as further recognized by the American Library Association (ALA, 2022) may include: reading literacy, information literacy, technological literacy, skills for personal knowledge building, and oral literacy and numeracy. Supporting the above statements, Hallerman, Lewis and Dresbach (2019) equally opined that education coupled with teaching and learning provided in the 21st century is one that responds to the economical, technological, and societal shifts that are happening at an ever-increasing pace. This equally incorporates education that set students up to succeed in a world where more than half of the jobs they will have over their careers do not even exist yet. Teaching and learning however, provides students with the skills and competencies they need to thrive in the 21stcentury. Hence, the role of educators in the 21st century classroom should be helping every student learn how to learn. According to Thompson (2021), incorporating effective innovative methods into teaching and learning involves teaching strategies which does not always mean introducing the latest and greatest technology into the classroom. Instead, **innovative teaching** is the process of proactively introducing new teaching strategies and methods into the classroom.

The purpose of introducing these new innovative teaching strategies and methods is to improve academic outcomes and address real problems to **promote equitable** learning. Innovative methods aim at encouraging students to join proactively and interact with their classmates likewise the teacher during lessons. Students will have to work more, but in a way that meets their needs better and can help them grow faster. Unlike traditional teaching, which mainly focuses on how much knowledge teacher can pass on to the students. Innovative ways of teaching dig deep into what students truly take away from what the teacher is teaching during lessons (Tran, 2022).Being innovative however, tend to introduce innovations in the classroom which usually involves the use of various digital technologies(Fedena, 2019; Mynbayeva, Sadvakassova & Akshalova, 2017; Thompson, 2012; Tran, 2022; Upadhyay, 2020). From the foregoing, deploying effective innovative methods into teaching and learning is a crucial skill for teachers and education staff. Scientific research has shown that innovative teaching methods and approaches can significantly enhance the student learning process. However, experimenting new methods and strategies can improve student engagement, motivation and attainment and is a win-win for both students and teachers in the 21st century classroom. Examples of these effective innovative methods which are essential, likewise, should be effectively deployed for management of teaching and learning in the 21st century classroom for better students' engagement in public secondary schools

in Anambra State and beyond as pointed out by Fedena (2019), McKinney(2021), Thompson (2021), Tran (2022) and others include the use of blended learning, 3D learning, the design-thinking process, project-based learning and collaborations, inquiry-based learning, jigsaw, cloud computing teaching, robotic learning, mobile technology, flipped classroom, peer teaching, peer feedback, crossover teaching, personalized teaching, interactive lessons, virtual reality technology, Artificial intelligence (AI) in education, Ask Open-Ended Questions, use of Smart Boards and hybrid learning model. For instance, the use of blended learning, project-based learning, flipped classroom, virtual reality technology, smart boards, cross over teaching and hybrid learning model, in the classroom as one of the effective innovative methods has assisted to engage the students with different kinds of stimuli and creates an environment of activity-based learning. It makes the content of the classroom more interesting and makes learning fun (Fedena, 2019). Therefore, incorporating effective innovative methods seems to be of great relevance, beneficial and advantageous for the management of teaching and learning in the 21st century classroom. According to Fedena (2019), McKinney (2021) and Tran (2022), this includes that innovative method said research by encouraging students to explore and discover new things and tools to broaden their minds. It improves problem-solving and critical thinking skills by promoting creative teaching methods that allow students to learn at their own pace and challenge them to brainstorm new ways to address a problem instead of finding answers already written in textbooks. Avoid receiving a lot of knowledge at once whereby teachers using new approaches still give students information, but they tend to split it up into smaller parts. Digesting information can now be easier, and keeping things short helps students get the basics faster.

Innovative methods encourage the adoption of more soft skills which enable students to use more complex tools in class to finish their work, which helps them learn new things and spark their creativity. Also, when doing individual or group projects, students know how to manage their time, priorities tasks, communicate, work with others better, and so much more. It equally aids to check students' understanding whereby using grades and exams can say something, but not everything about a student's learning capacity and knowledge (especially if there are sneaky peeks during tests). Innovative teaching ideas let teachers monitor classes and better know what their students struggle with to find the most suitable solutions. It improves self-evaluation, that is, with great methods from teachers, students can understand what they have learnt and what they are missing. By finding out what they still need to know by themselves, they can understand *why* to learn particular things, and consequently become more eager to do it. Innovative methods enliven classrooms. Teachers should not let their classrooms be full of your voice or awkward silence. Innovative teaching methods give students something different to get excited about, which encourages them to speak up and interact more. Identifying the use of digital technologies as one innovative method in teaching McKinney (2021) observed that its benefits and relevance in the 21st century

classroom includes that; it makes learning interactive, interesting and engaging, especially for younger generations raised on the latest technology. It allows for faster and more efficient delivery of lessons, both in the classroom and at home. It reduces the need for textbooks and other printed material, lowering long-term costs incurred by schools and students. It makes collaboration easier. Students, teachers, and parents can communicate and collaborate more effectively. It helps to build technology-based skills, allowing students to learn, early on, to embrace and take advantage of the tools technology offers. Given all the above benefits and relevance, it is important to deploy effective innovative method for the management of teaching and learning in the 21st century classroom in public secondary schools in Nigeria and Anambra State inclusive. The focus of this present study therefore, is on just three of such popular and common innovative methods exposed to students in the public secondary schools in Anambra State as the crossover teaching methods, project-based learning, and the use of technology. The crossover innovative method as marked by Fedena (2019) and Tran (2022) allows learning to happen in an informal setting such as after-school learning clubs, excursions, field trips, visit to museums, visit to cinemas and exhibitions. Crossover teaching combines the experience of learning in both the classroom and a place outside. Explore concepts in school together, then arrange a visit to a particular place where the teacher can demonstrate how that concept works in a real setting. The teacher can link the educational content with the experiences that the students are having. This teaching is further enhanced and deepened by adding questions related to the subject. The students can then add to the classroom discussions through field trip notes, photographic projects and other group assignments related to the trip. It would be even more effective to further develop the lesson by hosting discussions or assigning group work in class after the trip.

Project-Based Learning (PBL) as observed by Thompson (2021) is an effective method that helps students drive their own learning journey. In a PBL exercise, students identify a real-world problem then develop a solution. Project-based learning relies on developing key skill sets such as research, critical thinking, problem-solving, and collaboration. Project-based learning is an active method of learning where students gain mastery through the application of their knowledge rather than rote memorization. Like the flipped classroom, the teacher's role becomes that of a guide and the students take charge and ownership of their own learning journey. Tran (2022) asserted that working on projects at the end of a unit lesson is something all students do. Project-based learning also revolves around projects, but it allows students to solve real-world issues and come up with new solutions over a longer period of time. PBL makes classes more fun and engaging while students learn new content and develop skills, like researching, working independently and with others, critical thinking, etc. Examples of teaching and learning provided through PBL as further indicated by Tran (2022) will include filming a documentary on a social issue in the community, planning and organizing a school party or activity, creating and managing a social media account for

a specific purpose, artfully illustrating and analyzing the cause-effect-solution of a social problem (example; overpopulation and the housing shortage in big cities), and helping local fashion brands go carbon neutral. Other types of PBL methods will include constructive projects, artistic projects, group work, problem-solving projects, placed-based projects, activity-based learning projects (Study Lecture Notes, 2022).Studying through the PBL innovative method can lead to better engagement and understanding, spark students' creativity and promote lifelong learning. Furthermore, use of technologies as an innovative method assists to enhance teaching and learning in the 21st century classroom. According to Fedena (2019), McKinney (2021) and Moemeke (2019), effectively deploying and using technology in the classroom helps to engage the students with different kinds of stimuli and creates an environment of activity-based learning. It makes the content of the classroom more interesting and makes learning fun. For teachers, technology offers an endless set of resources that they can tap into depending on the need of the students. Just to mention a few of such technologies that could be deployed for management of teaching and learning in the 21st classrooms as further indicated by Fedena (2019), McKinney(2021) and Moemeke (2019) include computers like tablets, laptops and desktops, mobile technologies such as the smart phones, ipads and ipods, online digital technologies through the Internet, social networks and websites such as cloud computing, Learning Management System (LMS), Artificial intelligence (AI),social media apps such as WhatsApp, YouTube, Twitter, Zoom, video conferencing and audio conferencing, Google apps such as the google classroom, google meet and google hangouts, Dropbox, Open Education Resource (OER) facilities such as moodles (Modular Object-Oriented Dynamic Learning environment) which is a free software e-learning platform,Screen casting, etc, Computer Assisted Instructions (CAI) recorded on CD-ROMs, discs, flash drives and external hard drive, flipped classroom, use of multimedia technologies such as films or movies, smart television, radio, DVD, CD, VCD, smart boards and virtual games in the classroom, virtual reality technology through the 3D world, among many others. For a teacher looking for effective teaching methods in a classroom, turning towards the latest technology will offer a vast number of updated solutions. However, incorporating these innovative methods is one way of effectively managing teaching and learning in the 21st century classroom for attainment of educational goals and instructional objectives.

Management on the other hand according to Kaehler and Grundei (2019), entails the art of getting things done through and with people in formally organized groups. It equally the art of creating an environment in such an organized group where people can perform as individuals and yet cooperate toward attainment of group goals, the art of removing blocks to such performance, the art of optimizing efficiency in effectively reaching goals. Management is working with and through other people to accomplish the objectives of both the organization and its members. It is the process of working with people and resources to accomplish organizational goals (Kaehler & Grundei,

2019). It equally involves the control, coordination, application, harmonization and utilization of both human and material resources for achievement of educational objectives (Akpakwu, 2012). Management of teaching and learning in the 21st century classroom as observed in the NPE by the FRN (2014) will entail proper coordination of all the human and materials resources in the system. Therefore, in pursuance and attainment of the previously mentioned educational goals of Nigerian secondary education, through effective management, secondary schools must consider deploying such innovative method as the use of Information Technology (IT) in order to manage the teaching and learning in their respective classrooms for better results (FRN, 2014). But in reality, looking at situation in the management of the public secondary schools (owned by the government) in Anambra State and Nigeria as a whole, it seems that the use of innovative methods in the teaching and learning in the 21st century classroom is yet to be fully integrated. Preliminary observations from the public secondary schools especially in Anambra State shows that many schools still reply more on the old traditional method of teaching without using must of the innovative methods. Many schools are yet to effectively internalize and incorporate the use of crossover innovative method, the PBL and use of digital technology in the practice of teaching and learning in their classrooms, which calls for urgent need to remedy such situations existing in Anambra State public secondary schools.

STATEMENT OF THE PROBLEM

Creating innovations through the deployment of various innovative methods is prerequisite for management of teaching and learning especially in the 21st century classroom in public secondary schools in Anambra State. Using innovative methods has been seen and showcased by a few researchers and scholars as one of the ways by which secondary school students and youths can imbibe and cultivate the necessary skills such as critical thinking skills, problem-solving skills, analytical skills, among many others, which can make them to function properly and survive in the 21st century technological age and knowledge-based economy. Application of effective innovative methods into teaching and learning in the classroom also helps students to uncover their potentials, talents, competences and skills which is necessary for societal development. But observations from the poor situation of management of teaching and learning in Anambra State, shows that many of these innovative methods seem not yet to have been incorporated in the 21st century classroom which demands that students be exposed and knowledgeable to such teaching and learning experiences that will enable them to face and tackle real life challenges. Evidence of lack of deployment of innovative methods in the 21st century classroom is displayed and showcased in the public secondary schools in Anambra State through the high level of academic malpractices and misconducts, indiscipline, students' failure, students' poor academic performances and achievements, and teachers' inefficiency observable from the poor management of the teaching and learning processes. Imagine staying in a boring class where teachers do not care about deploying effective innovative methods that will improve learning. This

situation is not the best scenario for any class, Nowadays, many teachers are trying to keep their classes as far as possible from that scenario and let their students get more involved in learning by finding different approaches to teaching them.

The education field is changing likewise challenges as well, at such, a fast pace that teachers need to keep up and adapt to the more modern strategies, otherwise it may be hard for them to fit in. Therefore, it is time for teachers to get innovative by deploying effective innovative methods in managing teaching and learning in the 21st century classroom which will equally aid in filling the knowledge gap by this present study. Hence, the need to find out the extent of deployment of effective innovative methods for management of teaching and learning in the 21st century classroom in public secondary schools in Anambra State, which is also the problem of this present study.

PURPOSE OF THE STUDY

The purpose of this study was to determine the deployment of effective innovative methods for management of teaching and learning in the 21st century classroom in public secondary schools in Anambra State. Specifically, the study sought to achieve the following objectives:

1. The extent of deployment of crossover innovative method for management of teaching and learning in the 21st century classroom in public secondary schools in Anambra State.
2. The extent of deployment of Project-Based Learning (PBL) innovative method for management of teaching and learning in the 21st century classroom in public secondary schools in Anambra State.
3. The extent of deployment of technology as innovative method for management of teaching and learning in the 21st century classroom in public secondary schools in Anambra State.

RESEARCH QUESTIONS

The following research questions guided the study;

1. What is the extent of the deployment of the crossover innovative method for management of teaching and learning in the 21st century classroom in public secondary schools in Anambra State?
2. What is the extent of the deployment of the PBL innovative method for management of teaching and learning in the 21st century classroom in public secondary schools in Anambra State?
3. What is the extent of the deployment of technology as innovative method for management of teaching and learning in the 21st century classroom in public secondary schools in Anambra State?

METHODS

A descriptive survey research design was adopted in the study. Population for the study comprised 5,674 teachers from 259 public secondary schools located within the 6

education zones in Anambra State (Source: Anambra State Post Primary Schools Service Commission - PPSSC, 2021). Sample size for the study constituted 567 teachers from 130 public secondary school within the 6 education zones in Anambra State selected at 10% from the entire teacher population using the stratified random sampling technique. The instrument for data collection was a researchers-developed 21-item questionnaire titled: "Deployment of Effective Innovative Methods for Management of Teaching and Learning Questionnaire (DEIMMTLQ)", which was equally structured on a 4-point scale of Very High Extent (VHE), High Extent (HE), Low Extent (LE) and Very Low Extent (VLE) in order to answer the three research questions. The questionnaire was validated by two experts from the Department of Educational Management and Policy, and one Measurement and Evaluation expert, all from the Faculty of Education, Nnamdi Azikiwe University, Awka, Anambra State. Reliability of the instrument was established through a pilot-test on a sample of 15 teachers from three public secondary schools in Enugu State. The scores obtained after the pilot test were measured using Cronbach Alpha statistics which gave coefficient reliability value of 0.88, 0.84 and 0.78 for the three clusters respectively. Copies of the questionnaire were distributed to the teachers on a face to face contact to them with the help of six research assistants who are familiar with the education zones and the various public secondary schools selected for the sample in the study. These six research assistants were communicated about the essence of the study and told what to do in order to retrieve the necessary information from the respondents (that is, teachers). Distribution of all copies of the questionnaire took a period of 10 working days. All the copies of the questionnaire distributed immediately on-the-spot were retrieved and sent for appropriate data analysis. This making it a total of 567copies of the questionnaire that were gathered at a 100% rate of return. The decision rule for taking decision was that any mean score which rated at 2.50 and above was regarded as high extent; meanwhile any of the mean score which rated at 2.49 and below was seen as low extent.

Results

Research Question 1: What is the extent of the deployment of the crossover innovative method for management of teaching and learning in the 21st century classroom in public secondary schools in Anambra State?

Table 1: Mean Scores and SD Ratings of Teachers on Extent of Deployment of the Crossover Innovative Method for Management of Teaching and Learning in the 21st Century Classroom in Public Secondary Schools in Anambra State

N = 567 Teachers

S/N	Please determine the extent to which the following under listed crossover innovative methods are effectively deployed for management of teaching and learning in the 21st century classroom:	VHE	HE	LE	VLE	X	SD	Decision
1.	Excursions organized to get firsthand information of lessons taught in order to manage teaching-learning in the classroom	101	114	137	215	2.18	1.12	Low Extent

2.	Educational field trips conducted outside the school premises to expose students' to the realities of topics which have already been discussed for management of teaching-learning in the classroom	94	129	185	159	2.28	1.05	**Low Extent**
3.	After-school learning clubs such as the drama club, music group, arts club, debate club, cultural dance group scheduled to showcase students' talents and skills which is equally necessary for management of teaching-learning in the classroom	88	166	164	149	2.34	1.03	**Low Extent**
4.	Exhibitions which allows learning to happen in an informal setting for management of teaching-learning in the classroom	49	153	191	174	2.14	0.95	**Low Extent**
5.	Out-door school visit/trip to the museum which enables the teacher to link educational contents with students experiences which is necessary for management of teaching-learning in the classroom	67	168	150	182	2.21	1.02	**Low Extent**
6.	Educational sports activities where teachers can demonstrate how some important concept works in a real setting which can also be transferred for management of teaching-learning in the classroom	59	159	186	163	2.20	0.97	**Low Extent**
7.	Visit to important educational resource centre including event centres which enable students gain knowledge in order to add to the classroom discussions for management of teaching-learning	79	140	193	155	2.25	1.01	**Low Extent**
8.	Visit to cinemas which will help students organize information before, during, and after the visit which can effectively be utilized for management of teaching-learning in the classroom	84	128	188	167	2.23	1.03	**Low Extent**
9.	Flipped classroom which allows students learn the new materials at home first, then, practice it later in the classroom for management of teaching-learning	86	101	179	201	2.13	1.06	**Low Extent**
	Overall Mean Score =					**2.22**	**1.03**	**Low Extent**

Analysis of data in Table 1 revealed none of the items from 1 to 9 was rated above 2.50 of the accepted mean score by the respondents (that is, the public secondary school teachers) in order to show that they agreed with any of these statements in the table. All the items were rated below 2.50 of the accepted mean score by the teachers in order to show that they disagreed with all the statements. The overall mean score and standard deviation (SD) of 2.22 and 1.03 determined closeness in the mean responses of the teachers. Therefore, this result indicates that the extent of the deployment of the crossover innovative method for management of teaching and learning in the 21st century classroom in public secondary schools in Anambra State was to a low extent.

Research Question 2: What is the extent of the deployment of the PBL innovative method for management of teaching and learning in the 21st century classroom in public secondary schools in Anambra State?

Table 2: Mean Scores and SD Ratings of Teachers on Extent of Deployment of the Project-Based Learning Innovative Method for Management of Teaching and Learning in the 21st Century Classroom in Public Secondary Schools in Anambra State

N = 567 Teachers

S/N	Please determine the extent to which the following under listed project-based learning innovative methods are effectively deployed for management of teaching and learning in the 21st century classroom:	VHE	HE	LE	VLE	X	SD	Decision
10.	Arranging constructive project where students have to construct something related to social life through charts, models, maps, parcels, etc. necessary for management of teaching-learning in the classroom	81	111	216	159	2.20	1.00	**Low Extent**
11.	Assigning students problem-solving project which will enable them tosolve the problems related to any life-situation or related to any subject so as to become efficient for social life for management of teaching-learning in the classroom e.g. how to operate bank accounts, send an email or letters, etc.	84	129	174	180	2.21	1.05	**Low Extent**
12.	Artistic project generally allotted in the aesthetic fields of life to spark students' creativity for management of teaching-learning in the classroom e.g. in music, drawing, painting art and culture	92	118	135	222	2.14	1.11	**Low Extent**
13.	Group-work given to a team of students to be executed for strong teambuilding including collaborations for management of teaching-learning in the classroom e.g. to develop a garden in the school	77	100	197	193	2.11	1.02	**Low Extent**
14.	Activity-based learning project given to students to develop them in their areas of critical thinking and understanding which motivates them towards learning in the classroom	93	90	218	166	2.19	1.03	**Low Extent**
15.	Placed-based learning project that provides a context for students learningin order to strengthen understanding of the social, environmental and economic conditions of their community while also increasing students' engagement and academics in teaching-learning in the classroom	69	137	150	211	2.11	1.04	**Low Extent**

Overall Mean Score =					**2.16**	**1.04**	**Low Extent**

Analysis of data in Table 2 revealed none of the items from 10 to 15 was rated above 2.50 of the accepted mean score by the respondents (that is, the public secondary school teachers) in order to show that they agreed with any of these statements in the table. All the items were rated below 2.50 of the accepted mean score by the teachers in order to show that they disagreed with all the statements. The overall mean score and standard deviation (SD) of 2.16 and 1.04 determined closeness in the mean responses of the teachers. Therefore, this result indicates that the extent of the deployment of the project-based learning innovative method for management of teaching and learning in the 21st century classroom in public secondary schools in Anambra State was to a low extent.

Research Question 3: What is the extent of the deployment of technology as innovative method for management of teaching and learning in the 21st century classroom in public secondary schools in Anambra State?

Table 3: Mean Scores and SD Ratings of Teachers on Extent of Deployment of Technology as Innovative Method for Management of Teaching and Learning in the 21st Century Classroom in Public Secondary Schools in Anambra State

N = 567 Teachers

S/N	Please determine the extent to which the following under listed technology innovative methods are effectively deployed for management of teaching and learning in the 21st century classroom:	VHE	HE	LE	VLE	X	SD	Decision
16.	Hardware computer technological devices such as laptops, desktops with monitors, palmtops, tablets, ipads, ipods, etc deployed to create activity-based learning for management of teaching-learning in the classroom	31	64	242	230	1.82	0.84	**Low Extent**
17.	Mobile technologies deployed in the classrooms such as the use of smart phones, in order to manage teaching-learning delivery in the classroom	19	48	231	269	1.68	0.77	**Low Extent**
18.	Online digital technologies through the Internet, social networks and websites such as cloud computing, Learning Management System (LMS), Artificial intelligence (AI),social media apps such as WhatsApp, YouTube, Twitter, Zoom, video conferencing and audio conferencing, Google apps, Dropbox for management of students engagements in the teaching-learning activity in and outside the classroom environment	21	40	255	251	1.70	0.76	**Low Extent**
19.	Free software e-learning platforms through Open Education Resource (OER) facilities such as moodles for management of teaching-learning in the classroom	13	35	279	240	1.68	0.69	**Low Extent**

20.	Computer Assisted Instructions (CAI) recorded on CD-ROMs, discs, flash drives, external hard drive to manage presentations during teaching-learning in the classroom	29	41	203	294	1.66	0.82	**Low Extent**
21.	Deployment of multimedia technologies such as films or movies, smart television, radio, DVD, CD, VCD, smart boards and virtual games to manage teaching-learning in the classroom	33	54	260	220	1.82	0.83	**Low Extent**
	Overall Mean Score =					**1.73**	**0.79**	**Low Extent**

Analysis of data in Table 3 revealed none of the items from 16 to 21 was rated above 2.50 of the accepted mean score by the respondents (that is, the public secondary school teachers) in order to show that they agreed with any of these statements in the table. All the items were rated below 2.50 of the accepted mean score by the teachers in order to show that they disagreed with all the statements. The overall mean score and standard deviation (SD) of 1.73 and 0.79 determined closeness in the mean responses of the teachers. Therefore, this result indicates that the extent of the deployment of technology as innovative method for management of teaching and learning in the 21st century classroom in public secondary schools in Anambra State was to a low extent.

DISCUSSION OF FINDINGS

Findings of the study generally indicated that the extent of deployment of such innovative methods as the crossover innovative method, Project-Based Learning (PBL)innovative method and the use of technology innovative method for management of teaching and learning in the 21st century classroom in public secondary schools in Anambra State were all to a low extent. These findings corroborate and agree with Samba, Achor and Ogbeba (2010) study which found out that although the level of teacher awareness of innovative strategies was high but that only a few of these innovative strategies were being effectively utilized by the teachers. Among the 6 strategies being effectively utilized, 5 are student-centered while 1 is not. Thirteen of the strategies have not been effectively utilized by the science teachers, most of which are not the common strategies. This finding is supported by that of Ukoha and Ukoha (2009) who found that though most teachers are aware of what is regularly required for utilization in their classroom to teach effectively, the extent of utilization was generally low.

It was however discovered through one of the findings that the extent of the deployment of the crossover innovative method for management of teaching and learning in the 21st century classroom in public secondary schools in Anambra State was to a low extent. The finding included that crossover innovative method such as excursions organized to get firsthand information of lessons taught; educational field trips conducted outside the school premises to expose students' to the realities of topics which have already

been discussed; after-school learning clubs such as the drama club, music group, arts club, debate club, cultural dance group scheduled to showcase students' talents and skills; exhibitions which allows learning to happen in an informal setting; out-door school visit/trip to the museum which enables the teacher to link educational contents with students experiences; educational sports activities where teachers can demonstrate how some important concept works in a real setting; visit to important educational resource centre including event centres which enable students gain knowledge in order to add to the classroom discussions, paying a visit to cinemas which will help students organize information before, during, and after the visit in the classroom; and use of flipped classroom which allows students learn the new materials at home first, then, practice it later in the classroom; were all deployed to a low extent for management of teaching and learning in the 21st century classroom in public secondary schools in Anambra State. The above present study finding corroborates and does not deviate with Kenna (2019) study conducted a study on field trips among secondary social studies teachers in Florida which found out that percentage of secondary teachers utilizing field trips has changed little over the years. While the frequency has decreased and this is in line with more recent study of Kenna and Russell (2016) which confirmed that teachers use of field trips have decreased to a great extent. The study of Olukayode and Tina (2013) confirmed that students in the field trip group consistently lagged behind in knowledge of and attitude to multicultural concepts. Planning and execution of field trips are difficult for some teachers to do and they therefore would rather not employ it for normal classroom teaching strategy.

It was further discovered through the finding of this present study that the extent of the deployment of the project-based learning innovative method for management of teaching and learning in the 21st century classroom in public secondary schools in Anambra State was to a low extent. This finding included that constructive project where students have to construct something related to social life through charts, models, maps, parcels, etc.; students problem-solving project which will enable them to solve the problems related to any life-situation or related to any subject so as to become efficient for social life, classroom e.g. student are applied to discover on their own how to operate bank accounts, send an email or letters, etc.; artistic project generally allotted in the aesthetic fields of life to spark students' creativity given in form of music, drawing, painting art and culture; group-work given to a team of students to be executed for strong team building including collaborations, e.g. situation where students are given the opportunity to develop a garden in the school; activity-based learning project given to students to develop them in their areas of critical thinking and understanding which motivates them towards learning in the classroom; and placed-based learning project which provides a context for students learning in order to strengthen understanding of the social, environmental and economic conditions of their community while also increasing students' engagement and academics in the classroom; were all deployed to a low extent for management of

teaching and learning in the 21st century classroom in public secondary schools in Anambra State. This finding corresponds and supports Oyelekan, Igbokwe and Olorundare (2019) study which found out 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. The prescribed methods for implementing the senior school science curricula such as field trip, guided discovery, problem solving, and project based learning were rarely used. This study confirms the finding of Samba, Achor and Ogbeba (2010) which concluded that science teachers do not extensively utilize most of the innovative strategies they are aware of, which is an indicator that certain concepts in science have probably not been taught using the appropriate teaching strategies. The present study corroborates and agrees with the finding of Victor-Ishikaku and Gift Ukpai (2021) study which confirmed that teachers found it challenging in utilizing the PBL approach in teaching computer science, therefore, inhibiting innovations in the management of teaching and learning in the classroom through the PBL.

Finally, the finding of the present study indicated that the extent of the deployment of technology as innovative method for management of teaching and learning in the 21st century classroom in public secondary schools in Anambra State was to a low extent. This finding further revealed that hardware computer technological devices such as laptops, desktops with monitors, palmtops, tablets, ipads, ipods, etc deployed to create activity-based learning in the classroom; mobile technologies deployed in the classrooms such as the use of smart phones, in order to manage teaching-learning delivery in the classroom; online digital technologies through the Internet, social networks and websites such as cloud computing, Learning Management System (LMS), Artificial intelligence (AI),social media apps such as WhatsApp, YouTube, Twitter, Zoom, video conferencing and audio conferencing, Google apps, Dropbox for management of students engagements in the teaching-learning activity both in and outside the classroom environment; free software e-learning platforms through Open Education Resource (OER) facilities such as moodles; use of Computer Assisted Instructions (CAI) recorded on CD-ROMs, discs, flash drives, external hard drive to manage presentations during teaching-learning in the classroom; and multimedia technologies such as films or movies, smart television, radio, DVD, CD, VCD, smart boards and virtual games to manage teaching-learning in the classroom; were all deployed to a low extent for management of teaching and learning in the 21st century classroom in public secondary schools in Anambra State. The present study finding also corresponds and does not deviate with the findings of Musa, Mamuda and Kamba (2020) study which found out that 19 (67.86%) out of 28 innovative instructional strategies were not known by science teachers, while 5 (17.86%) were known but not utilized by the teachers. Similarly, science teachers do not frequent libraries or browse the internet for current books, journals and other resources to update their knowledge on recent practices on teaching and learning science. This present study finding also

collaborates and agrees with Rothrauff (2011) study which found out that science teachers do not utilize the numerous technological teaching strategies through research information on improvement of teaching and learning process.

The present study finding also collaborate with the findings of Olatomide (2012) study which confirmed that the Agricultural Science teachers in Lagos state lamented that they experience difficulties accessing the internet, lack the time to use the internet, low level of connectivity, and cannot afford high cost of computers and Internet facilities, these issues, to some extent, have hindered the teachers' use and innovative methods and practices of the Internet. The present study finding does not deviates from the findings of Nwaukwa, Onyemechara and Ndubuisi (2019)showed that the respondents utilized e-learning technologies at small extent due to a number of constraints. Out of the 15 e-learning technologies listed in the table, 60 percent of them were being utilized at small extent while only 40 percent were being utilized at either great or moderate extent. It was also revealed that public and private secondary school teachers differ significantly in their mean ratings on the extent they utilize e-learning technologies for instructional delivery. In the same vein, Atsumbe Raymond, Enoch and Duhu (2012) investigated the availability and utilization of e-learning infrastructures in Federal Universities of Technology, Minna, Nigeria. The findings showed that e-learning infrastructures were not adequately deployed for teaching and learning. Lecturers and students have laptops and can access internet, but they do not use them for teaching and learning in the classroom. However, the present study findings on the low extent of deployment of effective innovative methods for management of teaching and learning in the 21st century classroom in public secondary schools in Anambra State seeks for absolute redress and show of priority concern in order to revert the poor situation of things affecting the management of teaching and learning delivery in the classrooms during this period of electronic and technological age.

CONCLUSION

Through the findings, this present study submits that the extent of deployment of such innovative methods as the crossover innovative method, project-Based Learning (PBL)innovative method and the use of technology innovative method for management of teaching and learning in the 21st century classroom in public secondary schools in Anambra State were all to a low extent. It is however concluded that to promote and improve best practices that will enhance students' learning and academic performances in the management of teaching and learning in the 21st century classroom in public secondary schools in Anambra State, the deployment of effective innovative methods remains very crucial and essential. Hence, the recommendations made below.

RECOMMENDATIONS

Based on the findings of this study, the following recommendations were proffered;

1. Teachers should avail themselves of the opportunities provided by these innovative methods in improving the management of teaching and learning including academic performances of the students in the public secondary schools in Anambra State. Thus, principals through their instructional supervision should encourage teachers to deploy the crossover innovative method to a high extent for management of teaching and learning in the 21st century classroom in public secondary schools in Anambra State.
2. The use of Project-Based Learning (PBL) innovative method to a high extent should be encouraged in the public schools through the private sector support and parents for management of teaching and learning in the 21st century classroom in public secondary schools in Anambra State.
3. Anambra State government in conjunction with the Post Primary Schools Service Commission (PPSSC) and principals should constantly organize in-service training programmes through computer education workshops and seminars in order to expose teachers to the use of technology innovative method to a high extent for management of teaching and learning in the 21st century classroom in public secondary schools in Anambra State. This calls for adequate funding of the public secondary schools for adequate mobilization of technological resources that will boost this innovative method in the classrooms in Anambra State.

REFERENCES

Akpakwu, S.O. (2012). *Educational management: Theory and practice.* Makurdi: Destiny Ventures.

American Library Association (ALA, 2022). *Characteristics of 21st century education*. https://www.ala.org/tools/research/librariesmatter/ characteristics-21st-century-education.

Atsumbe, B.N., Raymond, E., Enoch, E.B. & Duhu, P. (2012). Availability and utilization of e-learning infrastructures in Federal University of Technology, Minna. *Journal of Education and Practice, 3* (13), 56-58.

Fedena School (2019).*Innovative methods of teaching strategies: That will help every teacher in the classroom*.https://fedena.com/blog/2019/02/innovative-methods-of-teaching-strategies-that-will-help-.

Federal Republic of Nigeria (FRN, 2014). *National policy on education,* 6th edition. Abuja: NERDC.

Global Partnership for Education (2022). *Benefits of education.* https://www.globalpartnership.org/benefits-of-education.

Hallerman, S., Lewis, C. & Dresbach, B. (2019). *What is a 21st century education*? https://www.battelleforkids.org/learning-hub/learning-hub-item/what-is-a-21st-century-education.

Ishikaku, E.C.&Ukpai, G.(2021). Teachers' perception on the challenges of utilizing problem-based learning in teaching computer science in public senior secondary

schools in Port Harcourt metropolis. *British Journal of Contemporary Education, 1* (1), 52-63. http://www.abjournals.org/.

Kaehler, B. & Grundei, J. (2019). *HR governance. A theoretical introduction*. https://link.springer.com/book/ 10.1007/978-3-319-94526-2.

Kenna, J.L. (2019). Field trips among secondary social studies teachers in Florida. *Journal of Social Studies Education Research, 10* (3), 1-16.https://files.eric.ed.gov/fulltext/EJ1229421.pdf.

Kenna, J.L. & Russell, W.B. (2016). Secondary teachers' utilization of field trips in era of high stakes testing: A research study. *Journal of Social Studies Education, 5*(1), 1-20.

McKinney, P. (2021). *Innovation in the classroom: Why education needs to be more innovative*. https://philmckinney.com/innovation-classroom-education-needs-innovative/.

Moemeke, C.D. (2019).21st century learning technologies use in Nigerian classrooms: Issues, prospects and challenges. ***ADECT 2019 Proceedings***, chapter 7.https://open.library.okstate.edu/adect/chapter/ 21st-century-learning-technologies-use-in-nigerian-classrooms-issues-prospects-and-challenges/.

Musa, U., Mamuda, S. & Kamba, A. H. (2020). Assessment of level of awareness and extent of utilization of innovative instructional strategies for teaching science in secondary schools in Kebbi State, Nigeria. *African Educational Research Journal, 8* (3), 491-498.https://files.eric.ed.gov/fulltext/EJ1263481.pdf.

Mynbayeva, A., Sadvakassova, Z. & Akshalova, B. (2017). *Pedagogy of the twenty-first century: Innovative teaching methods.* https://www.intechopen.com/chapters/58060.

Nwaukwa, F.C., Onyemechara, C.C.& Ndubuisi, S.I. (2019). Extent of utilization of e-learning technologies by secondary school teachers for instructional delivery in Abia State. *International Journal of Recent Innovations in Academic Research, 3* (8), 76-86.https://www.academia.edu/.

Nworgu, B.G. (2015). *Educational research: Basic issues and methodology, third edition*. Nsukka: University Trust Publishers.

Olatomide, W.O. (2012). An assessment of internet uses, practice and barriers for professional development by agricultural science teachers in Lagos State. *Education Research International, 8* (5), 31-42.

Olukayode, A.S.& Tina, S.E. (2013). *Effects of cooperative learning and field trip strategies on secondary school students' knowledge of and attitudes to multicultural concepts in social studies.*https://core.ac.uk/download/pdf /234634803.pdf.

Oyelekan, O.S. Igbokwe, E.F. & Olorundare, A.S. (2019). *Science teachers' utilization of innovative strategies for teaching senior school science in Ilorin, Nigeria.*https://files.eric.ed.gov/fulltext/EJ1142454.pdf.

Rothrauff, L. (2011). *Blended learning, what is it and why try it*? http://ets.berkley.edu/article.

Samba, R,M.O., Achor, E.E.& Ogbeba, J.A. (2010). *Teachers' awareness and utilization of innovative teaching strategies in secondary school science in Benue state, Nigeria*. http://www.interesjournals.org/.

Study Lecture Notes (2022). *Project method of teaching, meaning, advantage & disadvantages.*http://studylecturenotes.com/project-method-of-teaching-meaning-advantage-disadvantages/.

Think Strategic group (2019). *Education in the 21st century.* https://thinkstrategicforschools.com/education-21st-century/.

Thompson, S. (2021). *Innovative teaching strategies*. https://corp.kaltura.com/blog/innovative-teaching-strategies/.

Tran, E. (2022). *15 innovative teaching methods with guide and examples.* https://ahaslides.com/blog/15-innovative-teaching-methods/.

Ukoha, U.A. & Ukoha, E. (2009). Utilization of instructional materials among vocational education teachers in the teaching of vocational subjects in primary schools in Obudu Local Government Area. *Journal of Res. Curriculum Teach., 4* (1), 343-354.

Upadhyay, I. (2020). *What is innovative learning and innovation in teaching?* https://www.jigsawacademy.com/blogs/design-thinking/innovation-in-teaching/.