STUDENTS IDENTIFIED BARRIERS IN ADAPTING ONLINE LEARNING OF CHEMISTRY IN POST COVID-19 PANDEMIC ERA IN EGOR LGA

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A PROJECT SUBMITTED TO THE DEPARTMENT OF CURRICULUM AND INSTRUCTIONAL TECHNOLOGY, FACULTY OF EDUCATION IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF BACHELOR OF SCIENCE DEGREE IN EDUCATION [B.Sc.(Ed)] CHEMISTRY, UNIVERSITY OF BENIN, BENIN CITY,

JANUARY, 2023.

CERTIFICATION

This is to certify that this project work was carried out by **Hope JEGEDE,** Mat. No. EDU1702605 in the Department of Curriculum and Instructional Technology (CIT), Faculty of Education, University of Benin, Benin City in partial fulfillment for the award of B.Sc. (Ed) Degree in Chemistry.

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DEDICATION

This project is dedicated to God Almighty who has shown me mercy through this program; and to my parents, Mr. and Mrs Jegede.

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The researcher wishes to express her appreciation to God Almighty for his mercies that has made all things work out for him during the course of his study in the University of Benin. He also wishes to express his wholehearted gratitude to him for his infinite mercy upon his life and for seeing him through his academic programme.

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ABSTRACT

This study examined Students Identified Barriers in Adapting Online Learning of Chemistry in Post Covid-19 Pandemic Era in Egor Local Government Area. The challenges and obstacles of learning Chemistry online, impact of learning chemistry online compared to classroom learning and proportion of chemistry students having access to their online facilities.

This study adopted a survey research design sampling technique in order to achieve the purpose of this study. Twenty (20) research questions were raised. The sample for the study consists of hundred (100) respondents from three public schools in Egor local government area of Edo State. data was collected with the aid of questionnaire . the validity and reliability of the instrument were ascertained using the exert judgement and cronbach method. Mean were used to analyze collected data.

Based on the findings of the study, it was ascertained that learning of chemistry online in Post Covid-19 Era remains a difficult task based on the challenges such as lack of trained personnel, software for teaching chemistry are in short supply, poor internet connection and data plans, no ICT department in most secondary schools are the major barriers in adapting online learning of chemistry. Finally, for online learning to be effective, appropriate measure should be given to maintenances, government should finance and connect the rural areas particularly to stable electric grid.

CHAPTER ONE

INTRODUCTION

Background to the Study

Covid-19 pandemic has created the largest disruption of education systems in human history, affecting almost every learner especially those in secondary schools in Nigeria. Closures of schools, institutions and other learning spaces have impacted more than 94% of students in Nigeria. Several schools, colleges and universities have discontinued face to face teachings geared by the fear of losing 2020 academic year or even more in the coming future. The need of the hour is to innovate and implement alternative educational system and assessment strategies. The Covid-19 pandemic has provided us with an opportunity to pave way for introducing digital learning in order to bridge the gap in learning thus the birth of online learning.

Online learning is a type of learning that happens outside the classroom, with digital-based equipment and the learner's autonomy guaranteed. Invariably the student does not have to face to face contact with either the teacher or peers. Online learning, as part of telecommuting, has also been proposed as a way to reduce the need for physical presence for students. This

will allow schools to manage their physical and non-physical resources, as well as increase access to education, especially in developing countries like Nigeria. Therefore, online learning has been steadily growing in the past few years and has been gaining momentum after the Covid-19 pandemic due to school closure, as well as mobility restrictions imposed by government.

The global Covid-19 pandemic has pushed educational institutions to adopt online learning as the only channel for their education activities. Children from poorer backgrounds who tend to have less access to online connectivity, computers and other devices and reside in rural areas where local languages take dominance over English ICT learning uptake will be limited. The inequity in access to ICT-based learning has the adverse effect of further intensifying the existing disparities in learning outcomes along socio-economic lines, and the urban-rural divide.

Klemm and Snell (1996) believe that applying online collaborative team work is one of the best ways to boost learner's critical thinking, interactivity, and creativity. The unexpected eruption of the novel corona-virus disease 2019 (COVID-19) pandemic has begun a new era of social change, especially in the education system. The abrupt disruption in the social order caused by the

COVID-19 pandemic has brought into the spotlight the challenge of instantly switching from proximate learning to remote learning platforms. Regarding the use of online learning within the school curriculum, Karon (2020) commented on its capability to improved accessibility of subjects online that can be self-paced and tailored to the learner, as compared with conventional distance learning delivery agents.

Furthermore, with the governmental acknowledgement of the need for ICT in teaching and learning at this critical time, its introduction in schools will result in the creation of new possibilities for learners and teachers to engage in new ways of information acquisition and analysis. Online learning platforms however will enhance and improve the quality of education delivery on equitable basis in our secondary schools. The quest of governments all over the world is turned toward strategies that increase access to innovative, inexpensive, and quality education for their citizenry given the obstruction caused by the pandemic. Hence, the quest for introduction and integration of online learning platforms into the teaching and learning process in the Nigerian educational sector can be considered as the silver bullet to increase access education, enhances acquisition of 21st century skills, autonomous and lifelong

learning. Although technology has enabled online education in many schools across West Africa, the situation is virtually not the same in Nigeria. Our system is still not at its best in building networking, infrastructure with acquisition of computers, which can make the integration of technology into the teaching and learning process a challenge (Coleman, 2011).

Statement of the Problem

Truly, Covid-19 pandemic has been a major problem experienced around the world, and in the educational sector at large. The challenges of Covid-19 pandemic resulted to the closure of all schools and institutions of learning in Nigeria and learners were yet to fully adapt to the online learning. The doubt arises as to whether the goals and objectives of online learning can be achieved considering the challenges. Hence, the research seeks to ascertain students identified the barriers in adapting online learning of chemistry in post Covid-19 pandemic era in Egor local government area in Edo State.

Purpose of the Study

The aim of this research is to examine an overview of students identified barriers in adapting online learning, especially in chemistry subject

i) Identify the obstacles senior secondary school students face in online learning of chemistry in post Covid-19 pandemic in Egor local government area.

ii) Find out if chemistry students will prefer e-learning to classroom conventional learning in Egor local government area.

iii) Ascertain how to overcome the barriers in online learning of chemistry in Secondary schools in Egor local government area.

Research Questions

The following questions were raised to guide the study:-

1. What are the barriers in adopting the use of online learning of chemistry in post Covid-19 pandemic?
2. What are the factors that facilitated the learning of Chemistry in Post-Covid-19 era?
3. What are the positive impact of learning chemistry online when compared to conventional classroom learning?
4. What proportion of Chemistry students have access to their secondary schools online facilities?

Significance of the Study

This study will provide an insight on students identified barriers in adapting the online learning of chemistry in post Covid-19 pandemic era in Egor local government area. This study will also be beneficial to students as it will enlighten them on how to understand chemistry topics that was not fully explained by the teacher in details and hence increases the student's intellectual capacity with broadened knowledge of the topic being taught.

Scope and Delimitation of the Study

This research work was aimed at investigating students identified barriers in adapting the online learning of chemistry in post Covid-19 pandemic era in Egor local government area. This study is limited to three (3) public senior secondary schools in Egor local government area.

Definition of Terms

Covid-19 (Corona Virus disease 2019): It is a mild to severe respiratory illness that is carried by a novel coronavirus now called severe acute respiratory syndrome.

On-line learning: Online learning is education that takes place over the internet. It is often referred to as "e-learning" among other terms.

Pandemic: A pandemic is an epidemic of an infectious disease that has spread across a large region, for instance multiple continents or worldwide, affecting a substantial number of individuals.

Chemistry: Scientific study of the properties and behavior of matter. It is a natural science that covers the elements that make up matter to the compounds composed of atoms, molecules and ions.

Barrier: A circumstance or obstacle that keeps people or things apart or prevents communication or progress.

CHAPTER TWO

REVIEW OF RELATED LITERATURE

Theoretical Framework

This study is anchored at the reputation conferral concept propounded via way of means of Paul Lazarsfied and Robert Merton (1948). The principle presupposes that press insurance distinguishes and confers significance upon the persons, problem or institution reported. It provides that the media does this through frequently providing such issues, people or businesses outstanding within side the eyes of the public. The cause for that is that the media has an excessive attain and is thought to most effective often function issues, humans and corporations of first-rate significance.

Asamah, Nwammuo & Nkwam-Uwaoma (2017) agreed to the above after they located that media interest complements interest given to people, issues and topics and that if a person (or issue) seems on television, on the way to decorate his or her reputation (or the issues prominence).

According to Asemah et al (2017), people believe as proposed by the theory that if an issue or person is not important, the media will not project them as the media do not have time nor space for unimportant issues and

people. Consequently, the reporters are on this premise expected to be factual and objective in issues and people they present to the public as a wrong status conferral could be deceptive and detrimental to both the public and the media.

The theory is applicable to this study as it shows that aside other factors, it was the mass media's recurrent reportage and education of the people about Covid-19 that conferred the virus a high awareness and prominent status amongst Nigeria. Recall that at the initial stage of the virus in Nigeria, many Nigerians highly disputed the existence of the virus, but with the mass media's projection of the virus, its fatality and preventive measures, most Nigeria citizens now believe the virus is real although some of them think it is not as grave as it is projected by the government and the mass media.

Concept of Online Learning

The online learning is a not a new phenomenon in promoting education in some parts of world. Online learning can be defined as the online delivery of information. It is the integration of learning with technology (Okure, 2018).

There is no single definition of online learning since the systems for such learning are continuously evolving and learners are adopting new tools such as blogs and whatsapp as these emerge on the internet. Online learning

may include the use of different technological tools, for example, digital devices (computers and phones), the internet, online application tools, videos, and different software packages. Technology-supported online learning systems not only help in collaboration through interaction and communication, but they also help students retain more information than in traditional face-to-face classes.

Online learning is a method of education whereby students learn in a fully virtual environment. Online learning refers to an internet based learning environment that can connect students of diverse backgrounds who boast different perspectives. There is a requirement of a quick shift to online learning mode. Therefore, the products by Google can be really useful under such problematic situations; they are Gmail, Google forms, calendars, G-Drive, alternative for face-to-face classes.

Online learning could be described based on the summaries of its characteristics. In the first place, they proposed a multimedia environment. Secondly, they corporate several kinds of information. Thirdly, online learning systems support collaborative communication whereby users have total control over their own situation of learning. Fourthly, it supports networks of accessing

information and fifthly, it allows for the systems to be implemented freely on various kinds of computer operating system (Cascella M., Rajni M. & Cuomo A. (2020). Algahtani (2011) in his evaluation of the effectiveness of the e-learning in Saudi Arabia categorized the definitions of e-learning from three perspectives; the distance learning perspective, the technological perspective (Nichols, 2003) and also from the perspective of e-learning as a pedagogy.

Approaches to online learning

There are diverse ways of classifying the approaches of online learning. According to Algahtani (2011), there have been some classification based on the extent of these engagement in education. Some are classified based on the timing of interaction. Going further, he divided or learning into two basic types consisting of computer based and the internet based learning.

The computer based learning comprised of the use of full range of hardware and software generally that are available for the use of information and communication technology and also each component can be used in either of the following ways; computer managed instruction and computer-assisted learning. In computer assisted learning, to Algahtani, computers are used instead of the traditional methods by providing interactive software as a

support tool within the class or as a tool for self learning outside the class. In the computer managed instruction, however, computers are employed for the purpose of storing and retrieving information to aid in the management of education.

According to Almosa (2017), the internet based learning is a further improvement of the computer based learning approach for chemistry students whereby the contents are made available in the internet. The relevant links to the knowledge source are uploaded on the internet where the students can access them at any time in the absence of the teachers. Zeitoun (2008) classified this by the extent of such features use in education; mixed or blended mode, assistant mode and completely online mode. The assistant mode helps to complement the effort of the traditional method. mixed or blended mode is an approach that involves the blended use of both the traditional method and the online method of learning. The completely online mode, which is the most complete improvement, involves the exclusive use of the network for learning.

Algahtani (2011) described the completely online mode as synchronous and asynchronous in accordance with the timing of interaction. The synchronous type allows chemistry students to discuss with the teacher and

also among themselves via the internet at the same time with the use of tools such as video conference and chat rooms. This type according to Almosa and Almubarak (2005) offers the advantage of instantaneous feedback. The asynchronous on the other hand allows students to discuss with the teachers as well as among themselves over the internet at different times. It is therefore not interaction at the same moment but later, with the use of tools such as thread discussion and emails.

History of online learning

Prior to the advent of internet, distance courses were being offered to provide students with education on particular subjects or skills. Isaac Pitman in 1804s taught his pupils shorthand via correspondence. He has usually sent completed assignments by mail and he would then send his students more to be finished using the same medium.

In 1920s, the first testing machine was developed by Sidney pressey which allowed students to test themselves without the presence of the teacher. During the 1950s, B.F. Skinner, a Havard Professor invented the teaching machine, which enabled schools to administer programmed instruction to their students. In 1960, the first computer based training progam was introduced to

the world. He was known as plato-programmed logic for automated teaching operation. This offered the ability and drill skill to skip questions. In 1966, a Stanford university psychology Professor, Patrick Suppes and Richard Alkison began using computer aided instruction (CAI). This was set up to enhance the delivery of information to students. In 1969, U.S department of defence commissioned ARPANET to create internet. Computer mouse and GUI were invented in 1970 which help to define modern computing and the eventual startup of CBT (Computer Based Training) at New Jersey institute of Technology. Personal computer era began with Macintosh, online communities began sharing information, slowly paving way for online learning in the 1980s. Moving, further, in the 1990s, the first digital natives came to place. People started using emails. This stood as the down of new era of learning. Virtual learning environments began and eventually, online learning became a widely recognized term.

Concept of Covid-19 and Schooling

The Covid-19 pandemic affected educational system worldwide, which led to the near total closures of schools, universities and colleges. Most governments decided to temporarily close educational institutions in an attempt

to reduce the spread of Covid-19 on the 12th of January 2021, approximately 825 million learners were affected during to school closures in response to the pandemic. On 23rd of March, 2020, Cambridge International Examinations (CIE) released a statement that announced the cancellation of Cambridge IGCSE, Cambridge O Level, Cambridge International AS & A'Level, Cambridge AICE Diploma, and Cambridge Pre-U examinations for the May/June 2020 series across all countries. International Baccalaureate Exams were cancelled. In addition, Advanced Placement Exams, SAT administrations, and ACT administrations were moved online or cancelled.

The school closures not only impacted the students, teachers and families. This led to major economic and societal consequences. As a result, school closures in response to the pandemic gave room for people to shed light on various social and economic issues, including student debt, digital learning, food insecurity, and home lessons, as well as access to childcare, healthcare, housing, internet, and disability services. The impact was more severe for disadvantaged children and their families, causing interrupted learning, compromised nutrition, childcare problems, and consequent economic cost to families who could not work. In response to school closures, UNESCO

recommended the use of distance learning programmes and open educational applications and platforms that schools and teachers can use to reach learners remotely and limit the disruption of education.

Online Learning Tools/E-Learning Tools

According to Olaniyi (2006) e-learning is all about learning that occurs at the computer. In our contemporary world, the learning through the aid of a computer simply means online knowledge acquisition through the internet or offline through CD-ROM etc. In other words, it is the use of network technologies to create, foster, deliver and facilitate learning, anytime and anywhere. Horton (2005) defined e-learning as the use of internet and digital technologies to create experiences that educate our fellow human beings. E-learning has the potential to revolutionize the way we teach and how we learn (DFES, 2015).

Clark, R.C; Mayer, R.W. (2003), stated that the availability of the internet provided the channel for the use of the electronic approach in education known as electronic learning or E-learning. Online learning has become an increasingly popular learning approach on secondary education due to the vast growing internet technology. Online learning has competitive

advantages and many secondary students' performance. Today technology is a tool used to remove geographical barriers and to facilitate learning for everyone to learn anytime and anywhere without the presence of the teacher. Learning online has increased accessibility to qualitative education, reduced cost and time as well as improved students' academic performances. Nowadays, technology has become one of the best means for learning with or without school premises. This technology allowed the use of instructional methods to improve the quality of education and students' academic performances. Different researches conducted have reiterated the fact that students engage in E-learning, generally perform better than those in face-to-face courses. The researchers also affirmed that students who participated in Electronic learning programmes achieve better grades than the students who studied by way of the traditional approach.

E-learning is widely used in many secondary schools in the world today and this, no doubt, adds more value to the teaching and learning activities in secondary schools. Some secondary schools in Nigeria have electronic learning sites designed for learning with the use of module software packages but these are not fully utilized by students. Koszalka & Wang, 2002; et al (1997) carried

out studies on the utilization of E-learning facilities in secondary schools and the research studies have discovered either the non-availability of electronic learning facilities, their inadequacy or their ineffective utilization in most of the secondary schools.

Chemistry study requires a lot of memorization, the ideas and concepts that are developed during e-learning can be captured by the students and help to broaden their understanding of the theories, reactions, and mechanisms presented. Many approaches to this are the enhancement of teaching chemistry through guided inquiry, 3D molecules, equations, graphics, animations, quizzes, etc; which have been developed to help amplify student participation in school room things to do with the goal of growing their application and skills.

Challenges/Obstacles of Learning Chemistry Online

Online learning of chemistry after the Covid-19 pandemic faces many challenges ranging from learners' issues, educators' issues and content issues. It is a challenge for institutions to engage students and make them participate in the teaching-learning process. It is a challenge for teachers to move from offline mode to online mode, changing their teaching methodologies, and managing their time. It is challenging to develop content which not only covers

the curriculum but also engage the students. However, from the beginning of the pandemic, chemistry subjects were implemented using flip classroom learning strategy, which is a learning strategy that reverses the implementation of traditional learning. In traditional learning, the teacher enters to explain material starting from facts, concepts, theories and laws to students in the classroom, then for the implementation of theory and law, the teacher assigns assignments to students at home. Whereas in the flipped classroom strategy, the teacher assigns assignments to students to learn facts, concepts, theories and laws at home independently, then at virtual face to face teachers and students discuss complex and essential problems, and discuss the implementation of chemistry theory and law as well as problems containing algorithmic calculations. Here it is hoped that a little time in virtual eyes will be effective.

The challenges students experience on the course of learning online particularly chemistry subject is poor internet network in their place of residence, then limited gadgets such as smartphone, computer, flash drive etc. No electricity to charge phones, lack of the knowledge of the internet usage,

anxiety, depression, unfavourable home learning environment which were aggravated when students are marginalized and from remote areas.

Another major obstacle to e-learning of chemistry in senior secondary school is tied towards the high cost of internet data services. The internet service required to connect to this e-learning platform sometimes requires a lot of data. The cost of purchasing the data bundle is so high which might be difficult for both students and learners. In cases where there is even data, poor internet connectivity by network providers is of major concern especially when it comes to video conferences where both the students and teachers have to interact. The cost of accessing the internet in Nigeria is still on the high side. Hence, some students find it a challenge to afford. The cost of a personal computer (PC), laptop and smart phones suitable for e-learning are still very high in Nigeria considering the income level of an average worker in the country. Few students that are privileged to have a PC/Laptop are of connected to the internet as this do attract extra cost which they cannot afford. Also, this poor internet connectivity and high cost of data has resulted in low attendance of students during the online classes (Eze et al, 2018).

Chemistry is regarded as the central science for its contribution to other sciences such as Biology, Physics, Nutrition, and Health. However, Chemistry is mainly viewed as one of the most challenging subjects to understand among the science subjects to enroll it. Despite the vital role and importance of Chemistry, the failure rate has remained very high. Various factors may contribute to students' poor achievement in Chemistry, such as students' background, lack of interest and qualified teachers, and traditional teaching strategies with inadequate instructional materials. Hussain considered three levels of barriers to using ICT in Chemistry classes. These levels are teacher, school, and system levels that may affect the attitudes of students to learning, opportunities for professional development of science teachers that affect teaching in the classroom, and students' performance in Chemistry. Murgatrotd (2020), broadly identified challenges with e-learning are accessibility, affordability, flexibility, learning pedagogy, life-long learning and educational policy. The online education poses a risk of exposure to increased screen time for the learner. Therefore, it has become essential for students to engage in offline activities and self-exploratory learning. Lack of parental guidance, especially for young learners, is another challenge, as both parents are working.

According to Oviawe et al; 2019, the transformation process suffered some challenges like shortage of teachers, poor network coverage and internet connectivity, adoption of technology and problems of few classrooms. However, the initiative is believed to be successful in the areas of teachers' delivery of lessons and motivation of students to learning, and the positive changes in students towards their academic work.

Overcoming the Challenge

Chemistry subjects become one of the subjects that are considered difficult to understand by students besides mathematics and physics after the pandemic because of the process of learning transformation from face-to-face learning to online learning. There must be a new strategy to address this problem by using flipped classrooms based on problem-solving. The flipped classroom is a simple strategy for providing learning resources such as articles, pre-recorded videos and YouTube links before the class. The online classroom time is then used to deepen understanding through discussion with faculty and peers (Doucet et al; 2020). This is a very effective way of encouraging skills such as problem-solving, critical thinking and self-directed learning. This learning will make effective limited interaction time between teachers and

students when they face virtually. Besides that, with the concept of flipped classroom students can learn independently facts, data, concepts, and laws before they meet in cyberspace.

Learning with the flipped classroom strategy carried out in chemistry subject matter is expected to be able to overcome the problems faced by students, namely the difficulty of understanding materials in science subjects due to the limited time for direct learning online. Even before the coronavirus pandemic, the e-learning market was growing rapidly. However, now the closure of businesses and educational institutes has provided greater momentum to the adoption of e-learning tools. Whether it is distance learning, virtual tutoring, video conferencing online learning software, or language apps, there has been a massive upsurge since COVID-19. One can expect online tutoring to become a trend after the pandemic passes, supplementing the resumed learning at schools and colleges. In the coming years, the integration of information technology, A1, and ARLVR in education will be further accelerated, making online education an integral component of school learning.

Barriers in the online learning engagement in chemistry

1. **Difficulty in understanding the concept of the subject matter:**

This group includes learners who identified the difficulty in understanding chemistry concepts as the dominant barrier affecting their online learning engagement in chemistry. From the anecdotes culled from their narratives, causes of this challenge can be thematized into lack of self-efficacy, lack of appropriate learning strategies, and lack of practical exposure to the subject. However, students had a consensus that their perceived difficulty is not entirely due to the nature of the subject matter, but also because of the other external factors affecting their sense of focus in understanding the subject.

The solutions to this problem include the provision of feedback, changing the nature of the learning material, and gradual introduction the content. In fact, Leenknecht et al. (2021) opine that these mode of assessments are associated with learners' autonomy, competence, and motivation. As they participate in the online platform of learning, their independence to self -study the content can be best supported by providing them with the learning materials that remediates their conceptual understanding.

Lack of Intrinsic motivation towards online learning:

The primary causes of the challenge that students identified are lack of interest in the subject matter, unengaging learning atmosphere, adjustment to online learning, and lack of socialization. In solving such, student participants dwelled mainly on the role of students' active participation in online learning through exposure to the practicality and meaning of the content as the solution to boost their motivation.

3. Difficulty in accommodating academic responsibilities online:

The difficulty in accommodating academic responsibilities in online learning including lack of study habits, screen fatigue, distractions, time management, and lack of conducive learning space. To orient learners on how to accommodate academic responsibilities in online learning, the group affirmed the importance of personal development and reflection, clarity of the nature of performance tasks, and consistent feedback.

4. Technical challenges:

Participants affirmed the notion that problem with internet connectivity cannot be resolved instantly, and that is a given and common problem associated with online learning. However, the student participants suggested that teachers may

also consider this learning dilemma when it comes to giving learning activities that require students to have a stable internet connection.

Summary of Review of Related Literature

In conclusion, the Covid-19 outbreak has introduced a lot of challenges for secondary school students across Edo State and the world at large. Due to the lock down and other Covid-19 regulations, has forced a sudden shift from face to face learning to online learning in many academic institutions. This shift came with numerous challenges for students and academics, and these challenges includes; connectivity issues, unconducive physical environment, mental health related issues, lack of basic needs, lack of learning resources etc.

CHAPTER THREE

METHODOLOGY

This chapter deals with the description of the research design and the procedure for data collection. It also specifics the method that was adopted in analyzing data.

Design of the Study

Population of the Study

Sample and Sampling Technique

Research Instrument

Validity of the Instrument

Reliability of the Instrument

Method of Data Collection

Method of Data Analysis

Design of the Study

The design of the study was a survey research design. In a descriptive survey, the researcher infers information about a population of interest based on the responses on a selected sample drawn from that population. The research design was adopted specifically to carry out the study on students

identified barriers in adapting online learning of chemistry in post covid-19 pandemic era in Egor local government area of Edo State.

Population of the study

The population of this study consist of chemistry students in public senior secondary schools in Egor local government area of Edo state.

Sample and sampling Technique

A sample of one hundred (100) Chemistry students were selected from three (3) public secondary schools in Egor local government area of Edo State.

Gender	**Frequency**	**Percentage**
Male	15	15.0
Female	85	85.0
Total	**100**	**100.00**

The table above shows that 85% of the respondents were female while 15% of the respondents were male.

Name of school	**School type**	**Frequency**	**Percentage**
Federal govt. girls college	Single sex	30	30.0
Iyoba girls college	Single sex	40	40.0
Benin Technical college	Co-education	30	30.0
Total		**100**	**100.00**

Research of the Instrument

The research instrument used for data collection in this study is the questionnaire. The questionnaire used was in the form of checklist.

The questionnaire has two sections; section A, and B. Section A contains the demographic information of the respondent. Section B contains information from the research questions. The items in the questionnaire are structured on the four point Likert rating response scale of strongly Agree, Agree, Disagree, Strongly Disagree.

Validity of the Instrument

The questionnaire was validated by the researcher's supervisor and two other experts in the department of Curriculum and Instructional Technology, Faculty of Education, University of Benin. The criticisms and suggestions made was used to produce the final draft of the instrument.

Reliability of the Instrument

The reliability of the instrument was carried out using the Cronbach's Alpha formula. The reliability coefficient was found to be 0.73. This indicates that the instrument was adequate for the study.

Method of data collection

The instruments were administered to three (3) different secondary schools in Egor local government area. The number of questionnaire administered to Iyoba Girls College was 40, while 30 questionnaires was

distributed to federal government Girls College and 30 questionnaires was administered to Benin Technical school and collection was done immediately after completion.

Method of Data Analysis

Data was analyzed using descriptive statistics namely "frequency distribution and percentage mean value". The result was analyzed and presented in tables to explain the various responses to each of the questions. The cut-off point is 2.5 (for acceptance is $x \geq 2.5$) will be used to present the data on the basis of conclusions drawn and recommendations made.

CHAPTER FOUR

PRESENTATION OF RESULTS AND DISCUSSION OF FINDINGS

This chapter deals on the presentation, analysis, interpretation and discussion of findings from the data collected.

Presentation of Results

Responses to the items in student questionnaire were used to answer the research question above. The responses were computed using mean statistics, the researcher use 2.5 as the acceptance decision value. Therefore, items with a mean value of 2.5 and above were accepted while below 2.5 were rejected.

Table 1: Students Opinion on the barriers in adopting the use of online learning of Chemistry in Post Covid-19 pandemic era.

S/N	Items	Federal Govt. Girls College	Iyoba girls College	Benin Technical School
1	The use of online system is expensive	2.90	3.18	3.67
2.	Most secondary school teachers do not possess the skills required to fully utilize technology	3.37	2.90	2.90
3.	There are trained personnel's to help in the usage of online learning in my school	2.53	2.90	2.83
4.	There are no internet facilities in most communities	3.17	2.88	3.30
5.	Software for teaching chemistry are in short supply	3.03	2.98	3.17
	Grand Total	**3.00**	**2.96**	**3.17**

Researcher fieldwork, 2023

The mean response in table 1 above shows the responses from the three secondary schools in Egor local government showed their opinion on the barriers in adopting online learning of chemistry in post Covid-19 pandemic. It should be noted that students agree strongly to the fact that, the use of online systems is expensive, most secondary school teachers do not possess the skills, no trained personnel, no internet facilities and software for teaching chemistry are major problems in online learning of chemistry. Since the grand mean of this research is greater than the acceptance decision of 2.5, it therefore implies that the responses from the three (3) different schools were accepted.

Table 2: Factors that facilitating the learning of chemistry in Post Covid-19 era

S/N	Items	Federal Govt. Girls College	Iyoba girls College	Benin Technical School
1.	Provision of stable internet to support easy and fast learning of chemistry	2.70	3.05	3.20
2.	Use of alternative power supply in the school	3.10	2.95	3.10
3.	Regular and cheap data plans for educational purposes	2.40	2.90	3.07
4.	Basic knowledge on how to operate digital tools should be govern to both the students and chemistry teachers	3.70	3.45	3.30

5.	Access to specified educational software to aid better teaching and learning of chemistry	3.53	3.33	3.20
	Grand total	**3.08**	**3.14**	**3.17**

Researcher fieldwork, 2023

The table 2 above reveals the factors that facilitated the learning of chemistry in post Covid-19 era. Also, from the 3 public schools shows the factors listed (except) item 3 in the federal government girls college which were more on agree column than strongly agreed to the facts that there is regular and cheap data plan for educational purpose in post covid-19 era. Since the grand mean of the 3 schools is greater than the cut off mean 2.5 therefore, it implies that the factors that facilitated the learning of chemistry online in post covid-19 era is accepted by the three schools.

Table 3: Impact of learning chemistry online when compared to conventional classroom learning

S/N	Items	Federal Govt. Girls College	Iyoba girls College	Benin Technical School
1	The use of online learning would foster better understanding of difficult concepts than the conventional classroom learning.	2.97	2.67	3.03
2.	The use of online learning develops a strong bonding between students and teachers and allows students ask questions easily without hesitation or shyness	3.03	3.20	3.10

3.	One of the benefits that comes along with online learning is that it increases the concentration of students	2.13	2.55	2.80
4.	Online learning boosts students' confidence in asking questions	3.33	2.98	3.10
5.	Online learning is fun and interactive	3.65	3.10	3.40
	Grand Total	**3.01**	**2.90**	**3.08**

Research fieldwork, 2023

The means response on table 3 above shows the impact of learning chemistry online when compared to conventional classroom learning. The grand mean values are all in line with the criteria for accepting a factor. However, from the table above, it shows that the three (3) schools are on the same opinion that learning of chemistry online has positive impact than the conventional classroom learning.

Table 4: Proportion of Chemistry Students Access to their secondary school Online Facilities

S/N	Items	Federal Govt. Girls College	Iyoba girls College	Benin Technical School
1.	I have used a computer system before	3.63	2.68	3.40
2.	My school has trained internet personnel	3.00	2.05	2.97
3.	There is internet in my school	2.67	2.17	3.07

4.	My school has ICT department.	3.70	2.03	3.23
5.	There is no restriction to my secondary school online facilities	2.20	2.25	2.07
	Grand total	**3.04**	**2.24**	**2.95**

Research fieldwork, 2023

The mean response on table 4 above shows the responses from federal government girls college, Iyoba girls college and Benin Technical college school. The grand mean from Federal Government Girls College and Benin Technical School is greater than the acceptance mean of 2.5, while the grand mean for Iyoba Girls College is less than the acceptance mean of 2.5. This implies that students from Iyoba Girls College do not have access to their secondary school online facilities.

Discussion of Findings

The result of this study has been quite instructive, informative and revealing. Based on the analysis of data or information collected from the opinion of the respondents on: students identified barriers in adapting online learning of Chemistry in post Covid-19 pandemic among secondary schools in Egor local government area of Edo State.

The analysis from table one shows that the challenges and obstacles of learning Chemistry online in post Covid-19 pandemic had a greater impact on student's concentration and better understanding of Chemistry, than the traditional classroom. The paradigm shift from the traditional educational system to ICT based teaching and learning is rapidly becoming one of the most widely discussed issues in the contemporary education policies (Theorer, 2000).

The result from table question two revealed the factors that facilitated the learning of Chemistry in post Covid-19 era. There should be provision of stable internet provider to support easy and fast learning of Chemistry, also use of alternative power supply in the school, there should be regulation and cheap data plans for educational purposes. Basic knowledge on how to operate computer and computer related tools should be given to both the students and Chemistry teachers and access to specified educational softwares should be built for Chemistry to aid better teaching and learning of Chemistry.

The result from table three shows the positive impact of learning Chemistry online when compared to conventional classroom learning. The use of online learning fostered better understanding of difficult concept, it developed a strong bonding relationship between students and teachers and

allows students ask questions easily without hesitation or shyness, it increased the concentration of students, online learning boosted students confidence in asking questions and the fact that online learning is fun and interactive than classroom method.

The result from table four shows the proportion of Chemistry students that have access to their school online facilities, apart from having computers in the schools of study; the use of internet facilities is grossly poor as there are no internet facilities. Its been discovered that insufficient number of computers and peripheral devices inhibit deployment of online learning by teachers in rural places while the number of computer units in urban schools is fairly okay. Electricity failure in rural schools has been a persistent problem militating against online application and use in Nigeria. Funding has been reported as one of the factors which influence provision and use of online learning services.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary

The purpose of this research was to examine student identified barriers in adopting online learning of Chemistry in post Covid-19 pandemic among secondary schools in Egor Local Government Area of Edo State. The researcher made effort in analyzing the barriers in adopting the use of online learning of Chemistry in post Covid-19 pandemic, factors that facilitated the learning of Chemistry in post Covid-19 era, the positive impact of learning Chemistry online when compared to conventional classroom learning, also proportion of Chemistry students having access to their secondary school online facilities.

The survey research design was adopted for this study. A sample of one hundred (100) chemistry students drawn from three (3) public secondary schools in Egor Local Government Area of Edo State were randomly selected from this study. The instrument for data collected was the questionnaire which was validated. The reliability coefficient of 0.75 was established using the cronbach alpha formula. The data collected were analyzed using mean statistics.

Conclusion

Following the analysis of the data collected and findings were made:

1. Apart from having computers in the schools of study, the use of internet facilities is utterly poor as there are no internet facilities.
2. The advantages of using online learning in post covid-19 pandemic fostered better understanding, of difficult concepts than the classroom conventional learning and also developed a strong bonding between students and teachers, increased students' concentration, boosted students' confidence and made classes more interactive.
3. The challenges and obstacles faced are; online learning systems are expensive, most schools do not have skilled personnel for online learning, no internet facilities and software
4. To enhance the use of online learning for teaching and learning of chemistry, there should be provision of stable internet connection to support easy and fast learning and teaching, also an alternative power supply in the school, there should be regular and cheap data plans for educational purposes, basic knowledge on how to operate computer and computer related tools should be given to both the students and teachers,

and specified educational soft wares should be built to aid better teaching and learning.

Recommendations

Based on the conclusion of the study, the following recommendations are made;

1. Internet facilities should be mounted remotely around school building to enable easy access and use of online leaning.
2. For online learning to be effective, appropriate measure should be given to maintenances, provision of stable internet connection to support easy and fast learning and teaching and Electricity is one of the driven force and backbone of computer and computer tools, so Government should finance and connect the rural areas particularly to a stable electric grid.
3. Basic knowledge on how to operate computer and computer related tools should be given to both the students and teachers.
4. And finally, Government should provide educational packages for data usage for educational purpose and software be built for subject specifications.

Suggestion for further studies

This study investigated the barriers in adopting online learning of Chemistry in post covid-19 era, using 100 respondents from three (3) public schools in Egor local government area. The future researcher may repeat this study by using larger population such as more than one local government area.

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QUESTIONNAIRE ON BARRIERS IN ADAPTING ONLINE LEARNING OF CHEMISTRY IN POST COVID-19 PANDEMIC AMONG SECONDARY SCHOOLS IN EGOR LOCAL GOVERNMENT AREA OF EDO STATE.

Dear Respondents,

This questionnaire is designed for academic purposes. It is structured to find out Students identified barriers in adapting online learning of chemistry in post covid-19 pandemic era in Egor local government area of Edo state.

Please kindly respond sincerely to the questions by ticking [√] where applicable. Your responses which are needed for research purposes only will be treated with high level of confidentiality. Thank you.

Section A

Instructions: Please tick ( ) where applicable.

1. Gender: male ( ) female ( )
2. Name of school……
3. School type: single sex ( ) coed ( )

Section B

	ITEMS	**Strongly Agree**	**Agree**	**Disagree**	**Strongly Disagree**

1.	The use of online systems is expensive				
2.	Most secondary school teachers do not possess the skills required to fully utilize technology				
3.	There are no trained personnel's to help in the usage of online learning in my school				
4.	There are no internet facilities in most communities				
5.	Software for teaching chemistry are in short supply				
6	Provision of stable internet to support easy and fast learning of chemistry				
7	Use of alternative power supply in the school				
8	Regular and cheap data plans for educational purposes				
9	Basic knowledge on how to operate digital tools should be given to both the students and chemistry teachers.				
10	Access to specified educational software to aid better teaching and learning of chemistry.				
11.	The use of online learning would foster better understanding of difficult concepts' than the conventional classroom learning.				
12.	The use of online learning develops a strong bonding between students and teachers and allows students ask questions easily without hesitation or shyness.				
13.	One of the benefits that comes along with online learning is that it increases the concentration of students.				
14.	Online learning boosts students' confidence in asking questions				

15.	Online learning is fun and interactive.				
16.	I have used a computer system before				
17	My school has trained internet personnel				
18	There is internet in my school				
19	My school has ICT department				
20	There is no restriction to my secondary school online facilities				