

**AN INVESTIGATION INTO THE ETHICAL ISSUES TO THE USE OF  
TECHNOLOGY IN TEACHING CHEMISTRY IN SECONDARY  
SCHOOL IN EDO STATE**

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**FACULTY OF EDUCATION**

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**A PROJECT SUBMITTED TO THE DEPARTMENT OF  
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**CERTIFICATION**

We the undersigned, certify that the research work was carried out by **Nkiruka Emmanuella IBEH** in the Department of Curriculum and instructional Technology, University of Benin , Benin City

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## **DEDICATION**

This study is dedicated to God almighty for his wisdom, steadfastness and love; he has been my source of strength and motivational throughout the program.

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## ABSTRACT

The use of educational technology in education has transform teaching and learning chemistry process significantly influencing Student's ability to engagement. This has caused some ethical issues in the classroom in the cause of learning process. This study examine the various educational technology and ethical issues during teaching process. The research explores how Student's familiarity with the use of technology, media source affects their instruction delivery and classroom engagement. The study is grounded in the technology use and review of related literature which collectively provide insight into the educational technology for teaching chemistry in secondary school

A descriptive research design was employed incorporating questionnaire as the instrument of Study to assert ethical issues to the use of technology in classroom and their possible solution. The findings reveal that the various ethical issues seen in classroom are likely to incorporate to the poor learning/engagement and low-class performance.

The study underscore the challenges of the educational technology which includes inadequate technological facilities, unstable power supply, poor internet service. By providing solution to these challenges, the ability to utilize educational technology effectively during class teaching ultimately, go and quality education.

This research contribute to the ongoing discourse on educational technology and it's role in modern pedagogy, highlighting the need for continuous innovation of learning.

The ethical issues include (discrimination and bully, plagiarism, examination malpractice, watching of unauthorized videos) can hinder the learning and easy understanding for students, violation of copyright law, decrease in academic performance at large. Moreover the ethical issues encounter in classroom, research shows the affect the learning and classroom engagement in a negative way. Based on my findings derived from this study, it is clear that the use of Educational Technology can make or mar the student learning either by positive or negative impact.

# CHAPTER ONE

## INTRODUCTION

### **Background to the Study**

Education has played a huge role in transformation of the world and human standard of living. The rate of change brought about through education cannot be over emphasized. It is believed that, " Education is a key to success " this therefore means that the level of success achieved is determined by the level of education acquired. According to Cameron & Cameron (2019), Countries with higher educational literacy rate tends to be wealthier. Education is a means for change, transformation and improvement. Education can be refer to as the process of transfer and acquisition of skills and knowledge for change in behaviour of the individual. It involves the transfer and receiving of skills and knowledge needed to fit into the society and successful adopt to any change that may occur in the society. The process of acquisition of skills (education) can be carried out in two different setting either formal or informal. Informal education can also be regarded as unofficial and it is a type of teaching and learning that is carried out in anywhere by an instructor who is not qualified or certified but has the skills or knowledge to transfer to others. Formal education on the other hand is when a furnished conducive environment that is equipped with facilities is used to transfer knowledge by a qualified and certified teacher. To make education effective in achieving its goals, an institution called School was set up

with the responsibilities of ensuring quality education in the society. School has therefore been seen with the responsibilities of ensuring sound and quality delivering of education.

Science is refer to as a body of knowledge that help to study about the happening within the environment. Science helps us to know about ourselves. Subjects in science include biology, physics and chemistry.

Chemistry is a branch of science that involves the study of chemicals reactions and the results of such reactions. It deals with how bonds are broken and formed in substance and compounds. Chemistry as a science subject involves a lot of practical and experimental work in carrying out research to know or discovery things. The study of science yields both theoretical and practical knowledge about the environment which can be used to manipulate and harness the forces and resources of nature for human development and well-being (Njoku, 2017). Study of chemistry helps to develop skills in critical thinking and knowledge for creativity and problems solving. Chemistry deals with chemicals and help in production of medicines and treatments facilitates. To study chemistry can be difficult and complicated at times as it therefore requires the aids of instructional materials to facilitate the process of teaching and learning. Due to this, the secondary school curriculum recommends the use of discovery or acquiring approach of teaching chemistry which emphasizes practical work in the laboratory (Eze, 2019). In this sense, technology can be adopted or use as an

Instructional aid in the teaching of chemistry to enable effectiveness. Different technology devices like computer, phone and projector can be use in facilitating teaching chemistry to achieve the objectives of the lesson. Afforma (2018) defined instructional materials as materials that facilitate teaching and learning activities and consequently the attainment of the lesson objectives. Adoption of technology in education involves the use of technology software's and programmes in the field of education.

The use of technology in teaching and learning are sometimes faced with different challenges, those challenges may limit the effective use of technology in education or end in threat to the users. Many ethnical issues have arise in the course of utilization of technology which has caused a lot of damaged. Technology softwares and programs designed for communication and learning could serve as a risk which may affect those using it when not properly scrutinised. According to kernighan (2018), most people will not be directly involved in creating of systems or softwares, but everyone is strongly affected by them in different ways and some people would be requested to make relevant decisions about them. Ethnical issues are refers to as moral dilemmas which arise when developing or making use of an electronic technologies. It addresses most questions on what is right or wrong or things which are fair as well as equitable in the use of technology. According to Morrison & Lowther ((2015), content should be scrutinised for accuracy from websites and programs software.

Therefore, ethical issues are those situations or circumstances that may threaten the moral standards of use of technology. These issues then need to be properly addressed as it involves moral conflict.

Examples of ethical issues includes: data privacy, environmental issues, health implications, cyber-crime and security, misinformation, plagiarism and personal privacy. According to Friedmen (2017), technology have developed to where nearly all of one's history can be traced. Many people engaged in misuses of technology as wrong information are passed on daily basis, people's privacy are been compromised coupled with cyber bullying and insecurity. According to Peace & Hertzal (2022), Internet contains a plethora of inaccuracies, yet represent a legitimate tool for finding information.

### **Statement of Problems**

Education is a means for development, improvement and growth of a society. The level of education of a society correlate with the level of advancement and wealth of the society. According to Cameron & Cameron (2019), Countries with higher educational literacy rate tends to be wealthier. Despite knowing the significance of education in the society, there are still increase in number of drop-out children in school today. The number of out of school children has in one way or the other contributed to poverty and criminal issues in the society. According to Deak & Tanama (2021) failure to build education would give room to different crucial problems like unemployment, crime and drug abuse in

the society. This is because, education helps to prepare the mind of people positively for creativity and good impact into the society. For Education to be effectively carried out, there must be good organization of the classroom, appropriate method should be adopted and Instructional media or aid should be use to facilitate the process. Utilization of technology or media plays a major role in the teaching process as it assists in achieving the preplanned goals of the lessons. Unfortunately, instructional media, technology or needed facilities are not readily available or utilized in the classroom by the teacher. Utilization of technology in education could be challenging sometimes as there are many issues faced with the use of technology aids in field of education. Those issues have their ways of influencing the process of teaching and learning which therefore needs to be handle properly to ensure best use of technology in teaching. Technology space like site and program which accommodate different information for learning and awareness purposes could also be an issue to learning as there could be wrong information, misuses of the site and cyber-crime. All these can cause insecurity and limitations to the use of technology in education (teaching and learning) as wrong information could mislead in teaching.

### **Research Questions**

The following research questions were raised by the researcher in order to adequately investigation on the topic.

1. What are those ethical issues in the use of technology for teaching of chemistry in senior secondary schools in Ovia North East Local Government Area?
2. To what extent do those ethical issues influence the use of technology for teaching of chemistry in senior secondary schools in Ovia North East Local Government Area?
3. What are the possible solutions to those ethical issues in the use of technology for teaching chemistry in senior secondary schools in Ovia North East Local Government Area?

### **Purpose of The Study**

The objective of this research study is carried out an investigation into ethical issues in the use of technology for teaching chemistry in Ovia North East Local Government Area. The research aims to ;

1. Investigate those ethical issues in the use of technology for teaching of chemistry in senior secondary schools in Ovia North East Local Government Area.
2. Determine the extent to which ethical issues influence the use of technology for teaching chemistry in senior secondary schools in Ovia North East Local Government Area.

3. Ascertain the possible solutions to those ethical issues in the use of technology for teaching of chemistry in senior secondary schools in Ovia North East Local Government Area.

### **Significance of the Research Study**

Findings and discoveries made in this research would be very useful to the students, teacher and curriculum planner.

Discoveries in this research study would be very important to the students as it would expand the students' knowledge on the utilization of technology in teaching. The students would be exposed to different ethical issues in teaching with technology. This would assist the students in their learning in the classroom as it would help them to ask questions regarding those areas. It would also help the students to pay maximum attention to the teacher in the classroom when teaching with technology so as to avoid those issues. All these would therefore contribute to effectively learning of the students and academic achievement.

The teacher would be exposed to the various possible ethical issues in the use of technology for teaching. Exposure to those ethical issues would help the teacher gain insight into the issues that may affect the process of teaching with the aids of technology utilization in the classroom. Enlightenment of the teacher

on the issues of using technology in teaching would assist the teacher to ensure proper and effective use of technology when in classroom. This research would as well help the teacher to develop ways to effectively use technology by managing those issues properly. The teacher would also be educated on how to avoid those ethical issues in order to prevent negative impacts of technology use in teaching or to ensure quality education with the use of technology. The teacher would as well be educated on different solutions to these ethical issues in utilization of technology in teaching.

The research findings in the study would be of relevance to the curriculum planners as it would help to draw the attention of the planners to those ethical issues, the implications and possible way out so that technology can be effectively utilized in teaching and learning. It would assist the curriculum planners to emphasis on safety measures that must be considered when teaching with the aid of technology. This study would enlighten the curriculum planners to make sure that there are proper monitoring of schools and teachers, in the use of technology for teaching to ensure that technology in education (teaching and learning) is best use in classroom to achieve the objectives of the curriculum.

### **Scope And Delimitation of The Study**

This study focuses only on an investigation into ethical issues in the use of technology for teaching of chemistry in senior secondary schools in Ovia North East Local Government Area. The study is delimited to senior secondary school

class one, two and three (SSS1, SSS2 and SSS3) students in Ovia North East Local Government Area.

### **Definition of some terms used**

**School:** this is an institution set up to ensure that teaching and learning effectively carried out in an organized way to achieve planned objectives.

**Instructional aids:** these means anything that is utilized in the process of teaching and learning to facilitate the process.

**Improvement:** this is defined as the increase, advancement and growth in an area of work or endeavor.

**Socialization:** this is regarded to as interaction with people or learning of others cultures just to fit into the way of their lives.

**Technology:** technology means an electronic device that is used to aid the process of communication and learning.

## **CHAPTER TWO**

### **REVIEW OF RELATED LITERATURE**

This chapter presents a review of related literature carried out under the following subheading:

- Concept of the use of technology
- The role of use of technology
- Availability of technology in class for teaching chemistry
- The ethical issues on the use of technology for teaching chemistry
- Student engagement in the use of technology in classroom
- The engagement in using technology in school
- The ethical challenges in the implementation of use of technology in school

#### **Concept of the use Of Technology**

Educational Technology is program that permits educates to make a completely virtual educating and learning environment. Educational Technology (frequently alluded to as ed tech) has ended up progressively imperative to college workforce and chairmen as they look for ways to offer mixed or half breed courses. Agreeing to W.K. Richmond," Educational Technology is concerned to give suitably testing and working school as educational system." Concurring to Jacquetta Developer, (2000) characterizes" Educational Technology is the application of logical Based on the meaning and definition of the fitting Educational Technology, we can agreeing to Robert Plants Gagne(1999) characterizes , Educational Technology refers to as the logical standards beneath which reason of educating and learning prepare through

instruction is summarize in this way that in the field of instructive specialized instruction there is such utilize of improvement of a set of precise strategies, going with down to earth information for planning bear the best implies of instruction."

Educational Technology serves as a supplement to educators' claim instruction by permitting for more interactivity and engagement. In practice, this may incorporate encouraging surveys or talks in course or taking participation by means of an educational technology platform stage versus with paper and pen. "Technology will never replace incredible teachers/instructors, but in the hands of extraordinary instructors, it's transformational," says George Couros, Aide Educators in the Graduate School of Education at the College of Pennsylvania and creator of The Innovator's Mindset.

Educational Technology makes a difference and active learning environment no matter their discipline. Educational Technology has had an especially significant affect in Science, technology, Math and Building (STEM) courses. Educational Technology is imperative in STEM classes as educates may have intuitively recreations that let understudies test in a risk-free environment. Ed tech can too offer assistance STEM understudies make visual representations of huge information sets, upgrading their basic considering and expository aptitudes. STEM instructor may utilize Educational Technology to conduct virtual labs, subsequently decreasing the require for physical lab space and equipment. S. S. Kulkarni (2004) characterizes Educational Technology as the application of the laws as well as later revelations of science and technology to the handle of education" Educational Technology is an application of logical information around learning to viable learning situation

Educational Technology has radically changed higher education over the a long time. There are a number of ways educates advantage from utilizing Educational Technology in the classroom. Concurring to G.O.M. Tenth,"

Educational Technology is the application of logical Information is called educational technology. In this way, a few definitions Educational Technology have almost learning and the conditions of learning to make strides the adequacy of educating and preparing." These incorporate making energetic reading material that are filled with custom case considers related to today's features. Another case of educational technology utilize is the prepare of gamification, where recreations and exercises are imported into course lessons to strengthen concepts in a fun way. Participation, homework assignments and tests can moreover be managed by means of instructive innovation and offer assistance teachers guage which student are the most noteworthy and most reduced performers.

Educational technology is a field included in the help of human learning through the orderly identification, improvement, organization and utilization of a full extend of learning assets and through administration of these processes. (Januszewski 2001). In the 1972 definition of Educational Technology (and the two ensuing corrections), control was supplanted with encourage. Science is "a body of information, a way or strategy of exploring and a way of considering in the interest of an understanding of nature" (Abimbola, 2006; 2011). Essential science is an occasional equivalent word of essential science moreover called unadulterated science, mainly in normal sciences such as Science, Chemistry, Material science and so on (Reference book, 2014). Ekeyi (2013) Essential Basic Innovation is the procurement of down to earth and specialized aptitudes at the lower craft.

Example of Educational Technology in classrooms

We see at the distinctive advances changing the instruction industry and the classroom

Technology inside the classroom is getting to be progressively vital. Over 80% of the populace have a keen gadget and innovation is something we presently depend on. The classroom subsequently needs to enhance to lock in understudies and back learning. Here we take a see at a few of the most recent advances and items that are changing the classroom.

### 1. Digital Pads

Digital pads are plug-in or remote gadgets that permit understudies and craftsmen to make computerized drawing and work. These gadgets too educate understudies advanced plan which is a developing industry. In expansion, the utilize of the pads takes the require of paper absent and diminishes squander as students can utilize an boundless sum of advanced paper and materials. A few of the most well known advanced drawing gadgets are the iPad Master with Apple Pencil, the Wacom Intuos and the Huion H420.

### 2. 3D Printing

3D printing is a vital innovation inside the education industry. It is particularly valuable inside plan-based courses, understudies considering engineering, safe materials, and designing can utilize 3D printing to make models and models for their ventures. Moreover understudies considering science can utilize the innovation to print particles and models to at that point consider from.

### 3. Tablets

Tablets are presently commonly utilized inside our day by day lives and inside the working environment. These are presently being presented into the instruction industry. Tablets have numerous employments in schools the

most common being a substitution for note pads and course readings, this permits students to store all their work on one gadget and schools are able to cut down on their paper utilize. Student are moreover more locked in when utilizing innovation and tablets are more effortlessly usable compared to computer rooms and tablet trolleys. The most common tablet brands being utilized in the classroom are the iPad Scaled down, the Amazon Fire Tablet and the Samsung Universe Tab.

#### 4. Smartboards

Smartboards are huge intelligently projector screens. They work with a projector which makes an upscaled form of the computer screen, this can at that point be drawn on and controlled by means of the screen itself. This is useful for schools and classrooms as students are able to completely connected with the work on the board without utilizing the computer. Not at all like customary whiteboards, these are not drawn on with genuine pens and do not require to be always cleaned.

#### 5. E-Books

E-Books are publication available in a digital form. There are two sorts of E-Books – applications for advanced items like phones and tablets or E-Reader gadgets which are comparative to a tablet but are exclusively for E-Books. Books accessible on ebook gadgets and stages are commonly cheaper, as different books can be put away on one gadget. These are particularly valuable in the education industry as students are required to studied a huge sum of books. Once books are no longer in the educational modules or ended up harmed, they are arranged of which makes a endless sum of squander, E-Books anticipate this from happening due to their capabilities and amplified lifetime.

## 6. Document Camera

The document Camera is a unused innovation item that permits instructors to venture paper reports onto unused projectors and smartboards. These cameras are being utilized in the education industry to appear classes, objects and pictures. The Document Camera is overwhelmingly utilized in science classes to exhibit tests so that understudies do not have to accumulate in an area.

## 7. Remote Learning

Remote learning has taken over education, this is primarily due to the worldwide widespread. When students were incapable to go into the classroom, the education industry improved and started utilizing video conference stages as an elective. Stages such as Zoom, Groups and Google meet all permitted understudy instruction amid the COVID -19 widespread lockdown period. This utilize of technology implied that students did not miss out and were approximately to proceed their education.

### **Roles of the Utilize of Instructive Innovation in Classrooms.**

We can't deny the reality that the created world we see nowadays can never be conceivable without the assessment of technology. Indeed the Universal Society for technology in education (ISTE) advances the Imperative parts of technology in education. As it were through a technology-driven education system framework, students have innovation learning arrangements and solution

In this widespread period of Covid-19, it would have never been conceivable for instructors to make students effective learners at domestic if technology was not presented. In expansion, innovation permits understudies to learn more successfully by means of online educational tools.

The crucial parts of technology in education is that teachers /instructors can serve all study material so that students can way better get it the themes and fathom the issue simpler by means of Edtech. Diverse sorts of education technology and their approaches to present day classrooms/smart classes, basically center on moving forward for improving the performance of each student.

Technology advances effective educational systems, without a doubt, since the technology is presented in the classroom, it empowers the generally development of students. Technology is a strong handle to advance a solid education around the world. The Most Imperative parts of technology in education make learning more open, energizing, and pleasant. The improvement of technology headways in instruction leads to upgraded information and aptitudes of understudies. Technology makes a difference students learn much and superior , are any of us still pondering how imperative Technology is in education? In this way, let me advise you that a study has demonstrated that computerized learning technology makes a difference most students make improve their grades. Besides, through technology-based E-learning, students can learn more and way better from diverse assets without depending on an institution or an educators. Way better communication and collaboration ;we all know that the presence of technology has progressed communication and collaboration to a superior level. Moreover, Educational Technology too boosted communication and collaboration between instructors and students and understudies/ guardians, teachers/parents, and peers. Instructors can associated with students to clear their questions and make e-learning more successful. Innovation empowers one-on-one interaction in the classroom online.

Educational Technology gives teachers with bounty of e-learning instruments like Gamification, AR / VR, smartboards etc. Through Progressed present day technology in education, teachers can utilize different advanced apparatuses to

amplify learning openings for students. E-learning arrangement advances empower teachers to make strides their educating abilities. From technology, teachers /instructors can taught well through video lessons, micro learning, appealing infographics, etc. Besides, teachers can lock in the students by conveying online tests and distinctive courses.

### **Availability Of Educational Technology In Classroom**

Educational tablet utilization in Nigeria is far reaching, with a noteworthy parcel of understudy populace owning and utilizing the tablet for educational purposes. The number of educational tablet clients in Nigeria, as of now, appraise from distinctive states at generally to 40 million. In Edo State we ought to be around 5 million student users.

However in 2021, the statistics detailed that in the Joined together State, roughly 81% of the understudy populace utilized Educational tablet the state has a noteworthy populace with get to educational tablets and there are different organize suppliers advertising scope over the locale. Educational tablet gadgets are commonly utilized for educating and learning, web get to and different other purposes by students in Edo State

### **The Ethical Issues on the use of Technology for teaching Chemistry**

Ethical issues encompassing the utilize of innovation in instructing chemistry fundamentally center around guaranteeing evenhanded get to innovation, ensuring student protection, avoiding computerized separate, overseeing potential deception, and guaranteeing dependable utilize of information collected through educational technology devices, all whereas maintaining the astuteness of the learning handle. Unequal advanced education can prevent understanding and cooperation in technology-based learning exercises due to ability level varieties. Protection and Information Assurance, concerns

approximately how understudy information collected through online stages is put away, utilized, and shared, possibly abusing protection rights.

Perhaps deception and precision students might get to wrong or deceiving data online, especially when utilizing open-source stages. Confirmation obligation: Instructors require to carefully vet online substance to guarantee its logical exactness. Evaluation and Responsibility, Cheating and literary theft. Simple get to online data can encourage scholastic untruthfulness if not legitimately checked. Availability and Consideration: Incapacity contemplations: Guaranteeing that educational technology is available to students with inabilities, counting fitting assistive advances.

Language boundaries Giving substance in different dialects to cater to different students populaces. Digital education hole among instructors/ teachers must be enough prepared in utilizing educational technology viably to dodge abuse or academic issues.

### Concept Of Ethical Issues Among Students

Ethical issues among students” alludes to circumstances where students confront ethical problems or lock in in behaviors that abuse standards of genuineness, engage in behaviors that violate principles of honesty, fairness, respect, and responsibility, often manifesting in actions like cheating on exams, plagiarism, bullying, stealing academic work, or engaging in discriminatory behavior within the school environment.

Key aspects of ethical issues among students:

- a. Academic dishonesty: This is the most common ethical issue, including plagiarism (copying someone else's work without proper acknowledgement), submitting someone else's work as your own, cheating on tests, or fabricating data.

- b. Bullying and harassment: Verbal, physical, or social intimidation directed towards other students, which can include cyberbullying.
- c. Confidentiality breaches: Sharing personal information about classmates without their consent.
- d. Discrimination and bias: Unethical treatment of others based on factors like race, ethnicity, gender, sexual orientation, or religion.
- e. Plagiarism: Presenting another person else's work as your own without proper acknowledgement or attribution
- f. Inappropriate use of technology: Using technology to cheat on exams, access unauthorized materials, or engage in cyberbullying.
- g. Violation of school rules and policies: Disregarding established guidelines regarding attendance, dress code, or behavior.

### **Student Engagement To The Use Of Technology**

Students Engagement In recent decades, chemistry education research has centered on secondary students' vigorous participation in chemistry learning. The traditional lecture model replacement with one that stimulates good student interactions to adopt active learning in mathematics classes is vital. communication standards, for example, to encourage students to participate in chemistry by explaining to peers, conjecturing, or justifying their answers (Aliyu et al., 2021; Morgan et al., 2018; Reynolds, 2019). Students' participation has a significant impact on academic progress and involvement in subjects such as chemistry and is enhanced or diminished depending on the learning context. This avenue of investigation emphasizes on mechanisms forming chemistry understandings in the mathematics education literature. Chemistry involvement is becoming more widely recognized as means to which students' exam performance and participation in STEM-related disciplines are achieved (Watt et al., 2017). Student participation encompasses academic, behavioral, cognitive, and psychological aspects. Indeed,

understanding the mechanisms and processes that aid in school adjustment and development may improve learners' participation and achievement (Liem and Chong, 2017).

## **CHALLENGES IN THE IMPLEMENTATION OF THE USE OF TECHNOLOGY IN SCHOOL.**

Challenges Facing technological learning in Basic Education ( secondary school) in Edo State, Nigeria. There are many challenges facing technological learning programmes in Basic schools in Nigeria. In this session, some of the problems include; inadequate funding, inadequate technological facilities, Unstable power supply, poor internet services, shortage of computer teachers, poor Implementation of technological policies, poor ICT literacy of students, high cost of ICT facilities, lack of Technical support for repairs and maintenance of ICT facilities, corruption and insecurity

### **1. Inadequate Funding**

Poor funding of Basic education is affecting the e-learning programme of Basic school education In Nigeria. The annual allocation for the administration of education include ; Recommendation of UNESCO 26% for developing countries like Nigeria. Therefore, Nigeria is performing below the UNESCO recommendation for budgetary allocation to educational development for the past six years. Punch (2021) disclosed that in 2016, the education budget Was N369.6bn which amounted to 6.7 percent of the national budget of N6.06tn while in 2017, N550.5bn; 7.38 percent of the N7.29tn budget was allocated to the sector. In 2018, N605.8bn, Out of N9.12tn budget, representing 7.04 percent was allocated to education; while it was N620.5bn, representing 7.05 percent of the N 8.92tn budget in 2019.

In 2020, N671.07bn of N10.33tn which amounted to 6.7 percent was allocated to the sector; while in 2021, the sector Got N742.5bn of the N13.6tn budget, representing 5.6 percent. The budgetary allocation to Education follows the same trend in 2022 and 2023 with a mere 7% and 5% of the total budget Allocated respectively. Ogunode, Somadina, Yahaya & Olatunde-Aiyedun (2021) noted that Inadequate funding is a major challenge that has affected the deployment of ICT in schools in Nigeria. The areas that poor funding has affected ICT deployment include funding of training, And retraining of ICT teachers, ICT projects, development of infrastructural facilities, Development and maintenance of ICT software packages and energy. The effects of underfunding primary school education are poor Quality of education, shortage of infrastructural facilities, shortage of professional teachers, Shortage of instructional resources and poor implementation of primary school policies and Programme.

## 2. Inadequate Technological Facilities

Inadequate technological facilities that will support the e-learning programme to work and Function in public Basic schools is another major problem facing the e-learning programme. (Attah 2021) affirms that 60 percent of Nigerians do not have access to smartphones or digital Devices. An empirical research study carried out by Sabina (2012) to investigated the challenges In the application of e-learning in schools in Ovia North East LGA, Edo State, Nigeria, Among one hundred and seventy four (174) secondary school and two hundred and twenty-five (225) teachers in public secondary schools revealed an Acute shortage of e-learning materials such as on-line/internet-connected computers, e-mail Facilities, multimedia television, multimedia computer, and digital library. N. Likewise, Ogunode, Iyabode & Olatunde-Aiyedun (2022) supported this by stating That the inadequate ICT facilities in majorities of public primary schools also account

for the Poor application of ICT in teaching and learning process by secondary school teachers and Students in Nigeria. ICT facilities like Computer hard and soft wares consisting of: Laptops, Scanners, Printers, Fax machines, GSM Phones, Memory chips, Hard disks, Flash drives, Internet connectivity, DVD, Compact disks, Cables (power and data), Word processing Packages, Database packages, spreadsheet pack inadequate funding, poor implementation of ICT policies, corruption, poor maintenance culture.

### 3. Unstable Power Supply

Unstable power is a challenge to the usage of e-learning packages in the secondary Basic schools in Nigeria. Today in Nigeria do not have access to a stable power supply. Punch (2022) reported that Nigeria has the lowest access to electricity globally, with about 92 million persons out of the Total population of 200 million people in Nigeria are lacking access to power. According to the Energy Progress Report (2022) released by Tracking the sustainable development goal number 7 (SDG 7) and produced in conjunction with the International Energy Agency, International Renewable Energy Agency, United Nations Statistics Division, the World Bank and the World Health Organization, indicated that Nigeria was followed by the Democratic Republic of Congo's 72 million, Ethiopia's 56 million and Pakistan's 54 million access deficits. In another Report, it was noted that access to electricity in Nigeria remained poor because electrification Advances failed to keep pace with population growth in contrast with Kenya and Uganda's Fastest progress in electrification due to their annual increases of more than three percent points Between 2010 and 2020. The power problem has remained a perennial problem in Nigeria, Stifling the country's industrial growth, and limiting commercial ventures' expansion and Profitability and the well-being of its people. This problem is also affecting

educational institutions, Especially public primary schools across the country. The problem of unstable power supply is Hindering the students from integrating ICT into their learning program. Ohiwerei, Azih, & Okoli (2013) opined that Nigeria being a developing nation cannot boast of twenty-four hours

Electricity supply to its citizens. The schools are directly connected to Power, yet no electricity is Supplied to the schools. It is a sad note that some of schools cannot afford a power generating set That can power the entire computers for teaching and learning. Consequently, both the teachers And students are handicapped and may not be able to offer the e-learning initiatives. The power Generation in Nigeria is below 10, 000 megawatt. This implies that majorities of towns and Villages are underpowered by electricity. Many educational institutions in Nigeria are located in Rural areas or developing areas which make it impossible for many of the schools to have access To a stable power supply. The inability of educational institutions to access stable power supply Is affecting the utilization of ICT for administrative functions in those institutions (Ogunode & Jegede 2020).

#### 4. Poor Internet Services

Poor internet services are a major problem preventing effective usage of e-learning packages in Some public Basic schools in Nigeria. The Internet service in Nigeria has limited coverage across the federation. Datareport (2022) Disclosed that there were 109.2 million internet users in Nigeria as of January 2022. Kepios analysis Indicates that internet users in Nigeria increased by 4.8 million (+4.6 percent) between 2021 and 2022.

Ogunode, Okwelogu & Olatunde-Aiyedun (2021) stated that another problem hindering the effective usage of ICT facilities by Nigerian public primary school students for learning in their Schools is the problem of poor internet

services. Many secondary schools are in rural areas Where there are no internet facilities and many public primary schools cannot afford to provide Internet services for the students due to high costs and charges. Internet services are still very Expensive in the country. Accessing the services in the schools by school administrators is on the High side in terms of cost implication. (Attah, 2021) expressed regret that access to technology Has remained a major challenge facing Nigeria, noting that Internet penetration stands at 42.06 Percent in Nigeria where most of the population lives in rural areas.

#### 5. Poor Implementation of ICT Policies

(Musa, 2019) and (Ogunode & Jegede, 2020) claimed that to ensure full integration and usability of ICT in Nigerian public secondary schools, the government designed ICT policies and programs For all educational institutions. National Policy on Education FRN (2013) recognized the Prominent role of Information Technology (IT) in advancing knowledge and skills Necessary for effective functioning in a knowledge-driven world. According to it, the Government shall provide adequate infrastructure and develop capacity for effective Utilization of Information Technology (IT) to enhance the delivery of Basic Education in Nigeria. Ogunode & Jegede, (2020) observed that the poor implementation of these ICT policies In public primary schools across the country is another factor responsible for the poor usage of e-Learning packages by Nigerian public secondary students. Obi, (2016) observed that the Change in government in Nigeria usually result in policy modification and poor implementation.

#### 6. Poor ICT Literacy of Students

The poor ICT literacy among Basic school students in Nigeria is affecting the usage of e-learning Programmes. (Amos 2019) opined that poor ICT literacy among Nigerian public primary school Students is another challenge to the effective use of ICT for learning in their schools. Musa (2019) and Ogunode &

Jegade (2020) observed that many students in public primary schools are Not computer literate and this is affecting the rate at which they are using ICT for learning Purposes. Adak & Aturamu (2006) as cited by Ogunode & Dahir (2021) concluded that Children are not equipped on how to handle technology because their parents are equally Disadvantaged. Over 90% by a conservative estimate of Nigerian school students cannot use.

## **CHAPTER THREE**

### **METHODOLOGY**

The various technique used to carry out the study were discussed under the following sub-heading

- Research Design
- Population of the study
- Sample and sampling technique
- Research instrument
- Validation of the instrument
- Reliability of the instrument
- Method of data collection
- Method of data analysis

#### **Research Design**

Survey research design was adopted as a plan of action in the conduct of the study. Survey design is a strategy in which quantitative information is

systematically collected from a relatively large sample selected from a population. Edith , Joop , Don (2008). Therefore survey research design possesses great relevance of adoption when the researchers intend to describe the investigation into ethnical issues to the use of technology for teaching chemistry in secondary school in Edo State, Nigeria. The choice of the design is informed by its efficient way of collecting information about population studied, by its efficient way of collecting information about the population studied, ease of administering which can be linked to the problem the researchers are studying.

### **Population of the Study**

The population of this study consist of secondary school in Ovia North East Local Government Area of Edo State. The study's population comprise 10, 000 students across the 24 public secondary school in the Ovia North East Local Government Area of Edo State (Ministry of Education 2024)

### **Sample and sampling technique**

The sample of the study of hundred (100) Students from the population. The sample was done using simple random sampling technique.

### **Research instrument**

The research data will be collected through a structured questionnaire which was developed by the researcher for the survey titled "analysis of the

investigation into ethnical issues to the use of technology for teaching chemistry in secondary school in Edo State questionnaire.

The questionnaire, has been thoughtfully divided into two distinctive section, namely section A and Section B. Section A is design to gather essential information regarding the demographic profile of the respondent, offering insight into the diverse background that contribute to the research context. On the other hand, Section B encapsulate 20 carefully crafted items strategically aimed at extracting pertinent information concerning the subject matter under investigation.

It is worth noting that the questionnaire adopts a four points Likert scale, providing respondent with options ranging from **Strongly Agree (SA) ( 4 points) to Agree (A) (3 points) , Disagree (D) (2 points) and lastly Strongly Disagree (SD) (1 point)** if the items was positively phrased. Negatively phrased items were scored using reversed scoring. Respondent are expected to tick any of the options. This scaling system facilities a nuanced understanding of participants perspectives, allowing for a more comprehensive analysis of the data collected.

### **Validity of instrument**

The questionnaire was validated by the researcher's supervisor and two other lecturers in the Department of Curriculum and Instructional Technology from the Faculty of Education, University of Benin, Edo State, Nigeria. Their

correction and suggestions will be used to produce the final draft of the instrument.

### **Reliability of the instrument**

To determine the reliability of the instrument, it was administered to 15 Students who will not be part of the main study, the data was subjected to Cronbach's Alpha statistics with a reliability coefficient of 0.721

### **Method of data collection**

The questionnaire would be administered by the researcher. Orientation on this research study will be given to respondent, so as to aid the proper answering of the questionnaire to be filled. The questionnaire will be collected by the researcher as soon as they are completed by the respondent.

### **Method of data analysis**

The collected data is systematically organized and tabulated. Statistical analysis of the responses was conducted, utilizing mean and standard deviation for a comprehensive examination.

## CHAPTER FOUR

### PRESENTATION OF RESULTS AND DISCUSSION OF FINDINGS

This chapter presents the result obtained from the analysis of data presented in a tabular form. The information in the table was used to answer the research questions that guided the conduct of the study. A total of one hundred (100) copies of 10 items of questionnaire were administered and analyzed in order to ascertain an investigation on the ethical issues to the use of technology for teaching chemistry in secondary school in Edo State.

**Research Question one:** what are those ethical issues in the use of technology in teaching chemistry in secondary school in Ovia North East LGA?

**Table 1: Mean and Standard deviation on the ethical issues to the use of technology in teaching chemistry in secondary school in Ovia North East LGA?**

ITEMS	N	SA	A	D	SD	MEAN	St. Dev	DECISION
Technology use in classroom has aided a lot of examination malpractice over the	100	10	30	20	40	2.1	0.91	Agree
1 years		10%	30%	20%	40%			
Student often misuse the use of technology by watching pornography and	100	10	50	20	40	2.5	0.87	Agree
2 harmful images		10%	50%	20%	40%			

3	Recently, there is high level of plagiarism among students due to the use of technology	100	20 20%	50 50%	10 10%	20 20%	2.7	0.85	Agree
4	The use of technology most times brings about discrimination among genders of different race or religion	100	0 0%	20 20%	30 30%	50 50%	1.7	0.89	Agree
5	Bullies and harassment are often caused by the use of technology	100	0 0%	20 20%	40 40%	40 40%	1.8	0.94	Agree
<b>Grand Mean</b>							<b>2.16</b>	<b>0.89</b>	

Research question one sought to ascertain the ethical issues in the use of technology in teaching chemistry in secondary in Ovia North East LGA. The findings from table 1 illustrate the mean and standard deviation on how the use of technology has aided examination in classroom. Analysis of the data on items 1 reveal that a mean response score 2.10 with standard deviation of 0.91 was obtained. The mean score is below the acceptable mean point 2.50 which therefore largely disagreed that the use of technology in classroom has aided to

the cause of examination malpractice in classroom. Student Often misuse the use of technology by watching pornography and harmful images with the mean score of 2.50 (SD= 0.87) the mean score is on the same level with the acceptable mean point, therefore it is agreed to be so. For high level of plagiarism among student due to the use of technology (mean score is 2.70, SD= 0.85) which the mean score is above the acceptable mean point which it is largely agreed. Moreover, gender discrimination due to the use of technology with a (mean score=1.70, SD = 0.89) . Additional, the series of bullies and harassment caused by Technology use in classroom which reflected in a mean of 1.80 (SD= 0.94). Those findings suggested that various ethical issues affect the teaching and learning with the use of technology in classroom.

**Research question two:** To what extent do those ethical issues influence the use of technology for teaching of chemistry in senior secondary school in Ovia North East LGA?

**Table 2: Mean and Standard deviation on what extent do those ethical issues influence the use of technology for teaching chemistry in senior secondary school in Ovia North East LGA.**

ITEMS	N	SA	A	D	SD	MEAN	St. Dev	DECISION
The presence of technology in the classroom brings about laziness to	100	0	3	60	10	2.2	0.9	Agree
1 critical thinking		0%	30%	60%	10%			

2	Pornography destroys student's mental health which in turn influence poor learning ability	100	60 60%	40 40%	0 0%	0 0%	3.6	0.69	Agree
3	Examination malpractice influenced by the use of technology by causing great havoc to the educational system	100	20 20%	50 50%	10 10%	20 20%	2.7	0.84	Agree
4	However, most times bully and harassment can make the student to be introvert during an open class discussion	100	30 30%	60 60%	10 10%	0 0%	3.2	0.77	Agree
5	Student poor engagement in classroom can be trace to limited availability of the technology	100	20 20%	50 50%	20 20%	10 10%	2.8	0.83	Agree
<b>Grand Mean</b>							<b>2.90</b>	<b>0.81</b>	

Research question two sought to examine the extent which those ethical issues influence the use of technology in teaching chemistry in senior secondary school in Ovia North East LGA. Based on the findings from table 2, which

presents the mean and standard deviation on the extent of which the ethical issues influence the use of technology in teaching chemistry in classroom, it can be interpreted that a larger percentage agreed; only one do not align with the agreement. The presence of technology in the classroom bring about laziness to critical thinking which is not well agreed to , with a mean score of 2.20 ( SD= 0.90) , pornography destroy Student’s mental health which in turn influence poor learning ability ( Mean score = 3.60, SD= 0.69), examination malpractice influence the cause of education havoc ( Mean score= 2.70, SD= 0.84), introvert bully and harassment can alter an open class discussion with a ( mean score= 3.20, SD= 0.77). Student poor engagement can be trace to limited availability of technology in school (Mean score = 2.80, SD= 0.83). These findings suggested that to a very large extent the influence of some ethical issues to the use of technology in classroom , which only do not solely agreed to that.

**Research Question Three:** what are the possible solutions to those ethical issues to the use of technology in secondary school?

ITEMS	N	SA	A	D	SD	MEAN	St. Dev	DECISION
Copyright law should be strictly enforced and maintained	100	70 70%	10 10%	10 10%	10 10%	3.4	0.74	Agree

2	Teachers should take away software that promotes pornography from their computers used in classroom	100	70 70%	30 30%	0 0%	0 0%	3.7	0.68	Agree
3	Student should not be allowed to bring their technology gadgets from home to the school	100	60 60%	30 30%	10 10%	0 0%	3.5	0.72	Agree
4	Discrimination of any kind should not be encouraged in classroom	100	60 60%	40 40%	0 0%	0 0%	3.6	0.69	Agree
5	Examination malpractice body should be set up to help eradicate examination malpractice in the secondary school	100	80 80%	20 20%	0 0%	0 0%	3.8	0.65	Agree
<b>Grand Mean</b>							<b>3.60</b>	<b>0.70</b>	

Research question three sought search for the possible solution to those ethical issues to the use of technology in secondary school. The findings from table 3 reveal that the mean response of all the items were above midpoint scale,

indicating an uniform agreement. Specifically, student agreed that copyright law should be strictly enforced and maintained ( mean= 3.40, SD= 0.74) , and teachers should take away software that promotes pornography from their computers used in classroom ( mean score 3.70 , SD=0.69) and student are not allowed to bring their Technology gadgets from home to the school ( mean score= 3.50, SD= 0.72), discrimination of any kind should not be encouraged (Mean score= 3.60, SD= 0.69) , examination malpractice body should be set up to help eradicate examination malpractice in senior secondary school ( Mean score= 3.80 SD= 0.65).

## **DISCUSSION AND FINDINGS**

The findings of this study shows that the ethical issues encounter in the use of technology in teaching chemistry which includes plagiarism, bully and harassment, discrimination and a lot more of them. This allows and influence the learning and teaching space in the classroom in senior secondary school, it involves level of participation and engagement. It causes laziness among Students to think deeply as to put the brain to work.

Again, examination malpractice been influence by these ethical issues is a big issue at hand which was agreed to be true form our findings above. Technology misconduct or misuse among Students by watching of harmful images and pornography which is among the world biggest challenging in this

present century. Limited Technology gadgets seen in classroom has been identified to ethical issues.

Lastly, to reduce those ethical issues in school, copyright law must be enforced and maintained to help reduce theft and pirate of people's work. This will enable high level of creativity among student. Setting up examination malpractice body in this level should be encouraged to eradicate the menace of examination malpractice in the society at large. Software that promotes pornography should be seen in the technology used in classroom for the mental well-being of student.

## CHAPTER FIVE

### SUMMARY, CONCLUSION AND RECOMMENDATIONS

#### Summary

This quantitative study used in survey design with descriptive statistical analysis in the investigation into the ethical issues to the use of technology in teaching chemistry in secondary school in Edo State 100 undergraduate students in secondary school were explored. The researcher made effort in investigating the different type of ethical issues seen in the classroom influence by teacher and student, the concept Educational Technology, roles of the use of technology, the ethical issues on the use of for teaching chemistry and the challenges faced on the implementation of use of technology in school.

The study employed descriptive survey research design. The variables of the study would be an investigation into the ethical issues of using technology in teaching chemistry and the types or level of the ethical issues currently in senior secondary school. The collection of data was carried out through the administration of questionnaire of one hundred (100) Students in secondary school.

The data were interpreted and discussed using mean and standard deviation table to determine the validity of the instrument, the instrument was validated

by the supervisor in the Department of Curriculum and Instructional Technology and two other lecturers from the Faculty of Education, University of Benin. Benin City, Edo State.

To determine the reliability of the questionnaire, a trial test of the instrument was conducted using (15) Students who are not part of the main study, the reliability was computed through the use of Cronbach Alpha statistics and a reliability coefficient of 0.721 was obtained which indicate that the instrument was reliable.

The following are the major findings of the study.

1. The ethical issues in the use of technology in teaching chemistry in secondary school, which the two items; student often misuse the use of technology by watching pornography and harmful images and high level of plagiarism among student are seen to be above the mean midpoint ie 2.50
2. The influence of ethical issues in the use of technology in teaching chemistry in senior secondary school, the findings emphasis on the different example of ethical issues like examination malpractice, bully and harassment and how it greatly affect the teaching and learning.

3. The possible solution to those ethical issues in the respect to the use of technology in teaching chemistry, the findings enumerate that this measure can help to eliminate the ethical issues.
4. The findings highlight how ethical issues play a role in the education system and how to solve these problems or reduced to minimal level at all cost.

## **Conclusion**

In conclusion, this study provides comprehensive insight into the ethical issues to the use of technology in teaching chemistry in secondary school in Ovia North East LGA Edo State. The ethical issues include (plagiarism, examination malpractice, bully and harassment) can cause low or poor learning ability, poor engagement in classroom, laziness to critical thinking.

Those ethical issues make student to have poor academic performance, as a student who have limited availability of technology in classroom, learning some aspect will be difficult in a big way. Based on the findings derived from this study, it is clear that ethical issues are real and can be seen on our classroom which the solution to them are also available.

## **RECOMMENDATIONS**

Based on the findings and conclusion of this research study, the following are carefully made recommendations:

It suggests that the ethical issues in the use of technology among secondary school student has increased and now affect the classroom learning.

Some ethical issues distract the student cognitive reasoning and critical thinking in the cause to acquire knowledge. When asked how pornography destroy the student's mental health , 80% indicated that he strongly agreed . this confirms the Wolak and Finkelhor (2008) findings that over 72% of participants of pornography (93.2% of boys, 62.1% of girls) have seen pornography before thye age of 18years

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## **APPENDIX**

### **DEPARTMENT OF CURRICULUM AND INSTRUCTIONAL TECHNOLOGY**

#### **FACULTY OF EDUCATION**

#### **UNIVERSITY OF BENIN, BENIN CITY**

Dear Respondent ,

I am Ibeh Nkiruka Emmanuella, an under graduate student from the above-named department. As part of the requirements for the program, I am conducting a research titled **“AN INVESTIGATION ON THE ETHICAL ISSUES TO THE USE OF TECHNOLOGY FOR TEACHING CHEMISTRY IN SECONDARY SCHOOL IN EDO STATE”** I also wish to assure you that your answers will be treated in strict confidence and used for the stated academic purpose only.

#### **SECTION B**

Instruction: please indicate (  $\checkmark$  ) against your chosen and record your view where necessary the extent to which you agree with the following, you are assess the following on a scale of “ strongly agree to strongly disagree

Keys: SA= Strongly Agree, A= Agree, D= Disagree, SD= Strongly Disagree.

S/N	ITEMS	SA	A	SD	D
	<b>What are those ethnical issues in the use of technology in teaching chemistry in secondary schools in Ovia North East LGA ?</b>				
1.	Technology use in classroom has aided a lot of examination malpractice over the years				
2.	Student often misuse the use of technology by watching pornography and harmful images				
3.	Recently, there is high level of plagiarism among Students due to the use of technology in classroom				
4.	The use of technology most times brings discrimination among genders of different race or religion				
5.	Bullies and harassment are often caused by the use of technology in classroom during lecture				
	<b>To what extent do those ethnical issues influence the use of technology for teaching of chemistry in senior secondary schools in Ovia North East LGA?</b>				
6.	The presence of technology in the classroom brings about laziness to critical thinking				
7.	Pornography destroy Student's mental health which in				

	turn influences poor learning ability				
8.	Examination malpractice influenced by the use of technology by causing great havoc to the educational system				
9.	However, most times bully and harassment can make the student to be an introvert during an open class discussion.				
10	Student poor engagement in classroom can be trace to limited availability of the technology				
	<b>What are the possible solutions to those ethnical issues with respect to the use of technology in teaching chemistry in secondary schools?</b>				
11.	Copyright law should be strictly enforced and maintained				
12.	Teachers should take away software that promotes pornography from their computers used in classroom.				
13.	Student should not be allowed to bring their Technology gadgets from home to the school				
14.	Discrimination of any kind should not be encouraged in classroom				
15	Examination malpractice body should be set up to help				

	eradicate examination malpractice in the secondary school.				
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## Reliability

Scale: ALL VARIABLES

### Case Processing Summary

		N	%
Cases	Valid	20	100.0
	Excluded <sup>a</sup>	0	0.0
	Total	20	100.0

a. Listwise deletion based on all variables in the procedure.

### Reliability Statistics

Cronbach's Alpha	N of Items
.721	15