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Innovation, Technology and Education

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AITIE

Creative minds innovate to transform the world.

They innovate through forward-thinking ideas to create the desired values.

Beyond the politics of educational research for certification lies the politics of educational research for transformation.

Only the network of dedicated and technology literate individuals can constructively integrate technology to support learning.

Through creative thinking, research and praxes we must Domesticate, Innovate and Integrate Technology for Instruction

INTERNATIONAL CONFERENCE AND WORKSHOP ON INNOVATION, TECHNOLOGY AND EDUCATION

This conference is dedicated to educators globally, the legends and pioneers who have made contributions into the integration of media in the Nigerian educational system and to the members of the Association for Innovative Technology Integration in Education (AITIE) who have the desire to facilitate learning in variety of educational settings through innovative and creative use of technology

Vision

To be the foremost professional association in the integration of technologies for teaching, learning, research and administrative purposes in conventional and distance education settings.

Mission

We seek to be a force for qualitative accessible education, through the promotion of scholarship and best practices in the design, development, use, and innovative management of technologies for effective teaching and learning in a variety of educational settings.

Core Values

The following principles guide our work and define the mission of AITIE:

- **access to quality education:** a commitment to access to quality education for all, irrespective of location, gender, race, religion, disability, etc., as education is a human right and an instrument for poverty alleviation and sustainable human development;
- **excellence:** promotion of quality research, teaching, learning, and life-changing scholarship and value-based service, through innovative use of technology
- **innovation and creativity:** encouragement of intellectual inquisitiveness through the promotion of technology for enhanced lifelong learning
- **teamwork**: encouragement of collaboration among individual and institutional members and promotion of shared values in the integration of information and communication technology in all aspects of education;
- **continuing professional education**: promotion of quality professional education for members and graduates already in the workforce;
- **association, institutions and industry collaboration**: encouraging closer social and economic ties among the Association, other professional associations, educational institutions, and the industry;
- **academic and professional integrity**: commitment to maintaining academic quality and standards, and integrity in all programmes of the association.
- **resources for teaching and learning**: commitment to providing resources for teaching, learning, research, and administration in conventional and distance education settings; and
- **Professionalism**: expertise and judgment of educational technology and related media professionals are critical to the successful integration of technology in education. AITTIE maintains the highest professional standards and expects the status, compensation, and respect due to all professionals.

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PRESIDENTIAL ADDRESS AT THE 2021 AITIE CONFERENCE

This is a presidential address delivered at the 4th annual Convention of the Association for Innovative Technology Integration in Education (AITIE), held at the Emmanuel Alayande College of Education, Oyo State, from the 8th to 13th of August 2021.

Technology: Responding to a Changed Landscape in Instructional Delivery

Four years as the President of AITIE has offered me the opportunity to reflect on the need for concerted efforts to deepen the infusion of technology within the school system. In addition, the scourge of the deadly virus, COVID-19, that shut the school system globally in 2020 has given a further fillip to the need for technology integration for instructional and training processes in educational and corporate settings. As if predicting the events of 2021 engendering a need for permanent change from the Face-2-Face instructional delivery system to blended or fully online, we chose the theme "Technology Integration for Instructional Delivery in Institutions and Performance Enhancement in Non-Educational Settings." Events of the last 18 months have established that the school and corporate training systems cannot remain the same. The knowledge and skill gaps in technology infusion for instruction manifested in poor online content delivery and interaction with students by teachers during the challenging COVID-19 pandemic. The poor and teacher-centred online content delivery has led to students' negative responses to online or blended content delivery.

Educators must redefine teacher education to meet the demands of the 21st-century knowledge economy. As Mishra and Warr (2020) had asseverated in the forward to the seminal publication of the International Society for Technology in Education (ISTE), "Championing technology infusion in teacher preparation," change involving system design and culture can make a difference in achieving organisational goals. According to them, stand-alone courses on technology integration would not enhance technology use for institutional teaching and corporate training. Rather, the infusion of technology in the entire teacher preparation programme is required systematically and pragmatically. Among several human innovations is technology, which requires innovation application to teaching. Innovative and systematic infusion of technology will enable multimedia applications to address diverse students' learning styles, space and pace.

As experts and advocates for technology integration in education, we must remain responsive to the needs of contemporary higher education institutions, corporate training settings and the 21st century and future learners' needs. Furthermore, learners need to get used to digital learning platforms for social distancing and other future emergencies. Therefore, technology-enhanced and technology-enabled teaching modalities suitable and accessible for generations and categories of learners are important. Traditional teaching and training need a transformation from the traditional book and physical classroom teaching and learning to digital form. Knowledge acquisition and delivery become simplified through technology innovation leading to effective and efficient teaching.

We must master the arts and sciences of developing people for technology integration, design a workable implementation process, and apply appropriate technology for productive people, process, and technology framework. As advocates and practitioners, we need to model and promote variety in quality instructional delivery through online learning platforms. These online learning platforms include real-time (synchronous instructional delivery) through video conferencing applications (Google Meet, Microsoft Teams, Zoom, etc). It can also involve

recorded (asynchronous) methodologies with multimedia and varieties of resources for enriched lessons. There is also Learning Management System (LMS), designed as a one-stop-shop environment for providing students with required learning resources and activities to promote students' engagement and interaction for enhanced learning outcomes.

Also, we must promote the knowledge and competence in applying Blockchain Technology, especially in data storage, Big Data for relevant information about learners' experiences, and Artificial Intelligence (AI) useful to provide learners and educators with helpful feedback. Learning Analytics allows educators to measure and report student learning for better understanding and optimisation of learning. Gamification allows for turning learning into a fun and engaging one. Immersive Learning with Virtual Reality (VR) and Augmented Reality (AR) makes learning much more interactive and help explain complex concepts, VR giving a constructed reality, while AR provides an enhanced real image.

In our small way, we addressed these issues through the hands-on workshop tracks, focusing on some of the highlighted issues in this address. We hope for more of the workshop experience through our online training platform.

I express the Association's words of thanks to the Management and staff of Emmanuel Alayande College of Education, Oyo, Oyo State, under the able leadership of our Chief Host, the Provost of the College Dr. R. A. Adefabi. We equally appreciate the support of our Host, Dr. S. O. Raimi, the Dean of the School of Education. We also acknowledge and thank our Keynote Speaker, Prof. Patrick Eya, our Lead Paper Presenters: Prof. I. A. Gambari, Prof. Ayotola Aremu, and our international mentor, Prof. John Traxler.

I wish to thank the Local Organising Committee (LOC) members, under the leadership of the Chairman, Dr. Olasedidun, K. Olutoye (Chairman), Dr. Bola O. Olaniyi (Secretary) and other members of the LOC. Likewise, members of the National Executive Committee who joined in preparation for the 2021 AITIE Oyo convention are equally appreciated.

Mudasiru Olalere Yusuf (PhD)
Professor of Educational Technology
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Keynote and Lead Papers

TECHNOLOGICAL INTEGRATION FOR INSTRUCTIONAL DELIVERY AND PERFORMANCE ENHANCEMENT

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A keynote address presented at the 4th International Conference and Workshop on Innovation, Technology and Education held at Emmanuel Alayande College of Education, Oyo State, Nigeria

Introduction

In the past 3 – 4 decades, scholarly discussions including government activities have harped on technology, information and communication technology, the 4th industrial revolution, computer competencies, ICT competencies and everything that has to do with computers and ICT. In addition, more especially, in the decades of the 1990s, with the discovery of the internet and the World Wide Web (WWW), using technology to transact business and governmental operations have fastened and reduced the time spent engaging in such activities.

Nations all over the world have keyed into the exploits of information and communication technology. Most countries have developed policies on technology and information technology. Nigeria, for example, has policies on technology and ICT integration in the Primary, Secondary and Tertiary education levels. Technology and ICT have also been integrated into almost all areas and fields of human endeavour: Agriculture, Health Services, Education, Transportation, Power generation and so on. There is hardly any area of human existence and even death that technology has not dealt with. For even a corpse can be kept as long as we want to keep it before burial.

Such is the extent and influence of technology and its integration that one (a novice) will begin to ask:

- What is technology and technology integration?

- Why is the effort of integrating technology worthwhile?

- Why technology integration in education?

- What has technology integration in instructional delivery achieved?

There are so many questions to ask, and they all beg for answers.

In this paper, I have tried to answer some of these queries as they relate to instruction and service delivery in (1) Higher education & (2) Distance Education. While I discussed some positive outlooks of technology integration, I have also posited some negative issues that are enhanced by the application of technology, which is also germane to education and instructional delivery.

Defining Concepts

A few definitions will help sharpen our focus on the direction of this paper.

Technology: In this paper, technology is simply defined as the application of scientific knowledge to the practical aims of human life or the use of scientific knowledge to create machines that enhances human activities in his environment. Thus, technologies are science in practice. Which cannot discuss integration in isolation without mentioning information and communication technology, for human activities are enhanced by technology, must be stored, retrieved for use etc. Thus, Information and Communication Technologies (ICT) refers to any arrangement that is capable of capturing, storing, retrieving, manipulating, transmitting or receiving information or data (Onwuagboke & Singh, 2014). Broadly, these include television sets, bulletin boards, radio, record players, disc players, still cameras, video cameras, projectors computers, interactive boards, internet and internet resources, etc. The list here includes electronic and non-electronic technologies and infrastructure systems used to create, store, manipulate, retrieve communicate and disseminate information.

The generally accepted belief is that information and communication technologies are computer-based tools used by people to work with the information and communication processing needs of an organisation. The purview covers computer hardware and software, the network, and the other digital devices like video, audio, camera, and so on, which convert information (text, sound, motion, etc.) into digital form.

Technology integration: It has been stated from onset that the application of technology in human endeavour is pervasive. However, it is generally believed that *technology integration* means the use of technology tools in general content areas in education to allow students to apply computer and technological skills to learning and problem solving. The above presupposes that the curriculum drives the use of technology and not vice-versa. Davies & West (2014) define technology integration as the effective implementation of educational technology to accomplish intended learning outcomes. According to them, education technology is considered to be any tool, piece of equipment or device – electronic or mechanical – that can be used to help students accomplish specified learning goals. Technology integration is therefore defined as the use of technology to enhance and support the educational environment. Technology integration in the classroom can also support classroom instruction by creating opportunities for students to complete assignments on the computer rather than the normal pen-on-paper.

A further aspect of technology integration is "curriculum integration". Here the use of technology involves its infusion as a tool to enhance the learning of a content area or multidisciplinary setting. Effective integration of technology is achieved when students can select technology tools to help them obtain information in a timely manner, analyse and synthesize the information, and present the information professionally to an academic audience (Amini & Oluyide, 2020)

For Grabe & Grabe (2007), technology integration nowadays had gone through innovations and transformed our societies. This has changed the way people think, work and live. As part of this, schools and other educational institutions which are supposed to prepare students to live in *"Knowledge Society"* need to consider technology (ICT) integration in their curriculum (Ghavifekr, Afshari & Amla, 2012). Arnseth & Hatlevik, (2010) see technology integration as information and communication technology in education and refers to the use of computer-based communication that incorporates into daily classroom instruction process. In conjunction with preparing students for the current digital era, teachers are seen as the key players in using ICT in their daily classroom activities. ICT here is seen to be capable of providing a dynamic and proactive teaching/learning environment.

Why the efforts for technology integration?

Albirini (2006) posited that ICT integration aims to improve and increase the quality, accessibility and cost-efficiency of the delivery of instructions to students. It also results in benefits from networking the learning communities to face the challenges of current globalisation.

Young (2003) stated that ICT (technology) integration is not a one-step process, but several ongoing steps that are continuous, and fully support teaching and learning and information resources. Technology (ICT) integration in education for instructional delivery generally means technology-based teaching and learning process that closely relates to the utilisation of learning technologies in schools. It is also worth the effort to embrace technological integration in the face of our "digital generation". A vast majority of the community of learners today belong to the generation that speaks the technology language. Assignment, teachings, facilitation can effectively be done using computers and smartphones. Social media chat apps are readily available to the teachers and learners of this generation. If they can read, interpret; respond to WhatsApp chats, Twitter, Facebook, etc. We can say in certain terms that if integrated into the classroom, these will enhance teaching and learning. Overall, it is safe to say that the efforts to invest in technology integration is not a wasted one.

Technology can be used in various ways to help both teachers and learners to learn about their respective subject areas. Technology-based teaching and learning offer interesting ways which include educational videos, stimulation, storage of data, the usage of databases, mind-mapping, guided discovery brainstorming and everything that will make the learning process more fulfilling and meaningful (Finger & Trinidad, 2002). Students on the other hand benefit from ICT integration where

they are not bounded to limited curriculum and resources, but can gain insight from hands-on activities, and a variety of information from the internet. Teachers use ICT to plan lessons by tapping from the internet and Open Educational Resources (OER). These can enhance efficiency and improve performance. It is however suggested that conclusions on why efforts in technology integration should be made cautiously.

Who integrates technology, and for whom?

A whole lot of categories of people are strategically positioned to integrate technology for instructional delivery: - the institution management, the ICT specialist, the teachers or instructor, the student (learner).

At the institutional level, management provides the enabling policy and finance for technology integration. The budgeting process and items for the purchase of various technology and ICT tools are proposed and provided by the institutional management for effective procurement and deployment of technology for classroom instructional use. For example, computers, video cameras, interactive whiteboards used for instructional delivery are budgeted for, procured, deployed to appropriate units for use in instruction.

Thus, the management plays a very crucial role in technology integration. Followed closely here are ICT specialists who may assist as operators, technical staff, etc. in the deployment of various ICT technologies in the classroom. They may set up and operate the projector, or help create various PowerPoint presentations and videos for effective instructional delivery. The Institutions must acquire by either recruitment or training necessary specialists for effective integration of technology in the classroom.

The third category of persons for technology integration is the teacher (facilitator, or instructor) who must know the type of ICT to be used in his instruction. The teacher needs to have a fair knowledge of what to do with what technology or ICT piece. In the management of learning content, for example, the instructor is expected to create videos, PowerPoint presentations and links for the possible online presentation of his lesson. Management is therefore requested to encourage teachers to take mandatory short courses in some ICT operations so that they can function effectively in an ICT- enabled instructional classroom, whether such classroom is virtual or physical.

The student (learner) may provide himself or herself with necessary ICT tools like the computer, the smartphone, they may be required to function in such virtual or physical classroom that integrates technology for the delivery of institution.

The answer to the question "for whom is technology integrated?" in the institution is obvious. The students (digital children and generation) are the direct beneficiaries of technology integration. It can also be argued that such technology deployment in teaching and learning bring benefit for lots of other people.

The teacher (instructor) also benefits from improved teaching and dynamic approaches for lesson delivery. The students are also equipped with the necessary skills to live in the digital generation and can become computer or technology savvy. Society is the ultimate gainer, as students find it fit to engage in the knowledge society.

Thus, it is trite to conclude that the government (through national policies on technology and ICT), Institutional management, ICT specialists, teachers and students (learners) are the enablers of technology integration for learning, instructional delivery, training and professional development.

ICT (Technology) in Higher Education Service Delivery

Universities are established to train needed work force for national development. It is the centre for advanced knowledge acquisition for effective living in a 'knowledge society' there are various sectors (departments) in a typical higher education. All these sectors work in synergy to deliver services to the student's client and subsequently to the society. Thus, the universities serve the "organic society" so that they can function effectively. It is expected that a network of computers, suggesting massive

deployment and integration of ICT in its operation, link all the sectors of higher educational institutions.

Services ranging from:

- Students admission
- Payment of fees
- Teaching and learning
- Examination administration
- Students graduation
- Students disciplinary issues
- Bursary
- Learners support services
- Payment of salaries
- Personnel recruitment
- Promotion and rewards
- Research, etc.

are all ICT-based. All institutions of higher education in Nigeria have a designated department of ICT that organizes periodic staff training to enable them to function effectively.

Technology Integration for Professional Development

Many methods have been utilized to provide professional development to teachers on technology integration. Davies & West (2014) highlighted three methods used in professional technology integration development, which include:

(a) Developing technological skills.

(b) Increasing support through collaborative environments.

(c) Providing increased mentoring.

Skills Development Using Technology

Here, technology integration practices are modelled by using blogs and other forms of internet communication (Chuang, 2010), video-based self-assessment (Calandra, Brantley-Dias, Lee, & Fox, 2009), electronic portfolios (DiPerna & Derham, 2007), and individual response systems (Cheesman, Winograd & Wehrman, 2010). These approaches are intended to help teachers gain experience and confidence with technology, as well as provide them with models for how it might be used effectively.

Collaborative Environment

Other scholars have also found that increasing collaboration among teachers learning to integrate technology can improve professional development outcomes. For example, MacDonald (2008) wrote that to effect lasting educational change" collaboration for teachers needs to be facilitated in "authentic teacher contexts". Hur & Bush (2009) added that professional development needs to emphasize the ability of teachers to share their emotions as well as knowledge. Most collaborative environments typically only emphasize knowledge sharing.

An increasing popular medium for enabling this collaboration and development of emotional safety is online discussions and social networking.

Mentoring

Similar to research on teacher collaboration, some scholars have discussed the important role of mentoring in helping teachers gain integration skills. Kopcha (2010) described systems of approach to professional development emphasizing communities of practice or shifting mentoring responsibilities throughout the various stages of the technology integration adoption process. Apart from the methods

used in assisting teachers to gain knowledge of technology integration, scholars also discuss various goals of technology integration for them. One of such goals is to change teacher's attitudes towards technology integration to get them to use technology more often (Annetia et al, 2008), Lambert, Gong and Cuper, (2008).

Technology Integration in Distance Education (Learning)

No sector of education has technology been integrated like in Distance Education or Distance Learning. The very nature of distance education itself is an innovation. Distance Education is a model of education delivery that thrives on the philosophy of (1) Ensuring access to educating a large (mass) member of people, (2) The use of technology.

The essential feature of Distance Education is aimed at reducing or eliminating the barriers imposed by: (1) Time, (2) Space, (3) Location, and other circumstances on man's quest to access education. This presupposes that the teacher (instructor, facilitator) are separated from the student (learner) most of the time. What the above scenario paints are that students would be assisted to learn on their own; students can be reached through technology integration, students can study from any location of their choice – office, designated classrooms, in the comfort of their homes, in prison, in transit etc.

Technology integration in distance learning has taken a very advanced form including the use of online classrooms like Google Classrooms, Zoom etc. Social media platforms like WhatsApp, various chat machines etc. are copiously employed by students and instructors to communicate for teaching and learning.

In Nigeria, the flagship institution for Distance Education is the National Open University of Nigeria (NOUN). NOUN is a single-mode distance learning institution. Its administrative structure and operations are couched in ICT integration. Admission, examination (including thesis defence) and graduation of students are now effectively done by using technology, especially using virtual platforms. Students are taught in Virtual Learning Environment.

Other conventional universities that also operate distance learning institutes, like the Universities of Ibadan, Lagos, Maiduguri; Obafemi Awolowo University, Nsukka, Babcock University, Federal University of Technology, Minna are dual mode in nature. The National Teachers Institute in Kaduna is also a single-mode Distance institution in Nigeria.

Leading global universities which operate the distance learning mode include the Open University of the UK (OUUK), Indhira Gandhi Open University India, Athabasca University, Canada etc. Open Universities depend on ICT and ICT integration in their everyday operations.

Technology Integration, Enhanced Access, and Quality Assurance

With technology integration in the administration, teaching and learning in higher education, more students are reached, effective teaching and learning are guaranteed, performance is enhanced, students learn the skills demanded in the fourth Industrial Revolution and the digital society.

With the Distance Education Innovation, leveraging on technology access to education is improved. The issue that emerges as a result of the above scenario is the issue of Quality Assurance. Can technology help?

I want to posit that there is a global explosion in the demand for higher education. In 2007, there were 150.6 million students in tertiary institutions globally. This figure increased to 165 million in 2012. It is expected that the figure will hit 263 million in 2025.
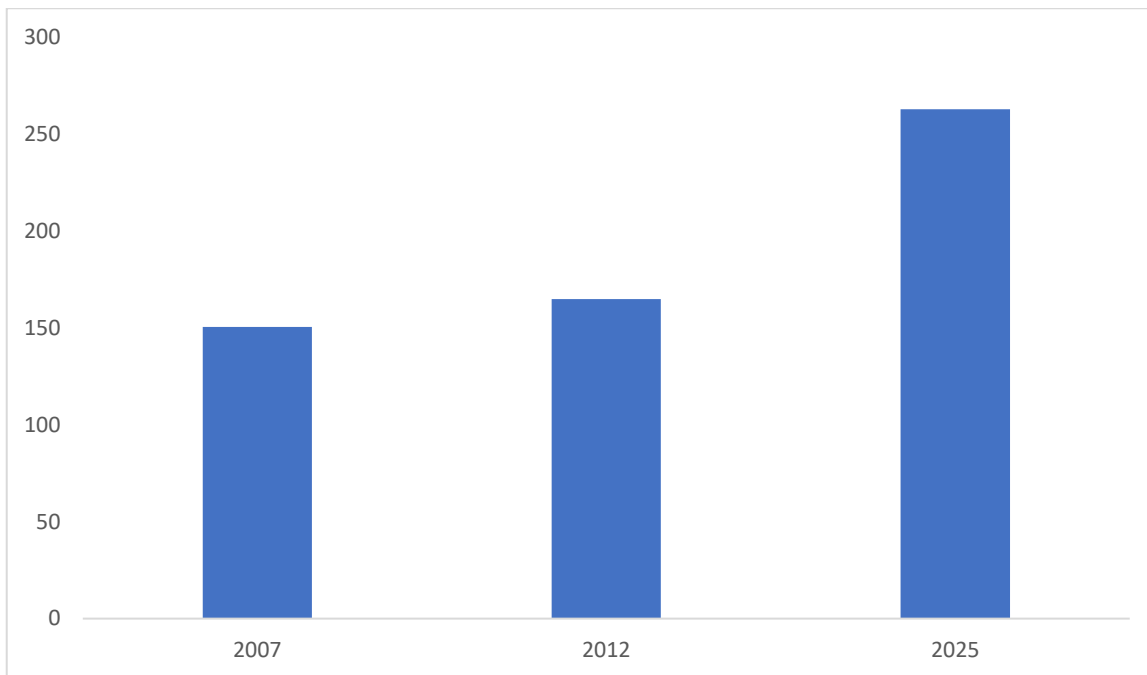
What does the above mean in real terms? It means that if we are to accommodate the children who will reach enrolment age between now and 2025, we will need to build four Universities with a capacity of 30,000 every single week that is a huge task. With an increase in demand, and access provided by Open Universities, comes the issue involving quantity and quality. That is another issue to be looked at in another conference.

Technology Integration: Benefits; The Dark Side

As I continued with the development of this paper, the question that kept recurring is: Technology integration is it worth the effort? What benefit? What is the dark side of Technology Integration?

The essence of every classroom instruction is to cause learning to occur. Before the advent of technology and its foray into the instructional classroom (physical and Virtual), teaching and learning had been face-to-face. The integration of technology for instructional delivery serves as an aide to teaching, and all instructional aides are provided to improve learning outcomes. That is what will be expected with technology integration. What do the research show? Trucano (2005) had posited that the coming of ICT into teaching and learning has necessitated a paradigm shift from the traditional method that was teacher-centred to the modern method, which is learner-centred. Teachers are no longer sages on stage who dish out knowledge to willing empty learners willing to learn.

Learners can also access the internet through various technologies to get information and acquire knowledge. The gains of such a new approach have been extolled by Buabeng-Andoh (2012), who affirms the great capabilities of ICT in the spreading of knowledge, making education more real and developing more efficient educational services.

Abolade & Yusuf (2005) posited that information and communication technology are essential tools in any educational system with the possibilities of being used to meet the learning needs of individual learners, support equality of educational opportunities, offer high-quality learning materials, increase self-efficiency and independent learning among students. It is as well important in teacher's professional development. The integration of ICT in the classroom creates more conducive learning platforms, which kindle interaction, thereby removing passivity (Ibeh, Adamu, and Owoseni, 2007). It can only be added that a conducive learning environment can only lead to positive learning outcomes, which is the expectation of most instructors. Olorundare (2006) also affirmed that technology integration in instructional delivery is important in teaching and learning as it guarantees unrestricted access of teachers to relevant information and development in the subject area as well as the provision of efficient and effective tools to take care of students' individual differences. It should not be

overlooked, that the integration of technology will also enhance student's computer skills needed as digital natives.

Effective instructional delivery embraces all human interactive skills employed by the teacher to promote/facilitate learning in the classroom situation. This will only lead to improved performance on the part of the learner. Amini and Oluyide (2020), established a positive correlation between student's ICT competencies and their academic performance as measured by an increase in their CGPAs, among students of the National Open University of Nigeria.

I have painted a positive effect of technology (ICT) performance among students (Learners), and effective classroom methods among modern teachers. However, let me also state that there is this dark side to technology integration. The so-called digital natives also apply their knowledge of ICT and Technology negatively to give them unmerited benefits. What of a situation where Bluetooth devices are hidden on the bodies of students writing examinations in the hall, and someone, not quite far from the hall reads and dictates answers to the student writing exams? Such students will obtain unmerited marks and grades in such examinations. We have seen cases of the use of smartphones to cheat in examinations and so on. Students have also superimposed their pictures on other students' pages and write exams as impersonations to fellow students. However, it should be noted that the positive contributions of technology integration overwhelm its negative tendencies of students to use it to cheat. Hence, we must advocate technology integration to find ways to fight any negative inclination of students and teachers that apply it to cheat.

Conclusion

Ladies and gentlemen, colleagues, thank you for listening to me these past minutes while I put forward my ideas, as I understand technology integration. My ideas are not absolute. You may have more information and understanding. Together, we contribute knowledge on technology integration and its superlative benefits for our students. (Learners), our teachers (facilitators), our institution managements. I also wish to reiterate that every institution should embrace the potentials of technology in our service delivery. They must especially for instructional delivery. They must also not look the other side respectively the proclivity of students wanting to help themselves by applying technologies negatively. I do not intend to burg you with summaries of my paper, but to wish you a fine deliberation in this conference. Let me invite you to the menu which is already set.

Thank you. And welcome to the digital generation.

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ADOPTING 21ˢᵗ-CENTURY GLOBAL BEST PRACTICES THROUGH INNOVATIVE TECHNOLOGY INTEGRATION IN EDUCATION

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Abstract
Technology has become an indispensable tool for meaningful teaching and learning in the 21st century. Hence, stakeholders have advocated for the need for innovative technology that can be integrated into education in this 21st century because the century is technological driven. This paper focused on four different generations that exist within the century and each has different approach to technology and life. The paper highlighted twenty-first century education to include certain skills that every individual require to survive ranked by employers for global employment, which could be acquired by the use Information, and Communication Technology tools. Technologies for the 21st century pedagogy with emphasis on technologies for teaching, learning, and assessment and the role of teachers towards technology integration in the 21st century were emphasized. It discusses rational for technology integration, Nigerian government policies towards ICT development, problems associated with technology integration and success factors for effective technology integration into education in the 21st century. Recommendations to overcome current educational challenges for proper technology integration were proffered.

Introduction

The essence of education globally is to assist individuals to maximize their potentials for optimum self-development and the development of society. Therefore, education is a prerequisite for an individual to attain self-reliance and the greatest instrument for any meaningful and sustainable national development. The role of education in the 21ˢᵗ century is not just only inculcating knowledge in students but also the skills they need to survive and bring about changes in society. It involves technology driven education designed to prepare and equip humans for acceptable, profitable, and worthwhile life in any community where they may find themselves. This presentation focusses on various technologies that could be integrated into teaching and learning, roles of a teacher in the 21ˢᵗ century, problems associated with technology integration in education, and recommendations on the need to adopt 21ˢᵗ century global best practices through innovative technology integration in education.

Twenty-First Century Education
The 21ˢᵗ-century is the contemporary century of the Anno Domini era or Common Era, following the Gregorian Calendar. It began in Janauary1, 2001, and will end on December 31, 2100. It is the first century of the 3rd Millennium which is also synonymous with the Digital Information and Technology generation.

Generations within Twenty-First Century
The century comprised of four different generations and each has a different approach to technology and life which must be noted. The **"Silent generation"** comprised those born before 1946 (72 years old and above), who were not raised with modern technology. Next to that is the "**Baby Boomers generation" (Digital Immigrants)** which is a generation of those born between 1946 and 1964 (between 53-74 years old), at the advent of computer technology. Following this is the "**Generation X" (Digital natives)**, a generation of those born between 1965-1980 who may be between 37-54 years old. They are the first to be computer literate. The next is the "**Net Generation" (Digital natives)**, which is the generation of those born after 1980 (from 37 years and below, as of today). They are born with modern technology and they communicate technologically via the internet and social media (Tapscot,

2009). Irrespective of the generations, there are certain skills required to become relevant and succeed in the century.

The Twenty-first Century Skills

The 21st-Century skills are the competencies that students nowadays need to acquire to succeed in their careers. According to UNESCO, (2016), the skills are sub-divided into three as shown in Table 1.

Table 1: Twenty-first century skills

Learning Skills (4Cs)	Literacy Skills (IMT)	Life Skills (FLIPS)
Critical thinking	Information literacy	Flexibility
Creative thinking	Media literacy	Leadership
Collaborating	Technology literacy	Initiative
Communicating		Productivity
		Social skills

The skills can further be categorized as hard skills, soft skills, and go-getting skills. The Hard skills belong to the realm of cognitive intelligence and they emphasize reasoning analysis and communication competencies. Soft skills are a mixture of intra-personal and intra-personal competencies and are in the domain of emotional mastery and control that enable us to function as team players. With the go-getting skills, the domain of imaginative intelligence, one can be entrepreneurially creative. Today's world of work demands a combination of each of the three sets of skills. The employers' ranking of skills required for employment is presented in Table 2.

Table 2: Employers' ranking of skills required for employment

Skills	Mean	Rank
Communication (verbal & written)	4.69	1
Honesty/Integrity	4.59	2
Teamwork skills	4.54	3
Interpersonal skills	4.50	4
Strong work ethics	4.46	5
Motivation and initiative	4.42	6
Flexibility/adaptability	4.41	7
Analytical skills	4.36	8
Computer skills	4.21	9
Organisational skills	4.05	10
Detail-oriented	4.00	11
Leadership skills	3.97	12
Self-confidence	3.95	13
Friendly/outgoing personality	3.85	14
Well-mannered / polite	3.82	15
Tactfulness	3.75	16
GPA (3.0 or better)	3.68	17
Creativity	3.59	18
Sense of humour	3.25	19
Entrepreneurial skills/risk-taker	3.23	20

Source: Job-interview-site.com (Employability Skills Checklist)
http//www.jobinterviewsite.com

All these skills could be acquired through the use of Information and Communication technology. Technology and educational development, especially in the current era, cannot be separated. Digital technologies are acknowledged as powerful tools in the development of education that is meaningful in the 21st century (Peeraer & Van Petegem, 2011).

Information and Communication Technology (ICT) in Education

Information and communication technology has the potential in preparing students for life in the 21st century. Through learning ICT skills, students are ready to face future challenges based on proper understanding. The use of ICT can help students to develop the competencies needed for the current globalization, boosts their motivation and widen their knowledge and information (Hussain et al., 2011).

Information and communication technology is defined as a process, which is a set of activities facilitated by electronic means: the capturing, storage, processing, transmission, and display of information (Curtin, 2002). As a product it covers the hardware and software, the network, and several other devices that convert information into digital form (Moursund & Bilefeldt, 1999). For our discussion today, it is defined as technologies that are used to store, receive, communicate or exchange information with others (Anderson, 2010). Within the school context it is a mix of media for information processing and delivery.

Information and communication technology tools are many and expanding. The tools include traditional hardware and software such as radio, television, motion picture projector, camcorders, audio player, photography camera, to mention a few. It also covers established and emerging hardware and software like computers, netbooks, mobile phones, MPs, e-book readers, personal digital assistants, interactive white board, e-mail, videoconferencing, and so on (Anderson, 2010; Curtin, 2002; Moursund & Bilefeldt, 1999). Some ICT tools are as depicted in Figure 1.

Figure 1: ICT tools adapted of teaching and learning
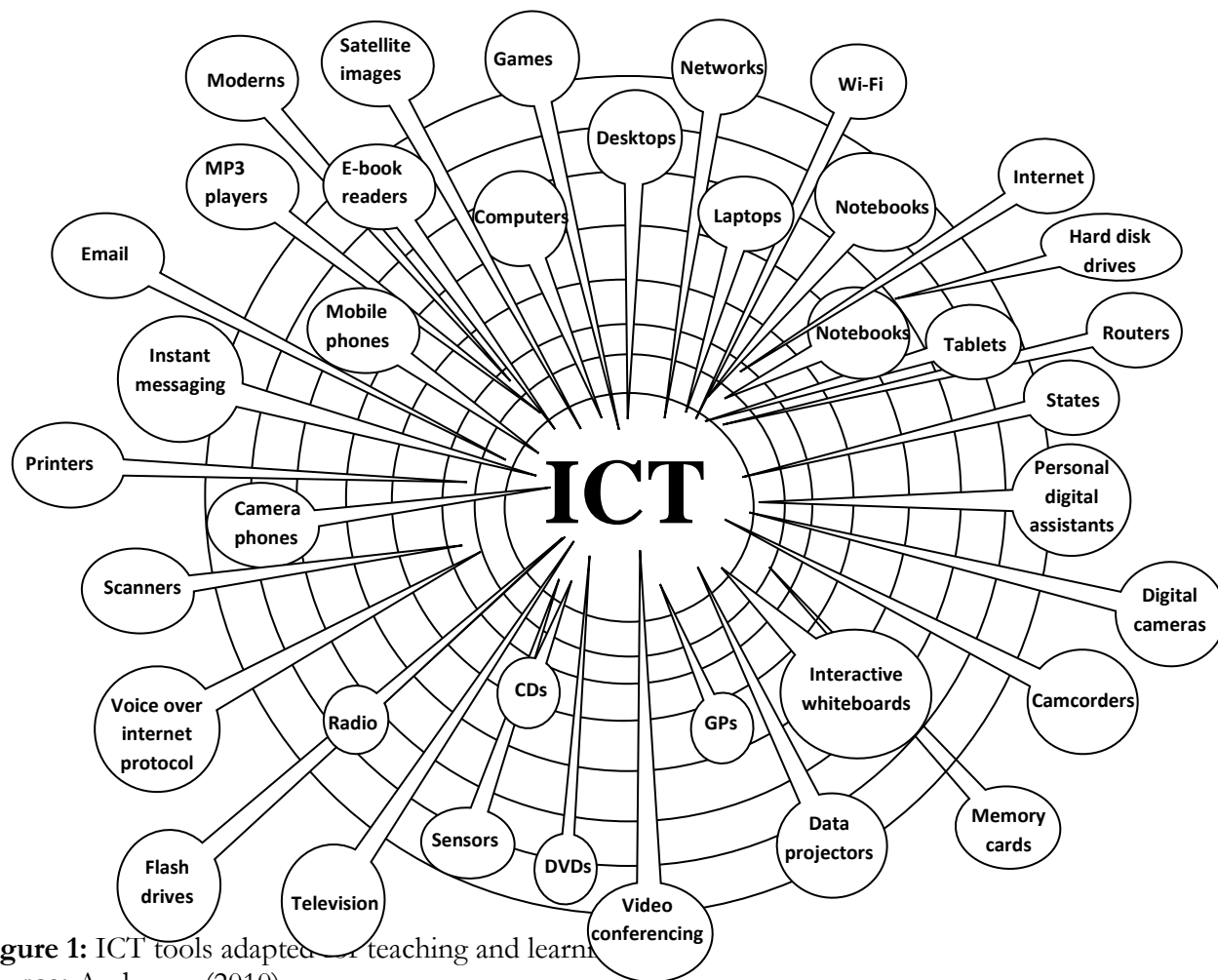**Source:** Anderson (2010)

Roles of Technologies for the 21st Century Pedagogy

The recent advancement in teaching, learning and assessment has placed a great deal of emphasis on the need for the adoption of global best practices in classroom instruction. The lesson delivery approaches and learning environments have been diversified and modernized. Teaching no longer

depends on the use of Blackboards (BB), White Board (WB), but uses SMART Boards, or even 'No Board' (such as Computers, Laptops, iPods, iPads, Tablets, SMART Phones, SMART TVs among others). Teaching and Learning (T&L) no longer take place just within the "four corners of a brick-and-mortar classroom" but does happen effectively as well outside. Teaching and learning could be face-to-face, online, offline basis or blended in both real and virtual environments. The advent of e-Learning has revolutionized education and pulled down many barriers to learning such as geographical, class size, distances, race or ethnic nationality, gender, among others (UNESCO, 2014; Yalam, 2016).

Technologies for teaching: The delivery is fast changing from "Time-based Education and Training (TBET) to Competency-Based Education and Training (CBET). Technology supports a variety of teaching strategies (such as learner-centered or personalised learning, collaborative learning, inquiry-based learning, project-based learning, flipped classrooms), thereby, improving access to electronics resources; providing a variety of resource formats including text, images, audio, video, and animation to make learning innovative, interactive, and engaging to students. Furthermore, technology enhancing and extending learning environments such as display technologies in the classroom to improve traditional learning environment as well as extend the learning environment to an online environment using Internet connections and technologies such as learning platforms. It also allows the extension of the learning environment to a mobile environment using mobile technologies. Presently, technology is used to support continuous professional development such to access online courses, to collaborate and communicate with technologies to reach global and regional online communities and create learning networks and communities of practice.

Technologies for learning: Technology supports a variety of learning strategies such as Active learning, Independent learning, and Informal learning. It improves access to learning using the Internet and mobile technologies at any time and from any location. In addition, it enables the choice of the pace of learning by students using ICT tools such as e-learning courses or simulations to learn at the pace that suits them. Different learning styles are accommodated by using a variety of digital resource formats such as text, image, audio, video, simulations, games, quizzes, and demonstrations, among others. Students' motivation and engagement are improved by using a variety of active and engaging electronic resource formats such as videos, games, simulations, and social media tools. Similarly, it supports the development of 21st-century skills Learning with technology helps in developing learners' ICT skills and by learning how to use technology effectively, they can develop other 21st century skills while using technology in the learning process.

Technologies for assessment: Today, the assessment and evaluation of learners' performance in school subjects have changed in many developed countries from content-based assessments to performance-based; also, most examinations have changed from pencil on paper to Computer-Based Testing. The method of certifications was also changed to National or Regional Vocational Qualifications (NVQ) which creates an opportunity for job mobility thereby boosting employment opportunities among teaming unemployed youths in those regions (UNESCO, 2014).

Technology supports a variety of assessment strategies such as diagnostic assessment, formative assessment, summative assessment, formal assessment, informal assessment, self-assessment, peer assessment, and collaborative assessment. We use technology for an online survey for diagnostic assessment to determine a student's current abilities or progress. An online quiz, simulation or game can be used for self-assessment. Blogs can be used for peer and collaborative assessment. Similarly, technology provides a variety of formats such as text, images, audio, animation, and video to make assessment appealing and engaging for students.
Technology enables re-use by providing assessment formats and collaborative tools that enable an assessment to be easily shared and re-used to reduce workload. A range of authoring tools enable students to demonstrate their knowledge and skills by creating content in different formats. Students can also update their work easily and share their work using tools like online storage, social networks and learning platforms. Nowadays, the teacher uses technology to assess a wider range of skills using different assessment types such as electronic portfolios, simulations, games, and virtual worlds to allow

students to demonstrate skills that go beyond the physical walls of the classroom. Finally, technology improves assessment management by using digital tools such as spreadsheets, databases, learning platforms, plagiarism detection software, and communication tools to manage submissions, markings, storage and communication of results. Also, online assessment tools for teachers include, Socrative, Google Forms, Mentimeter, Poll Everywhere, and Kahoot - game-based assessment tool.

Teachers' Roles in Technological Driven Century

In preparing students for the current digital era, teachers are seen as the key players in using ICT in their daily classrooms. Technology use in schools has influenced the way educators plan, design instruction, and assess their students. Innovations in educational technology have changed systems of communication, learning resources, lesson ideas, and professional development. Innovative technology facilitates creativity and learning productivity. The modern technology offers many tools that can be used in classrooms to improve teaching and learning quality (Hussain et al., 2011).

Given the proceeding, technology has changed the role of teachers in this dispensation. Therefore, teachers at all levels of schooling should be prepared for such radical revolution otherwise, they will be caught unawares. This is because students have already embraced technology and are waiting patiently for their teachers to catch up. The role of the teacher is being transformed from one of the primary dispensers of knowledge to one of facilitators of learning (Spiteri & Rundgren, 2020). The teacher now provides information in the context of a rich learning environment, in which the student is an active learner. Rather than the teacher telling the students what they are to learn, the teacher sets up an environment where the students can be active in acquiring knowledge and skills using appropriate technology tools (Gambari & Yusuf, 2015).

Presently, teachers should have the ability to collaborate effectively with others, being potential users of, and taking advantage of technology such as social media for educational purposes. Teachers should acquire verse knowledge of the network of digital learning communities, become innovators and facilitators with diverse knowledge of modern teaching strategies supported by technology. Teachers should become critical thinkers, researchers, and problem solvers, among others. These roles would assist them to effectively integrate the technological tools into education. Twenty-first century has changed teaching and learning approaches from the old teaching methods to new ones. These paradigm shifts of instruction have influenced the roles of teachers as shown in Table 3.

Table 3: Old and New Paradigm Shifts of Instruction

Old Paradigm	New Paradigm
Teacher-centered instruction	Student-centered learning
Single sense stimulation	Multi-sensory stimulation
Single path progression	Multi-path progression
Single media	Multimedia
Isolated work	Collaborative work
Information delivery	Information exchange
Passive, receptive learning	Active, inquiry-based learning
Factual, knowledge-based	Critical thinking informed decision making
Reactive response	Proactive, planned
Isolated, artificial context	Authentic, real-world context

The educational needs are changing in the 21st century and thereby, teachers should respond to the needs of children with different characteristics in their educational processes. The new generation of children are extremely familiar with a variety of digital technologies in their daily lives (Robertson, Fluck & Webb, 2007). Therefore, pre-service teacher education programs are now challenged to prepare teachers who can effectively understand, guide and teach these digitally competent children (Smolin & Lawless, 2007). Therefore, to prepare children for their future after formal education, teachers must continue to seize every opportunity to integrate technology to improve student learning outcomes. The following are the top ten technologies for 21st century instruction, Social Networking, Gamification, Mobile Devices, Digital Electronic Books (eBooks), Digital Video/Videoconferencing, Electronics

Response Systems, Simulation Technology, Podcasting, Lecture Capture Apps, 3-D Printing & Apps (Tomei, 2017).

Technology Integration in the 21st Century Education
Technology integration is defined as the use of technology to enhance and support the educational environment. Effective integration of technology is achieved when students can select technology tools to help them obtain information promptly, analyze and synthesize the information, and present it professionally. Technology should become an integral part of how the classroom functions.

Effective technology integration in teaching and learning should aspire to enrich students' learning, support teaching and reduce routine work for teachers. It should involve phases like designing suitable learning activities that apply ICTs to support varied requirements of the learners, planning strategies to handle technology and student learning, applying it for record keeping, developing effective classroom management strategies (A framework for training in-service secondary school teachers on ICT, 2010). Integrating technology is thus not about merely technology but it is primarily about content and effective instructional practices. Integration can therefore be defined not by the amount or type of technology used, but by how and why it is used (Earle, 2002).

To achieve this, there should be policy formulation, implementation, and practices (Yusuf, 2013). Figure 3 shows the components of transformative technology integration.
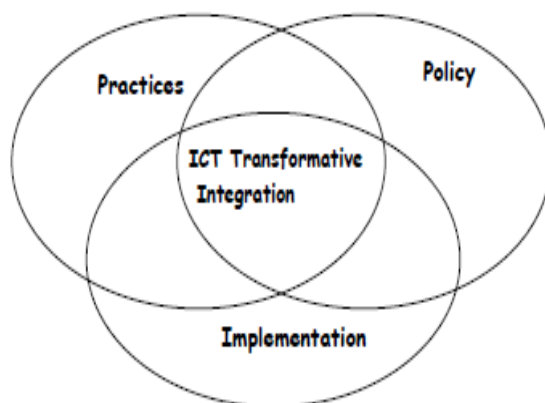
Figure 2: Components of transformative Technology integration
Source: Yusuf (2013)

As shown in Figure 2, the policy will inform implementation and practices. The policy provides a sound basis for assessment and evaluation. These three components must be addressed at the macro, meso and micro levels. Macro deals with national ICT policy development, implementation, and practices. Meso deals with the state, local government, or school policy development, implementation, and practices. Micro, however, entails individual teachers' implementation and practices based on the conception of learning. These major areas should be critically examined. Government has made the following policies towards the ICT Development in Nigeria:
(i)   Launching of the National Policy on Computer Literacy at Primary, Secondary and Tertiary levels of education in 1988
(ii)   Launching of the National Telecommunications policy (September, 2000)
(iii)   Development of a comprehensive science and Technology policy. (2001)
(iv)   Development and launching of the National Information Technology Policy (2001)
(v)   Establishment of the National Information Development Agency (NITDA) (2001)
(vi)   Launching of the Nigerian Satellite Systems Programme by the NASRDA (2001).
(vii)   Development of the National Infrastructure Backbone (NIIB)
(viii) Development and launching of the Mobile Internet Units for schools in remote areas.
(ix)   Establishment of Rural Internet Resource centres (RIRC) in the six geo-political zones

All these policies would translate to nothing without adequate implementation and practice. There are factors that could lead to ICT transformative integration in Nigeria. The success factors for effective technology integration are generally classified as human factor, leadership, technological, pedagogical, and course/programme factors (Menchaca & Bekele, 2008; Yusuf, 2013). These factors and their elements are shown in Figure 3.
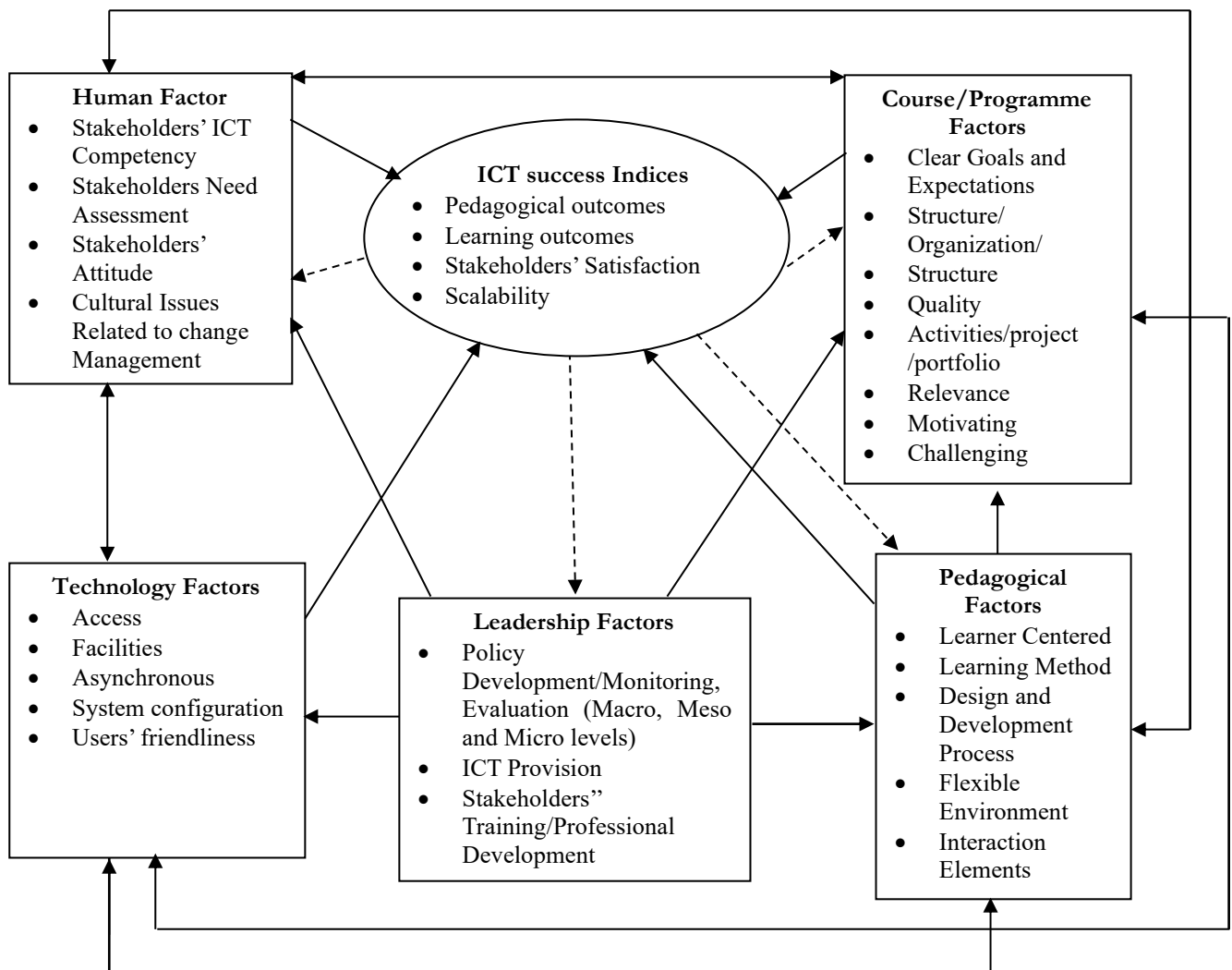
Figure 3: Adapted model of success factors in technology transformative integration
Source: Adapted from Menchaca and Bekele (2008) and Yusuf (2013)

The figure shows the interplay, and inter-relationships among human, leadership, technological, pedagogical, and course factors in ensuring successful technology application are complex, yet they need to be taken care of to ensure success in technology integration.

Benefits of Technology Integration in Education
The benefits of integrating technology in education cuts across every educational stakeholder such as teachers, students, administrators, parents among others. For instance, it provides tools for teachers to be more productive, helps them in using multi-institutional strategies, eases stress and reduce their work load, provides avenue to be continually trained on the job as professionals, assists them to learn along with the students who are digital natives, helps them to facilitator of learning, and reduces mundane routine and create room for efficiency (Spiteri & Rundgren, 2020).

Technology integration makes students to take ownership and control of their learning time, pace, content and make them actively responsible for their learning, it ensures availability and accessibility of

quality resources economically, it aids effective collaboration, enables dynamic media to be more readily exploited., It will make for the development of high-order skills through problem solving activities (Davies & West, 2014).

For school administrators, technology integration ensures availability of resources at affordable cost, eases record keep through the use of databases, ensures prompt retrieval of information for decision making, ensures multiplicity of services provided (Spiteri & Rundgren, 2020). It makes school and home connection feasibly, and eases the monitoring of wards' progress (Ekpo, 2017). With technology integration, educational issues could be technologically handled, difficult routine tasks become easy, instructional materials can be developed, materials can be delivered in varying contexts to learners, student and programme assessment and evaluation become easier, cheaper, faster, among others.

Technology Integration to Enhance Students' Performance
Students' poor performance has been a great concern to education stakeholders (teachers, parents, Government, private sectors, administrators, policymakers, educational experts, among others) over some decades ago in Nigeria schools. There several factors are responsible for students' poor performance. Among the causes of students' poor performance are poor instructional strategies and inadequate technology integration for classroom instruction (Gambari *et al.,* 2013; Nwokocha, *et al.,* 2020). Furthermore, poor knowledge retention, gender differences between male and female students, ability levels, poor attitude to studies, and lack of motivation to learn are also contributed to poor academic performance. Studies revealed that technology integration for instructional delivery promote knowledge retention (Gambari & Yusuf, 2016), gender friendly (Gambari, *et al.*, 2016c), it bridges the gap among students' ability levels (High, Medium and Low) (Gambari *et al.,* 2013b); it influences students' positive attitude towards their studies and enhanced their academic achievement (Gambari & Yusuf, 2017). Technology integration motivate students to learn, promotes their social interaction and academic performance (Gambarı *et al.,* 2015).

Technology has revolutionized the way we think, work, and play. Therefore, when integrated into the curriculum, it enhances the learning processes and improves students learning outcomes (Spiteri & Rundgren, 2020). With technology, students are engaged in their learning, motivated to learn, become creators and critics instead of just consumers. Effective technology integration must support four key components of learning: active engagement, participation in groups, frequent interaction and feedback, and connection to real-world experts (Chaamwe, 2010). There is growing body of evidence that technology integration positively affects student achievement and academic performance. Therefore, increased implementation of technology will increase students' comprehension of content and development of skills such as analytical reasoning, problem solving, information evaluation, and creative thinking.

Problems Associated with Technology Integration in the 21st Century
The presenter agrees with Yusuf (2013) and Vikoo (2019) on the challenges confronting technology integration in the 21st-century pedagogy in Nigeria schools as follow:
1. Teacher factor: Many Nigerian teachers lack basic ICT and fundamental technological skills to integrate technology into the instructional process. Many are resistant to change and are yet to embrace ICT. In addition, Nigerian teachers are poorly paid, and these unfavourable working conditions may cause frustration and reluctance in integrating technology into classroom activities.
2. Unreliable electricity supply: Electricity is intermittent and most schools are not connected to the national grid, therefore, insufficient power supply becomes a major impediment to the adoption of 21st-century pedagogy.
3. Poor economy and its effects: Most Nigerians cannot afford simple digital resources, therefore, they do not have access to computer-based telecommunication facilities and this makes it difficult for schools to access and integrate required online services.
4. High cost of ICT facilities: Most educational institutions in Nigeria lack adequate computers and other ICT-related equipment. However, the few who have access to the Internet are unable to retain

the access because they cannot afford to pay for Internet hosting rights, as well as to maintain and sustain ICT facilities.

5. *Shortage of ICT experts:* In many schools, there is a severe shortage of qualified ICT experts in the areas of application software, operating systems, network management, and technicians who can perform routine maintenance and minor repairs.

6. *Epileptic Internet Services:* Internet services are extremely limited and expensive and this make the integration of telecommunication in the delivery of 21st-century pedagogy in Nigeria a difficult task.

7. *Inadequate software with local content:* There is scarcity of educational software that is relevant to Nigeria curriculum. Those that may be adaptable are expensive due to high foreign exchange rates and artificial scarcity created by intermediaries.

8. *Outdated curriculum:* Most Nigerian curricula are not technologically inclined to meet the 21st-century learners' skills.

9. *Instability and unreliability of technology:* The dynamic nature of technology causes a rapid turnover of technical tools and techniques, rendering them obsolete in a short time.

10. *Lack of maintenance culture:* Most Nigeria's public schools are neglected and under-maintained and some equipment is rotting in their initial containers.

All these constraints can be intimidating and discouraging, but they should serve as a reminder that education in this dispensation requires unconditional commitment from all the stakeholders. We can decide to leverage on the potentials of technology towards achieving 21st-century skills through vision, improvisation, and determination. We should design and develop indigenous software packages that can improve our curriculum.

Conclusion

Every century comes with different challenges. Education is a useful tool to overcome these challenges. Our education products will solve no problems if technologies meant to support innovative teaching and learning are not available for the use of teachers and students at all levels of education.

There are many challenges and difficulties in integrating technology in schools. The needed facilities are not available, political backing, steady electricity, and dependable infrastructure as well as adequate funding for education to thrive are all insufficient. Addressing these challenges is necessary if Nigeria wants to join the global world in providing skills for our citizens to compete favorably in a global economy. Presently, we are producing unskilled graduates who cannot think outside the box, who cannot create jobs rather than rely on unavailable white-collar jobs. The present curriculum also does not focus on the 21st century skills that could lead to growing youth population out of unemployment. "How then do we deal with these challenges?"

Technological tools and resources could assist in individualized learning, collaborative learning, and help to ensure effective interactions among education stakeholders. They could help facilitate unrestricted access to quality education hitherto limited by distance, gender, physical disability or other family and socio-economic commitments. Also, the multi-modal affordance of ICT would help ensure high-speed and quality pedagogical delivery.

Recommendations

The following are recommendations to overcome the current educational challenges and for the adoption of 21st-century global best practices:

1.   Teachers should be encouraged to embrace 21st century pedagogy and integrate modern digital technologies into their instructional process. Therefore, government and educational stakeholders should provide adequate digital literacy training for teachers to enable them to integrate technology for effective instructional delivery in the 21st century.

2.   There is a need to restructure the existing curriculum at all school levels to reflect 21st century thinking and best global practices.

3.   Government and non-governmental organisations should procure and deploy adequate ICT facilities at all levels of Nigeria's educational system in order to compete academically with their counterparts globally.

4.   Federal Government should remove tax on importation of digital technology devices for education sector.

5.   Government should provide adequate technical support for planning, implementation and troubleshooting when technical problems occur.

6.   Students should be guided on the positive use of mobile technology devices to promote effective learning. This is achievable by sharing learning materials to their devices, record lecture presentations, download other relevant learning resources, among others.

7.   Professional organisations such as Educational Media and Technology Association of Nigeria (EMTAN), Association for Innovative Technology Integration in Education (AITIE), and other related bodies should drive reforms in using technology to transform Nigerian educational system towards 21st century education.

8.   The Educational technology programme in higher institutions should be redesigned to emphasise both teachers and students' repackaging to learn via the deployment of digital learning tools such as the Google Classroom, Prezi, Quizlet, etc.

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Conference Papers

STRENGTHEN THE BASIC PROGRAMING SKILLS OF GUIDANCE AND COUNSELLING UNDERGRADUATE STUDENTS THROUGH COMPUTER BASED INSTRUCTIONAL STRATEGY IN VERITAS UNIVERSITY ABUJA

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Abstract

Programming is a complex task that requires generation of new ideas, thinking and creative skills. This study, therefore, was aimed at strengthening the BASIC programming skills of guidance and counseling students of Veritas University Abuja, Nigeria. Interest of students towards computer usage and gender were examined. The study adopted the pretest-posttest control group, quasi-experimental design. 100 and 200 level students were selected with well-equipped computer laboratory and available Computer lecturers were purposively selected from the University. Two intact classes with 50 students were randomly assigned to Experimental (25) and Control (25) groups. Treatment lasted 6 weeks. Instruments used were Undergraduate Students' Interest towards Computer Usage Questionnaire and Programming Skills Performance Test with the reliability coefficient stands of 0.78 and 0.88 respectively. Data were subjected to Analysis of covariance and Estimated Marginal Mean (EMM) was used to determine the magnitude of the mean score across the groups at 0.05 level of significance. More than half of the participants were female (62%). Treatment had a significant main effect on the students in BASIC Programming Language F=36.385; p<0.05. Also, students' interest in computer usage has no significant effect on students F=2.109; p>0.0 performance in BASIC programming language F=0.021; p>0.05. Computer based instructional strategy was found to improve students' performance and stimulate student's interest in computer usage and programming in Veritas University Abuja. Computer based instructional strategy should be adopted by computer lecturer in the teaching of computer programming in ICT in education to enhance students' performance in coding. Also, the strategy emphasis on the need to continuously use innovative strategies such as computer instructional strategy to facilitate and improve instructional delivery.

Keyword: *Strengthen, Basic Programming, Skills, Guidance, and counselling, Computer Based, Instructional Strategy, Veritas University, Abuja*

Introduction

Human, capital and societal development are fundamental to every nation, depend on the education put in place. Thus, it is on this note that levels of education are built and therefore forms a prerequisite for growth and development in education. University education scheme in Nigeria is the highest level of academic attainment. University education comprises at least four-year duration, irrespective of any courses in education.

The emphasis on undergraduate Guidance and Counselling student's skills has to do with all-round development of the students. This programme requires unique respond needs, providing benefits to students while taken care of their intellectual, emotional, social, psychological and technological needs. The expectation of successful student can be free from crisis-oriented learning situation instead of preventive, remedial, developmental and innovative. However, guidance and counselling must be

accountable, well-planned and goal-oriented towards technology. That is, a life-long learning experience aiming at deepening the skills level of the students to lay the foundation for critical thinking through the inculcation of appropriate learning, self-awareness, and life skills (Owuamanam, 2005). Guidance and Counselling plays a prominent role in future career of Nigeria and her youths. For the programme to be comprehensive, it should also be relevant in all facet to the students in accordance to 21st century technological development, and not merely maintain a status quo (Maduewesi, & Ezeoba, 2010) It must be purposeful, and designed to meet the priority of the students. These should be met in an efficient and effective manner. It is a transition stage where students are exposed to programing skills with instructional strategy in Computer application and so on.

Hence, they are relevant and instrumental in making the remarkable contribution to education growth of developing countries by producing suitable manpower according to the needs of the education industry, society and the global world as a whole (Vijay, 2017). This can be achieved where students have opportunity to interact with ICT resources and engage in hands-on activities. The Federal government of Nigeria as contained in the National Policy on Education, FRN (2013) highlighted the major objectives of educational opportunities to:

- acquire necessary knowledge, skills and attitudes for the development of self and the nation
- build a firm foundation for further education and training
- develop ability for enquiry, critical thinking and rational judgment
- identify individual talents and develop them
- build a foundation for technological and industrial development.

In respect to the above, proper education of the university (Guidance and Counselling) students is regarded as the basic tool for effective child upbringing and societal development. In this context therefore, there is the dire need to build computer programming skills with learning instructional strategy communities all over the educational institutions, and in particular among the younger generations of teachers. These learning communities enhances continuous improvement, promotes collective responsibility, and supports alignment of individual, team, school, and school system goals. Each members are accountable to one another to achieve the shared goals of the school and school system and work in transparent, authentic settings that support their improvement. Based on these, there is a rising need for improved learning of computer programming as a tool in promoting quality human resources for sustainable development of nation education as emphasised by UNESCO (2013). It is in line with these that school at all levels offer a number of ICT and computer related subjects and as such to harness the potentials of teaching and learning of computer programming for guiding of human and materials resources in schools.

However, computer programming language is the universal language of our planet and a basic literacy in the digital age. It is a special language understood by a computer, it consists of various command that user give to a computer to carry out any given task. They are set of words, symbols and codes that are used to write a computer program. The process of writing these instructions (program) is called programming. Programming language can now be defined as a sets of rules given to the computer to perform a given task. Computer programming language can be defined as an act of writing a program which a computer can execute to produce the expected or desired result (output). Programs are a set of instructions that computers execute in order to perform a task and are written in a programming language.

Programming involves the ability to generate solution to a problem, which means that one of the learning outcomes is the ability to solve problems and also, if the problem is a big problem, the ability to split the problem into sub problems and create a generalizable central solution. In addition, the student achieves the ability to create usable, readable and attractive solutions. Furthermore, knowledge of programming helps students also acquires a sense of mastery over a wide range technological gadget and establishes contact with some of the deepest ideas of different disciplines such as: education, science, engineering, mathematics and the art of intellectual and mind building.

There is no doubt that learning computer programming at the undergraduate is helpful for all students, at least in their everyday life. The benefits of learning programming help young teachers to gain advantages in thinking, processing and communication. These benefits can support acquiring, developing and improving the 21st-century skills among learners (Alharbi and Steve 2014).

The knowledge of Computer programming skill among others enables students to solve tasks that demand strategic reasoning, critical thinking, insight and creativity. These tasks appear to be far more engaging for students and better prepare them to take their place in a knowledge society. Many researchers believe that engaging in programming tasks not only enables students to gain knowledge of programming, but also has great potential in promoting their higher order thinking performance (Chang, Shieh, and Liu, 2012.). The ability to understand and implement the programming language is important skill for the students to acquire.

Computer programming skills, which is an integral part of ICT is the main driver in the 21st century which has made life become easy since its emergence. The progress recorded for virtual development in all aspects of human endeavour, had significantly contributed to the use of computer technology in school counselling system. With increasing and frequent changes in curriculum to meet the 21st century learner's need, there is increased demand for computer programming usage in diverse ways. Hence, Governments' organizations, education systems, researchers, school leaders and lecturers consider instructional strategy to be critical in developing university education curriculum (Chao, 2016). The important role that technology plays in education gives guidance and counselors, learners and other stakeholders of education the opportunity to design meaningful learning experiences, derived from the application and use of computer.

The inclusion of Computers programming into teacher in training in Veritas university, Abuja was as a result of the need to acquire requisite skills on computer usage where, students are expected to learn how to use word processing application for editing, perform simple arithmetic and logical operations and apply such knowledge to transform the counselling ability of human and educational resources (Adegoke, 2015). The introduction and implementation of this subject in many countries across the world came about as a result of policy pronouncement and the need to cope with the trends in computer technology and education (Ramlogan, Raman & Sweet, 2014). Computer programming is therefore a subject organized to enable students understand the function, uses and limitations of the computer and to provide an opportunity for the study of the modern methods of information processing.

In other word, as a classroom tool, the instructional strategy captures the attention of students and these often elicit excitement to learn (Bukaliya, 2012). He stressed further that, Computer is a versatile instrument that can store, manipulate, and retrieve information with the capability of engaging students in instructional activities to increase their learning, as well as helping them to solve complex problems in counselling to enhance their cognitive and manipulative skills.

Govender and Govender; Havenga, Mentz, Breed, Dignum and Dignum (2014), suggests that some skills required in the program writing process are not taught explicitly, therefore teaching problem solving, one of the skills required, should not only include the presence and practice on problems, but should also include teaching the problem-solving process. The programming writing process requires in-depth reading and cognitive awareness skills about how the counselling problem can be effectively solved. For this reason, program writing involves reviewing decisions and actions continuously to improve the quality of the program and producing alternative methods that may lead to more expressive results (Kpolovie, 2014).

In today's digital world, programming is a fundamental skill alongside mathematics and reading, but few learners have the opportunity to learn to program because it is rarely taught in school due to lack of requisite programing skill of teachers (Kay, 2012). However, there has been varied opinion that programming is necessary only for gifted students and to those who will continue to deal with programming as their further profession in engineering and computer science. Fortunately, leading scientists, inventors and educators recognize the benefits of programming for all students. They believed that since programming drives innovations, it will in turn lead to success in other areas of life.

Finally, considering the importance of the programming as one of the most valued 21st century's skills, the main challenge is how to enable learners to start programming at an early age as scholars (Kátai, 2015 and Tynker, 2017) are of the opinion is that programming is best learned early.

Some of the programming language that enables learners to acquire these skills are the beginner's level among others include BASIC. Scratch, Logo, C programming language among others learning of computer programming. The teaching and learning of QB language lies in its interactive user interface, which provides immediate feedback on syntax and run-time errors. Like other structured programming languages such as PASCAL, FORTRAN, PL/I, ADA, ALGOL etc, it is a procedure-oriented language, which employs the technique of problem solving and uses English syntax in the solution of problems in a form understandable to human beings.

To achieve these objectives and for effective acquisition of programming skills and knowledge as a school subject, it should be effectively taught by qualified computer educators.

Despite a growing use of technology in daily life, there is a persistent gender gap in participation of girls in technological fields compared with boys. They also receive less exposure to technology-related activities compared with boys, and this starts early in development. It was reported in many computers education studies that female enrollment in computer science towards programming was remarkably low (Alharbi and Steve 2014). This may be attributed to the more negative attitude of females towards computers than males (Chang, Shieh, Liu and Yu, 2012). Accordingly, the result of another study showed that females' mean scores of programming attitude were significantly lower than males as opposed to the result of the studies done by (Yildirim and Kaban 2010) which favour high performance for female.

Computers have been generally accepted as modern instruments that enable the teachers to select the teaching methods that will increase students' interest and participation in learning. Hence, the National Policy on Education (FRN, 2013) sets guiding principles for procedures and activities in computer technology usage at different levels of learning in school curricula at the early years of education, and these influence the use of Computer-Based Instructional Strategy (CBIS) as essentially a problem-solving specialized ICT and technology-based methodology for teaching, learning and counselling in schools, which is germane to inspiring, coordinating and supporting students' classroom learning and counselling activities.

The CBIS is a systematic methodology for retentive learning among students, due to its powerful, expressive and non-textual ways and approaches of capturing and presenting information and facts which helps students to use ICT-based technology and computer content in interaction and learning. It is a pedagogical strategy that involves the use of computer to deliver counselling and learning content.

CBIS has been a common pedagogical method used in classroom and beyond to deliver instruction (Ramlogan, Raman & Sweet, 2014). In a school classroom, the self-paced learning using CBI encourages independence and the ability to take the time needed for mastery of the content presented. This type of learning allows learners to replay the computer as many times as they need in order to understand its contents. More specifically, the use of computer, video streams or video-web communication has spanned the educational curriculum in a range of fields not leaving behind computer programming. From the students' perspective, studies have shown that computer can be a more effective medium than text to enhance their satisfaction and motivation during the learning process (Sáez-López, Román-González, & Vázquez-Cano, 2016).

CBIS approach differs from flipped or blended learning as the computer is viewed in the classroom during the lesson time, rather than at home. This means that the teacher is in control of the exact content to be presented in the computer, and different videos can be made at various levels, catering precisely to learner needs. It also changes the teacher's role to that of facilitator or coach, able to roam around the classroom overseeing the various videos being used as students complete the given instruction (Micheal, Horn and Heather 2014).

Teacher-made programming allow specifically chosen content to be presented to individuals or groups of students as needed, they also ensure the teacher is both planning and delivering appropriate content for the range of needs found in a classroom. Chang, Shieh, Liu and Yu, (2012) found that implementing computer-based instruction offers many advantages, such as increased student independence and decreased reliance on adult assistance, consistent instruction for students, and minimal training for

adults who assist with computer-based instruction. Computer-based instruction appears to be highly motivating to learners as it allows students to view actual objects and realistic scenes, to see sequences in motion, and to listen to narration. Therefore, this study tends to strengthen the basic programming skills of university undergraduate students through computer-based instructional strategy.

Statement of the Problem
Computer programming is included in university undergraduate curriculum to expose students to the requisite of thinking and problem solving skills for the production of globally competitive individual and thus promote higher order thinking in learners among others through guidance and counselling. Learning programming is a complex task since programming requires generation of new ideas, thinking and creative skills in problem solving. Experience shows that students perceive learning computer programming as a difficult, non-attractive and boring task in carrying out their activities. This has often made researchers to attempt developing programming environments with graphical interfaces to ease students' load of developing computer programs.

One of the main challenges faced by teachers and educational practitioners in the field of computer education is how to make computer programming attractive and interesting for students to meet up with the global competitiveness which includes the ability of the learners to demonstrate adequate competence needed for human and materials management, counselling, economic growth and being able to write a simple BASIC programming code. This requires application of different strategies and techniques to make it interesting, friendly and meaningful to learners. Therefore, this study aims to improve and deepen the programming skill of undergraduate students using BASIC computer programming language through computer-based instructional strategy.

Hypotheses
The following hypotheses were tested at 0.05 level of significance:

1. **H_{O1}:** There is no significant main effect of treatment on Guidance and Counselling students' performance in basic programming skills language.

2. **HO2**: There is no significant main effect of Guidance and Counselling Students' interest in Computer usage on students' performance in basic programming language.

3. **HO3:** There is no significant interaction effect of treatment and gender on performance in computer BASIC programming language.

Methodology

Research design adopt the pretest-posttest control group, quasi-experimental. Variables in the Study are Computer-based Instructional Strategy, Students' interest towards computer usage in three (3) categories (low, average and high) and Students' performance test in BASIC programming language. The population for the study comprises all students of Faculty of Education Veritas University, Abuja. While the sample size consists of 50 students of three departments in the faculty. The purposive sampling procedure was used to select the university that participated in the study. The criteria for the selection of the university are the availability of well-equipped computer laboratory and willingness of the school to participate in the study.

A random sampling procedure was adopted in selecting participants for the study into control and experimental groups. The instruments used for the study are Students' interest towards computer usage questionnaire, Use of Computer-Based Instructional Strategy and Students' performance test in BASIC programming skills language. The instruments was validated by computer studies lecturer and experts in the field of Educational Technology in the Veritas University Abuja for content and face validity. While the reliability of the instruments named; Undergraduate Students' Interest towards Computer Usage Questionnaire and Programming Skills Performance Test stand at 0.78 and 0.88 respectively. Inferential statistics of Analysis of Covariance (ANCOVA) and Estimated Marginal Mean (EMM) was used to test and determine the mean score across the groups at 0.05 level of significance.

Testing of Hypotheses

H$_{01}$: There is no significant main effect of treatment on Guidance and Counselling students' performance in basic programming skills language.

Table 1: Analysis of Covariance (ANCOVA) showing effect of treatment on Students' in BASIC Programming Language

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	205.504[a]	7	29.358	12.269	.000	.672
Intercept	200.082	1	200.082	83.620	.000	.666
Pre test	13.335	1	13.335	6.6531	.023	.117
Treatment	**87.061**	**1**	**87.061**	**36.385**	**.000***	**.464**
Gender	.933	1	.933	.390	.536	.009
Interest	5.046	1	5.046	2.109	.154	.048
Treatment * Gender	30.755	1	30.755	12.854	.001	.234
Treatment * Interest	4.820	1	4.820	2.014	.163	.046
Gender * Interest	2.328	1	2.328	.973	.330	.023
Treatment * Gender * Interest	.000	0	.	.	.	.000
Error	100.496	42	2.393			
Total	6804.000	50				
Corrected Total	306.000	49				

R Squared = .672 (Adjusted R Squared = .617)

This table 1 showed that the treatment has a significant main effect on the Guidance and Counselling students' performance in computer BASIC programming language F= 36.385; p<0.05. Hence the null hypothesis is rejected. The result also showed that the effect size is 46.4%. The table of the treatment estimated marginal means showed that Guidance and Counselling students exposed to computer-based instructional strategy had a higher posttest mean score compared to those in the control. This means that the computer-based instructional strategy increase the state of students exposed to it.

Dependent Variable: Post test

Treatment	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Treatment	10.228	.265	10.089	11.561
Control	7.270	.342	7.493	10.112

Covariates appearing in the model are evaluated at the following values: Pre-test = 6.6531.

Based on modified population marginal mean table revealed that the Post-test of Guidance and Counselling students exposed to computer-based instructional strategy were significantly difference from their counterparts in control group. This implies that students taught using computer-based has a highest means score and more engaged than their counterpart in control group.

H$_{02}$: There is no significant main effect of treatment on Guidance and Counselling students' interest' in computer basic programming.

Table 3. Analysis of Covariance showing Guidance and Counselling Students' interest in Computer usage on students' basic programming language

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	144.011	7	22.144	5.191	.000	.376
Intercept	315.886	1	315.886	74.324	.000	.567
Preperformance	2.414	1	2.414	.566	.456	.013
Treatment	63.345	1	63.345	14.849	.000*	.261
Gender	19.897	1	19.897	4.664	.037*	.100
Interest	**.088**	**1**	**.088**	**.021**	**.887**	**.231**
Treatment * Gender	.002	1	.002	.000	.984	.000
Treatment * Interest	3.664	1	3.664	.859	.359	.020
Gender * Interest	.418	1	.418	.098	.756	.002
Treatment * Gender * Interest	.000	0	.	.	.	.000
Error	167.169	42	4.201			
Total	6445.000	50				
Corrected Total	321.180	49				

a. R Squared = .432 (Adjusted R Squared = .345)

This table 3 showed that the interest has a significant main effect on the performance of Guidance and Counselling students F= 0.21; p<0.05. Hence the null hypothesis is rejected. The result also showed that the effect size is 23.1%. The table of the treatment estimated marginal means showed that students exposed to computer-based instructional strategy had a higher posttest mean score compared to those in the control.

H_{O3}: There is no significant interaction effect of treatment and gender on performance in computer BASIC programming language

Table 4: Analysis of Covariance (ANCOVA) showing interaction effect of Treatment and Gender on Students' computer performance in BASIC Programming Language

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	201.524	7	26.347	12.269	.000	.572
Intercept	198.082	1	198.082	67.520	.000	.466
Preperformance	13.335	1	13.335	5.573	.023	.117
Treatment	**87.061**	**1**	**87.061**	**36.385**	**.000***	**.464**
Gender	**.933**	**1**	**.933**	**.355**	**.536**	**.009**
Interest	5.046	1	5.046	2.109	.154	.048
Treatment * Gender	20.641	1	20.641	10.678	.001	.234
Treatment * Interest	4.820	1	4.820	2.014	.163	.046
Gender * Interest	2.328	1	2.328	.973	.330	.023
Treatment * Gender * Interest	.000	0	.	.	.	.000
Error	101.396	42	2.393			
Total	5804.000	50				
Corrected Total	306.000	49				

a. R Squared = .334 (Adjusted R Squared = .317)

This table 4 also showed that gender has no significant effect on students' performance F=0.35; p>0.05; Hence the null hypothesis related to gender is not rejected. This means that students' gender has no significant effect on their performance.

Dependent Variable: postperformance

Treatment	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Treatment	7.208	.333	4.244	12.231
Control	4.406	.256	2.326	5.765

Table 5   revealed that the post-performance of guidance and counselling students exposed to computer-based were significantly different from their counterparts in Control Group. This implies that students taught using – basic computer language has a highest means score and more engaged than their counterpart in control group.

Discussion of Findings

The results revealed that treatment had a significant effect on Guidance and Counseling students' Performance in Computer BASIC Programming Language. The findings revealed that computer-based instructional strategy was more effective than the traditional strategy in the learning of BASIC programming language. The effectiveness of the treatment strategy was due to the fact that it engaged and support undergraduate students in both practicum and conceptual teaching (Kay, 2012), and also helps them to take full control of their counselling activities in a more interactive manner.

The result of the interest of computer-based instructional strategy on student's performance in BASIC programming supports the findings of Barr, & Guzdial, (2015), Schneps et al., (2010), Akinyemi, (2013). and Taslibeyaz et al., (2017) who posited that computer-based instructional strategy is a more proactive approach needed to help students collect information, create new ideas, and organize their knowledge, which can improve their change of behavior during and after the counselling and the learning content.
The performance scores of students in computer-based instructional strategy was due to the fact that it provides students the opportunities of acquire counsel anywhere at any time and help them achieve their in order to solve behavioral problem. It also allows independent learning with interactive hands-on activities. The interest of computer-based strategy is in support of cognitive theory of multimedia learning established on the assumption that the use of computer-based instructional strategy will engage learners and result in a better and meaningful learning.
The results revealed that treatment has a significant main effect on the performance of guidance and counselling students in learning of BASIC programming language. This was supported by the findings of Akinyemi (2013) that there is a significant difference in competence and achievement of student before and after they were exposed to LOGO programming Instructional Package. The findings of the study revealed that video-based instructional strategy was effective in enhancing students' achievement in programming. The use of the strategy provided the students with richer learning experience than they had when taught using conventional teaching methods. It was further supported by Chao, (2016) who had similar opinion that the instructional approaches and methods used by teachers play a key role in determining learners' achievement in any subject at all levels of learning. However, this study negates the findings of Kaleliog˘lu, (2015) who found no significant difference between the achievement in pre-technical skills of junior high school students who were exposed to learning with video-based programmed instruction and conventional teaching strategie.

The study revealed that gender had no significant effect on students' competence in BASIC programming. This could be credited to the fact that the treatment was suitable to both sexes as it provides male and

female the equal learning conditions and opportunity to participate actively in the learning process. This is an indication that the treatment is suitable to both sexes, as it shows no biases to gender. This claim was supported by the finding of Akinyemi (2013) that gender has no significant mean difference on pupils' competence in LOGO Programming Language. The findings is also in line with those of Adedoja and Fakokunda (2015) and Oguntunde (2014) who reported no significant main effect of gender. However, the finding can be deduced that the treatment is favourable to male and female with respect to academic performance in programming. This corroborates the findings of Gambari, Shittu, Daramola and Jimoh (2016); Kritina, Jacqueline and Lindy (2017); Kanchan (2018) who reported that video-based instruction improves students' achievement. The finding confirms the effectiveness of video-based instruction to improve students' achievement in BASIC programming language.

Conclusion
Based on the findings of this study therefore, it was proven that computer-based instructional strategy was found to improve students' performance and also arouse student's interest in programming and coding, as compared with the conventional strategy. It was also establish that student treatment and gender have a significant main effect on students' performance in BASIC programming. The strategy was more suitable in communicating facts and demonstrating procedures during counselling and to assist in mastery learning where a student can view complex procedures as many times as they need to.

Recommendations
Following the outcome of the findings in the study, it was recommended that:
   i.   Lecturers should adapt computer-based instructional strategy in the teaching of BASIC computer programming language studies concepts in order to enhance students' performance, in coding.
   ii.   ICT lecturers should be properly equipped through workshops, seminars and conferences on the use of computer-based instruction for instructional delivery that can motivate interest of learners at tertiary level of education.
   iii. Nigeria Universities Commission should emphasize on the need to continuously use innovative strategies such as computer-based instructional strategy to improve instructional delivery.

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EFFECTS OF VOICE THREAD MODES ON COMPUTER SCIENCE STUDENTS' ACHIEVEMENT IN COLLEGES OF EDUCATION IN NORTH-CENTRAL NIGERIA

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Abstract

This study investigated the effects of voice thread modes on achievement of students in Computer Science in Colleges of Education in North-Central Nigeria. A quasi – experimental design - pretest, posttest non randomized non-equivalent group design was adopted. A multi-staged sampling procedure was employed to select 210 participants who were randomly assigned to experimental groups I, II and control group from Colleges of Education within the study area. Voice thread Modes (Video Only, Animation only and Audio) and Computer Science Achievement Test were used as research instruments. The instruments were validated by experts and test- retest method and Pearson Product Moment Correlation Co-efficient formula were used to determine the reliability of the achievement test. The reliability index of 0.758 obtained shows that the instrument was reliable for data collection. Three research questions and three corresponding null hypotheses were answered and tested respectively in the study. The data collected were analyzed using Mean, Standard Deviation and Analysis of Covariance (ANCOVA). The findings of the study revealed that there was significant difference in the achievement scores of students taught computer Science using voice thread (F$_{(2, 206)}$ = 6.768, p < 0.05) in favour of those exposed to video and animation modes. Also, gender has no influence on the achievement of students in the video and animation groups. It was therefore recommended among others, that video and animation voice thread modes should be adopted to complement the teaching of computer Science in order to improve students' academic achievement.

Keywords: Voice Thread, Video, Animation, Audio, Achievement, Computer science

Introduction

Globally, innovative technologies are trending, and they have helped to establish meaningful classroom link among teachers, resource persons and students. Today, learning does not end in the classroom after acquiring experience but continues anywhere and anytime. This is because Internet-based technologies have become a means of spreading information, broadcasting, circulating of files and submitting assignment among others (Wushishi & Aniah, 2013). There is different technological platforms/learning software that can be used to impact knowledge at all levels of education, especially in tertiary institutions (Olorukoroaba *et al.,* 2016).

To effectively utilize these technological platforms, there is need for teachers and students to learn how to log on and access this technology platform for effective teaching and learning (Ali, 2013). Technology is what teachers and students need to be current with the right information all the time (Ajileye, 2015). Therefore, using computer to teach in education improves the teaching - learning process positively in diverse ways for example, it helps the students to learn at their own speed and enables teachers to prepare well and plan their lesson for effective lecture as well as facilitates students' learning in various courses especially in Computer Science.

Computer Science is a core course offered by students in Colleges of Education. It provides students with the necessary knowledge required to teach contents with long-term value (Sulaiman, 2012). Computer information is used everywhere in the world by everyone to carry out one particular task or the other (Orolade and Oyewusi, 2017). In the school, the knowledge students get about computational thinking and application helps them to carry out academic tasks easily as well as endowed them with the spirit of discovery, creativity and novelty (Sulaiman, 2012).

Therefore, to improve on the learning achievement of students in Computer Science concept, there is the need to cautiously examine the quality of instructional strategy employed by Computer Science teachers in Colleges of Education in North-Central Nigeria. Instructional materials such as Voice Thread Modes (Video Only, Animation and Audio) may be effective instructional platforms that can be used to

complement the teaching of computer science concept in Colleges of Education to enhance students' achievement.

Voice Thread (VT) is a Web 2.0 cloud based technology that can be used to support learning achievement of students in computer science concept in Colleges of Education in North - Central Nigeria. Brunvand and Bird (2011) asserted that this amazing technology platform provides voice to students by helping them to partake in harmonized online setting using multimedia elements like audio, video, text and animation among others.

The application of Voice Thread in Computer Science Concept enables students to post pictures, share documents, images, videos and add interactive group discussions to any website anywhere in the world (Eslami *et al.,* 2015). It also enables teachers and students to learn in an active learning platform which enhances both visual and auditory narratives. These modes of learning in Voice thread combines sounds with pictures, sounds and animation and audio among others which when combined appeal to student's sense of seeing, hearing and touching. Any learning that involves more senses makes learning meaningful and improves academic achievement (Bush, 2009).

Academic achievement is viewed as learning outcomes of students of computer science students in colleges of education (Umar *et al.,* 2015). This is seen in their various courses as revealed by their scores, test and examination (Umeh, 2013). Despite the importance attached to computer science in colleges of education curriculum and the fact that several studies have proven that multimedia element enhance students' learning outcomes, only few teachers of computer science try to employ it for the benefit of enhancing students learning outcomes especially at this time when teaching and learning are experiencing serious restructuring to stand the test of time. Some computer science teachers are still holding unto the traditional method of teaching which is not adequate enough in enhancing the leaning needs of students in computer science in this contemporary times. This has contributed to poor performance of students in the subject especially in Colleges of Education and must be addressed.

This trend of poor performance as pointed out in computer science result of 2016 to 2019 by the researcher from Computer Science departments of Colleges of Education in North - Central Nigeria prove that students are not doing well in computer science concepts (NCCE Digest, 2019). However, study on gender remains inconclusive. Several researchers have found boys performing better than girls; a few others have found girls out-performing boys while some few others found no significant difference (Oba *et al.,* 2015).

Moreover, only few studies have been conducted on Voice Thread Modes such as foreign language proficiency, geo-science, listening and speaking comprehension, but none has been done on Voice thread Modes (Video Only, Animation and Audio) in computer science concepts in Colleges of Education in North- Central Nigeria. This is the gap the researcher wants to fill in this paper. It is against this backdrop that the researcher investigates the effects of Voice thread modes (Video Only, Animation and Audio) to teach students Computer Science concepts in Colleges of Education in North - Central Nigeria to find out whether it would enhance students' mastery, better retention, and interest.

Research Questions
The following research questions were raised to guide the study:
1. What is the difference in the mean achievement score of students taught Computer Science concept with Voice thread Modes (Video Only, Animation and Audio)?

2. What is the difference in the mean achievement score of male and female students taught Computer Science concepts with Voice Thread Mode (Video Only)?

3. What is the difference in the mean achievement score of male and female students taught Computer Science concepts with Voice thread Mode (Animation Only)?

Research Hypotheses

The following null hypotheses were tested in the study:

HO_1: There is no significant difference in the mean achievement score of students taught Computer Science concept with Voice thread Modes (Video Only, Animation and Audio).

HO_2: There is no significance difference in the mean achievement score of male and female students taught Computer Science concepts with Voice Thread Mode (Video Only).

HO_3: There is no significance difference in the mean achievement score of male and female students taught Computer Science concepts with Voice thread Mode (Animation Only)

Research Methodology

The research design adopted for this study is quasi- experimental research design, precisely pre-test, posttest non- randomized, non- equivalent group design. There are three level of independent variables that is two experimental and one control group. There are one level of independent variables (achievement scores), while the gender variable has male and female. Experimental group one were taught with voice thread modes (Video Only), experimental group two were taught with Voice thread modes (animation) while the control group were taught with Voice thread modes (audio). The three groups were administered pre- test and the posttest and were taught the same content. The population of the study consisted of 2,501 Nigeria Certificate in Education (NCE) Computer Science students in the 2020/2021 academic session in North - Central Nigeria namely Niger, FCT, Nassarawa, Kwara, Kogi, Plateau and Benue. The target population constituted 210 year two Computer Science Students of 2020/2021 academic session. The sample size for the study is 210 Nigeria Certificate in Education (NCE) year two computer science students selected from six Colleges of Education in North Central Nigeria namely Niger, FCT, Nassarawa, Kogi, Plateau, Benue and Kwara.

The research design layout is as shown in Table 1

Table 1: Research Design Layout:

Groups	Pre-test	Treatment	Post-test
Experimental Group One (Video)	O_1	X_1	O_2
Experimental Group Two (Animation)	O_3	X_2	O_4
Control Group (Audio)	O_5	X_3	O_6

$O_1, O_2,$ Observation of pretest for the experimental and control groups

$O_3, O_4,$ Observation of posttest for the experimental and control groups

X_1; Voice Thread Modes (Video Only)

X_2; Voice Thread Modes (Animation Only)

X_3; Voice Thread Modes (Audio Only)

A multi-stage sampling technique was employed in selecting sample for the study. Firstly, random clustering technique was used to cluster the 15 Colleges of Education in North- Central Nigeria into six groups A-E. Thereafter, one College of Education was randomly sampled from each of the cluster making it six Colleges of Education. These six Colleges of Education randomly selected made up the three groups (State Colleges of Education Minna Niger State and State College of Education Kabba Kogi State) was randomly allocated to Voice thread modes (Video Only) and used as Experimental group

I. State College of Education Akwanga Nassarawa, and Benue State College of Education Oju, was randomly allocated to Animation and used as experimental group II and FCT College of Education Zuba, Abuja and State College of Education Oro Kwara was randomly allocated to Video and used as Control Group respectively. The intact class of NCE year two students which comprises of male and female was used for this study. Table 2, reveal the distribution of sample school by gender.

Table: 2. Distribution of Sample Schools by Gender

Groups	Male	Female
State College of Education Minna Voice Thread (Video)	17	20
State College of Education Kabba Voice Thread (Video)	15	21
State College of Education Akwanga, Nassarawa, (Animation)	14	23
Benue State College of Education Oju (Animation)	12	25
Federal College of Education Zuba Abuja (Audio)	17	19
State Colleges of Education Oro Kwara (Audio).	13	14
Total	88	122

Source: NCCE (2020)

Table 2 shows the breakdown of the sample size for the study. 210 students was selected for the study. 73 students was exposed to the use of Voice Thread Modes (Video Only) in Experimental Group 1, 74 students was exposed to the use of (Animation) in Experimental Group 11, 63 students was exposed to the use of audio Only in the Control Group.

The instruments used for the study are treatment instrument which is Voice Thread Modes (Video Only, Animation and Audio) and test Instrument which is the Computer Science Achievement Test (CSAT). Computer Science achievement test was made up of two parts namely parts, A and part B. Part A contained information on Bio data of students while part B was developed to take care of information on students' cognitive level based on the course content that the lesson focused on. Computer Science Achievement Test (CSAT) was designed by the researcher in line with NCCE Benchmark Minimum Standard (2012 Edition) drawn from the concepts taught. Computer Science Achievement Test (CSAT) consisted of 50 multiple-choice questions. The Computer Science Achievement Test (CSAT) was made up of five optional answers A-E with only one right answer. The students are expected to indicate by ticking the right answer that matches the question. The test questions included every content in the course outline that was taught which include Basic Computer operations (Booting process) Computer Network (LAN, MAN and WAN) and Application of Computer in Education and these concepts was used to teach the students by the researcher using Voice Thread Modes (Video Only, Animation and Audio) and was used also to obtain data on their achievement (Entry behaviour) before the treatment to ascertain the possible pre-existing differences in the overall ability between the experimental and control groups.The Computer Science Achievement Test (CSAT) was used to obtain data on student' achievement after treatment and was also used for trial study to determine the reliability Co-efficient of CSAT.

The lesson plan for instruction was validated by one Educational Technology Lecturer in FCT College of Education, Zuba- Abuja and two (3) Senior Lecturers from the Department of Educational Technology, School of Science and Technology Education, Federal University of Technology (FUT), Minna. Commputer Science Achievement Test (CSAT) was validated by one Computer Science lecturers in FCT College of Education Zuba Abuja and one senior lecturer from the Department of Computer Science, College of Education Minna for validation. The reliability index was 0.758 using Pearson Product Moment Correlation Co-efficient test to obtain the reliability coefficient of CSAT. The reliability index of 0.758 was obtained which shows that the instrument is reliable for the study. The three groups were gien pre- test and was taught for eight week after which post test was administered. The research questions were analyzed using Mean and standard deviation, while the hypothesis were analyzed using analysis of Variance (ANOVA) and Analysis of Covariance (ANCOVA) at 0.05 alpha level of significance using Statistical Package for Social Sciences (SPSS) version 23.0.Sidak Pairwise Post-hoc analysis was used to determine where differences lie.

Results

The tables below show the outcome of the analysis of data collected:

Research Question 1: What is the difference in the mean achievement score of students taught Computer Science concept with Voice thread Modes (Video Only, Animation and Audio)?

In answering research question one, the pretest and posttest mean achievement scores of experimental groups one, two and three were analyzed using mean and standard deviation as shown in table 1

Table 1: Mean and standard deviation of pretest and posttest scores of students taught computer science concepts with voice thread modes (Video, Animation and Audio)

Groups	N	Pretest		Posttest		Mean Gain
		Mean	SD	Mean	SD	
Exp Grp 1 (Video)	73	26.68	4.497	69.48	6.019	42.80
Exp Grp 2 (Animation)	74	28.62	4.828	69.84	4.877	41.22
Ctrl Grp (Audio)	63	27.46	4.631	66.57	6.278	39.11

Table 1 shows the mean and standard deviation of achievement scores of experimental groups one (Video Only), experimental group two (Animation Only) and control groups (Audio Only) at pretest and posttest. The table revealed the mean and standard deviation scores at pretest and posttest of experimental group one as $\acute{X}=26.68$, SD=4.497 and $\acute{X}=69.48$, SD = 6.019 respectively. This gives a mean gain of 42.80 in favour of the posttest. Similarly, the mean and standard deviation at pretest and posttest score of experimental group two are $\acute{X}=28.62$, SD=4.828 and $\acute{X}=69.84$, SD = 4.877 respectively. This gives a mean gain 41.22 in favour of the posttest. On the other hand, the mean and standard deviation at pretest and posttest of the control group are $\acute{X}=27.46$, SD = 4.631 and $\acute{X}=66.57$, SD = 6.278 respectively. This gives a mean gain of 39.11 in favour of the posttest. The table also revealed that experimental groups one, two and control group had a mean gain of 42.80, 41.22 and 39.11 respectively and with the experimental group one having the highest mean gain of 42.80.

Research Question 2: What is the difference in the mean achievement score of male and female students taught Computer Science concepts with Voice Thread Mode (Video Only).

In answering research question two, the pretest and posttest mean achievement scores of male and female students in experimental group one were analysed using mean and standard deviation as shown in table 2

Table 2: Mean and standard deviation of pretest and posttest scores of male and female students taught computer science concepts with voice thread modes (Video only)

Groups	N	Pretest		Posttest		Mean Gain
		Mean	SD	Mean	SD	
Male	32	30.69	3.847	68.69	5.975	38.00
Female	41	29.41	4.863	70.10	6.053	40.69

Table 2 shows the Mean and Standard Deviation of Pre-test and Post-test Scores of male and female students taught computer science concepts using video. Male students had achievement mean score of 30.69 with a standard deviation of 3.847 at the pre-test while their female counterparts had achievement mean score of 29.41 with a standard deviation of 4.863. Also, male students had achievement mean score of 68.69 with a standard deviation of 5.975 at the post-test while their female counterparts had achievement mean score of 70.10 with a standard deviation of 6.053. This gives a mean gain of 38.00 for

male and 40.69 for female. Mean gain of 38.00 and 40.69 for the male and female students respectively indicates that female students achieved higher than their male counterparts.

Research Question 3: What is the difference in the mean achievement score of male and female students taught Computer Science concepts with Voice thread Mode (Animation Only)?

In answering research question three, the pretest and posttest mean achievement scores of male and female students in experimental group two were analysed using mean and standard deviation as shown in table 3

Table 3: Mean and standard deviation of pretest and posttest scores of male and female students taught computer science concepts with voice thread modes (Animation only)

Groups	N	Pretest		Posttest		Mean Gain
		Mean	SD	Mean	SD	
Male	26	28.88	5.256	71.04	5.355	42.16
Female	48	28.48	4.631	69.19	4.523	40.71

Table 3 shows the Mean and Standard Deviation of pre-test and post-test scores of male and female students taught computer science concepts using animation mode. Male students had achievement mean score of 28.88 with a standard deviation of 5.256 at the pre-test while their female counterparts had achievement mean score of 28.48 with a standard deviation of 4.631. Also, male students had achievement mean score of 71.04 with a standard deviation of 5.355 at the post-test while their female counterparts had achievement mean score of 69.19 with a standard deviation of 4.523. This gives a mean gain of 42.16 for male and 40.71 for female. Mean gain of 42.16 for male and 40.71 for the male and female students respectively indicates that male students achieved higher than their female counterparts.

Hypotheses Testing

The purpose of pretesting experimental group I, experimental group II and the control group is to establish the equivalence of the three groups before the study started. To analyze the pretest scores, the mean scores and standard deviations of the experimental groups I, II and the control group were computed and compared using Analysis of Variance (ANOVA). The results of the analyses are presented in Table 4.

Table 4: Summary of ANOVA comparison of pretest mean scores of students in experimental group I, II and the control group

Source of Variation	Sum of Square	df	Mean Square	F	P
Between Groups	139.590	2	69.795		
Within Groups	4486.810	207	21.675	3.220*	.042
Total	4626.400	209			

*: Significant at 0.05 level

Table 4 shows the ANOVA comparison of pretest scores of experimental group I, experimental group II and the control group. An examination of the table shows a significant difference in the pretest scores of the three groups ($F_{(2, 209)}$ = 3.220, p < 0.05). This implies that the three groups were not equivalent before treatment was administered. Hence, Analysis of Covariance (ANCOVA) was used to test the hypotheses generated for this research as the students' pretest scores were used as covariates.

Hypothesis One: There is no significant difference in the mean achievement score of students taught computer science concepts with Voice Thread Modes (Video Only, Animation and Audio).

Table 5: Summary of Analysis of Covariance (ANCOVA) of posttest scores of experimental groups I, II and the control group

Source	Type III Sum of Squares	*Df*	Mean Square	F_{cal}	P_{value}

Corrected Model	505.089ᵃ	3	168.363	5.170	.002
Intercept	29973.917	1	29973.917	920.490	.000
Pretest	79.724	1	79.724	2.448	.119
Groups	440.792	2	220.396	6.768*	.001
Error	6707.978	206	32.563		
Total	999310.000	210			
Corrected Total	7213.067	209			

*: Significant at 0.05 level

Table 5 shows the ANCOVA result of the comparison of mean achievement scores of students in experimental group I (Video), II (Animation) and the control group (Audio). An examination of the table shows ($F_{(2, 206)} = 6.768$, $p < 0.05$). On the basis of this, hypothesis one was rejected. Therefore, there was a significant difference in the mean achievement scores of students taught computer science concepts with Voice Thread Modes (Video Only, Animation and Audio). Therefore, a Sidak Pairwise post-hoc analysis was computed to show where the significant difference exists as presented in table 5 (b).

Table 5 (b): Sidak Pairwise Post-hoc analysis of the achievement scores of students in experimental group I, II and control groups

Treatment	Experimental Group I	Experimental Group II	Control Group
Exp Grp 1 (Video)	-	.889	.014*
Exp Grp 2 (Animation)	.889	-	.002*
Ctrl Grp (Audio)	.014*	.002*	-

*: Significant at 0.05 level

Table 5 (b) shows the Sidak post-hoc analysis of achievement scores of students in experimental group I, II and the control groups. The table indicates that significant difference exist between the achievement scores of students in experimental group I and control group (0.014). It also shows that a significant difference exists between experimental group II and control group(0.002*).

Hypothesis Two: There is no significant difference in the mean achievement score of male and female students taught computer science concepts with Voice Thread Modes (Video Only).

In testing hypothesis two, the summary of analysis of covariance of mean achievement scores of male and female students taught computer science concept with Voice Thread Modes (Video Only) as shown in Table 6

Table 6: Summary of Analysis of Covariance (ANCOVA) of mean achievement scores of male and female students taught computer science concept with voice thread modes (Video only)

Source	Sum of Squares	df	Mean Square	F_cal	P_value
Corrected Model	40.201ᵃ	2	20.101	.548	.581
Intercept	6978.418	1	6978.418	190.220	.000
Covariate (Pretest)	4.467	1	4.467	.122	.728
Gender	38.664	1	38.664	1.054*	.308
Error	2568.018	70	36.686		
Total	355008.000	73			
Corrected Total	2608.219	72			

*: Not Significant at 0.05 levels

Table 6 shows the ANCOVA result of mean achievement scores of male and female students taught Computer Science concept with Voice Thread Modes (Video Only). An examination of the table shows ($F_{(2, 70)} = 1.054$, $p > 0.05$). On the basis of this, hypothesis two was retained. Therefore, there was no significant difference in the mean achievement scores of male and female students taught computer science concept with Voice Thread Modes (Video Only).

Hypothesis Three: There is no significant difference in the mean achievement score of male and female Students taught computer science concept with Voice Thread Modes (Animation Only).

In testing hypothesis three, the summary of analysis of covariance of mean achievement scores of male and female students taught computer science concept with Voice Thread Modes (Animation Only) as shown in Table 7

Table 7: Summary of Analysis of Covariance (ANCOVA) of mean achievement scores of male and female students taught computer science concept with voice thread modes (Animation only)

Source	Sum of Squares	df	Mean Square	F_{cal}	P_{value}
Corrected Model	196.943[a]	2	98.472	4.543	.014
Intercept	12290.343	1	12290.343	566.960	.000
Covariate (Pretest)	139.163	1	139.163	6.420	.013
Gender	65.146	1	65.146	3.005*	.087
Error	1539.111	71	21.678		
Total	362658.000	74			
Corrected Total	1736.054	73			

*: Not Significant at 0.05 levels

Table 7 shows the ANCOVA result of mean achievement scores of male and female students taught Computer Science concept with Voice Thread Modes (Animation). An examination of the table shows $(F_{(1, 71)} = 3.005, p > 0.05)$. On the basis of this, hypothesis three was retained. Therefore, there was no significant difference in the mean achievement scores of male and female students taught Computer Science concept with Voice Thread Modes (Animation).

Summary of Findings
Based on the results presented, the following findings were obtained:
1) The use of both video and animation voice thread modes improved students' achievement in computer science.

2) Both male and female students taught computer science using video onlyvoice thread modehad their achievement improved.

3) Both male and female students taught computer science using animation voice thread mode had their achievement improved.

Discussion of Findings
Findings from this study revealed that using both video and animation voice thread modes in teaching computer science improved the retention of student's and it's also gender friendly. Results from tested hypotheses showed that both video and animation voice thread modes did not only enhance students' achievement but also facilitate retention of computer science concepts. Their interest towards computer science using both video and animation voice thread modes were enhanced.

There is no significant difference in the mean achievement score of students taught computer science concepts with voice thread modes (Video Only, Animation and Audio). The finding shows that student's taught computer science voice thread modes (Video Only, Animation) performed better after treatment. This is an indication of a clear understanding of concepts and content instructions delivered through the two learning modes.

This finding is in line with the earlier findings of Melanie, (2012) who carried out a study on the Effect of Voice Thread integration on High School Students' Anxiety and Oral Proficiency in the Foreign Language Classroom in North Georgia and found out that a significant main effect difference exists between the control and experimental groups meaning that voice thread platform enhances the oral proficiency of students in Foreign Language. However, findings of this study disagree with the earlier

findings of Sing, (1999) who investigated the relative effectiveness of Audio, and Static Visual Computer-Mediated Presentations and found out from their ANOVA results that the different treatment groups do not differ significantly.

Hypothesis two states that there is no significant difference in the mean achievement score of male and female students taught computer science concepts with Voice Thread Modes (Video Only). Findings from this study showed that both male and female students taught computer science using video only voice thread mode had their achievement improved. This finding is in line with that of Raanana *et al.,* (2012) who conducted a study on Resonance Factor: Probing the Impact of Video on Student Retention in Distance Learning. The results indicate that before the introduction of video most of the students who failed the course dropped out immediately after failing, but afterwards nearly all the students irrespective of their gender who failed the course continued their studies. Also, there was no significant difference in the post-test scores of male and female students taught Phonetics using Video Compact Disc Instruction Packages.

Hypothesis three states that there is no significant difference in the mean achievement score of male and female students taught computer science concepts with animation voice thread Mode. Both male and female students taught computer science using animation voice thread mode had their achievement improved. This finding corroborates the study of Gambari *et al.,* (2016) who conducted a study on Effects of Video Type Instructional Packages on the Achievement of Students in Mathematics among Senior Secondary Schools in Minna. The study involves the use of text, animation and narration modes of teaching. The result shows that gender have no significant difference in the mean achievement score of students taught using animation. Also, Abdu (2017) investigated the Influence of Gender on Secondary Schools Students' Academic performance in South-West, Nigeria. The study revealed that male and female students performed equally in English language. Yisa (2014) also found out that there was no significant difference between males and female students exposed to animation package.

Conclusion

From the findings that emanated from this study, the following conclusions were drawn;
Using voice thread modes (video, animation and audio) to teach computer science will enhance learners' performance in the course. This means that both video and animation voice thread modes are able to create conducive, interacting and engaging environment that will facilitate better understanding of concepts taught. Also, voice thread modes are gender friendly as both male and female students performed better when using these medium of teaching.
Furthermore, students taught computer science using voice thread modes were able to retain concepts taught well. This is because voice thread medium of teaching have more interesting and engaging features that is capable of enhancing learners' retention of concepts taught. In addition, students taught computer science using video and animation voice thread modes were able to retain concepts taught irrespective of their gender. This means that the two mediums are gender friendly although male students retained more of the course than their female counterpart. Both male and female students taught computer science using animation voice thread mode had their achievement improved. Finally, students will have their interest in computer science increased after they have been taught the course using video animation thread modes.

Recommendations

In light of the findings of this research, the following recommendations were made:
1. Video and animation voice thread modes should be adopted to complement the teaching of computer Science in order to improve students' academic achievement.

2. Regulating bodies should ensure that the use of video and animation voice thread modes is incorporated into the colleges of education curriculum in order to prepare pre-service teachers for future usage of innovative technologies in the classroom.

3. Workshops and trainings on procedures for developing and integrating voice thread into teaching and learning should be organized for in-service teachers.

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PERCEPTION OF FLIPPED INSTRUCTIONAL METHODOLOGY: DIFFERENTIAL EFFECTS OF PRE-SERVICE SCIENCE TEACHERS' GENDER AND AGE

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Abstract

*The efficacy of flipped methodology is adequately reported, there is dart of evidence on the pre-service science teachers' perception of the novel pedagogy. Therefore, the study investigated perception of flipped instructional methodology the differential effects of pre-service science teachers' gender and age in Emmanuel Alayande College of Education, Oyo. Two research questions and three hypotheses guided the study, adopted mixed method both qualitative and quantitative approaches (concurrent triangulation) to the research. 476 pre-service science teachers were randomly sampled for the study. Two instruments; Perception of Flipped Instructional Methodology Questionnaire (**PFIMQ, R=.73**) and Perception of Flipped Instructional Methodology Interview (**PFIMI, IRR=.81**) were used for data collection. Data was analysed using frequency counts, percentages, mean and standard deviation. T-test and Analysis of Variance (ANOVA) were used to test the set hypotheses at 0.05 level of significance. Majority of the pre-service science teachers preferred flipped methodology to conventional lecture method, there is significant pre-service science NCE teachers' perception of flipped methodology (N = 476, $\bar{x}$ = 34.60; SD = 7.39; df = 475, t = 35.71, p < .05). The perception of flipped methodology was not differed by gender and respondents' age. It was therefore recommended that tertiary Institutions' lecturers should adopt flipped methodology to interact with their students and that tertiary institutional management to organize seminars, symposia, lectures and workshops on the strategies to implement effectively the flipped methodology by the lecturers.*

Keywords: Flipped instructional methodology, Pre-service science teachers' gender, age
Word count: 229

Introduction
There have been advocacy for more effective instructional methodology at the tertiary level of education. Guided inquiry (Olagunju & Ige, 2013); technologically-aided instructions (Okebukola, 2013; Olagunju & Adesina, 2017), practical and pragmatic instruction, augmented-blended (Ige & Oke, 2019; Adebiyi, 2019; Adesina, 2019; Kannan, Kuromiya; Gouripeddi; Majumdari; warriem & Ogata, 2020) had been recommended as active learning strategies and many more techniques for efficient and effective teaching learning in tertiary institutions.

None of these identified methodologies has the feat and single accomplishment of flipped methodology. Flipped methodology according to Toh; Tengah; Shahrill; Tan and Leong (2017) is that kind of instructional methodology in which there is a shift to students attainment of the content knowledge outside of the class or before class in any form of media then the in-class interaction time is spent to apply the content through problems solving, deeper coverage and interactions with peers. The convention of flipped pedagogy has the underlying fact of reversing or inverting the traditional teaching and learning approach from the dominance of the lecturers linear transmission of contacts of instruction to the passive learners into an arrangement in which lecture materials can be accessed at home in advance of the class interaction and the in class time to focus on questioning and answers, advance conceptual knowledge as well as engaged peer-centred learning activities.

Jang and Kim (2020) identified flipped methodology as an innovative instructional model which is gaining popularity in higher education as it provides active and students centered learning which enhances students' learning which enhances students' learning outcomes both the attitudinal and academic achievement. Unlike the traditional lecture method, flipped pedagogy prompts the learners to study instructional contents before class interaction, synchronously or asynchronously offline instructions, the application of such independent personal learning to be done in in-class activities. Jang and Kim (2020) posited that flipped methodology engages, enhances, enriches and empowers both the lecturers and the students for mutual interchange of ideas in a more an hypothetico-deductive model; they affirmed that such arrangement provide students with engaging, interactive learning experiences that development the learners' complex reasoning, metacognitive thinking, speaking, written communication skills and critical thinking skills.

Hew; Jia; Gonda and Bai (2020) gave the five phases framework of flipped methodology; These are: Engage phase; Explore phase; Explain phase; Elaborate phase and the evaluate phase.

Pre-Class   **In-Class**

Engage → Explore → Explain

Re-Engage → Elaborate → Evaluation

Fig. I: *Conceptual Framework of Fliped*
Methodology (Hew; Jia; Gonda & Bai, 2020)

Figure I, the first three phases started at pre-class, within the learners' control and management. At the engage phase, the learner engages with the contents of instruction through videos, lecture-notes, journal articles, magazines, etc. Questions are asked to prompt students to brainstorming or critical thinking which connect the new contents of instruction to their entry behaviour (previous knowledge). This leads to the second phase, explore, here the questions raised in the engage phase give the learners opportunities for exploration of the contents in order to construct their own understanding of the topic at hand. From the 2nd phase, having made succinct exploration, the students construct their knowledge which form the basis for their explanation of the topic(s) in consideration. The in-class phase, the lecturer whose task is instructional facilitator re-engage the learners with the content of instruction, using real world scenarios, poses problems or question to be answered them enhance their active and constructive interactive instruction. At the fifth phase, the lecturer provides more lucid information about the subject content of instruction using the lecture note or any other instructional materials, the learners are are prompt into class discussion, application of the explored contents and the lecturer moderate or facilitates the interaction with prompting feedback. The last phase, evaluation phase is solely meant for integrated formative assessments right from the beginning of the flipped methodology for continuous monitoring and revision of what ought to have been learnt and summative at the end of the instruction, questions and tests, quizzes are posed to enhanced mastery of the content knowledge.

The study is premised on the Constructivists' theories of human perception. Constructivist theories assume that the process of perception is a highly active process of extracting sensory stimuli, their evaluation, interpretation and backward organization of sensory stimulus. Perception is the end product of the interaction between stimulus and internal hypotheses, expectations and knowledge of the observer, while motivation and emotions play an important role in this process. Perception is thus influenced by a wide range of individual factors that can lead to an inadequate interpretation. (Eysenck & Keane, 2008). While behaviorist background is typical for the theory of direct perception,

constructivists accepted Helmholz's principle of sensory data processing by means of unconscious inference (inference of color constancy). They also took into account the knowledge of Gestalt Psychology, which enabled them to look for unconscious patterns of perception as well as to study the influence of conscious experience on irreversibility or reversibility of perceived shape.

Among the constructivist theories of perception proponents are Gregory and Gibson who integrated the phylogenetic flow of time (the influence of evolution on cognitive apparatus) into the process of perception, Gregory used also the flow of ontogenetic time. They emphasized the importance of our previous experience and that data have the past and the future which can change themselves and they influence each other. They have some hidden aspects that emerge only if influenced by various conditions. (Gregory, 1990). This is applicable to the present study as pre-service science NCE teachers' perception of flipped instructional methodology would have impacts on their acceptability or not of the novel pedagogy which invariable would influence their learning outcomes and efficiency via the methodology.

Blair, Maharaj and Primus (2015) analysed performance and perception in the flipped classroom of the undergraduate Material Technology course at The University of the West Indies, the qualitative data shows that the flipped format led to a slight improvement in how students perceived the course and the lecturer's reflection shows that they are keen to continue with the flipped format as it allowed more time for them to work with students at an individual level It was therefore recommended that practitioners who intend to flip their classroom pay as much attention to student performance as they do to students' perception.

Aljaraideh (2019) investigated students' perception of flipped classroom for private universities in Jordan the results showed that the students' perceptions of flipped classroom in the Jordanian private universities were high. This study recommended the necessity of using flipped learning technique at universities in Jordan due to its efficiency in developing students' understanding of the curriculum and in motivating them to become active rather than passive participants in the classroom. Onojah, Olumorin, Adegbija and Babalola (2019) evaluated the perception of undergraduate students on the utilization of flipped classroom for learning in South-West Nigeria established the invaluableness in the perception of undergraduate students of flipped pedagogy as useful and easy to use for learning.

Rathner and Schier (2020) assessed the impact of flipped classroom andragogy on student assessment performance and perception of learning experience in two advanced physiology subjects found that students' perception of their learning experience remained at or above the university benchmarks with flipped classroom andragogy. Colomo-Magana, Solo-Varela, Ruiz-Palmero and Gomez-Garcia (2020) surveyed university students' perception of the usefulness of the flipped classroom methodology using 123 students from the Faculty of Educational Sciences of the University of Malaga (Spain) found that the students perceived flipped pedagogy as effective in promoting learning that has a positive effects on the students' performance.

Joseph, Roach, Natarajan, Karkada and Cayaban (2021) explored flipped classroom improves Omani nursing students performance and satisfaction in anatomy and physiology found that the results of a survey showed that nursing students were satisfied with the flipped classroom method. Overall, 68 to 78% of students agreed or strongly agreed that the flipped classroom method improved their learning and increased their interest in the course. Nasera Putri and Purwaningsih (2021) examined students' view of flipped classroom in physics' class. The new instructional strategy was found to be more acceptable by the students in teaching and learning of Physics.

Birgili, Seggie and Oğuz (2021) investigated the trends and outcomes of fipped learning research between 2012 and 2018: A descriptive content analysis, The results indicate that most of the studies are conducted with students as the most frequent study group and with a mixed-method research design in the subject areas of education and medicine. The fipped learning approach is mostly conducted in higher education. As a region, Asia has taken the lead in flipped learning studies. Finally, the outcomes of flipped learning indicate an increase in student performance and positive influence on cognitive, affective, and soft skills.

Al-Husban and Alshorman (2020) studied perceptions of Syrian student refugees towards blende learning, the implications for higher education institutions. Sampled 93 Syrian refugees and collected data using questionnaire, data were analysed using frequencies, percentages, means, standard deviations and t-

test. Results revealed that the Syrian refugees have positive perceptions of the blended learning approach and they are satisfied with. Also, there was no significant difference in participants' perceptions of blended learning attributed to gender but age had a significant influence. As at 2020, Yeboah; Ampadu; Ahwireng and Okrah (2020) reported that the flipped methodology has not been conceptualized into the Ghanaian classroom and that majority of the teachers were not familiar with the model of flipped pedagogy. The case in Nigeria is not so different as the researchers' personal enquiring on the flipped pedagogy from their professional colleagues revealed their low understanding of the methodology. Adesina (2021) experimented the flipped pedagogy with 300 level pre-service NCE teachers in GSE 323, Service and Technology in the society adopting pre-text, proof-text quazi-experimental design, found that there were significant improvement in the student innovativeness and metacognitive skills. Therefore, the present study investigates the news of the pre-service science NCE teachers on the adoption of flipped methodology.

Among the factors that moderate peoples view of an issue, component or methodology is gender. Pre-service science NCE teachers' position of being male and female did influence their performance in schools (Ndirika, 2013; Bamidele, 2018), the reverse is the effect of gender on students' perception of experimental method (Raimi, Bolaji and Adesina, 2013; Wonu & Anakwe, 2014). Yu (2021) findings regarding gender differences in online learning outcomes tend to be inconsistent and even paradoxicals regards online learning perseverance and engagement. Lu (2021) reported a similar finding that students' perceptions of a blended learning environment to promote critical thinking has inconsistent gender effects. This engenders need for further clarification on gender impacts on flipped methodology preferences. Therefore, this study examines the gender difference in pre-service NCE teachers' view of flipped instructional methodology.

Age is another variable that can easily differentiate individual(s) behaviour or perception of a methodology (Gonzalez, Famirez & Viadel, 2015; Afolabi, Afolabi & Adesina, 2018; Fleming; Mason & Paxton, 2018; Staddon, 2020). Ma, Chan and The (2020) found from a generational perspective the older adult behaviour model more effective than the young behaviour model in increasing self-efficacy to ICT methodology. Gomez-Garcia et al (2020) that age differentiated mathematics teachers on ICT training and use perceptions reported similar result.

Statement of the Problem

Evidence in research reveals that the novel flipped instructional methodology improves students learning outcomes both the attitudinal and the academic achievement. The views of the students stand a strong factor for the efficacy of the pedagogy. This has not been ascertained in Colleges of Education in Oyo Township. Whenever the students have a negative perception of an instructional strategy, it affects their disposition, acceptability as well as their productivity through the methodology. This study thus investigate the flipped instructional methodology, the view of pre-service teachers in Emmanuel Alayande College of Education, Oyo.

Objective of the Study

The main thrust of the research is to examine the perception of pre-service science NCE teachers on flipped instructional methodology.
The specific objectives of the study are:

i. To investigate the perception of pre-service science NCE teachers on the flipped instructional methodology.
ii. To assess whether there is gender difference in the pre-service science NCE teachers' perception of flipped instructional methodology.
iii. To evaluate the age difference in the pre-service science NCE teachers' perception of flipped instructional methodology.

Research Questions

The following questions were answered in the study:

i. What is the perception of the pre-service science NCE teachers on the flipped instructional methodology?

ii. Do the pre-service source NCE teachers prefer flipped instructional methodology to the regular conventional lecture method?

Hypotheses
The following hypotheses were tested at 0.05 level of significance:

Ho₁: There is no significant perception of flipped instructional methodology of pre-service science NCE teachers in Emmanuel Alayande Collede of Education, Oyo.

Ho₂: There is no significant gender difference of pre-service science NCE teachers' perception of flipped instrumental methodology.

Ho₃: There is no significant age difference of pre-service science NCE teachers' perception of flipped instructional methodology.

Methodology

The research adopted the mixed method of qualitative and quantitative approach (concurrent triangulation). Qualitatively the sample of the study were interviewed, their responses were thematically analysed to answer the research questions. Quantitatively, questionnaire was administered on the sample in a likert-scale type of descriptive survey design and the collated data were subjected to inferential statistics for hypotheses testing. The 300level pre-service science NCE teachers of Emmanuel Alayande College of Education, Oyo were purposively sampled for the study (they were already exposed to flipped instruction in GSE 323, Science and Technology in Society). Altogether, there are 476 that responded to the questionnaire and the focused group interview. Two instruments; Perception of Flipped Instructional Methodology Questionnaire (**PFIMQ**) and Perception of Flipped Instructional Methodology Interview (**PFIMI**). PFIMQ was a fifteen item instrument adopted from Onithin and Adetodun (2018) Perception of Flipped Pedagogy Scale. The 30-item instrument was a four- likert scale type with responses of Strongly Agree, Agree, Disagree, and Strongly Disagree, scored in 4,3,2,1 respectively for the items. The PFIMQ was trial-tested at another College of Education in Oyo Township; the collated data were subjected to Cronbach's Alpha reliability which yielded the value of 0.73. PFIMI was a self-constructed tool with 10 items. The tool was given to experts in Test and Measurement as well as those in psychometry, their critiques and comments enhance the face, content and construct validity of PFIMI. The scale was reduced to five items, the items were trial tested with individuals outside the scope of the study, their collated responses were subjected to inter-rater reliability of FleisKappa which yielded a value of 0.81. The researchers administered the validated instruments on the sample of the study, on the spot collection was made to ensure hundred percent retrieval. The collated interview was analysed thematically, the demographic variables of the respondents were represented in tables of frequency counts and percentages, mean and standard deviation were used to answer the research questions, t-test and analysis of variance (ANOVA) were used to test the set hypotheses at 0.05 level of significance.

Results

Table 1: Socio-demographic attributes of the Respondents

Variable	Frequency	Percentage (%)
Gender		
Male	159	33.40
Female	317	66.60
Total	**476**	**100.0**
Age Group		
18 - 21yrs	124	26.05
21 – 24yrs	217	45.59
25yrs & above	135	28.36
Total	**476**	**100.0**

Table 1 revealed that there are 159 (33.40%) male, 317 (66.60%) female. 124 (26.05%) 18 – 21 years, 217 (45.59%) 21 – 24 years and 135 (28.36%) respondents in the distribution.

Table 2: Pre-service Science NCE Teachers' Perception of Flipped Instructional Methodology

S/N	Items	SA	A	D	SD	$\bar{x}$	SD

No.	Statement						Mean	SD
1.	I like flipped methodology of teaching science.	Freq. (%)	279 58.61	115 24.16	25 5.25	57 11.97	3.27	1.21
2.	Flipped methodology lecture note are easy to understand.	Freq. (%)	253 53.15	156 32.77	28 5.88	39 8.19	3.09	2.47
3.	Flipping methodology helps science contents mastery.	Freq. (%)	310 65.13	126 26.47	11 2.31	29 6.09	3.41	0.97
4.	Flipped methodology has videos that add meaning to lectures.	Freq. (%)	307 64.50	122 25.63	18 3.78	29 6.09	3.27	1.15
5.	Science contents are easy to learn with flipped methodology.	Freq. (%)	296 62.18	126 26.47	21 4.41	33 6.93	2.89	1.53
6.	Flipped methodology makes students more active in science classroom.	Freq. (%)	311 65.34	118 24.79	11 2.31	36 7.56	3.29	0.75
7.	Flipped methodology encourages interactions with peers and lecturers.	Freq. (%)	309 64.29	116 24.40	19 3.99	32 6.72	3.74	0.36
8.	Flipped methodology enhances my mind-on and hands-on in science instruction.	Freq. (%)	286 60.08	138 28.99	17 3.57	35 6.93	3.05	1.73
9.	Flipping science instruction enables quick objectives attainment.	Freq. (%)	325 68.27	101 21.22	19 3.99	31 6.51	3.32	0.83
10.	Flipped methodology helps science effective lesson evaluation.	Freq. (%)	299 62.82	126 26.47	13 2.73	38 7.98	3.19	0.57
	Grand Mean							3.46

Answers to Research Questions
Research Question 1:

From table 2, majority of the pre-service science NCE teachers agreed that they like flipped methodology of instruction (394, 82.77%) while minority of 82(17.23%) disagreed with the statement. 409 (85.92%) agreed that the flipped methodology lecture note are easy to understand while the minority of 67 (14.08%) disagreed with the assertion. 436 (91.60%) agreed that flipping methodology helps science contents mastery while the remaining 40 (8.40%) disagreed with the statement. 429 (90.13%) agreed that flipped methodology have videos that add meaning to lectures while 47 (9.87%) disagreed that flipped methodology gave videos that add meaning to lectures. 422 (88.66%) agreed that science contents are easy to learn with flipped methodology whereas 54 (11.34%) disagreed with the statement. 429 (90.13%) agreed that flipped methodology makes them more active in science classroom while 47 (9.87%) disagreed with the assertion. 425 (89.29%) agreed that flipped methodology encourages interactions with peers and lecturers, whereas 51 (10.71%) disagreed with the statement. 424 (89.08%) agreed that flipped methodology enhances their minds and hand-on in science instruction whereas 52 (10.92%) disagreed that flipped methodology enhances their minds and hands-on in science instruction. 426 (89.50%) agreed that flipping science instruction enables quick objectives attainment while 50 (10.50%) disagreed with the assertion. 425 (89.29%) agreed that flipped methodology helps science lesson effective evaluation whereas 51 (10.71%) disagreed with the statement.

Research Question 2:

From the interview conducted, the majority of the pre-service science NCE teachers preferred the flipped methodology to the regular conventional lecture method. They averred to the fact that the

flipped methodology makes the contents of instruction down to earth; it enhances their active participation in the class, it exposes them to the nitty-gritty of the course and thus encourage maximum understanding of the course contents.

Hypotheses Testing

Ho$_1$: "There is no significant perception of flipped instructional methodology of pre-service science NCE teachers in Emmanuel Alayande Collede of Education, Oyo"

Table 3: T-test Analysis of Pre-service Science NCE Teachers' Perception of Flipped Methodology

Flipped Methodology Perception	N	Mean	SD	df	t	Sig.	R
Pre-service science NCE teachers	476	34.60	7.39	475	35.71	.001	*S

Table 3 reveals that there is significant pre-service science NCE teachers' perception of flipped methodology in Emmanuel Alayande College of Education, Oyo (N = 492, $\bar{x}$ = 34.60; SD = 7.39; df = 475, t = 35.71, p < .05). Therefore, the null hypothesis that says there is no significant pre-service science NCE teachers' perception of flipped methodology is not held.

Ho$_2$: "There is no significant gender difference of pre-service science NCE teachers' perception of flipped instructional methodology"

Table 4: T-test Analysis of Gender Difference in Pre-service Science NCE Teachers Perception of flipped methodology

Flipped Methodology Perception	N	Mean	SD	df	t	Sig.	R
Male	159	35.26	7.39	474	1.75	.051	NS
Female	317	34.89					

Table 4 indicates that the t-test analysis of gender difference in pre-service science NCE teachers perception of flipped methodology in Emmanuel Alayande College of Education, Oyo is not significant (t = 1.75, df = 474; p > .05). Therefore, the null hypothesis that says there is no significant gender difference in the pre-service science NCE teachers' perception of flipped methodology is accepted.

Ho$_3$: "There is no significant age difference of pre-service science NCE teachers' perception of flipped instructional methodology"

Table 5: Analysis of Variance of Age Difference in Pre-service Science NCE Teachers' Perception of Flipped Methodology

Source of Variation	Sum of Square	df	Mean Square	F	Sig.	Remark
Treatment	628854.00	473	1328.501	2,071	.500	NS
Between	1282.793	2	641.397			
Total	630136.793	475				

Table 5 revealed that the analysis of variance of age difference in the pre-service science NCE teachers' perception of flipped methodology is not significant ($F_{(473,2)}$=2.071, p>.05). Therefore, the null hypothesis that says there is no significant age difference in the pre-service science NCE teachers' perception of flipped pedagogy was accepted.

Discussion

From the answered research question, it was identified that the pre-services science NCE teachers preferred the flipped methodology to the regular conventional lecture method. This is because the methodology flipped strategy is novel, learners' centered heuristic and interactive mode of instruction. This finding finds supports in Blair, Maharaj and Primus (2015), Aljaraideh (2019), Nasera putrl and Purwaningsih (2021) that majority of the learners' perceived flipped pedagogy better than the conventional instructional strategy.

From the tested hypothesis, it was found that there is significant pre-service science NCE teachers' perception of flipped pedagogy. This results corroborate the findings of Birgili Seggie and Ogniz (2021), Rashner and Schier (2020) that flipped methodology raised students' perception of their leaning experiences above the minority benchmarks.

Additionally, from the tested hypothesis, it was identified that the pre-service science NCE teachers' perception of flipped methodology was not influenced by gender. This finding agrees with the reports of Raimi, Bolaji and Adesina (2013), Wonu and Anakwe (2014) that gender did not influence students' perception of methodology efficiency. The inconsistencies in gender effects on students' perceptions of instructional methodology by Lu (2021) and Yu (2021) were equally clarified by the finding that indicated that gender had no significant effect on pre-service teachers' perception of flipped instructional methodology.

Furthermore, the pre-service science NCE teachers' perception of flipped methodology is not beclonded by age differences. This is owing to the fact that the novel methodology flipped pedagogy is both acceptable to the adult and youths alike. This finding is converse to the report of Ma, Chan and Teh (2020) that generational perspective of the older persons were better than the younger ones. Also, the results contrast the findings of Gomez-Garcia et al (2020) that age differentiated mathematician teachers' perspective on ICT training and utilization.

Conclusion

From the answered research question and tested hypotheses, it can be sincerity concluded that:

1. Pre-service science NCE teachers' prefer flipped methodology than the regular conventional lecture method.
2. The preference of flipped methodology by the pre-service science NCE teachers' was not beclouded by gender and age.

Recommendations

From the conclusion reached in the study: the following are recommended:

1. Tertiary Institutions' lecturer should adopt flipped methodology to interact with their students as it is widely preferred by the majority of the students compared to the conventional lecture mode.
2. The tertiary institutional management to organize seminars, symposia, lectures and workshops on the strategies to implement effectively the flipped methodology by the lectures.

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COMPUTER BASED TEST, QUALITY OF ADMINISTRATION AND SATISFACTION EXPERIENCE OF UNDERGRADUATES IN TERTIARY INSTITUTIONS IN LAGOS STATE

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Abstract
Expectedly in this digital era, many tertiary institutions are integrating Computer Based Test (CBT) into their educational activities, in particular to conduct semester examinations in some selected courses, on the students. However, a number of CBTs so far conducted in recent time by these institutions show that there are challenges on administration quality for a seamless process. This problem could affect performance rate, as well as the students' terminal grades. Thus, peculiar institutional problems associated with the practice of CBT in tertiary institutions in Lagos State were evaluated. The study adopted descriptive survey design, and purposive sampling method was used for sampling undergraduates across various departments in the institutions. Two questionnaires namely – CBT Administration Questionnaire and Student CBT Satisfaction Experience Questionnaire – with four Likert Scale were used for data collection. Each of the instruments had very strong reliability values of 0.76 and 0.84 respectively. Data were analysed using frequency count, percentage and correlations methods. From the results of analysed data, recommendations were made that a national best practice benchmark should be provided, to guide CBT conduct to promote quality student satisfaction experience; and that SDGs should be expanded to include more elaborate target and indicators for sustainable human resource development.

Keywords: *CBT, SDG goal, Quality administration, Undergraduates, Satisfaction experience*

Introduction

To know if education is effective, there should be evaluation of both the set goals and achievement of learning objectives. Computer Based Test – CBT is one of the approaches of conducting assessment and evaluation. In teaching and learning, the CBT could simply be defined as integration of computer or digital device to administer assessment instrument in order to gather information on achievement of learning objectives or aptitude in a specified area. The CBT could be conducted without integration of internet or as well on-line.

In addition, the CBT is used in other fields (e.g. engineering, medical or health, and sciences) to find out or collect information about situations and conditions of what is involved. As itemised by Ajinaja (2017), Computer Based Test (CBT) has been called various names such as – Computer Assisted Assessment, Computer Aided Assessment and Electronic Based Assessment. Apart from these, the nomenclature of Computer Based Test (CBT) include Computerized Assessment, On-line Assessment, Computer Assisted Test, E-Assessment, Computer Based Assessment, Web-Based Assessment and Automated Assessment. It is good to state that research efforts are also into Smart-device Based Test (SBT). In the words of Admiraal, Vermeulen and Bulterman-Bos (2020), Computer-based assessments generate data on students' performance that may be further analysed by the teachers.

Hence, to sustain effectiveness of the evaluation approach in use, the activities involved in administration of the evaluation should be continuously monitored and investigated, with intention to bring a desirable sustainable development. This is also expected in administration of

quality CBT that will ensure student satisfaction, and attain the goal of education in the society. Even in the 17 goals specifically set for sustainable development (by 2030), the fourth goal (goal 4) is on quality and equity in education of the citizens.

In this study, sustainable development is considered as making productive progress and appreciable improvement by using natural, material and human aptitude resources, in a way that will not deprive future generations any less of such natural, material or human aptitude resources, for development in their own generations. Each of the target 17 sustainable development goals (SDGs) also has appropriate key indicators (signs of progress) to examine goal if being achieved. This significantly emphasizes importance of assessment and evaluation. Possibly through many approaches, without or with technologies, such as CBT.

Importantly also, UNICEF (2014) reported that rapid increase in the gross enrolment rate has challenged the overall quality of education, particularly in the context of severely limited resources. In cognizance of this report, it is conceivable that the indicators in the target 17 SDGs will guide and help individual countries to monitor their progress on attaining stipulated global quality and equity in education, and to promote lifelong learning opportunities for all. According to Education International Toolkit (2017), the "goal 4" is "Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all" (p. 3). Furthermore, the indicator to monitor the "goal 4", among others, is target 4a of SDGs which is – "build and upgrade education facilities that are child, disability and gender sensitive, and provide safe, non-violent, inclusive and effective learning environment for all".

Despite that Ilesanmi and Lasisi (2015) noted a low financial priority on ICT in most educational systems in Africa, and despite conception of Fagbola, Adigun and Oke (2013) that lack of standardized/unified CBT development model alone will undermine the success of the e-examination platform for real-time adoption in practice, Ajinaja (2017) strongly asserts that CBT stands as a change catalyst (agent) that has brought about remarkable improvement in the education assessment process. Regardless of no consensus over the concept of quality, service quality has now become one of the central components of reform and policy instruments to adapt in higher education institutions, to the increasing expectation from both internal and external stakeholders all over the world (Mulu, 2012). Besides, it had also been explored that universities start realizing that the education and other services they offer should be considered as a business like other service industries, and they should focus on student's, academic staff's and all other stakeholders' expectations and perceptions while delivering the service (Malik, 2010; Mulu, 2012).

Though Kuyoro, Maminor, Kanu and Akande, (2016) opined that increase in the population of students spurred the need for CBT in the education assessment, Nwoke, Osuji and Agi (2017) considered the introduction of CBT in public examination as an approach to ensue global best practice in the conduct of examination in Nigeria. As attested by Umesh and Shivaprasad (2014), assessment provides information on progress to measure achievement of learning goals, (p, 11). In addition, Won Sun and Adrian Yong (2016) declared that comprehending the essentials of what determined learners' satisfaction provided insight into developing effective strategies that benefit learners (p. 1668).

However, the pains of over-population of undergraduate students and intending candidates at CBT centres are visible even within tertiary institutions that are using CBT in Nigeria. This could be as a result of insufficient accredited CBT centres or lack of enough adequately equipped CBT centres, be it within a university campus or outside the university campus (in private support organisations). In some challenging instances, officials who oversee or manage evaluation

environment are unable to act proactively to readily meet urgent needs of the candidates, because they lack professional training.

Such experiences could be a contributory factor that could affect the standard of conduct of CBT. If tertiary institutions had the facilities for CBT to sufficiently cater for undergraduate students or intending candidates, probably this aspect of administration could be better; but tertiary institutions are equally struggling to provide the CBT infrastructural and facility requirements for their undergraduate students. This raises serious alert on both the quality of evaluation approach in use, as well as quality of assessment administration in education sector, particularly in Nigeria. Despite that, the CBT is being trial administered on a few selected courses, on the undergraduate students in some tertiary institutions in Nigeria; most institutions are far from getting things about CBT done appropriately. Hence, this study investigated perception of CBT administrators and satisfaction experience of students, on the conduct of CBT in tertiary institutions.

Purpose

The purposes of this study were:

1. to examine perception of staff on quality of administration of CBT, on undergraduate students in tertiary institutions in Lagos state.
2. to examine CBT satisfaction experience of undergraduate students, on courses in tertiary institutions in Lagos state.
3. to establish if there is relationship between the invigilators-staff's perception on quality of CBT administration and the CBT satisfaction experience of undergraduate students in tertiary institutions in Lagos state.

Research questions

This study was guided by two research questions which stated that:

1) What is the perception of invigilators-staff on quality of administration of CBT, on undergraduate students in tertiary institutions in Lagos state?
2) What is the CBT satisfaction experience of undergraduate students, on courses in tertiary institutions in Lagos state?

Research Hypothesis

The following null hypothesis was formulated and tested at 0.05 level of significance.

1. There is no relationship between the invigilators-staff's perception on quality of CBT administration and the CBT satisfaction experience of undergraduate students in tertiary institutions in Lagos state.

Significance

This study is significant because it would provide reliable empirical reference as a yardstick for measuring progress and to plan on improving implementation of the SDGs in Lagos state and across Nigeria. This could also guide some developing countries.

Research Design

Descriptive survey was used in this study. The target population for the study was all undergraduate students in tertiary institutions in Lagos state, Nigeria. The scope was limited to undergraduate students, in five tertiary institutions (one polytechnic and four universities), that had CBT centres, and whose institutions used CBT. Purposive sampling method was used to select participants in this study; a total of 145 participants comprising 106 undergraduates and 39 staff of tertiary institutions. Data were collected with researchers' designed and validated questionnaires. The two instruments were further subjected to reliability test by single administration of the instruments on 15 undergraduates and 10 invigilator-staffs who were replica but not part of the samples in the study. Both instruments had very strong reliability values; the reliability co-efficients of the instruments were 0.82 for CBT Administration Perception Questionnaire (CAPQ) and 0.84 for Student CBT Satisfaction Experience Questionnaire (SCSEQ).

Procedure for Data Collection

The links for the digital instruments (on-line questionnaires) were sent by the researchers to the WhatsApp platforms of academics and non-teaching staffs who did invigilate CBT; as well as to the WhatsApp platforms of undergraduate students (who have been taking CBT examinations in their courses of study in their institutions). All the respondents participated voluntarily in the study and those responses received were computed for final analyses.

Data Analysis and Results

Research question 1:

What is the perception of invigilators-staff on quality of administration of CBT, on undergraduate students in tertiary institutions in Lagos state?

Table 1: Descriptive statistics on perceptions of Invigilators-staff on quality of administration of CBT

S/n	Description of perceptions about Administration of CBT	Mean	Decision
1	I perceived that there were official forum where course lecturers meet to prepare pools of questions for CBT in advance	3.03	Agreed
2	I perceived that there were sufficient questions in the question pool/bank to juggle (select at random) for CBT	3.21	Agreed
3	I perceived that there were orderliness in managing large population of candidates at the CBT centre on the day of examinations	2.64	Agreed
4	I perceived that there were adequate training and briefing for the staff before invigilation duties	2.62	Agreed
5	I perceived that there was teamwork among officials of CBT centre	2.97	Agreed
6	I perceived that the CBT software is easy to download	2.82	Agreed
7	I perceived that candidates were thoroughly searched before being allowed into examination halls	3.21	Agreed
8	*I perceived that some candidates find it difficult to read on the screen of computer systems	2.28	*Agreed
9	I perceived that the general condition of the CBT centre was conducive for candidates and staff	2.51	Agreed
10	I perceived that there was compliance with rules and regulations in general attitude of candidates for CBT	2.97	Agreed

11	I perceived that examination malpractice was appropriately monitored	3.18	Agreed
12	I perceived that the security at the centre was adequate and efficient	3.00	Agreed
13	I perceived that there were no problems on presentation of questions or issue of incomplete questions in CBT	2.77	Agreed
14	I perceived that there was no problem of excess questions on CBT for the candidates	3.05	Agreed
15	I perceived that there were immediate responses from staff to solve complaints from candidates, on CBT	3.00	Agreed
16	I perceived that there was fairness in activities of CBT invigilators	3.07	Agreed
17	I perceived that the time-table for CBT is flexible and convenient for the candidates	3.00	Agreed
18	I perceived that the duration of conducting CBT is appropriate	2.92	Agreed
19	I perceived that there was efficient communication between the CBT centre management and the candidates	2.72	Agreed
20	I perceived that there were no delay in uploading of candidate responses	2.69	Agreed

*The item is a negative question, so the scoring is reversed.
 N = 39 (100%).   Decision: Scale 2.50 is used for decision.

The Table 1 shown that all the 39 invigilators-staff agreed that the quality of administrative activities before, during and after the conduct of CBT in their individual institutions were appropriate; including item 8, which scoring was reversed. Item 2 and 7 jointly reported highest scale (3.31) which is far greater than the 2.5 decision scale.

Research question 2:

What is the CBT satisfaction experience of undergraduate students, on courses in tertiary institutions in Lagos state?

Table 2: Descriptive statistics on Undergraduate student CBT Satisfaction Experience

S/n	Description of student CBT satisfaction experience	Mean	Decision
1	I was satisfied with the computer system provided for the CBT	3.23	Agreed
2	I was satisfied with the internet/intranet speed and network for the CBT	3.08	Agreed
3	I was satisfied with stable supply of electricity	3.23	Agreed
4	I was satisfied with the immediate response from staff to solve complaints about CBT	3.85	Agreed
5	I was satisfied with fairness of staff in attending to each candidate at CBT centre	2.94	Agreed
6	I was satisfied with levels of human and material securities provided at the CBT centre	3.04	Agreed
7	I was satisfied with activities of invigilators who invigilated candidates for CBT	3.01	Agreed
8	I was satisfied with activities of administrative staff who checked identification details of candidates for CBT	3.17	Agreed

9	I was satisfied with period of time provided for the CBT at the centre	2.90	Agreed
10	I was satisfied with duration of time to do the CBT on the computer system	2.91	Agreed
11	I was satisfied with communication of messages from CBT centre to the candidates who sat for the CBT	2.91	Agreed
12	I was satisfied with neatness of the CBT centre and its environment	3.26	Agreed
13	I was satisfied with performance of software on the computer system for CBT	3.09	Agreed
14	I was satisfied with provision of information to easily locate CBT centre	3.03	Agreed
15	I was satisfied with indication of range of candidates' seat numbers at the entrance of the CBT examination halls	2.91	Agreed
16	I was satisfied with numbering of desks to make candidates locate their CBT seats with ease inside the examination halls	2.75	Agreed
17	I was satisfied with orderliness of arranging large population of candidates who came to the centre for CBT	2.88	Agreed
18	I was satisfied with provision of a place to stay for the CBT candidates who were waiting for their turn (and when it was raining) at the CBT centre	2.38	Disagreed
19	I was satisfied with provision of toilet facilities at the CBT centre	2.41	Disagreed
20	I was satisfied with provision of air-conditioners/fans at the CBT centre	3.11	Agreed
21	I was satisfied with flexibility and convenience of CBT time-table	2.95	Agreed
22	I was satisfied with communication of CBT results to the candidates	2.66	Agreed

N = 106 (100%).   Decision: Scale 2.50 is used for decision

As shown in Table 2, all the 106 undergraduate students agreed to have personally had satisfactory experience on CBT conducted by their institutions in their courses of studies; except on items 18 and 19, which they disagreed since the scales 2.38 and 2.41 respectively were lower than 2.5 scale used for decision. Among the items that were satisfactory, the item 22 has the lowest (2.66) and item 4 the highest (3.85). Also, the highest is far greater than the 2.5 decision scale.

In testing the just one stated hypothesis, results are presented as follow.

Hypothesis 1:

There is no relationship between the invigilators-staff's perception on quality of CBT administration and the CBT satisfaction experience of undergraduate students in tertiary institutions in Lagos state.

Table 3: Correlation analysis on the invigilators-staff's perception on quality of CBT administration and the CBT satisfaction experience of undergraduate students

Variable	N	Mean	Std. Deviation	P

Staff perception of CBT administration	39	52.3590	9.22664	
Student CBT Satisfaction experience	106	76.1038	3.52928	.169
Total	145			

As shown in Table 3 above, it is revealed that there was a positive relationship between the invigilators-staff's perception on quality of CBT administration and Student CBT Satisfaction experience. However, the p-value of .169 shows a very weak relationship.

Discussion

From the results of the tested hypothesis, a positive relationship was established between the invigilators-staff's perception on quality of CBT administration and Student CBT Satisfaction experience. Profoundly, the positive perception by the invigilators-staff and the undergraduate students, on the quality of CBT administration, could be that standard for CBT development in their institutions is not less than the standard of Joint Admission and Matriculation Board's (JAMB) CBT development in Nigeria. This is contrary to Fagbola, Adigun and Oke, (2013) that alerted on lack of standardized/unified CBT development in Nigeria. The implication of this is that, the education professionals should collectively define and accept a worthwhile guide, on best practices for CBT development in tertiary institutions in Nigeria. This will help in attaining quality education and global equality in education, that will be effective towards sustainable development.

This assertion is confirmed by positive relationship between the invigilators-staff's perception and the undergraduate student satisfaction experience. It greatly implies that in addition to agenda of natural, economic and environmental resources in sustainable development goals, the human capacity is also a delicately important resource that requires sustainable development agenda. Thus, is good to submit that such human capacity sustainable development goals, as required in tertiary institutions, are generally required in other facets of the society.

Conclusion

The CBT is of great innovation that solved peculiar problems of bulky paper and pencil test but the gains also have pains if appropriate digital technologies are not adequately available. However, the future relies on how human capacity resource would have its full sustainable development agenda, which is important towards attainment of the present 17 SDGs, particularly on quality and equity, enhanced by digital technology in education.

Recommendation

A national best practice should be provided to guide quality of CBT conduct, to ascertain student individual and general satisfaction experience of on-line evaluation, of learning in education. Finally, SDGs should be expanded to include more elaborate target and indicators for sustainable human resource development. Furthermore, training on best practices should continuously be given to tertiary institutions staff, on the conduct and administration of quality CBT.

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DEVELOPMENT AND ASSESSMENT OF GAMIFICATION INSTRUCTIONAL PACKAGE ON GENETIC CONCEPTS FOR SENIOR SECONDARY SCHOOLS ACHIEVEMENT AND GENDER IN MINNA, NIGERIA.

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Abstract

This study investigated the development and assessment of Gamification Instructional Package on genetics concept for senior secondary schools achievement and gender in Minna Metropolis, Nigeria.The study adopted pre-test post-test non-randomized quasi experimental research. The population of the study comprises federal government college students in Niger state Nigeria and target population were SSII biology students. Intact class of 90 students (male =50, female=40) were used for the study from two randomly selected federal government colleges in Niger state Nigeria, the schools were randomly selected because Niger state has more than two federal government colleges that are mixed schools. The Instruments for the study are Genetics Achievement Test (GAT) and treatment material is Gamification Instructional Package (GIP). The GAT comprises of 50 multiple choice objective questions and Gamification Instructional Package comprised of Genetics lesson. The Genetics Achievement Test (GAT) and Gamification Instructional Package (GIP) were validated by three experts in biology education, education technology, cyber security experts and computer scientist by both university and secondary school teachers. Experimental group were given Pretest before the treatment and after treatment posttest were administered on them. Experimental group was exposed to the use of Gamification Instructional Package (GIP) while Control group was exposed to Lecture Method (LM). Mean and standard deviation were used to analyze the research questions while ANOVA was used to analyzed hypotheses. Conclusively, it was established that there was significant difference in the achievement using Gamification instructional package and lecture method and no significant difference in the gender of biology student taught using Gamification instructional package.

Key words: Gamification Instructional Package, achievement, gender

Introduction

The advent of science and Technology has made the standard of living comfortable as it has influence every aspect of human life ranging from the immediate home, school, offices, market areas and politics. Technology can be seen as the application of scientific ways or methods to human lives involving the use of tools, methods systems and procedures to solve challenges. Technology has had much influence on development and has impacted our lives by making it easier. Today, the role of Technology in learning is of importance because of the increase in agitation for the use of various types of information and communication technologies. Kareem, (2003) stated that, in this present digital era, development in various aspects of computer technology has reached a stage beyond human imagination and expectations. Even though the computer has a lot of applications in various fields, one should never forget its application in the field of education as it has been seen to be helpful in the teaching and learning process. Gamification has been seen as one of such ways through which its application of typical elements of game playing can be integrated into the classroom.

Deterding, *et al.,* (2011) defined Gamification as the application of game-design elements to non-game contexts with the intention of modifying behaviours, increasing fidelity or motivating and engaging people. Gamification applies elements associated with video games (game mechanics and game dynamics) in non-game applications. It aims to increase people's engagement and to promote certain behaviors. Although, the concept has been explored primarily in the marketing area, the potential of its application has been extended to other areas such as Health, Environment, Government or Education (Jorge,*et al.,*

2013). It is used primarily as a tool for marketers, often making use of social media to engage existing and potential customers to increase public profile, market a new product or engage potential customers/stakeholders. Gamification involves adding a game layer into applications or businesses allowing users to collect points, compare stats in leaderboards, and compete in specific tasks.

It is a known fact that science is a tool for scientific and technological advancement of any nation as it is found in the National Policy of Education (Federal Republic of Nigeria, 2004) which states that the teaching and learning of science should among other things empower the students to live effectively in the modern age of science and technology. Biology is one of science subjects offered in Nigerian secondary schools.

Biology is a branch of science that involves the systematic study of living things. It is recognized as one of the core science subjects offered at the senior secondary school level in Nigeria and it is the most preferred subject offered by both science and non- science students this is proven by large number of students' enrolment in the O'level Biology examination (Nsofor, 2001). Among the core topics been taught in biology, questions on genetics is often times asked during the O'level Biology examination as it is an indispensable topic in the Nigerian secondary school Biology Senior Secondary School three curriculum.

Students' academic achievement tends to show the efficacy or otherwise of schools and tends to determine the future of students. Ogundukun, *et al.,*(2010) defined students' academic achievement as the exhibition of knowledge or skills acquired in a subject which is usually determined by scores in test. Academic achievement is defined as the performance of a student in a subject as designated by a score obtained in an achievement test. Achievement is defined as something accomplished successfully, especially by means of exertion skill, practice or perseverance (Umoren, *et al.,* 2007).

Gender influence on the students' achievement in biology has generated a lot of concern by educators. Studies on the influence of gender on students' performance is conflicting. For instance, Nkemdilim, *et al.,* (2014) conducted a study on students' achievement in ecological concepts and found that male students that were taught with computer-assisted instruction (CAI) performed better than female students

Aim and Objectives of the Study

The aim of this study is to develop and assess the Gamification Instructional Package on genetics concept for senior secondary schools achievement and gender in Minna Metropolis, Nigeria. The specific objectives are to:

1) Assess the effect of gamification on achievement of students taught genetics and those taught with lecture method.

2) Assess the effect of gamification on gender of students taught genetics and those taught with lecture method.

Research Questions:

The following research questions were raised to guide the study:

1. What are the mean difference in achievement scores of students taught genetics using Gamification Instructional Package and those taught with Lecture Method?

2. Will there be any difference in the mean achievement scores of male and female students taught Genetics using Gamification Instructional Package?

Research Hypotheses:

The following null hypotheses will be formulated and tested at 0.05 level of significance:

$H0_1$: There is no significant difference in the mean achievement scores of students taught genetics using Gamification Instructional Package and those taught using Lecture method method.

$H0_2$: There is no significant difference in the mean achievement scores of male and female students taught Genetics using Gamification Instructional Package.

Methodology
The study adopted pre-test post-test non-randomized quashi experimental research. The population of the study comprises all federal government colleges students in Niger state Nigeria and target population were SSII biology students. Intact class of 90 students (male =50, female=40) were used for the study from two randomly selected federal government colleges in Niger state Nigeria, the schools were randomly selected because Niger state has more than two federal government colleges that are mixed schools. The Instruments for the study are Genetics Achievement Test (GAT) and treatment material is Gamification Instructional Package (GIP). The GAT comprises of 50 multiple choice objective questions and Gamification Instructional Package comprised of Genetics lesson. The Genetics Achievement Test (GAT) and Gamification Instructional Package (MSI) were validated by three experts in biology education, education technology, cyber security experts and computer scientist in both university and secondary school teachers. Experimental group were given Pretest before the treatment and after treatment posttest were administered on them. Experimental group was exposed to the use of Gamification Instructional Package (GIP) while Control group was exposed to Lecture Method (LM). Mean and standard deviation were used to analyze the research questions while ANOVA was used to analyzed hypotheses. Conclusively, it was established that there was significant difference in the achievement using Gamification instructional package and lecture method and no significant difference in the gender of biology student taught using Gamification instructional package.

Results:
Research Questions One: What are the mean difference in achievement scores of students taught genetics using Gamification Instructional Package and those taught with Lecture Method?

Table 1: Mean and Standard Deviation of Pretest and Posttest Scores of Experimental and Control Groups

Group	N	Pretest		Posttest		Mean Gain
		$\acute{X}$	SD	$\acute{X}$	SD	
Experimental	50	33.50	6.12	77.48	7.92	43.98
Control	40	35.70	5.96	50.70	11.52	15.00

Table 1 shows the mean and standard deviation of achievement scores of experimental group and control group in pretest and posttest. The result revealed that mean and standard deviation scores of the pretest and posttest experimental group are $\acute{X}$ =33.50, SD = 6.12 and $\acute{X}$ = 77.48, SD = 7.92 respectively. This gives a mean gain of 43.98 for Gamification Instructional Package group. On the other hand, the mean and standard deviation of the pretest and posttest of the control group are $\acute{X}$ = 35.70, SD = 5.96 and $\acute{X}$ =50.70, SD = 11.52 respectively and gives a mean score of 15.00 for the Control Group. The results revealed that experimental group and control group had mean gain of 43.98 and 15.00 respectively with the experimental group (Gamification Instructional Package having the higher mean gain than Lecture method.

Research Question 2: Will there be any difference in the mean achievement scores of male and female students taught Genetics using Gamification Instructional Package?
Table 2: The mean and standard deviation of pretest and posttest scores of male and female Gamification Instructional Package)

Group	N	Pretest		Posttest		Mean Gain
		$\acute{X}$	SD	$\acute{X}$	SD	
Male	29	34.38	6.63	76.90	8.84	42.52
Female	21	32.29	5.26	78.29	6.58	46.00

Table 2 shows the mean and standard deviation of the pretest and posttest scores of male and female experimental group. From the result, it can be seen that mean score of the pretest and posttest score of

the male are $\acute{X}$ =34.38, SD = 6.63 and $\acute{X}$ = 76.90, SD =8.84, the mean gain is 42.52 in favour of the male posttest achievement score. Similarly, the mean and standard deviation of pretest and posttest score of female are $\acute{X}$ = 32.29, SD = 5.26 and $\acute{X}$ = 78.29, SD = 6.58, the mean gain is 46.00 in favour of the female posttest score. In addition, the result reveals the difference of 3.48 between the posttest mean gains score of male and female in favour of the female.

Hypothesis One: There is no significant difference in the mean achievement scores of students taught genetics using Gamification Instructional Package and those taught using Lecture method method.
Table 3: Summary of Analysis of Variance ANOVA comparison of the achievement mean achievement scores of the experimental and control group taught Genetics using (GIP)

Groups	Sum of Squares	Df	Mean Square	F	Sig
Between groups	15037.076	1	15937.076	169.648	000
Within groups	8266.880	88	93.942		
Total	24203.956	89			

Table 3 shows the results of the analysis of variance on achievement test of students who taught genetics using Gamification Instructional Package and Lecture Method. As shown in (Table 4.8) revealed F (1, 88) = 169.648 p=0.00. With p <0.05, the null hypothesis was rejected. Therefore, there was significant difference in the mean achievement scores of students taught genetics using Gamification Instructional Package and those taught using Lecture method.

Hypothesis Two: There is no significant difference in the mean achievement scores of male and female students taught Genetics using Gamification Instructional Package.
Table 4: ANOVA Analysis of Achievement of Male and Female Students Taught   Genetics Using Gamification Instructional Package

Groups	Sum of Squares	Df	Mean Square	F	Sig
Between groups	23.505	1	23.50	0.36	0.54
Within groups	3054.975	48	63..64		
Total	3078.480	49			

Table 4 shows the results of the analysis of variance on achievement of male and female students taught Mathematics using Mastery learning strategy and conventional teaching strategy as shown in (Table 4) revealed F (1, 48) = 0.36 P= 0.54 With P > 0.05 the null hypothesis was accepted. Therefore, there was no significant difference in the mean achievement scores of male and female students taught Genetics using Gamification Instructional Package.

Discussion
There was significant difference in the mean achievement scores of students taught genetics using Gamification instructional package and Lecture method. This is in support of findings of Tara and Bindu (2016) who examined the effect of blended learning strategy on achievement in biology, social and environmental attitude of students at secondary level. The findings reveal that Blended Learning strategy is an effective means for enhancing achievement in Biology, for improving Social Attitude and Environmental Attitude of secondary school students. Also agreed with the work Rabgay, (2018) who investigated the effect of using cooperative learning method on tenth grade students' learning achievement in biology. The test score analysis showed that the experimental group had significantly higher scores than the control group

There was no significant difference in the mean achievement of gender of students taught genetics using Gamification instructional package. Adeleke (2007) who carried out a study that examined the problem solving performance of male and female students' mathematical problem solving using conceptual

learning strategy (CLS) and procedural learning strategy (PLS). Findings of the study showed a non-significant difference in the performance of boys and girls in two learning strategies. This is contrary with the findings of Olumide (2013) who carried out a research to establish computer simulation package and gender as predictors in the teaching of Genetics on students' achievement in Biology. The findings shows there was a significant main effect of gender on students' achievement in Biology.

Conclusion

1.   Findings of this study indicates that; students exposed to Gamification instructional package   (GIP) improved their level of achievement compared to those taught using Lecture Method   (LM).

Recommendations

1   Given the evolving nature of the teaching and learning process, succession of studies based on Gamification instructional package (GIP) should be made to further enhance the decision to accept Gamification instructional package into the educational system thereby enabling both the students and teachers familiarize themselves with educational technology.

2   The findings of this study provide the basis for conclusion that the use of the package developed for the study (Gamification instructional package) is gender sensitive

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INFLUENCE OF GENDER ON THE ADOPTION OF MOBILE TECHNOLOGIES FOR LEARNING IN SELECTED UNIVERSITIES IN SOUTH-WEST, NIGERIA

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Abstract
This study investigated the influence of gender on the adoption of mobile technologies for learning. The objectives of this study were to investigate: the influence of gender towards perceived usefulness, ease of use, attitude and intention towards the use of mobile technologies for learning.
The study adopted the survey method. Respondents were 1,214, purposively drawn from 18 universities, which comprises of six Federal, six State and six Private Universities in South-west, Nigeria. Data were collected using questionnaire. Using Cronbach Alpha, reliability of the instrument was established at 0.86. Hypotheses one to four were tested using t-test. The findings of the study were that: positive difference was established between undergraduates gender on their perceived usefulness of mobile technologies, t (1212) = .32, p = .75; their perceived ease of use, t-(1212) = .86, p = .39; their attitude t (1212) = -.76, p = .45 and their intention, t (1067) = - 1.21, p = .23 to use mobile technologies for learning. The study concluded that no significant difference existed among all the variables such as (perceived usefulness, perceived ease of use, attitude and intention) based on gender. The implication is that mobile technologies can greatly influence students' learning in Nigerian universities. The study therefore recommended that gender inequality should not be considered in the implementation of mobile based-learning in Nigeria.

Keywords: *Influence, Gender,* Adoption, Mobile Technologies, Learning, South-west, Nigeria

Introduction

The beginning of the use of technology for learning may be traced to the classical age but the industrial revolution of the 1950's and 1960's in Britain and France revolutionised it. The subsequent contemporary progress in science and technology globally enable work to be done with ease and timely too, using technological tools to achieve amazing breakthrough in diverse fields of human endeavour. It is on the basis of this reality that the application of mobile technologies to teaching and learning in Nigeria's education, particularly among undergraduates is necessary to reform, 're-invent' and make teaching and learning easier and more realistic. As a recent trend in Nigeria's education, mobile technology will help to transform the academic system from the traditional oriented system of teaching and learning to a technology oriented one.

Learning with mobile technology is no longer new in educational arena which has to do with the integration of electronic learning. Mobile learning has since moved from being a subordinate method of electronic learning into its own educational sphere and it has opened up new field of educational research which has become an issue of global discourse (Pollara & Broussard, 2011) as cited by (Adegbija and Bola (2014). The increase in the use and acquisition of mobile technology for learning is creating a paradigm shift for electronic learning and thus provides significant learning prospects for students who regularly use mobile devices like smart phones, android, personal digital assistance, and so on (Bola, 2015).

Mobile technology is defined as handheld information technological devices or artifacts which comprises of hardware (devices), software (interface and applications), and communication (network services) (Bola, 2015; Butler, Camilleri, Creed, & Zutshi, 2020). The researchers explain mobile technology as portal devices which encompass of hardware, software and communication which is made possible through network services. This technology will enable educational institutions to use some of its features such as portability, flexibility and ubiquity in learning and this has been of tremendous benefit to both teachers and students alike in the new digital world (Criollo-C; Guerrero-Arias; Jaramillo-Alcázar; Luján-Mora 2021). The ease of use, portability and relatively cheap procurement make the mobile technologies ready tools that can be used by students generally.

Hashemi, Azizinezhad, Najafi and Nesari (2011) defined mobile learning as the use of technological devices or technologies, which include mobile phones, androids, smart phones, iPad, and so on, to extend the reach of teaching and learning across multiple locations. Mobile learning is the wireless delivery of learning content/materials to students through mobile technology, anywhere and anytime (Pamela, 2011) as cited by Bola (2015). However, there are many definitions for this term mobile learning (see: Grant 2019; Janson, Söllner & Leimeister 2019; Petrucco, 2020; Biswas, Roy and Roy, 2020).

Also, relevant to this study is gender as a concept and as an international issue of concern and is discussed in all fields of human endeavour. Gender is referred to as the roles and responsibilities of men and women and the relationships that exist between them (Saghir, Ashfaq & Noreen, 2009). Although, gender does not simply refer to women or men, but to the way their qualities, behaviours and identities are determined through the process of socialization (Saghir, Ashfaq & Noreen, 2009). In the same vein, Ewhrudjakpor (2006) explained the concept of gender as soial attributes and opportunities associated with being male and female and the mutual relationships that connect them. These attributes and relationships are socially constructed and are learned through the processes of socialization while technological development serves as a forum for exploring the link between changing gender relations and technological development

Several Nigerian authors have produced scholarly works that assessed the extent to which Nigerian universities have tried to infuse ICT based teaching and learning techniques (Obanya, 2006; Olatokun and Opesade, 2007; Erinosho, 2007). The study carried out by Awodeji, (1997) as cited by Adegbija, Bola, Riaz & George (2013) found gender disparity in ICT achievement in favour of males while Esiobu (2011), Adegbija (2006) as cited by Adegbija, Bola, Riaz and George (2013) opined that gender is no longer a significant impediment for performance, hence, gender differences in ICT usage are inconclusive.

However, the proliferation and opportunities offered by these mobile technologies make it pertinent to investigate the influence of gender on the adoption of mobile technologies for learning in selected universities in south-west, Nigeria. This is very necessary because of the ailing educational sector coupled with the challenge of insurgency, banditry, herder - farmer's clashes, kidnapping and bad governance in the country. The use of mobile technologies in learning could help to ameliorate some of the challenges faced in Nigerian education system by contributing to the effectiveness of instruction thereby increasing access to education for those yarning and waiting for global information lacking in higher institutions in Nigeria.

Purpose of the Study

The main purpose of the study was to investigate the influence of gender on the adoption of mobile technologies for learning in selected universities in south-west, Nigeria. Specifically the study investigated the:

1. influence of undergraduates' gender on their perceived usefulness of mobile technologies for learning.
2. influence of undergraduates' gender on their perceived ease of use of mobile technologies for learning.
3. influence of undergraduates' gender on their attitude towards using mobile technologies for learning.
4. influence of undergraduates' gender on their intention to use mobile technologies for learning.

Research Hypotheses

The following null hypotheses were tested in this study:

Ho_1: There is no significant difference between male and female undergraduates on their perceived usefulness of mobile technologies for learning

Ho_2: There is no significant difference between male and female undergraduates on their perceived ease of use of mobile technologies for learning

Ho$_3$: There is no significant difference between male and female undergraduates on their attitude towards using mobile technologies for learning

Ho$_4$: There is no significant difference between male and female undergraduates on their intention to use mobile technologies for learning

Research Methodology

This research is a descriptive research of the survey type. The survey involves the use of researcher-designed questionnaire to collect data from randomly selected undergraduates from the eighteen purposively selected Universities. The universities include: University of Ibadan, Ibadan; Obafemi Awolowo University, Ile-Ife; Federal University, Oye Ekiti, Ekiti; Federal University of Technology, Akure; University of Lagos, Lagos; Federal University of Agriculture, Abeokuta; Ladoke Akintola University, Ogbomoso; Osun State University, Osogbo; Adekunle Ajasin University, Akongba-Akoko, Ondo State; Ekiti State University, Ado Ekiti, Ekiti state; Lagos State University, Ojo Lagos; Olabisi Onabanjo University, Ago-Iwoye, Ogun state; Ajayi Crowther University, Oyo, Oyo state; Bowen University, Iwo, Osun state; Achievers University, Owo, Ondo state; Afe Babalola University, Ado Ekiti, Ekiti state; Caleb University, Imota, Lagos state and Babcock University, Ilisan Remo, Ogun state in southwest, Nigeria.

Stratified random sampling technique was used to divide undergraduates along gender so as to obtain clear data for the variables of gender used for the analysis. This was done across departments in each of the faculties in the universities. Eighty undergraduates were purposively selected from each of the eighteen Federal, State and Private universities for the study. In all, the research instrument was distributed to a sample of 1,440 out of which 1,214 adequately responded and was analyzed in the study.

Results

This chapter presents the analysis of the results obtained from the data from the research questions and research hypotheses of the studies. The results are preceded by the demographic information of the respondents.

The respondents' demographic data are presented in table 4.

Table 1: Percentage Distribution of Respondents by School Ownership

Institution Type	No. of Respondents	%
Federal University	420	34.6
State University	447	36.8
Private University	347	28.6

Table 1 reveals that State universities formed the highest percentage of respondents with 447 (36.8%), and followed by Federal Universities which had 420 (34.6%) while that of Private universities was 347 (28.6%).

Table 2: Percentage Distribution of Respondents by Gender

Gender	No. of Respondents	%
Male	624	51.4
Female	590	48.6
Total	1214	100.0

Table 2 shows that male formed the highest number of respondents with 624 (51.4%) while that of female was 590 (48.6%).

Hypotheses Testing

Based on research questions 1-4, research hypotheses 1-4 were developed. The results related to hypotheses one to four formulated for the study as shown in subsequent tables. All hypotheses were tested at 0.05 level of significance.

Hypothesis One

Ho₁: There is no significant difference between male and female undergraduates on their perceived usefulness of mobile technologies for learning.

In determining whether there is any significant difference between male and female undergraduates in their perceived usefulness of mobile technologies for learning, the null hypothesis was tested by using t-test as shown in Table 3.

Table 3: t-test of Male and Female undergraduates on their Perceived Usefulness of Mobile Technologies for Learning

Gender	No	$\overline{X}$	SD	Df	T	Sig. (2-tailed)
Male	624	3.38	.42	1212	.32	.75
Female	590	3.37	.39			
Total	1214					

Table 3 indicates that t (1212) = .32, p = .75. This means that the stated null hypothesis was accepted. This was as a result of the t-value of .32 resulting in .75 significant value which is greater than 0.05 alpha value.

By implication, the stated null hypothesis was established thus: There is no significant difference between male and female undergraduates on their perceived usefulness of mobile technologies for learning.

Hypothesis Two

Ho₂: There is no significant difference between male and female undergraduates on their perceived ease of use of mobile technologies for learning.

To determine whether there was a significant difference between male and female undergraduates on their perceived ease of use of mobile technologies for learning, the null hypothesis was tested using t-test. This is seen in Table 4.

Table 4: t-test of Male and Female undergraduates on their Perceived Ease of Use of Mobile Technologies for Learning

Gender	No	$\overline{X}$	SD	Df	T	Sig. (2-tailed)
Male	624	3.36	.42	1212	.86	.39
Female	590	3.34	.41			
Total	1214					

According to Table 4, t (1212) = .86, p = .39. This implies that the stated null hypothesis was accepted. Because the result of the t-value of .86 resulting in .39 significance value which is greater than 0.05 alpha value.

By implication the stated null hypothesis was established thus: There is no significant difference between male and female undergraduates on their perceived ease of use of mobile technologies for learning.

Hypothesis Three

Ho₃: There is no significant difference between male and female undergraduates on their attitude towards using mobile technologies for learning.

In an attempt to determine whether there was a significant difference between male and female undergraduates on their attitude towards using mobile technologies for learning, t-test was used for the null hypothesis. Table 5 reflects this.

Table 5: t-test of Male and Female undergraduates on their Attitude towards Using Mobile Technologies for Learning

Gender	No	$\overline{X}$	SD	Df	T	Sig. (2-tailed)

Gender	No	$\overline{X}$	SD	Df	T	Sig. (2-tailed)
Male	624	2.09	.39	1212	-.76	.45
Female	590	2.11	.39			
Total	1214					

Table 5 reveals that t (1212) = -.76, p = .45. This means that the stated null hypothesis is accepted. This is as a result of the t-value of -.76 resulting in .45 significance value which is greater than 0.05 alpha value.

By implication, the stated null hypothesis is established thus: There is no significant difference between male and female undergraduates on their attitude towards using mobile technologies for learning. Considering the earlier mean score of the undergraduates' general attitude, it means that both male and female undergraduates had a high positive attitude.

Hypothesis Four
Ho4: There is no significant difference between male and female undergraduates on their intention to use mobile technologies for learning.

In determining whether any significant difference exist between male and female undergraduates on their intention to use mobile technologies for learning, the null hypothesis was tested by using t-test as evident in Table 6

Table 6: t-test for Male and Female Undergraduates on their Intention to Use Mobile Technologies for Learning

Gender	No	$\overline{X}$	SD	Df	T	Sig. (2-tailed)
Male	624	1.88	.45	1212	.06	.96
Female	590	1.87	.44			
Total	1214					

Table 6 indicates that t (1212) = .06, p= .96. The result of the t-value of .06 resulting in .96 significance value which is greater than 0.05 alpha value. This means that the stated null hypothesis was accepted.

Thus, there is no significance difference between male and female undergraduates on their intention to use mobile technologies for learning.

Conclusion and Recommendation
This research explores the influence of gender on the adoption of mobile technologies for learning in selected universities in south-west, Nigeria. The result obtained from data gathered and analyzed in this article indicated that there was no significant difference between male and female undergraduates in Nigeria universities on their perceived usefulness as well as the ease of use of mobile technologies for learning. The research also revealed that there was no significant difference between male and female undergraduates on their attitude and intention to use mobile technologies for learning. This indicated that female undergraduates are catching up with their male counterparts in the use of mobile technologies. Hence, activities that will involve the use of mobile technologies can thus be given to anybody without gender consideration.

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EFFECT OF GLOGSTER ON STUDENTS' ACADEMIC ACHIEVEMENT IN SELECTED BASIC TECHNOLOGY CONCEPTS IN ILORIN METROPOLIS

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Abstract

Basic Technology is a subject taught in the junior secondary school with the incorporation of many skilled subjects to enable students be abreast with basic technological skills and competencies for useful living in the society. Student's performance in the subject over the years has consistently been below average. This study examined the Effect of Glogster on students' Academic Achievement in Selected Basic Technology Concepts in Ilorin Metropolis. The study adopted a quasi-experimental type, of pre-test, post-test, non-randomized, control group design. The design is a 2 x 2 factorial design. The sample for the study comprised of 24 males and 20 females (44) students selected from JSS II classes of selected two schools. School A was assigned as the experimental group, while School B was the control group. Purposive sampling technique was used to select intact classes used for the study. Four research questions were raised and answered, while two research hypotheses were formulated and tested. Descriptive and Inferential statistics were used to answer the research question and test the stated hypotheses with the aid of stastistical product and service solution (SPSS) version 20.0 at 0.05 level of significant. The findings indicated that there was no significant difference in the mean scores' performance of male and female students that were exposed to Glogster and there was no significant difference between male and female students' attitude towards the use of Glogster for learning. The study concluded that learning can be enhanced among secondary school' students if appropriate technology like Glogster are deployed for learning. Therefore, it was recommended that secondary school students be encouraged to deploy Glogster for learning irrespective of their gender.
Key words: Glogster, Gender, Achievement and Basic Technology

Introduction

Education is a very socially oriented activity and quality education has traditionally been associated with strong teachers having high degrees of personal contact with learners, the advent of ICT and its rapid growth has increased the quality of education as students can learn anytime and anywhere with or without a teacher, students can also interact with other students. With the world moving rapidly into digital media and information, the role of ICT in education is becoming more and more important. The role of ICT for classroom instruction has rapidly become one of the most important and widely discussed issues in contemporary education policy (Aduwa- Ogbiegbaen & Iyamu, 2017). Most experts in the field of education agreed that, when properly used, ICT holds gear promise to improve classroom instruction in addition to shaping workforce opportunities. Aduwa- Ogbiegbaen and Iyamu (2017) Indicated that computer illiteracy is now regarded as the new illiteracy. This has actually gingered a new and strong desire to equip schools with computer facilities and qualified personnel necessary to produce technologically proficient and efficient students in developed countries of the world. There is no doubt that computer can aid the instructional process and facilitate students' learning. Many studies have found positive effects associated with technology aided instructions in Nigeria (Anikweze & Kanu, Abed Chibuzo, 2019).

The teaching and learning with Information and communication Technologies in the Nigerian institutions in the 21st century most importantly have developed within the framework of theory and practice. In this technological age, the effective means of communication in the classroom instruction

requires the use of communication technologies. The illiterate of the 21st century, will not be those who cannot read and write, but those who cannot learn, unlearn, and relearn Taylor (2021). The above statement pointed out the relevance of ICT revolution in the 21st century education. Haddad and Jurich, (2016) argued that there are four basic issues in the use of ICT in education in the 21st century. They are effectiveness, cost, equality and sustainability. They pointed out that in recent years there has been an upsurge of interest in how ICTs most importantly computers and the internet can best be harnessed to improve the efficiency and effectiveness of education at all levels and in both formal and nonformal settings Haddad and Jurich, (2016). Rather than focusing on content contained in a specifically chosen textbook, students can now gather content through their own research. Rather than working in isolation to find answers within the pages of an assigned book, students can now work collaboratively with classmates and even with others around the world through the advances in using appropriate technological tools. In the past, too often, students did not connect what they had learned in one subject with another.21st century education curriculum is integrated and interdisciplinary. Literature, math, science and writing for example can all be interwoven. 20th century education focused on literacy in reading, writing and mathematics. Multiple literacies such as media, computer, digital, information and technology are recognized in 21st century learning. Assessment transitioned from the teacher judging the accuracy of the work produced by students to more authentic forms of assessments. These include self-assessments, assessment by peers, and even assessments by a public audience in some cases.

The most significant aspect of the National Policy on Education (Federal Republic of Nigeria, 2004) is the focus it gives to Nigerian educational system, the need for the Industrialization of the nation in which technical education plays crucial roles and the realization to change from white collar job oriented educational system to science and technological oriented educational system which prepares individuals to be self-reliant and useful to the society, informed the Federal Government to lay emphasis on technical education.

The sudden outbreak of COVID-19 in 2020 all over the world made online learning more popular and relevant. As part of responses by the Nigerian government to curb the spread of the COVID-19 pandemic, schools were closed across the country and various measures were put in place to ensure that children/students continued to learn despite the closure of schools. Among the various interventions to ensure continuous learning of students despite the closure of schools is teaching via various online platforms Dhawan, (2020). Online learning has a potential to improve learning outcomes by replacing lecture time with group and individual work that engages students more actively in learning, enabling greater motivation and deeper learning (Twigg 2017a,2018b). These activities include online discussions, continuous assessments with immediate feedback and increased computer lab hours where students can get one-on-one support based on the work they have done from the simulations and visualizations that make challenging abstract demonstrated advantage of online learning. Teachers usually adopt the online form of instruction delivery to support the learning of students with disabilities and gifted students, to enable flexible scheduling, to reduce cost of traditional learning, to provide rich feedback and communication about students' performance and motivates students to learn on their own.

Online learning platforms include Edmodo, Google classroom/ meet, Udemy, Docebo, Turor room, Glogster among others. Online learning supports learning by making teaching and learning fun to teachers and students, students are able to interact with other students all over the world. It encourages creativity and continuous learning. Students complete the course at their own pace and at a time they find convenient (Sun & Chen, 2016). With the advent of online learning, education is easier to access than ever. Glogster is a Web 2.0 platform that allows users to create interactive online posters called Glogs, by adding images, videos, auditors and text. It is a cloud-based platform for creating presentations and interactive learning. As a learner-centered tool, it supports student's knowledge building by allowing them to construct their own meaning of the content. It is an online platform supports culturally responsive practices since students can use this tool to show what they know and can do, share their passions and interests and reveal what they care about. Students can use Glogster as a way to build upon their knowledge and present their learning. Learners enjoy making their own meaning and displaying it to others in an interactive, online poster. Its format promotes the construction of new knowledge while balancing mastery of skills and the use of multimedia and web resources.

There has been considerable scholarly interest in issues related to gender and the online classroom. Some evidence suggests that male and female students experience the online environment differently. West. et al (2017) investigated about how gender difference affects online participation and the results show that engagement is highly individual and complex activity, irrespective of any gender. Fadillah (2020) has shown that variations in satisfaction level can be due to gender difference. Other studies have found that gender differences exist in perceived playfulness regarding the level of technology acceptance of a blended learning system among student users. Descriptive studies have also shown that gender difference exist in terms of communication patterns among the students in mixed eLearning and traditional teaching environments.

In general, scholars agree that male students tend to be more autonomous and independent, however, female students tend to seek relationships and connectedness. Females show more involvement in communication as they tend to treat computers as social media. The level of involvement may affect the process of information integration, and thus gender behavioral differences in interaction may have different impacts on learning satisfaction. Further-more, self-efficacy can also vary between males and females. For instance, Kayany and Yelsma (2021) revealed that men possess a higher tendency to use new media. Besides, the gender gap also exists in technology, evaluation and capitalization. Student' attitudes have been shown to be an important predictor of usage and implementation of technology (Rodgers & Chen, 2002). Likert (1932, p.9), cited in Gardner (1980, p.267), defined the term attitude as ''an inference which is made on the basis of a complex and beliefs about the attitude object''. Gardner (1980, p.267), expatiates on likert's definition by defining attitude as ''the sum total of a man's intinctions and feelings, prejudice or bias , preconceived notions, fears, threats, and convictions about any specified topic''. Ajzan (1988, p.4) considered attitude as ''a dispositions to respond favorably or unfavorably to an object, person, institution, or event''. Krech and Crutchfield (1948) defined attitudes" as an enduring organization of motivational, emotional, perceptual, and cognitive processes with respect to some aspect of the individual's world" (p. 152). These definitions emphasized the enduring nature of attitudes and their close relationship to individuals 'behavior. Some sociologists (such as Fuson, 1942) and psychologists (such as, Campbell, 1950) defined attitudes simply in terms of the probability that a person will show a specified behavior in specified situation. Allport (1935) defined an attitude as "a mental and neural state of readiness, organized through experience, exerting a directive and dynamic influence upon the individual's response to all objects and situations with which it is related" (p. 810).

Studies have revealed that acceptance of Glogster depends on the attitude of students and the instructors towards it Adedoja and Abimbade (2013). Kun, Jamie, David and Niamboue (2013) various studies have attempted to investigate learners' attitudes toward the use of blogs in higher education (Coutinho, 2007; Ellison and Wu, 2008 Halic, Lee, Paulus and Spencer, 2010; William & Jacobs, 2004). William and Jacobs (2004) reported that a majority of MBA students at the Harvard Law School and Queensland University of Technology indicated a positive attitude toward the use of blogs in teaching and believed that the use of blogs contributed to their learning.

Teachers and pre-service teachers also show a positive attitude toward the use of blogs in teaching and learning. Yang (2009) found that Taiwanese English as Foreign Language (EFL) teachers appreciated the use of blogs for promoting critical thinking skills, reporting that the use of blogs for discussion was more effective than face-to-face discussion. Coutinho (2007) and Zeng and Harris (2005) obtained similar results. Simsek (2009) investigates the effect of weblog integrated writing instruction on students writing performance.

Also students perceptions toward weblog used in their writing courses has been examined seventy undergraduate students in the Department of Primary Education at Marmara University participated in this study. Data were collected through students, written products and weblog perception questionnaires. The finding indicated that blog integrated writing instruction improved the writing performance of students. Moreover, students had a favorable perception towards weblog use. Halic, Lee, Paulus and Spence (2010) found that the majority of the participants believed that blogs created a sense of community, which in turn enhanced their learning. Ellison and Wu (2008) conducted a study that investigated students' attitudes toward blogging in the classroom and its effect on comprehension. The results of the study indicated that the majority of the participants showed positive attitudes toward

blogging. They reported that reading others' blogs contributed to a better understanding of the course content. Undergraduate students writing blogs during their internship perceived blogging as a knowledge sharing space positively (Chu, Kwan, & Warning, 2012).

Based on the premise that attitude determines behaviors and on the work of Everett Rogers in Abimbade (2011), O'Malley and McCraw (1999) suggested that attitude towards Glogster is determined by three factors: the prior educational condition, characteristics of students and perceived characteristics of the blog. Students will then act in accordance to their attitude towards educational Glogster. Adedoja and Abimbade (2013) noted that the acceptance of Glogster depends on the attitude of students and the instructors towards it. Kun, Jamie, David and Niamboue (2013) various studies attempted to investigate learners' attitudes toward the use of glogster in higher education (Coutinho, 2007; Ellison and Wu, 2008; Halic, Lee, Paulus and Spencer, 2010; William & Jacobs, 2004). William and Jacobs (2004) reported that a majority of MBA students at the Harvard Law School and Queensland University of Technology indicated a positive attitude toward the use of blogs in teaching and believed that the use of blogs contributed to their learning.

Teachers and pre-service teachers also show a positive attitude toward the use of Glogster in teaching and learning. Yang (2009) found that Taiwanese English as Foreign Language (EFL) teachers appreciated the use of blogs for promoting critical thinking skills, reporting that the use of blogs for discussion was more effective than face-to-face discussion. Coutinho (2007) and Zeng and Harris (2005) obtained similar results.

Statement of the problems

The 21st century philosophy of teaching and learning is "child-centered" as such; Technology is deployed to compliment the teacher whose role is that of a 'guide on the side not a sage on the stage' (Yusuf, 2010) as it was in traditional method of teaching. However, Okure and Eze(2018) concluded that most teachers in Nigeria are used to the traditional (chalk-talk) method of teaching which renders students passive listeners and make teaching ineffective, consequently affecting the students' performance in Basic Technology especially. On the other hand, the state of knowledge explosion with increasing specialization, increase in student-teacher ratio and increase in workload of teachers, classroom instruction alone does not in most cases bring out the desired goals from the teaching and learning process, this causes some drawbacks in students' performance in basic technology. Again the situation in most classrooms in Nigeria is the prevalence of authoritarian and didactic approaches to teaching/learning which does not prepare students for 21st century challenges, with these approaches the objectives of the National Policy on Education (2004) will not be realized (Annulobi,2012). These outmoded and didactic approaches has only resulted into students' poor academic performances in Basic Technology and other subjects in external examinations.

An investigation carried out by Olugbade(2019) to find out the average performance of JSS students that offered Basic Technology in Junior Secondary School Certificate Examination (JSCE) in Ilorin from 2016-2018 academic sessions indicated very poor performance. These indicate that students performed very badly indeed and raised serious cause for concern considering the huge resources expended by governments at different levels to improve the standard of education in Nigeria as a whole and Ilorin in particular. The critical importance of basic technology to the development of science and technology in Nigeria and Ilorin in particular makes it necessary to explore available strategies to improve teaching and learn of basic technology. Since learning can be contextualized, online learning platform maybe the medium to facilitate students better learning of Basic Technology. Hence this study, examined the effect of Glogster on students' academic performance in Basic Technology in Ilorin.

Purpose of the study

The main purpose of this study is to determine the effect of Glogster on students' academic performance in Basic Technology in Ilorin. The study will specifically:

3) examined the difference between the achievement of Junior secondary school Student taught selected Basic Technology concepts using Glogster and those taught with the conventional method

4) examined gender influence on the achievement of Junior secondary school Student taught selected Basic technology concepts using Glogster.

5) examined gender influence on the Junior secondary school Student attitude towards the use of Glogster.

Hypotheses

The following hypotheses were formulated to guide the study:

H_{01}: there is no significant difference between the achievement of Junior secondary school Student taught selected Basic Technology concepts using Glogster and those taught with the conventional method

Ho_2: There is no significant difference in the attitude of male and female students towards the use of Glogster.

Ho_3: There is no significant difference in the achievement of Junior secondary school Student taught selected Basic Technology concepts using Glogster based on gender.

Methodology

This study is a quasi-experimental type, of pre-test, post-test, non-randomized, control group design. The design is a 2 x 2 factorial design. This paradigm represents two levels of treatment; the students taught using traditional method (experimental group1) and the students taught using Glogster (experimental group2); and two levels of gender (male and female).

Population, Sample & Sampling Techniques

The target population of this research is the second-year junior secondary school (JSS 2) Basic technology students in Ilorin. The nature of the study, however, require that the research sample was purposively selected. This is because a research on Glogster (Online learning platform) must necessarily be conducted in schools where computers and internet connection are available for students' use and where students are computer literate. This is why a standard private secondary school in Ilorin is purposely sampled for the study. A private secondary school in Ilorin is selected as the experimental group while a public secondary school is sampled as the control group, as the school is believed to be less equivalent in standard to the school used for the experimental group. The sample for the experimental group is made up of 20students, this comprises of 7 male students and 13 female students while the control group is made up of 20 male students and 25 female students. In all, 65 students (respondents) participated in this study.

Research Instruments

The instruments for this research were the Treatment instrument "Glogster" and the test instruments which include the Basic Technology (BT) performance test and questionnaire. The BT performance test was used to measure the pre-test and post-test. Finally, the questionnaire investigated the participants perception and reaction towards the use of Glogster.

Validation of Research Instruments

Validity explains how well the collected data covers the actual area of investigation (Ghauri and Gronhaug, 2005). Validity means "measure what's intended to be measured" (Field, 2005). The instrument was validated for face and content validity by the researcher's supervisor and three other lecturers within the Department of Educational Technology, University of Ilorin, Ilorin, Nigeria. Following the lecturers' validation reports, some items of the research instrument were corrected, adjusted and modified as directed to reinforce the validity. Reliability concerns the extent to which a measurement of a phenomenon provides a stable and consistent result (Carmines and Zeller, 1979). Reliability is additionally concerned with repeatability. For example , a scale or test is claimed to be reliable if repeat measurement

made under constant conditions will give the same result (Moser and Kalton, 1989). A pilot study was administered from a specific secondary school in Oyo State for the reliability of the research instrument. The research instrument was reliable at 0.84 for items on the achievement test, 0.76 on the attitudinal questionaire at 0.05 level of significance, using Cronbach Alpha SPSS statistical tool.

Procedure for Data Collection

The researcher obtained a letter of introduction from the Head of Department, Department of Educational Technology, University of Ilorin, and was taken to the sampled schools to seek permission from relevant authorities before the commencement of the exercise. The treatment lasted for one week at the rate two contact hours of integrated instruction. All groups (experimental and control groups) were subjected to the BT performance test as pre-test. Then, the students in the experimental group were exposed to Glogster, which had been installed on desktop computers and mobile phones using web browsers (explorer or chrome). Experimental group learners learned using the Glogster procedures which involve using computers and mobile phones to incorporate music, pictures, visual effects, word choice, font, and the design they like. Participants were oriented to use a variety of authentic tasks. The experimental group participants learned how to create and use a Glogster (online poster). Participants were able to convey the powerful tools of technology that help students express freely and creatively their opinions. Participants used a Glogster assessment rubric to critique their products. Participants were taught how to create a Glogster account amusing google.com.

Participants were given directions to create a new Glog. Participants were guided to create and name a new Glog. They were encouraged to select Glog templates, such as Glog Project. They were instructed to click "images" to upload an image from their computer. Participants were asked to add text boxes by clicking "Tools" and selecting "Text"; they were able to edit the text inside the text box and place the text box where they desire. Using Glogster, participants were able to upload videos to use them to express themselves better. The glogster project could be comprehensive enough to help improve the participation of the participants for it could include the image, graphics, text, videos and music. The control group students were exposed to the conventional/traditional teaching method on the same content used for experimental groups. They were taught using conventional classroom format. The classroom contained a chalkboard, charts and real objects which served as instructional materials for the instruction. After the treatment the two groups were exposed to BT performance test which had been re-arranged as posttest and questionnaire was used to investigate the students' perception . The researcher sought content of all the respondents and they have the right to withdraw from the study at any time. Data collected were treated with utmost confidentiality and anonymity.

Data Analysis Techniques

The analysis and interpretation of data obtained from the test items and questionnaire were carried out using descriptive and inferential statistics. Mean and standard deviation were used to answer the research questions. The questionnaire items were ranked 4 for Strongly Agree, 3 for Agree, 2 for Disagree and 1 for Strongly Disagree for questionnaire items that were positively worded and vice versa for items that were negatively worded. For hypotheses testing the following statistical tools were used with the aid of Statistics Package for Social Science (SPSS) version 20.0. Analysis of covariance (ANCOVA) statistical technique was used to test research hypotheses 1 while independent t-test was used to test hypotheseses 2 and 3. All hypotheses were tested at 0.05 level of significance.

Results

Research Question one: Is there any difference in the achievement of Junior secondary school Student taught selected Basic Technology concepts using Glogster and those taught with the conventional method?

Table 1: Mean Achievement score of the Experimental and Control group

Groups source	N	Pretest Mean	Post test Mean	Mean Gain
Experimental group	44	10.45	9.63	0.82
Control group	30	8.26	8.20	0.06

Table 1 shows that there was improvement in the post-test scores of two groups but the experimental group had a higher mean gain score. For instance, students taught conventional method had a mean gain score of 0.02 while students taught using Glogster had a mean gain score of 0.82. This implies that there was difference in the achievement of the two groups where experimental group performed slightly better than control group. This indicated that the experimental group benefited from the treatment instrument.

Research Question Two: What is the influence of male and female students on the achievement of Junior secondary school Student taught selected Basic technology concepts using Glogster**?**

Table 2: Mean Achievement Scores of Male and Female Students Taught Glogster

Treatment	Gender	N	Pretest Mean	Posttest Mean	Mean Gain score
Glogster	Male	24	8.38	9.50	1.12
	Female	20	9.79	9. 85	0.06

Table 2, indicated both male and female students exposed to Glogster had mean gain score of 1.12 and 0.06 respectively. This implies that the treatment improved the achievement of the students exposed to Glogster irrespective of gender. However, the males students had better mean gain score than females students.

Research Question three: What is the gender influence on the Junior secondary school Student attitude towards the use of Glogster**?**

Table 3: Mean Scores on Attitude of Male and Female Students Exposed to Glogster

Gender	N	Mean	Standard deviation
Male	24	13.73	3.48
Female	20	10.12	1.62

From Table 3, it can be deduced that both male and female students exposed to glogster had mean scores of 13.73 and 10.12 respectively. This shows that there was difference in the attitude of male and female students exposed to Glogster.

Hypotheses Testing

Hypothesis One: there is no significant difference between the achievement of Junior secondary school Student taught selected Basic Technology concepts using Glogster and those taught with the conventional method

To determine whether there was significant difference in the post-test mean scores of students in the experimental and control group Analysis of Covariance using the pretest as a covariate was done and the result is as shown in Table 4

Table 4: ANCOVA result of the Mean Achievement Scores of Experimental and Control groups

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	28.126a	2	14.063	2.098	.132
Intercept	279.783	1	279.783	41.741	.000
Main Effect(Treatment)	9.265	1	9.265	1.382	.245
Pretest	17.709	1	17.709	2.642	.110
Error	382.058	57	6.703		
Total	4865.000	60			
Corrected Total	410.183	59			

An examination of Table 4 revealed that $F (1, 57) = 1.382$, p >0.05 was not significant. The results revealed the supplementary instructional tool (Glogster) produced no significant effect on the post-test achievement scores of students when covariate effect (pre-test) was controlled. Hence, hypothesis one was not rejected. Therefore, there was no significant difference between the achievement of students taught selected Basic technology concepts using Glogster and those that were taught with the convention lecture method.

Ho$_2$:   There is no significant difference in the attitude of male and female students towards the use of Glogster.

To determine whether there was significant difference in the attitude of students towards the use of Glogster, the null hypothesis was tested by using t-test as shown in Table 12.

Table 5: T-test result on Student's Attitude Towards the Use of Blog

Gender	N	X	SD	Df	T	Sig	Remarks
Male	24	13.73	3.48	42	0.00	0.640	Not Sig.
Female	20	10.12	1.624				

From Table 5, it can be deduced that there was no significant difference between male and female attitude towards the use of Glogster. This is reflected in the result: $t (42) = 0.00$, p>0.05. Thus, the hypothesis was not rejected. By implication, the stated null hypothesis was established thus: There is no significant difference in the attitude of students toward the use of Glogster based on gender.

Ho$_3$:   There is no significant difference in the achievement of Junior secondary school Student taught selected Basic Technology concepts using Glogster based on gender.

Table6: ANCOVA result of the Mean Performance scores of Male and Female Students Exposed to Glogster

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	15.119a	2	7.559	1.032	.370
Intercept	154.363	1	154.363	21.066	.000
Main Effect (Gender)	15.041	1	15.041	2.053	.163
Pretest	.259	1	.259	.035	.852
Error	197.848	27	7.328		
Total	2661.000	30			
Corrected Total	212.967	29			

An examination of Table 11, revealed that an F (1, 27) = 2.053, p > 0.05 was not significant. The results revealed that there was no significant difference in the achievement of Junior secondary school Student taught selected Basic Technology concepts using Glogster based on gender. Hence, hypothesis two was not rejected.

Discussion
The result of the analysis of the performance scores of students at pretest and posttest (before and after exposure to Glogster) was examined with research question 2 and hypothesis 1. The result of the ANCOVA analysis indicated that there was significant difference between the performance of BT students taught using Glogster and those that were taught with the conventional lecture method. Also, the experimental group performed significantly different from their contemporaries in the control group. This finding agrees with the earlier findings of fageeh (2011) which revealed that Glogster had positive effects on the students' performance. This finding also agrees with the earlier finding of Lou et al. (2010) which revealed that blog significantly improved the performance of students. . This finding also agrees with the earlier finding of (Larson, 2010; Zawilinski, 2009) whose study indicated that Technological tools are used in the classroom to improve lesson planning and other aspects of the teaching and learning process. The author further indicated that Wed-based tools tremendously improve learning and boost the development of critical reading skills specifically, and the use of authentic texts will be ensured; accordingly, students will develop great awareness of the good online texts, for students will be writing texts for authentic purposes as well .

This finding however agreed with the earlier finding of (Kent, 2010) whose findings indicated Glogster is an internet tool that allows users to create and share interactive posters composed of text, graphics, sound and videos. Therefore, Glogster is an interactive poster display that provides opportunities for collaborative student-centered learning. The author further posited that Gloging is considered as a powerful communication tool that helps communication skills, for task-based language promotes communication and social interaction. From the above findings, it can be deduced that Glogster produced more positive effect on students' performance. The excellent performance of the students exposed to Glogster over those taught with conventional lecture method was to testify to the fact that using Glogster is a better approach for teaching Basic technology concepts in Nigeria. However, as effective as Glogster is, it should not be adopted to replace the conventional lecture method because of the missing real-life teachings which students enjoy in conventional one. Hence, Glogster should only be used to supplement and complement conventional teachings. The influence of gender on the performance of college of education student when exposed to Glogster was examined using hypothesis three and research question 3. The result of the ANCOVA established no significant difference in the performance of male and female students that were exposed to Glogster. Furthermore, analysis also indicated that gender had no influence on the performance of students in Basic technology when they were exposed to Glogster. This implies that the treatment improved the performance of the students exposed to Glogster irrespective of gender.

The result agreed with the earlier findings of Susan West. Et al (2017) whose study investigated about how gender difference affects online participation and the results show that engagement is highly individual and complex activity, irrespective of any gender. Another research by Fadillah Ismail (2020) has shown that variations in satisfaction level can be due to gender difference. Other studies have found that gender differences exist in perceived playfulness regarding the level of technology acceptance of a blended learning system among student users. Descriptive studies have also shown that gender difference exist in terms of communication patterns among the students in mixed eLearning and traditional teaching environments. These findings oppose the findings of (Herring, 2006) which revealed that female are less confident in the use of blog to improve their academic performance when compare to their male colleagues. It also refutes the findings of (pitler, 2007) which revealed that there was significant difference in the performance of student based on gender when taught with ICT tools.
The researcher could not locate any other previous research on influence of gender on students' performance when taught using Glogster to support or oppose these findings. Therefore, the conclusion

of many studies on gender in ICT usage is that gender difference had influence on students' performance when taught using ICT-Based Instructional strategies and innovative online tools like Glogster.

Glogster students' attitude towards the use of Glogster was examined using research question 4. The result of the mean scores indicated that the students had reaction towards the use of Glogster. The result agreed with the earlier findings of Shetty, Shilpa, Dey and Kavya (2020) whose study surveyed the attitude of the students towards online learning in India. The results show that the students have favorable perception towards online learning for sustaining their academic interest and development. The study contradicts the previous study of Abassi, Ayoob, Malik, and Memon (2020) whose study surveyed the perception of students towards eLearning during the lockdown. The result indicated that majority of the students have negative perceptions towards eLearning. The study shows that there is need for administration to take crucial measures for improving e-learning for better education. Hey reported that students' attitude were positive towards the use of blog. It also agrees with the finding of William and Jacob (2004) whose findings reported that students' attitude towards the use of Glogster were positive. Yang (2009) findings is in line with the result of this study as it revealed that learners had positive attitudes towards using blog for learning English vocabularies. It is also in line with the findings of Wilczak (2013) who indicated that students had positive attitude towards the use of blog. From the findings, it could be deduced that integrating Glogster as a supplementary tool for teaching Basic Technology will be a welcomed idea by students. Efforts to make it work should therefore be made by all stakeholders at the secondary school level.

Conclusion
The result obtained from the data gathered and analyzed in this study indicated that the Glogster covered the four selected Basic technology concepts. The Glogster was used and found effective for learning Basic technology concepts. The students taught using Glogster and conventional lecture performed better than their counterpart taught using conventional lecture alone. Gender equality performance was also recorded because both the male and female students that were taught using blog performed equally and the issues of gender influence or difference in students' performance did not arise. The findings showed that there was no significant difference in their performances.

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EFFECT AND ATTITUDE OF SECONDARY SCHOOL STUDENTS ON UTILIZATION OF AN EDUBLOG PACKAGE IN TEACHING AND LEARNING OF COMPUTER EDUCATION IN LAGOS STATE

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Abstract
This study focused on the effect and attitude of secondary school students towards the learning of computer science through the utilization of Edublog in Lagos state. Three research questions were raised and one hypothesis was formulated. The study adopted the pretest, posttest quasi experimental research design. Thirty (30) students were selected from two private schools to participate in the research. Fourteen (14) students participated for the experimental group while 16 students were used for the control group. Student Achievement Test (SAT) and Questionnaire on Students Attitudes towards the use of Edublog were used as instruments. Reliability index of 0.78 was obtained. Data collected were analysed using mean scores, simple percentage and ANCOVA at a 0.05 level of significance. The results indicated that students in the Edublog group performed better in the achievement test than those in the CMT group and there was a significant difference between the mean performance score of students taught with Edublog and their counterpart in the CMT group. The students that were exposed to use of Edublog had positive attitude towards its usage. It was recommended that teachers should encourage diversifying the various approaches to complement the conventional way of teaching like using Edublog.

Keywords: Computer Science, Utilisation of Edublog, Attitude, Computer-based instructional package

Introduction

Computer education in schools has become one of the most teaching subjects appreciable by stakeholders in education. The transmission of information and instruction are now bending towards computer technology. Computer is conceived as a device or machine designed specifically to perform calculations, process data and store information, which can be easily retrieved when required (Adamu & Bello, 2002). Computer education hence is defined as gaining of basic knowledge and skills to operate computers in order to perform desired jobs. Computer Education not only involves basic knowledge about computer, computer education extends to various branches of study in various fields and sectors. Computer Education is a broad term but in general there are two concepts used in education; with computer and about computer. The definition of computer education actually depends on time we are speaking of. In the past, computer used the languages which were too complex for everyone to understand; only specific people having specific qualification could be educated about and in computer. But, as the technology has evolved, their application and reach has widened due to simplicity they provide to general people and sophisticated operations they can perform. As the human civilization further advances in technology, more and more ubiquitous use of computers is bound to be certain.

The field of education has not been unaffected by the penetrating influence of information and communication technology. Undoubtedly, ICT has impacted on the quality and quantity of teaching, learning, and research in traditional and distance education institutions (Yusuf, 2005). In concrete terms, ICT has enhance teaching and learning through its dynamic, interactive, and engaging content; and it has provide real opportunities for individualized instruction. To further emphasis the uses of ICT in education, it has added value to education through the use of computer assisted instruction (CAI), the use of videos and audios for instructional material, conference or online lecture rooms used in distant

learning, presentations using power point and web-blog to mention a few. To this effect the federal government put in place a policy to ensure the stated impact ICT can have on education come to fruition. Some of the itemized objectives of Information Technology (IT) in National Policy on Education in Nigeria include to develop a pool of IT engineers, scientists, technicians, and software developers; to increase the availability of trained personnel; to provide attractive career opportunities; and to develop requisite skills in various aspects of IT. For this goal and objectives to be achieved other areas also must be looked into like the various problems facing the teaching and learning of computer education in Nigeria, some of which includes inadequate professionally trained computer teachers; inadequate computers; lack of support infrastructural facilities; inadequate instructional materials or teaching aids; poor teachers attitude toward the subject; general students apathy and indifference in computer science; lack of motivation and encouragement for students; lack of incentive and motivation for teachers and; misuse and inappropriate use of teaching method

Over the years different types of teaching and learning method has been discussed and adopted by many, in tradition these methods are mainly two (2) learner centered and teacher centered which can be further classified into; lecturing; demonstration collaboration; classroom discussion; debriefing; classroom action research. Furthermore the method of teaching and learning in Nigeria and computer education must be considered in order to have the desired effect on the learner, as it is important for the goal and objective of the National policy on Education on information technology to be met. From the above mentioned approaches, it is seen in our educational system that despite all said, the objectives and goals of the NPE has not been fully met due to inability of fully implementing the best method of teaching and learning in computer education in the methods listed above because of certain problem like the unavailability of instruction materials to back up the teaching of information technology in our society. In the developed countries statistics has shown that most of those countries have adopted a more effective teaching method which aid in the use of technology to teach in the traditional way or even fully adopted the online method of teaching through the use of CAD, CAI, web-quest, web-blog (edu-blog) to mention a few. The use of these methods have really enhanced the teaching of computer education and other subject matter, it helps the instructor or the teacher to better deal with practical aspect of teaching which was a major problem in the old teaching method, with these technology enhanced teaching not only does it allow the teacher to better express himself/herself but it also help them to better communicate with the learner through the use of various multimedia tools at their disposal. One of the methods as earlier stated is the Edublog which allows the learner to learn at his own pace with readily provided learning package where the learner can visit the blog-site go through the content with all resources needed at his disposal and can ask question like in the traditional sense and get answer to his/her questions.

Edublog (a truncation of the expression "weblog") is a discussion or informational website published on the World Wide Web consisting of discrete information, or an online platform for learning. An edublog is a blog created for educational purposes. Edublogs archive and support student and teacher learning by facilitating reflection, questioning by self and others, collaboration and by providing contexts for engaging in higher-order thinking. Some of its importance includes provision of services digitally in terms of e-resources, formation of digital infrastructure in terms of computing resources in educational organizations, helps develop proficiency in using ICT enabled services, allows creativity in the use of ICT resources, promotion of collaborative learning and shared learning resources. Edublog in recent time is been utilized by various institutions and even cooperate organizations for educational purposes. It helps various institutions of learning get their information across to the people faster and easier. It is a good communication tool for the teachers and the students from any location and also provides detailed information to the students at the same time.

Attitude in learning has been a major factor that determines how much a student will learn in the place of learning. Attitude can alter every aspect of a person's life, including their education. Students attitude on learning determine their ability and willingness to learn. If negatives attitudes are not altered, a student is unlikely to continue his education beyond what is required. Changing students' negative attitudes towards learning is a process that involves determining the factors driving the attitude and using this

information to bring about change. The word attitude in the dictionary is defined as a way of feeling or acting toward a person, thing or situation' another defined it as 'the position or posture assumed by the body in connection with an action, feeling, mood and many more. Therefore, attitude of student to learning can be defined as the physical position or posture assumed by the learner in the learning environment and the mental awareness of student towards learning in during the teaching and learning.

Statement of the Problem

Over the years many different teaching methods have been utilized and scrutinized for failing to meet up to what is expected of it which is why researchers never stopped trying to research new methods so as to achieve best result in teaching and passing the right knowledge to the learners while at the same time learners get the best possible learning experience. Teaching and learning computer education in our various secondary schools especially in Lagos State have not yielded sound result because parents are re-enroll their wards for extra computer training before can use the computer for practice or external exams. It was observed that method of teaching used for students to learn computer education was purely without practical and no avenue was made for them to interact on their learning for better understanding. Edublogs are user friendly and functioning by giving students access to the technology-based learning activities which can expose students the opportunity to share what they learn collaboratively with their colleagues and teachers. Attitude has been established as one of the main factors of student performance in examinations, if the attitude toward an approach is positive there is tendency for better result. Therefore, this study sought to investigate the effect and attitude of students towards learning through the utilization of an edublog instructional package in teaching and learning of computer education in Ikorodu and Kosofe Local Government Area of Lagos State.

Purpose of the Study

The purpose of this study was to examine the effect and attitude secondary school students on utilization of an Edublog package in teaching and learning of computer education in Lagos state. Specifically, this study was to determine;

1. the difference between the mean gains of students taught with *Edublog* and those taught with conventional method of teaching (CMT)?

2. if there is any significance difference in the post-test performance of students taught biology using the *Edublog* and those taught using conventional method of teaching (CMT)

3. *the attitude of student towards the use of Edublog for learning computer education in Lagos State?*

Research Questions

The following research questions were raised in the study:

1. What is the difference between the mean gains of students taught with *Edu-blog* and those taught with conventional method of teaching (CMT)?

2. Is there any significance difference in the post-test performance of students taught biology using the *Edu-blog* and those taught using conventional method of teaching (CMT)

3. *What is the attitude of student towards the use of Edu-blog for learning computer education in Lagos State?*

Research Hypotheses

The following research hypotheses are stated in the null form and would be tested in the course of this study

H_{O1}: There is no significant difference in the post test performance of students taught biology using the Flipped Classroom and those taught with Traditional Classroom.

Methodology

The study adopted pre-test, post-test quasi-experimental research design method to carry out the. The target population comprised all secondary school students particularly secondary school students in Lagos State. The purposive sampling technique was used to select two (2) private schools within Ikorodu Local Government Area and Kosofe Local Government Area of Lagos State. Chrisfield Private Schools Ikorodu, was used for experimental group (Edublog) while Humbies College, Omojuwa Estate, Kosofe was for control group (conventional method of teaching). Junior secondary school II students selected purposively for this study because the choosing subject is offered at the level which was computer education. Fourteen (14) students participated for Edublog while 16 students served as conventional method of teaching. The selected students were grouped into experimental and control groups. The experimental group was exposed to the Edublog package as the teaching instrument, while the control group was subjected to the conventional method of teaching using the same learning content for both groups.

The instruments used for this research study include (i) *Edu-blog Instructional Package:* The package has the Home section, the class content section, Required reading section containing extract from the national school curriculum of Nigeria in Information Technology (computer science) topics including Basic concept of computer, Introduction to computer science, Characteristics of Computer, Computer Organization, Computer Software, Computer Language, Operating System and Computer File Management and the Test and Assignment section which contains fifteen (15) objective questions. The second instrument was student achievement test (SAT), this containing twenty (20) objective questions with four (4) options to choose from. It comprised of sections A and B. Section A was on demographic information, while section B comprised twenty (20) multiple choice items while the third instrument was questionnaire on attitude towards the use of Edublog (QATUE). This contained 2 sections (A and B). Section A was bio-data where student data including name, gender, age, class are collected while section B comprised items used to measure the attitude of the students on how confortable the students are learning with the Edublog package.

The instruments were subjected to face and content validity by given to the researcher's supervisor and three experts in education, two from educational technology and one from biology and educational evaluation. There were twenty five Multiple choice questions but were reduced to twenty to suit the purpose and considering the respondents. Meanwhile, all other corrections that were identified were effected. The reliability of an instrument was ascertained by using the test-retest method which made the instrument a reliable. The reliability of SAT was determined by administering it on a trial group of 11 secondary school students of another school within the study population but not included in the main study using test-re-test method. A reliability test using Kudar Richardson (KR-21) revealed a reliability of 0.78 which was considered very adequate for the study. The selected were exposed to treatments which lasted for three weeks

The statistical tools used in this research were simple percentage, mean score and ANCOVA through the aid of SPSS.
Results
Research Question 1: What is the difference between the mean gains of students taught with Edublog and those taught with conventional method of teaching (CMT)?
Table 1: Mean Gain Scores of Students' Pre and Post Performance Test Scores in Computer Education

Groups	N	Pretest		Posttest		Mean Gain
		X_1	SD_1	X_2	SD_2	
Edublog	14	8.500	1.224	15.714	0.995	7.214
CMT	16	8.000	1.211	11.563	1.365	3.563

Table showed that pretest mean score of students in experimental group taught using Edu-blog was 8.500 and posttest mean score of 15.714 respectively giving a mean gain of 7.214, while students in the control group taught using CMT had pretest mean score 8.000 and posttest mean score of 11.563 with a mean gain of 3.563. The result indicated that students in the EduBlog group performed better in the achievement test than those in the CMT group. This implied that the treatment (EduBlog) had positive effect on students' mean performance score in computer education.

Hypothesis One

There is no significant difference in the mean achievement scores of student taught computer using EduBlog and those taught using conventional method of teaching (CMT)

Table 2: Analysis of covariance (ANCOVA) of mean achievement scores of student taught Computer using EduBlog and those taught using CMT

Tests of Between-Subjects Effects

Dependent Variable: Posttest

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	129.886[a]	2	64.943	44.264	.000
Intercept	134.983	1	134.983	92.001	.000
Prettest	1.181	1	1.181	.805	.378
Group	128.220	1	128.220	87.392	.000
Error	39.614	27	1.467		
Total	5637.000	30			
Corrected Total	169.500	29			

a. R Squared = .766 (Adjusted R Squared = .749)

Table 2 showed the analysis of covariance on mean achievement scores of student taught Biology using EduBlog and those taught using CMT. After adjusting for pretest scores, there was a significant effect of the subject between factor groups, $F(1,27) = 87.392$, $p = 0.000$ at 0.005 level of significance. The result revealed that there was a significant difference between the mean performance score of students taught with EduBlog and their counterpart in the CMT group.

Research Question 3

What is the attitude of student towards the use of Edu-blog for learning computer education in Lagos State?

From the table below, the statistical data gathered through the distribution of questionnaire given to the participating students in the experiment shows some of the students are excited using the Edublog package.

Table 3: *Attitude of Student towards the Use of Edublog for Learning Computer Education*

S/N	Variables	SA (%)	A (%)	D (%)	SD (%)	Mean	St. D.
1	Edublog make learning more interesting	10 (33.3)	10 (33.3)	6 (20.0)	4 (13.3)	2.867	1.042
2	Learning with Edublog promote collaborative among their peers.	13 (43.3)	10 (33.3)	2 (6.7)	5 (16.7)	3.033	1.098
3	I think that learning with Edublog is better than using printed materials or textbooks	10 (33.3)	10 (33.3)	6 (20.0)	4 (13.3)	2.867	1.042
4	I like the idea of using Edublog for learning	12 (40.0)	11 (36.7)	3 (10.0)	4 (13.3)	3.033	1.033

5	Edublog is very effective to improve students' learning	14 (46.7)	10 (33.3)	3 (10.0)	3 (10.0)	3.167	0.986
	Average Mean =		**2.993**				

From the results in Table 3, the average mean was 2.993 which is above the midpoint of 2.5. This implied that students exhibited positive attitude towards the utilization of Edublog for learning computer education in secondary schools.

Discussion of the findings
The findings of this study demonstrated that the students scored higher in their learning assignments after having a treatment by using Edu-blogs as a teaching of computer education. Edu-blogs in this study were used as tools to give the students an opportunity for collaboration. Furthermore, through using blogs, the students could also acquire knowledge and ideas from their peers' and apply them to their own attitude. The class group blog was also a useful tool for the teacher, as it helped the teacher post documents such as syllabi, course expectations, and changes in the class schedules without having to mail each person individually.

There were some improvements that were related to the computer education learning process, the students, the teacher, and the researcher. To the computer education learning process, before actions were conducted, the students were unmotivated to participate in writing process. The writing learning process was monotonous. The teacher only used the course book without any media. During the implementation of the actions, Edub-logs helped the teacher in learning process. The students were interested and enthusiastic to improve their skills. The Computer education learning process in the Blog process were more active and enjoyable than the previous condition, the classroom atmosphere was better, it was easy for the students to generate their ideas in a good generic structure, appropriate vocabulary, correct punctuation, and correct grammar. In addition, As the collaborator, the Computer education teacher got more knowledge about the effect and attitude of using web blog. The teacher realized that the students needed many new things to direct their attention in all skills in Computer education. The learning process looked easier because the use of media in the classroom. The last, to the researcher, it is trigger the researcher to improve learning skill especially on how to manage the class-room and how to create the interesting activities. In addition, the researcher realized that the planning could not always be implemented in the class because unexpected events might occur in the classroom.

Conclusion

The use of Edublogs will have many advantages to teaching and learning of computer education especially at secondary schools levels which it incorporated it will not only promote students to learning but also advances their collaboration in class and better academic achievement. It have been proven to be good as an approach to achieve better results among the students which also have open avenues for teachers to succeed in creating means of communication for knowledge dissemination to the learners. The attitude of the students were positive when engaged with Edublog which showed that integrating such approach will contribute meaningful enrolment of students in the schools and desire thinking of knowledge among the students.

Recommendations
Based on the result of this study, the following are recommended;
1. Teachers should encourage diversifying the various approaches to complement the conventional way of teaching like using Edublog. This will further motivate the learners more in their study.

2. Student position to an action in the class cannot be over-emphasied through which their interest can be recognized. Teacher should use ICT initiative like Edublog to promote students' positive attitudinal disposition to learning and encourage collaborative learning among the students.

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EFFECT OF EDMODO ON SECONDARY SCHOOL STUDENTS ACADEMIC PERFORMANCE IN PHYSICS IN ILORIN METROPOLIS, NIGERIA

Introduction

Education is the totality of life experience that people acquire which enables them cope with and derive satisfaction from living in the world. The significance of education, particularly in a developing country like Nigeria has increased because of the need to catch up with the developed world in several areas particularly in global competitiveness and best practices. One of the major trends in recent times that are shaping education (schools' activities, teaching and learning) is the rapid advancement of information and communication technology (ICT) with the help of ICT, students and teachers can more easily handle assignment and communicate across time and space. Hence, so as to make learning more effective, there is a need for new approaches, methods, and techniques which enable to generate rich-learning environments backed up with technologic tools and software based on student-centered education. Physics is central to the overall technological and industrial development of any nation.

Physics is concerned with the nature, structure and properties of matter and contributes immensely to the growth and development of the nation's economy. It plays a vital role in the development of different sectors of human endeavours such as telecommunications, architecture, engineering, electricity generation and transmission, construction, and transportation. Thus, physics could be described as an indispensable subject for socio-economic development of any country as it helps in the advancement of knowledge of the natural world (Erinosho, 2013). Physics is the branch of science that deals with objects, energy and their interactions. The contributions of physics to the production of instruments, equipment and devices that are of great benefit to man is immense. Bello, (2011) viewed physics as the core subject in science and technology, since it studies the essence of natural phenomena and helps people understand the rapidly technological changing society. Knowledge of physics has led to inventions in various areas. According NERDC, (2008) the objectives of senior secondary school physics curriculum in Nigeria includes provision of basic literacy in physics for functional living in the society, acquisition of basic concepts and principles of physics as a preparation for future studies, acquisition of essential scientific skills and attitudes as a preparation for technological application of physics and; stimulation and enhancement of creativity. As laudable as these objectives are, achieving them has seemed difficult over time. Adebule & Akomolafe, (2014) stated that the objectives of education cannot be achieved if the planned curriculum for such level of education is not well implemented. Jegede & Adebayo, (2013) revealed that the performance of students in physics is very appalling, this fact calls for attention. Achufusi, (2015) stated that students' poor performance in physics globally is basically due to lack of students' involvement in teaching and learning activities, lack of materials and qualified personnel as well as insufficiency of laboratories materials. The primary step in meeting students' needs is to adapt several curriculum delivery methods into the educational environment because the traditional method of instruction may not satisfy the learning styles of some students, while others may need more diverse methods. One of the instructional strategies for improving students' performance in physics is online method of instructional delivery.

Geth and Vinare(2008) stated that on-line learning helps to meet the increased demand of non-traditional students and offering multiple instructional styles to students online learning does not only meet students needs but also provides teachers with options to meet the challenges facing the delivery of instructional contents. Online learning uses the internet to deliver curriculum content and allows learners to control content delivery as well as the sequence, time and pace. These methods include learning management systems (LMS). Learning management system (LMS) is a comprehensive and integrated software that supports the development, delivery, assessment and administration of courses in traditional face-to-face, blended or online learning environments. According to Park & Mills, (2014) LMS are centralized online platforms that treat curriculum, assessment delivery and reception as commodities. The software provides students and teachers with a set of tools for improving the learning process and its management and functions as a support in the traditional classroom education as well as in distance education (AL-Busaidi, 2012). There are several LMS software, among the varieties. Edmodo application is one of the distinct LMS which favours collaborative learning, enabling interactions with resources from different media among all students and teachers (Abar&Barbosa,2011).

Edmodo is a free and secured learning platform designed by Jeff O'Hara and Nick Borg in 2008 for teachers, students, parents, schools and district and it is accessible at www.edmodo.com (KInchan,2013). Edmodo allows for bi-directional teacher-learner interaction where the teacher can communicate with the class or with any individual learner. Similarly, the learners can communicate with the class or send a private message to the teacher. The learning contents can be made interactional as hypertext links and documents can be dynamically uploaded and downloaded easily by both teachers and students (Kongchan, 2012). As a teaching and learning tool studies have also been conducted to investigate the use and effectiveness of Edmodo. Vegh, Nagy, Zsigmond, & Elbert, (2017) examined the efficacy of the Edmodo interface within biology education in high schools. Anonymous pre-and post-test questionnaires were filled out by the students and statistically analyzed. The research included 58 students; 34 females and 24 males. Over the course of the semester, the experimental group developed increased feelings of importance towards Biology, whereas no change was observed in the control group. At the end of the semester, the experimental group scores leant favourable towards the positive impact of Edmodo use in the classroom, in comparison to the control group. Enriquez (2014) reported that the collaboration provided in Edmodo enables students to improve their online work quality. This was made possible by students' ability to receive feedback on the status of their teachers and friends.

While creating online method for instructional delivery some variables or factors that may possibly interfere with the communication process that needs to be moderated are, gender, age, attitude, technology self-efficacy and computer self-efficacy. However, gender and computer self-efficacy would be adopted as moderator variables in the study, based on their strategic importance in influencing academic performance in physics.

Gender is a variable whose influence on students' learning outcomes has been vigorously examined by researchers. Gender differences in academic performance related to science subject have long been a topic of discussion among educators and researchers. Kessels, Rau, and Hannover (2006) found that female students lack interest in physics compared to male students. Female students claimed that physics is difficult for them because the subject aligns more to the masculine nature. However, Bada, (2013) and Adelokun, (2013) revealed the gap between male and female students' performance in science subjects is disappearing. Issue of gender is very important in this study even though the effect of gender seems to be controversial.

Many studies had revealed that the combination of gender and computer self-efficacy could determine students' participation in computer-related activities in the classroom and learning of physics in particular (Olatundun, 2008; Okoye, 2010). Existing investigations on gender in association with self-efficacy reported mixed results in science education. Some studies found that male students had higher self-efficacy than female students in science education (Lerdpornkulrat, Koul, & Sujivorakul, 2012;Saglam & Togrul, 2018;Stoet & Geary, 2018). However, Farooq, Chandhry, Shafiq, & Berhanu, 2011;Nnamani & Oyibe, (2016) revealed that female students have higher computer self-efficacy than their male counterparts

Results from these studies, however, have been inconsistent and research findings are inconclusive with regards to the effect of gender and computer self-efficacy on computer use. This study, therefore, would examine the Effect of Edmodo on Secondary School Students Academic Performance in Physics in Ilorin Metropolis

Statement of the problem

Physics remains a strategic science subject that could engender technological development of different countries across the world. The inconsistency in performance of students and declining enrolment at secondary school level has become worrisome over the years. Scholars have consistently advocated the need to employ modern technology-based instructional strategies that ensure active engagement of students in classroom activities and motivate them to give attention to the details of the instructional content. Studies have revealed that learning physics should create joys of discovery. However, this has been hampered by fear of failure, low enrolment and teaching methods of teachers

Previous studies have concentrated largely on the use of instructional materials mobile instruction (Okeke, 2019; Sulisworo, Yunita, & Komalasari, 2017) among others, to improve academic performance in physics, especially at the senior secondary school level some of which are positive and others less

than desirable. This study seeks to fill the gap by adapting an online method of instructional delivery, through the use of Edmodo a software application which has been widely promoted for its potential to enrich, enhance, and extend student-learning experiences as compared to conventional teaching.

Purpose of the study

The main purpose of this study was to investigate the effect of Edmodo on secondary school students' academic performance in physics in Ilorin metropolis specifically, the study:

1. Examined the influence of treatment on pre-service teachers' performance in physics

2. Determine the difference in the pre and post-performance mean scores of the treatment group

3. Examined the difference in the mean score of male and female pre-service teachers in physics after treatment

4. Ascertained the influence of gender on secondary school students' academic performance in physics

Hypotheses

The following null hypotheses were tested at 0.05 level of significance.

Ho_1: There is no significant main effect of treatment on students' performance in physics

H_{O2}: There is no significant main effect of gender on students' performance in physics

Ho_3: There is no significant main effect of computer self-efficacy on students' performance in physics

Ho_4: There is no significant effects of treatment, gender and computer self-efficacy on students' performance in physics.

Methodology

The study adopted quasi-experimental and control groups of pre-test and post-test design. The sample size of this study is 142 students of SS2. The sample size was sampled from two senior secondary school in Ilorin metropolis. Purposive sampling technique was used to select the experimental group because the school has a computer laboratory. The control group was randomly selected as they were thought physics in the conventional teaching method. Edmodo was used in exposing the experimental group to some topic in physics. The learning contents were three modes; audio, video and text. Physics Performance Test (PPT) and Computer Self-Efficacy Questionnaire (CSQ) was the measuring instruments. Physics Performance Test (PPT) consists of thirty-five (35) multiple choice items constructed on the physics curriculum. Each item have four Options-D with only one correct answer. The test was used in determining the performance of students in physics before and after being exposed to the treatment. A rearrangement of the same questions was used for the post-test. The instrument was validated by three educational technology lecturers and three ICT expert, their corrections and modifications were used to improve the quality of the instruments. The reliability of the instrument was determined. Physics Performance Test (r = 0.75) and Computer Self-Efficacy Questionnaire (r = 0.78). Treatment lasted for a period of 6 weeks. Data were analysed using mean, Analysis of Covariance (ANCOVA) and Bonferroni post –hoc test at 0.05 level of significance.

Results
Demographic Information of Respondents
Table 1

Gender	Frequency	Percentage
Male	53	37.3
Female	89	62.7
Total	142	100.0

Table 1, shows that the total number of students that participated in this study was 142, 53(37.3%) were male while others who constitute 89(62.7%) were female. The result from this table implies that female students participated more in the study than the male students. Figure 2 further presents the results in pie chart.

Figure 2: Distribution of Participants based on Treatment Groups
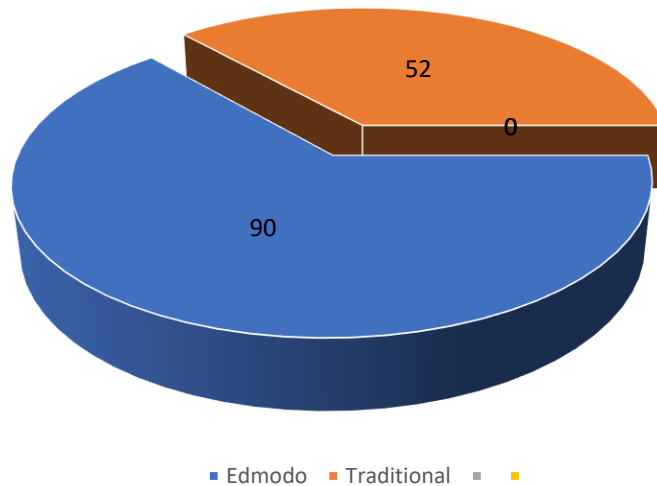
Table 3: Distribution of Participants based on Treatment Groups

Group	Frequency	Percentage
Edmodo	90	63.4
Traditional	52	36.6
Total	**142**	**100.0**

Table 3, shows that 90(63.4%) of the participants were in Edmodo group and 52(36.6%) were the traditional method group. figure 2 presents the results in pie chart

Table 2: Analysis of Covariance (ANCOVA) of Post-Performance by Treatment, Gender and Computer self-efficacy

Source	Type III Sum of Squares	df	Mean Square	F	Sig.	Partial Eta Squared
Corrected Model	7513.039	12	626.087	66.200	0.000	.794
Intercept	838.883	1	838.883	88.700	0.000	.301
PrePerformance	3234.834	1	3234.834	342.037	0.000	.624
Treatment	306.255	2	153.128	16.191	0.000*	.136
Gender	10.940	1	10.940	1.157	0.283	.006
Computer self-efficacy	0.437	1	0.437	0.046	0.830	.000
Treatment x Gender	20.168	2	10.084	1.066	0.346	.010
Treatment x Computer self-efficacy	6.785	2	3.393	0.359	0.699	.003
Gender x Computer self-efficacy	1.013	1	1.013	0.107	0.744	.001
Treatment x Gender x Computer self-efficacy	24.776	2	12.388	1.310	0.272	.013
Error	1948.258	206	9.458			
Total	108747.000	219				
Corrected Total	9461.297	218				

R Squared = 0.79 (Adjusted R Squared = 0.78)   * denotes significant p<0.05

Table 1 indicates that there is a significant main effect of (instructional strategy) on students' performance in physics ($F_{(2, 206)}$ = 16.19; p<0.05, partial η^2 = 0.14). The effect is 14.0%. This implies that 14.0% of the variation in students' performance in physics is due to the significant main effect of the treatment. Hence, hypothesis 1 was rejected. To explore the magnitude of the significant main effect across treatment groups, the estimated marginal means of the treatment groups were carried out and the result is presented in Table 2

Table 3: Estimated Marginal Means for Post-Performance by Treatment and Control group

Treatment	Mean	Std. Error	95% Confidence Interval	
			Lower Bound	Upper Bound
Edmodo	27.71	0.49	21.96	24.29
Traditional Method	26.97	0.34	16.57	19.49

Table 2 indicates that students exposed to the treatment (Edmodo) with highest adjusted post-performance mean score in physics (27.71) than their counterparts in the Traditional method™ control group (26.97). This order is represented as Edmodo > TM. In order to determine which of the groups causes this significant main effect, the Bonferroni post-hoc analysis is carried out across the treatment groups and the result is presented in Table 4.

Table 4: Bonferroni Post-hoc Analysis of Post-Performance by Treatment and Control Group

Treatment	Mean	Edmodo	TM
Edmodo	27.71		*
Traditional Method (TM)	26.97	*	

Table 3 shows that the post-performance in physics mean score of students taught with the Edmodo is significantly different from their counterparts in the control group. This indicates that the significant difference reveals by the ANCOVA summary is due to the result of difference between the treatment group (instructional strategy) and the control group (Traditional Method)

Discussion of Findings

The findings from the study indicated that there was a significant main effect of treatment on SS II physics students' performance. This implied that the Edmodo has significant influence on physics students' performance. In other words, students who were exposed to this strategy performed better in physics than students in the control group. The influence of Edmodo which provides learners opportunity to communicate and collaborate in a virtual environment was responsible for this improvement in students' performance after the experiment. Some of the critical factors that had been documented in literature to be responsible for students' poor performance in physics are due to teacher and student-related factors, poor motivation to learn the instructional content and lack of interest in the subject matter can largely be associated with the teaching approach employed by many teachers in instructional delivery process. These results correlate with Vegh, Nagy, Zsigmond, & Elbert, (2017) who reported that there was positive impact of Edmodo use in the classroom, in comparison to the control group also, Enriquez (2014) reported that the collaboration provided in Edmodo enables students to improve their online work quality.

The result obtained showed that the three-way interaction effects of treatment, computer self-efficacy and gender on senior secondary students' achievement in physics were not significant. This finding is not in agreement with Lerdpornkulrat, Koul, & Sujivorakul, 2012;Saglam & Togrul, 2018; Stoet & Geary, (2018). Who stated that male students had higher self-efficacy than female students in science education. However, in equilibrium with Bada, (2013) and Adelokun, (2013) revealed the gap between male and female students' performance in science subjects is disappearing.

Conclusion

This research investigated the effect of Edmodo on secondary school students' academic performance in physics. Findings established that the use of Edmodo significantly improved students' performance in physics. It was also established that Edmodo stands out as an effective tool for improving secondary school students' performance. Also, findings from this study revealed that while gender has no significant effect of secondary school students, computer self-efficacy of the students has no significant main effect on students' academic performance. The use of Edmodo in the teaching and learning of physics can foster students' learning engagement and improve students 'academic performance.

Recommendations

Based on the finding of this study, the following recommendations are considered appropriate:

1) Edmodo should be actively employed by teachers to supplement the traditional classroom strategy

2) Physics teachers should be adequately sensitised through workshops, seminars and conferences on the use of Edmodo for instructional delivery at secondary school level.

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EDUCATIONAL RESOURCE AS PREDICTOR OF STUDENTS ACHIEVEMENT IN MATHEMATICS
BY

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Abstract

Findings revealed that mathematics lessons have been described as boring, uninteresting, and unchallenging because of inadequate use of educational resources. It was revealed that lot of students perform below average in external examinations in secondary schools in mathematics. Thus, this study set out to critically appraise the influence of Educational Resources on academic performance of secondary school students in mathematics. Two hypotheses were posed. Descriptive survey research design was used, and the population of the study comprised all secondary schools in Oyo State. Simple random sampling technique was used to select six local government areas, two schools from each of the LGA and twenty students from each school. Schools were stratified into two, schools with educational media and schools without. Two self-designed instruments were used for data collection. The study revealed that there is correlation between the use of educational resource and academic performance (r =.002, p<=0.05) and there is significant difference between the performance of students in schools with educational resource and schools without educational resources. It was recommended that Provision of necessary education resource material should be encouraged in schools to enhance effective teaching and learning of mathematics and Government should increase funding for the entire educational sector with particular emphasis on acquisition of educational resources.

Key words: Educational-Resource, Performance, Mathematics, Students

Introduction

Mathematics is a compulsory subject at all levels of education due to its day-to-day application in our daily activities and can be applied in every aspect of life. It supports the development of critical and logical thinking and enables us to analyse, describe, and change things over. Federal Ministry of Education, Nigeria Digest of Education Statistics (2017) revealed the number of Oyo State candidates that Sat for May/June WASSCE from 2014 to 2018 as follows; 77,321, 78,574, 70,581, 53,850, 65,340 and number and percentage of candidates that obtained five credits and above including Mathematics and English Language in Oyo State 14754(19.08) 16998(21.63) 25,774(36.52), 28,852(53.58), 24,742(37.87). The analysis showed below average performance and research findings revealed several factors that may be responsible for student's underperformance in mathematics among which are peer group interaction (Owuruamaku, 2002), untrained and shortage of teachers (Negumbo, 2016), Language barrier (Mwinda & Vanderwall, 2015), lack of parental involvement (Kandumbu, 2005), lack of teaching and learning support (Kandumbu, 2005: 96-97) and teaching and learning strategies (Carl, 2012) were identified as causes of students' underperformance in schools.

Tata (2013) made his study in Nigeria and came out with findings that, students' negative attitude toward mathematics, fear of mathematics, inadequate qualified teachers and inadequate teaching materials were some of the causes of poor performance in mathematics. Developing positive attitude, motivation and proper guidance toward mathematics and provision of relevant teaching materials could make students

perform better in mathematics. Abbasi and Mir (2012) posited that student themselves play critical roles in getting good grades and must therefore explore all opportunities available within their academic environment. However according to Mlozi, Kaguo and Nyamba, (2013), students' performance in mathematics was not good at all in Tanzania as there were not enough teaching and learning materials.

Several factors had been identified (Suan, 2014) which seems to be the reason for student's underachievement in mathematics. First was teacher factor, such as teaching styles, mastery of the subject matter, instructional techniques and strategies, classroom management, communication skills, and personality. Second was student factor like study habits, time management, attitude, and interests towards mathematics. Third was environmental factor such as parents' values attitudes, classroom settings and peer group. Teachers were responsible to the learning and experiences (Iheanachor, 2007) the students might engage everyday as well as setting of educational goals and total personality development. This must be in line with professional development of teachers on content and instruction, which has remarkable effect on student achievement. Suan (2014) observed that teachers who have mathematical knowledge, good attendance and participate in programs development have the students with good performances in mathematics. However, findings by Iheanachor (2007), indicate that, there is a significant positive relationship between students' academic achievement in mathematics and teachers' background. Teachers who have good qualifications in mathematics have their students performing better in mathematics.

According to Ololobou (2010) too often mathematics lessons have been described as boring, uninteresting, and unchallenging this negative and uninspiring state can be turned around through the identification, collection, preparation and utilisation of instructional resources and materials. It has been suggested that Educational resources can play a number of roles in Education such as developing the kind of graduates and citizens required in informed society; improving educational outcomes and enhancing and improving the quality of teaching and learning (Waguer,2001; McCormick and Scoanshaw,2001; Flecknoe,2002); Garrison and Anderson (2003) argue that the application of Educational resources in Teaching learning process can enhance the quality of education of education in serial ways such as increasing learner motivation and enhancing teachers training. Since government is one of the major subjects being offered in primary schools its relevance and sustenance in day-to-day class activities requires the adequate application of educational resources like video tapes, television and multimedia computer software that combine text, sound and colorful moving images which can be used to provide challenging and authentic content that will not only engage the student in the learning process but as well make learning concrete.

Okwo (2006) found that accessibility to ICT makes information handling less demanding quicker and more effective. Also, Nwosu (2009) pointed out that the use of ICT makes learning less demanding, seedier energizing and fascinating to learners. Educational resources greatly facilitates the acquisition and absorption of knowledge, offering developing countries unprecedented opportunities to enhance educational systems, improve policy formulation and executions.

Educational resources have revolutionized the way people work today and how educational system is been transformed. As a result, if students who were trained in yesterday's skills and technologies do not update their knowledge, they may not be effective and fit into tomorrow's world. This is a sufficient reason for educational resources to win global recognition and attention. For instance, educational resources are dependable tools in facilitation the attainment of the Millennium Development Goals (MDGs). This indicates the growing demand and increasingly important place that educational resources could receive in education. Since Educational resources provide greater opportunities for students and teachers to adjust learning and teaching to individual needs, society is, forcing schools to give appropriate responses to this technical innovation. The reality of the digital divide the gap between those who access to, and control technology and those who doubt, make a huge difference in the use of educational resources. This means that the introduction and integration of educational resources at different levels and various types of education is the most challenging undertaking. Failure to meet the challenges would mean a further widening of the knowledge gap and deepening of existing economies and social inequalities among the developed and the under developing countries.

Yusuf and Onasanya (2004) opined that educational media provides opportunities for school to communicate with one another through email, mailing list, chat room and other facilities. It provides quicker and easier access to more extensive and current information. Educational resources can also be used to do complex task as it provides researchers with a steady avenue for the dissemination of research reports and findings. Honey and Mandinach (2003) advanced three major reasons for educational resources in education. They, however, suggested that it is a tool for addressing challenges in teaching and learning situation; a change agent; and central force in economics competitiveness. As a tool for addressing challenges in teaching and learning, technology has the capability to delivery of effective teaching and learning. As a change agent, it can change the content, methods and overall quality of teaching and learning. If educational resources are properly used it holds great promises to improve teaching and learning. Findings revealed that mathematics lessons have been described as boring, uninteresting, and unchallenging because of inadequate use of educational resources. A lot of students perform below average in external examinations in secondary schools today owing to lack of electronic media and well equipped and functional resource center. Thus, this study set out to critically appraise the influence of Educational Resources on academic performance of secondary school students on students' performance in mathematics.

Purpose of the Study

The purposes of the study are: -

1. To investigate the roles played by educational resources in the academic performance of students in mathematics.

2. To find out the correlation between the use of Educational resources and pupil performance in social studies.

3. To know whether or not to enhance the use of educational resources in the teaching and learning of mathematics to improve students' academic performance in secondary schools.

Hypotheses

The following hypotheses were tested in this study:

H_{01}:   There is correlation between the use of Education resources and secondary school students' academic performance in mathematics

H_{02}:   There is no significant difference in the performance of student in schools utilizing educational resource and schools who do not utilize educational resources in teaching/learning of mathematics

Methods
The research design used was descriptive survey research design. The population of this study consists of all secondary schools in Oyo State. Simple random sampling was used to select six local government areas from the thirty-three LGA's in Oyo State, from each of the LGA's two schools and twenty students and two teachers from each school. The schools were stratified into schools using educational media and schools not using Educational Media. Making a total of twelve (12) schools, two hundred and forty students (240) and twenty-four (24) teachers.
The two instruments developed by the researcher to collect information from the participants are **Questionnaire on Educational Resource (QER):** it was used to obtained information on educational resource material used in schools and it was administered by the researcher to obtain adequate information from the teachers. The reliability of the questionnaire using test-re-test is 0.78 and content validity was done by test and measurement expert. The questionnaire was divided into two sections; **Section A**; consisted of Personal Data of the respondent and **Section B;** contained questions on the variable of interest in the study. The total obtainable score on the questionnaire is 28 and any school that

score below 14 marks is regarded as schools not using Education resource while school rated above 20 marks were regarded as school with education resources.

Mathematics Achievement Test (MAT): It was constructed by the investigator using second term scheme of work of senior secondary one (SS1) student. The test contained twenty items. The pupils are to choose from option A to E. The total obtainable mark is twenty while the least score is zero (0). Any pupils that scored below ten are regarded as below average and score ten and above are above average. The reliability of the test item when suing Kuder Richardson 20 is 0.82 and the content and face validity was established by professionals in mathematics.

Method of Data Administration and Data Collection

The instruments were administered to the students and their teachers by the investigator and two research assistances.

Method of Data Analysis

To analysis the data correlation and T-test was used.

Results and Discussion of Findings

Table 1: Descriptive Statistics

	N	Minimum	Maximum	Mean	Std Deviation
Education Resource	240	8.00 6.75	26.00	16.83	
Students' Academic Performance	240	1.00	19.00	9.72	3.31
Schools with Education Resources and Schools without	240	1.00	2.00 .501	1.00	

Hypothesis I

There is correlation between the use of education resources and lower basic school students' academic performance in social studies.

Table 2:   Correlations

	Education Resource	Student academic performance
Education Pearson Correlation	1	.222
Resource Sig (2 tailed)		0.001
Number	240	240

From table 2, the value R obtained when using Pearson product moment correlation was .222 which was significant at 0.001. The results show that there is relationship between the use of education resource and students' academic performance. Therefore, we do not reject the hypothesis.

Hypothesis 2: There is no significant difference in the performance of students in schools utilizing educational resource and schools who do not utilize education resources in mathematics

Table 3:   Group Statistics

	Scores of Schools with ER & School without ER	N	Mean	S. D
Students Academic Performance	>20	120	10.43	3.73
	< 14	120	9.00	2.66

Table 4: One Sample T-Test of Schools Using Education Resources and Schools not using it

Students'Acad Performance	F	t	df	Sig (2 tailed)	Mean Difference	95% confidence interval of difference	
						Lower	upper
	14.59	3.338	238	0.001	1.417	5.93	2.24

Table 4 revealed that there is significant difference between the performance of students in school where education resource is used and schools where it is not in use.

(t = 3.34, df = 238, p = .001)

Therefore, we reject the hypothesis

Discussion: The finding revealed that there is correlation between the use of Education Resources and students' academic performance. The results are in consonance with the outcome of Okwo (2006) who found that accessibility to ICT makes information handling less demanding quicker and more effective. It also supports the finding of Nwosu (2009) who pointed out that the use of ICT makes learning less demanding, seedier energizing and fascinating to learners. It also buttressed the work of Lizzio, Wilson and Simons (2002) who found that facilities have significant impact on students' performance. It further corroborates the results of Kandumbu (2005) who identified lack of teaching and learning support materials as one of the challenges that face the primary school education sector in Namibia. It's also in agreement with Ololobu (2010) that retreated that education resource materials stimulates thinking and interest of pupils. The result that there is significant difference between the performance of students in school with education resource and school without supports the finding of Nwaji (2002) who discovered that instructional materials offer teachers and the learners' good opportunity to relate theoretical knowledge to practical experience.

The use of education resource in teaching and learning of mathematics exposes students to the realities of their environments and makes learning relatively permanent.

Conclusion

The study found that educational resources predict students' performance in mathematics

Recommendations

1. Provision of necessary education resource material should be encouraged in schools to enhance effective teaching and learning of mathematics.
2. Young software developer should be trained and supported with the necessary equipment to develop nationally usable education resource software for improved teaching and learning
3. Government should increase funding for the entire educational sector with particular emphasis on acquisition of educational resources.
4. Government should work with the private sectors to ensure affordable and sustainable access to educational resources infrastructure to enhance better students' academic performance.

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HUMAN RESOURCES DEVELOPMENT IN EDUCATIONAL TECHNOLOGY TEACHERS: THE CHALLENGES AND WAY FORWARD FOR NIGERIA EDUCATIONAL SYSTEM

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Abstract

This paper investigated different methods of human development in educational technology teachers and suggested the way forward for educational challenges. All over the world, the importance of human resources development in any organization cannot be over-emphasized hence this becomes very important for every organization to ensure constant increase in skill/knowledge acquisition for Educational technology teachers. Respondents of this study were mainly drawn from the population of Educational Technology teachers across different educational levels in Three (3) local government of Ekiti State. A total of two hundred and fifty respondents were randomly selected to participate in this study. The research instrument used for this study was a self-developed questionnaire modified by Education experts, it adopted from Likert scale model.

Four statements hypotheses were stated and tested using chi-square statistical analysis with the alpha level set at .05. Results of the calculated values of all the tested hypotheses showed that they were significantly greater than the table values, all the hypotheses were thereby rejected. Some of the findings showed that entry selection criteria will significantly influence human development in educational technology teachers and that attendance of conferences, organization of seminars and workshops will enhance human development in educational technology teachers. It was recommended that only qualified candidates should be recruited into teacher preparation programmes. Also, in-service training should constantly be organized by government and employers, for all the teachers, most especially educational technology teachers, in order to improve their skills and knowledge.

Introduction

Human development also refer to as Human resources development or manpower development is defined as the identifying, nurturing, managing, and using the abilities demonstrated by employees in order to help the Organization to attain its objectives (Bratton & Gold, 1999; Swanson & Holton, 2001; Vinesh, 2014). It includes training a person after he or she has been employed, providing opportunities to learn new skills, distributing resources that are beneficial for the employee's tasks, and any other developmental activities. In organizational context, it is a process by which the employees of an organization are helped, in a continuous and planned way to achieve the following three objectives:

1) Acquire or sharpen capabilities required to perform various functions associated with their present or expected future roles;

2) Develop their general capabilities as individuals and discover and exploit their own inner potentials for their own and/or organizational development purposes; and

3) Develop an organizational culture in which supervisor-subordinate relationships, teamwork and collaboration among sub-units are strong and contribute to the professional well-being, motivation and pride of employees.

There are several authors with diverse definitions depending on the context / perspectives of the author. In Educational context, Human resources development can be seen as an organization's investment in the learning of its people as part of human resources development approach (Bratton & Gold, 2017; Swanson & Holton, 2001; Vinesh, 2014). Allameh & others, 2012 highlighted the goals of human resource development as: access to organization proficiency; increasing quality and efficiency, in promoting growth and individual development; integrating people into business, it is worthy to note that goals must be in line with the organization's goals and missions.

Span of Human Resource Development

There are three basic scope of Human Resource Development, these are: Organization development Career Development and Training Development.

Organization development

Organization Development involves the Organization reflection, system improvements, Planning and self analysis (Vinesh, 2014; 214). In order to help individuals adapt with any changes in the Organization. Organizational development consists of the processes and practices through which an organization engages to link its Table 1: HRM vs. HRD employees with its mission. In its broadest sense, organizational development means anything that we do in an organization (i.e. a group of people and resources that form a unit) to promote positive change or growth (John's, 2009; 4). Another author said (OD) (Rothwell & Sullivan, 2005; 19-20) involves longrange in perspective, should be supported by top managers, effects change, although not exclusively, through education, change and learning, and emphasizes employee participation in assessing the current and a positive future state, making free and collaborative choices on how implementation should proceed, and empowering the system to take responsibility for achieving and evaluating results. So, (OD) is the process of developing the current reality of the Organization into the better to fit with changes in the external environment and the working environment, By solving current problems and reduce the gap between departments and employees with improve cooperation, coordination and collective action, And to increase the effectiveness of the Organization and the staff, and work into integrate the goals of employees and the Organization. OD important, why? It emphasizes both macro and micro organizational changes: macro changes are intended to ultimately improve the effectiveness of the organization as a whole, whereas micro changes are directed at individuals, small groups, and teams. For example, many organizations have sought to improve organizational effectiveness by introducing employee involvement programs that require fundamental changes in work expectations, reward systems, and reporting procedures (Werner & Desimone, 2012;11).

Career Development

Career development it is a general term used to describe numbers of activities aimed at improving individual and organizational performance (Everts, 2001). This has been used extensively in many literatures because of its importance to individuals and organization overall performances (Banks & Nafukho 2008). Agba & others (2010) stated that "career development has both personal and organizational dimensions" while Werner and Desimone, (2012) in their work define career development as "an ongoing process by which individual's progress through a series of stages, each of which is characterized by a relatively unique set of issues, themes, and tasks." Career Development involves two processes namely: career planning (CP) and career management (CM). CP involves activities performed by an individual, often with the assistance of counselors and others, to assess his or her skills and abilities in order to establish a realistic career plan. CM involves; taking the necessary steps to achieve that plan, and generally focuses more on what an organization can do to foster employee career development.

Training and Development

Some researchers have identified the mysterious difference between training and development. Noe and Raymond, (2010) defined development and indicated that it is future oriented. Development implies learning that is not necessarily related to the employee's current job. In contrast, training traditionally focuses on helping employees improve performance of their current jobs. Noe et all,. 2011. Also agree with (Yahaya & other use Yahaya el ta., and mention the year) that, Training is a process of learning that is organized and carried out by an organization to equip employees with the knowledge, skills and attitudes required to carry out their jobs and to improve their current job performance while development can be viewed as the learning process aims to develop the employee in general and not necessarily related to his current job (Yahaya & other, 2009). Here we note the development focus on the future and training on current jobs. Training process whereby people acquire capabilities to perform jobs (Mathis & Jackson, 2011. Werner & Desimone, 2012 viewed development as the focus on preparing for future work responsibilities while also increasing the capacities of employees to perform their current jobs.

On the other hand, many scholars combined Training and development. Training and development is defined as intension to enhance the performance of employees through a learning process that involves the acquisition of knowledge, improvement of skills, concepts, rules, or changing of attitudes and behaviors in organizational settings (Ahmad & Din, 2009). Further, Werner & Desimone focuses on changing or improving the knowledge, skills, and attitudes of individuals Werner & Desimone, 2012. According to (Pynes, 2009) training and development has been described as a planned effort by an organization to facilitate the learning of job-related behavior on the part of its employees (Pynes, 2009). Training is important in solving current problems while we need development to improve our situation in order to avoid future problems.

According to National policy on Education 2019. Education is an instrument for developing an individual in social, mental, physical, emotional, moral and psychological aspects. Education can be considered as a process which enables people to understand the difference between good and bad attitude, right and wrong behavior. Education can be defined as a combination of tools and techniques used to gain empirical knowledge about the useful elements of life and how to make use of them.
Educational Technology is a functional education designed to produce people who can be self-reliant. They are aspects of the total education that lead to the acquisition of practical and applied skills as well as basic scientific knowledge.
The National Policy on Education (FRN, 2004) outlines the following as the objectives of pre-vocational Education in Nigeria; Introduction of students into the world of technology and appreciation of technology towards interest arousal and choice of vocation at the end of Junior Secondary School and later in life; Acquisition of technical skills; Exposing students to career awareness by exploring usable options in the world of work; Enable youth to have an intelligent understanding of the increasing complexity of technology.

Challenges of Human Resources Development in Educational Sector

In the 70's and 80's to manage people at workplaces has been a difficult task. People are tired of doing same thing repeatedly. There is need for change and orientation in short time intervals. The senior and experienced people demand large amount of salary. The skilled people are very expensive. Their productivity is highly dependent on the person's ability to instruct. But in recent days with the Technology savvy, the following challenges are identified on basis of observation and experience.

Poor Working Condition

Staff expects financial rewards for achievement and a healthier and motivated environment in the institution. But it is observed that the higher institutions staffs have to adjust a lot with the little funds released to them by government, that is why they are always found demanding for facilities and flexibilities in their working conditions. There should be a systematic procedure for reward system. A good remuneration tends to reduce inequalities between staff earnings, raise their individual morale, motivate them to work for pay increase and promotions, reduces inter group friction and employee grievances. Staff salaries are not paid alongside with other civil servants and in some cases, faculties are owned many months of salary areas.

Problems of Staffing

The problem of staffing is massive in most of our higher Institutions. This is as a result of quality and quantity of staff with respect to the size of the institution. Poor staff recruitment and selection process. Many politicians interfere in the recruitment process, so the right people may not have their way. Favorism of candidates takes away the place of eligible and skilled candidates. Some staff rarely stay in the remote areas where the management wants their services. They try to shift in the cities for self-convenience and good earnings.

Use of ICT in Education

With the recent improvement in the information and communication technology, the application of ICT has covered almost all the sectors including business and educational sectors. ICT being the fastest means of information dissemination, imparting knowledge, decentralization of work and expansion of work force. It helps as a facilitator, supervisor and a guide for classroom instruction. ICT also helps in the administration of staff and students.

Budget

Budgets in Nigeria educational sector is much less than other sectors which results in low salary of the staff in the sector and this reduce or affect the flexibility and productivity of the workforce.

According to Ogbuanya (2006), the best could be achieved in Education sector through imparting and training individuals in practical skills; work habit and desirable attitudes that will enable its products function productively.

Development is an expression of growth and change as stated above. Human resources development in Educational Technology entails continuous increase in skill acquisition and creativity with the necessary work habit as well as desirable attitudes (Ogbuanya, 2006). Consequent upon the foregoing, it is important to look inwards into the curriculum of Educational technology teacher training programme and ensure that the section on practical skills acquisition is strictly followed to reflect what is obtainable in advanced countries of the world.

Challenges in human resources development in Educational technology according to Ojo, (2006) the challenges starts from the stages of admitting students, Lack of facilities and equipment, inspection and supervision, lack of finance etc. Most often, the students admitted to be trained in Educational technology have no interest or inclination for science subjects including mathematics and these are the subjects that will enable them acquires the necessary Scientific knowledge and technological skills that help them in the future.

Inadequate funding has also been a challenge for manpower development among educational technology teachers. According to FGN (2004), education is expensive and it requires adequate financial provision from all tiers of government for the successful implementation of education programmes. Funds are needed for buying and maintaining facilities as well as providing quality staff for instructional programmes. Also, the training and re-training of teachers is found to be lacking. Teachers are not expose to conferences, seminars and workshop which should have exposed them to modern trends in teaching.

Purpose of the Study
This study examined human resources development in Educational technology teachers in Nigeria.
Research Question
This study proffers answer to the following research questions;
1. Will student admission criteria enhance human resource development of Educational technology teachers?

2. How will inspection and supervision affect human resource development of Educational technology teachers?

3. To what extent will regular attendance at conferences, seminars and workshops promote human resource development of Educational technology?

4. In what way will funding affect human resource development of Educational technology teachers?

Research Hypotheses
For the purpose of this study, the following statements of hypothesis were stated and tested.
1. Student's admission criteria will not significantly influence human resource development of Educational technology teachers.

2. Inspection and supervision will not affect the human resource development of Educational technology teachers.

3. Attendance at conferences, seminars and workshops will not enhance human resource development of Educational technology teachers.

4. Finance will not affect human resource development of Educational technology teachers.

Delimitation
The study was delimited to Educational technology teachers at the Secondary Schools, Teachers and Student-teachers in College of Education Ikere Ekiti, Federal University, Oye Ekiti (FUOYE) and Ekiti State University, Ado Ekiti (EKSU) all in 3 selected local government of Ekiti State.
Limitation
Due to the global pandemic that led to the closure of all schools, it was difficult to physically get to all the concern institution as some of the student-teachers did not respond.
Methodology
The subjects for this study were drawn from Educational technology teachers in the Secondary Schools from 3 selected local government of Ekiti State namely: Ado, Ikere and Oye Local government, (One from a senatorial district, Ekiti Central, South and North respectively) Ekiti State University, Ado Ekiti, College of Education Ikere Ekiti and Federal University, Oye Ekiti and all in Ekiti State. A total of three hundred (300) respondents were randomly selected to participate in the study. Lecturers at the College of Education and University were also used as subjects for the study.
Research Instrument
    The research instrument used for the study was a modified self-developed questionnaire adopted from the Likert scale model. It required respondents to answer Agreed (A), Strongly Agreed (SA), Disagreed (D) and Strongly Disagreed (SD) to the statements contained in the questionnaire. The questionnaire items were drawn based on the variables contained in the hypotheses.
Administration of Research Instrument
Three hundred (300) copies of the questionnaire was directly administered on the respondents with the assistance of three research assistants selected one from 300 level Student of Educational technology Ekiti State University, Ado Ekiti, an NC II Students of the Department of Educational technology, Ekiti State College of Education, Ikere Ekiti and a 300 level student of Science education Department, Faculty of Education, Federal University, Oye Ekiti.
The questionnaires were allocated to the institutions in the following order;
1. Secondary Schools: (3 Schools) 10 per school =   30

2. College of Education (I)   =   70

3. University (EKSU)	=	100	
4. University (FUOYE)	=	<u>100</u>	
TOTAL	**=**	**<u>300</u>**	

Data Analysis

The chi-square (X^2) statistical analysis with the alpha level set at .05 was used to test the hypotheses formulated for study.

Findings and Discussions

Table 1: Gender and Number of Subjects

Subject	Number of Respondents	Percentages
Male	224	74.7%
Female	76	25.3%
Total	300	100%

Table 1 shows that of the three hundred (300) respondents, two hundred and twenty-four (224) respondents representing 74.7perpcent were male Educational technology teachers while seventy-six (71) respondents, representing 25.3percent were female Educational technology teachers.

Table 2: Academic Qualifications of the Teachers

Subject	Number of Respondents	Percentages
NCE	38	12.7%
B.Sc.(Ed); B.Ed	125	41.7%
M.Ed	96	32%
M.Phil	16	5.3%
P.hd	25	8.3%
Total	300	100%

The data in Table 2 above, reveals that thirty-eight (38) respondents (12.7%) were holders of the Nigeria Certificate in Education (NCE), One hundred and twenty-five (125) respondents (41.7%) were holders of B.Sc (ed), B.Ed, Ninety-six (96) respondents (32%) were holders of the M.Ed degree, sixteen (16) respondents (5.3%) had M.Phil while twenty-five (25) respondents (8.3%) were Ph.d degree holders.

Table 3: Hypothesis One: Admission/Selection Criteria

Reponses	Frequency	Percentages	X^2 Value	Df	Decision
SA	180	60			
A	60	20	10.9	3	Rejected
D	42	14			
SD	18	6			

Table value = 7.815; P>0.05

The result of analysis on Table 3 shows that the calculated value of 10.9 is significantly greater than the table value of 7.815 at the alpha level of 0.05 and a degree of freedom is 3. Based on the above result, the hypothesis which states that student's admission criteria will not significantly influence human resource development of Educational technology teachers is rejected. This result is in line with the opinion of Ojo, (2006) who stated that the quality of input into a training programme will determine its output; what is sowed is what is reap, garbage in, garbage out. Also, Ukeje (1996) stated that what is needed is the recruitment of high quality trainable individuals into the teaching profession.

Table 4: Hypothesis Two: Inspection and Supervision

Reponses	Frequency	Percentages	X^2 Value	Df	Decision
SA	139	46.3			
A	130	43.3	50.8	3	Rejected
D	20	6.7			
SD	11	3.7			

Table value = 7.815; P>0.05

The results on Table 4, revealed that the calculated value of 50.8 is significantly greater than the table value of 7.819 with alpha level at 0.05 and a degree of freedom is 3. As a result of this outcome, the hypothesis that stated that inspection and supervision will not affect the human resources development of Educational technology teachers was rejected. The result indicated that inspection and supervision is vital to the human resources development of the teachers. Inspection according to Omoifo and Igbinosun (2008) means assessing the state of educational system to ascertain its acceptable standard. In view of the above, curriculum, school administration and instruction (content, teachers and students) equipment; physical facilities and accounting system are inspected and supervised with the aim of proffering solutions.

Table 5: Hypothesis Three: Attendance of Conferences and Workshops

Reponses	Frequency	Percentages	X^2 Value	df	Decision
SA	120	40			
A	105	35	8.56	3	Rejected
D	65	21.7			
SD	10	3.3			

Table value = 7.815; P>0.05

The result of data analysis on Table 5 above showed that the calculated value of 8.56 is greater than the table value of 7.815 at the alpha level of 0.05 with 3 percent degree freedom. Based on this result, the statement of hypothesis which stated that attendance of conferences, seminars and workshops will not enhance human resources development of educational technology teachers is rejected. The result is in line with the opinion of the following researchers (Ogunmiade, Okedeyi and Ogunlusi, 2008) that a teacher need to value excellence and scholarship and to attach importance to his own continuing development and in addition, to value excellence in a wide domain of human endeavor if he/she is to be an active and alert mentor of the young ones.

Table 6: Hypothesis Four: Lack of Finance

Reponses	Frequency	Percentages	X^2 Value	df	Decision
SA	200	66.7			
A	60	20	12.5	3	Rejected
D	30	10			
SD	10	3.3			

Table value = 7.815; P>0.05

The result analyzed on table 6 above showed that the calculated value of 12.5 is greater than the table value of 7.815 at the alpha level of 0.05 with 3 percent degree of freedom. Based on the results of this

analysis the hypothesis which states that lack of finance will not affect manpower development of Educational technology teachers is rejected.

The result indicated that adequate funding is vital to the human resources development of the teachers. According to Ehiametalor (1983) the success of any academic program largely depends on funding.

Conclusion

With the advent of technology tools in all area of the human endeavor, every phase of human effort has stepped forward to be dynamic in nature. Educational technology is not left out, hence the need to make conscious efforts on the part of stakeholders in the provision of the needed enabling environment for the personnel and subjects (Educational Technology) to be compliant to these modern trends that will help move the subjects forward thereby benefits the entire citizenry.

Recommendations

Considering the importance of human resource development and to achieve effectiveness and efficiency of human resources development of Educational technology teachers for the purpose of promoting and achieving the goals of the subject, the following are recommended.

i. All courses of initial preparation irrespective of length should be regarded as the first stage only for the teacher's development.

ii. Government should provide adequate funding for the training and re-training of the teachers.

iii. The inspectorate and supervising units in the ministries of education and local education authorities should be restructure and revitalized for optimum performance.

iv. NUC, NCCE, NTI, TRC and other Professional bodies should regularly monitor teacher's preparation programmes to ensure that their activities and content meet with National development objectives.

v. Quality and qualified candidates should be recruited into teacher preparation programmes hence the current minimum entry requirement of five credits level passes at the school certificate level should be maintained.

vi. Students should be encouraged to study science subject at their secondary school level by awarding scholarship as a motivating factor.

vii. Government should organize in-service training for all Educational technology teachers. This will improve the skills and knowledge of the teachers in modern skills and techniques.

viii. Educational technology teachers should be continuously updating their knowledge on the use of ICT for the teaching of all subjects in Nigeria schools.

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FACULTY MEMBERS PERCEPTION ON THE USE OF VIRTUAL CLASSROOM FOR TEACHING IN THE UNIVERSITY OF ILORIN

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Abstract

The study investigated faculty members' perception on the use of virtual classroom for teaching in University of Ilorin. This study adopted the descriptive research of the survey type. The population for the study was all lecturers in the University of Ilorin. The instrument for the study was a structured questionnaire titled; Faculty Members' Perception on the Use of Virtual Classroom for Teaching (FMPUCL). The instrument was face and content validated by three educational technologists and one ICT experts. The instrument was pilot tested on a sample not covered in the study and a reliability coefficient of r=0.81 was obtained. Proportional sampling technique was used to select a sample of 270 lecturers which cut across the 10 faculties in the university, while random sampling technique was employed to select 27 lecturers from each of the faculties. Data collected were analysed using frequency count, percentage and mean. The null hypothesis was analysed using t-test at 0.05 level of significance. The findings of the study revealed that faculty members' have a positive perception towards the use of virtual learning for teaching, female respondents demonstrated a more positive perception towards the use of virtual classroom for teaching than their male counterparts. Although, little difference exists between them, there was no significant difference between male and female faculty members' perception on the use of virtual classroom for teaching in the University of Ilorin. Based on the findings it was therefore recommended among others that, trainings and seminars should be organised periodically for faculty members so as to acquit them on the emerging technology and the technicality of operation.

Keywords: Information and Communication Technology, Virtual Classroom, Perception and Gender

Introduction

The emergence of Information Communication and Technology (ICT) is germane in the field of education as it facilitates the quality of instruction in several ways, by enhancing learner's interest and involvement in the teaching-learning process. ICT aids the acquisition of basic skills and enhances teacher's training (Kennah, 2016). ICT eases the stress involved in teaching and learning by replacing the conventional method of teaching with innovative methods of instructional delivery. Furthermore, the emergence of ICT has boosted the relationship between: student to a student, teacher to student, student to educational technologies which has greatly improved advanced learning[CITATION Agb05 \l 2057]. Also, ICT gives students, teachers, academic and non-academic staff the opportunities to communicate with one another more effectively during formal and informal teaching and learning[CITATION Agy11 \l 2057].

In the 21st century, new technologies have changed the educational landscape by creating a set of digital learning platforms and digital classrooms. Virtual classrooms are one of the new technologies that have helped develop teaching and learning in a way that allows learning to happen anytime and anywhere (Ibrahem & Alamro, 2021). Anekwe (2017) asserted that virtual classroom could be seen as the classroom that is capable of replacing partially or totally the conventional educational, evaluating the administrative functioning of a regular classroom by adopting the advanced computer and ICT technologies like the internet, e-mail, on-line chatting, www, CD-ROMS, DVDs, teleconferencing and video conferencing.

A virtual classroom is a shared online space where the learners and the tutor work together simultaneously. Usually, these interactions take place through videoconferencing. The participants have tools to present learning content in different formats, as well as to implement collaborative and individual activities. These include videoconferencing, online whiteboard for real-time collaboration, instant messaging tool,

participation controls, breakout rooms [CITATION Rac18 \l 2057]. Virtual classrooms are great for people who are advancing their education while working. In a traditional classroom, lectures will be scheduled at a specific time of the day and your schedule will be formed around the availability of classes (Drexel University School of Education, 2021). In a virtual classroom, teachers interact with students in real-time; students can voice their questions and interact with peers similar to how they would in a regular classroom, albeit over the internet[CITATION Ale20 \l 2057].

Virtual Classroom sharpens student's digital skills. VC helps to increase knowledge and content retention of the subject matter. Virtual Classroom is BYOD (Bring Your Own Device) friendly. Students can join Virtual Classroom using any Internet-enabled device such as PC, Laptop, Mobile, Tablet, and so on[CITATION Edu21 \l 2057]. The virtual classroom has been used to describe a variety of online learning environments. These range from asynchronous systems such as those described previously, interactive learning spaces established in virtual worlds such as Second Life [CITATION Mas10 \l 2057]. Asynchronous virtual classrooms are self-paced e-learning systems that enable students to review the instructional material and therefore interact with the course content via the internet at the appropriate time and place[CITATION Ola14 \l 2057]

The Virtual Classroom is the main tool for blended learning since it allows the breaking of time and space barriers between the teacher and the student. In order to develop and put into practice a higher studies course through this tool, teachers need to have a series of skills related to the command of digital technologies and an understanding of students' affective and behavioural states and to apply appropriate communication strategies to deliver course content and prepare students for this innovative learning approach (Bigné, Badenes, Ruiz, & Andreu, 2018). A virtual classroom is a digital replica of a traditional classroom or training room. The instructors teach, and the participants learn in real-time, face-to-face but via internet-enabled technology devices[CITATION Wiz20 \l 2057]. Falloon (2012) while examining student's perspectives on virtual classrooms revealed that while virtual classroom use was viewed favourably, its value was influenced by task, communication tools, multimedia usability, and technical/logistical factors some of which were beyond student control. Despite the numerous benefits that virtual classroom offers, faculty members are a key stakeholder in the use of this technology, therefore, perception towards the use of virtual classroom is vital.

Perception refers to the way sensory information is organized, interpreted, and consciously experienced. In the context of this study, perception refers to the way, faculty members organizes, interprets, and use the virtual classrooms for learning. Technology Acceptance Model (TAM) deals with issues of technology adoption and usage based on their understanding of the usefulness and the ease of use of technology. Ajzen and Fishbein (1980) posited that Technology Acceptance Model (TAM) was considered as an extension of the theory of reasoned action (TRA). TAM originally proposed by Davis (1986) has proven to be a theoretical model that facilitates in explaining and predicting user behavior of information technology (Legris, Ingham, & Collerette, 2003). Davis (1989) and Davis, Bagozzi, and Warshaw (1989) adapted TRA to help in explaining users' acceptance or rejection of information technology

Al-Shamary (2016) study aimed to identify the reality of using the Learning Management System by the faculty members at Hail University. The results showed that faculty members perception of the use of the Learning Management System was high, however, there were no significant differences between faculty members perception and the use of learning management system. Oassim-Al-shboul, Sabiote, & Álvarez-Rodríguez, (2015) main findings indicate that, overall, distance education in virtual environments has earned a good opinion among the professors who participated in the study, although the potential benefits of distance education are the most highly valued dimension. The professors rank the dimensions of goals and difficulties in implementing this educational strategy second and planning the third and lowest dimension. Further, some identifying variables (e.g., department, gender) show statistically significant differences relative to the dimensions of the scale used.

Muganda, (2006) examined e-learning implementation in the University of Nairobi focused on the perceptions of academic staff towards online learning. The study found out that the factors which determine online learning readiness were computer and internet availability, computer literacy, motivation of users, and technical support. This study focused on the levels of adoption by university lecturers. Samuel, Onasanya, & Olumorin (2018) findings revealed that university lecturers had a positive perception toward the usefulness, ease of use, and adequacy of use of mobile technologies. Alqirnas, (2020) explored students' perception of virtual classrooms as an alternative to real classes. The results showed that perceived usefulness is a significant factor that positively influences students' Attitude toward virtual classrooms that intend to use them in the future.

Salloum (2011) examined the degree of integration between the virtual classrooms and the system of e-learning Learning Management System, the researcher compared the different virtual classroom systems in terms of integration with e-learning management systems. The study showed several results, including the need to use virtual classroom techniques in e-learning in general and in the live broadcast of lectures and tutorials in particular because of the benefits of many of these programs. The use of virtual classes allowed teaching female students by male faculty members, thus solving the problem of non-availability of specialized faculty members of the same sex of the students.

Gender plays a significant role in determining the intention and perception towards accepting new technology. Gender acts as an influencing factor in technology adoption as men claimed to be more technologically adept compared to women (Goswami & Dutta, 2016). Hakami (2017) findings indicated that male faculty members prefer to use the virtual classroom system rather than teaching via the videoconference system; and although female students like being taught via the virtual classroom, they prefer to use the videoconference system due to Internet connection problems. Alshorman & Bawaneh (2018) reported statistically significant differences in the attitudes and perception of university faculty members due to gender and in favour of the males. Conversely, Mashaqbeh (2009) reported that there are no differences of statistical significance due to sex, academic year, program, and previous experience.

Statement of the problem

The Covid-19 has affected the higher education sector dramatically, which is a crucial determinant of the economic future of a nation. The national lockdown and the growing health crisis have hit the education of students. The academic calendar in many tertiary institutions was greatly altered. However, in the developed countries the education sector wasn't hampered by the lockdown as they shifted swiftly to adopting and integrating the use of virtual classrooms as the single mode of instructional delivery. Conversely, developing countries like Nigeria especially, are yet to balance up from the negative impact of the pandemic, because many of the faculty members are addicted to the expository method of instructional delivery. Globally, we are still in the era of the covid-19. Given this, it is expedient that faculty members adopt and integrate virtual classrooms for teaching in tertiary instruction. Hence, this study investigated faculty members' perceptions of the use of virtual classrooms for teaching at the University of Ilorin.

Research purpose

The main purpose of the study is to investigate Faculty Members Perception of the use of virtual classrooms for teaching at the University of Ilorin. Specifically, the study:

1. examined faculty member's perceptions of the use of virtual classrooms for teaching at the University of Ilorin.

2. determine male and female faculty members' perception of the use of virtual classrooms for teaching at the University of Ilorin.

Research Question

i. what are faculty members' perceptions of the use of virtual classroom for teaching in University of Ilorin?

ii.   does male and female faculty members perceptions differ on the use of virtual classroom for teaching in University of Ilorin?

Research Hypothesis
Ho₁: There is no significant difference between male and female faculty members' perception on the use of virtual classroom for teaching in University of Ilorin.

Materials and methods
This study adopted the descriptive research of the survey type. The population for the study consist of lecturer in University of Ilorin. The instrument for the study was a structured questionnaire titled; Faculty members' perception on the use of virtual classroom for teaching (FMPUCL). The instrument was face and content validated by three educational technologists and one ICT experts, their observation and suggestions were used to modify the instrument. In order to ensure the reliability of the developed instrument a pilot study was carried out using 30 lecturers in Kwara State University not covered in this study. Cronbach alpha was employed to determine the reliability coefficient and r=0.81 was obtained. Proportional sampling techniques was used to select a sample of 273 lecturers which cut across the 10 faculties in the university. While random sampling technique was employed to select 27 lecturers from nine of the faculties. Thirty lecturers were selected in faculty of education because they had the highest number of lecturers. The copies of the questionnaire were administered by the researchers and two research assistants. 276 copies of the questionnaire were retrieved; 3 copies of the questionnaires were invalid while 270 copies of the questionnaire were valid. Thus, it was found useable for the data analysis for the study. The valid total therefore represents 81.9% response rate. Data collected were analysed using frequency count, percentage and mean. The null hypothesis was analysed using t-test using at 0.05 level of significance.

Results
Table 1:

Distributions of Respondent by Gender

Gender	Faculty Members'	%
Male	142	52.6
Female	128	47.0
Total	**270**	**100**

Table 1 shows the distribution of faculty members by gender. 142 (52.6%) of the sampled respondents were male, while, 128 (47.0%) of the respondents were female.

Research Question One: what are faculty members' perceptions of the use of virtual classroom for teaching in University of Ilorin?

Table 2: Mean Score of responses of Faculty Members Perception on the use of Virtual Classroom for Teaching

S/n	Items	Mean
1	I find virtual classrooms technology is flexible to use	3.27
2	I don't have time to access virtual classroom	2.77
3	My low level of proficiency in the use of ICT is a barrier in exploring Virtual classroom	3.42
4	The conventional method of instructional delivery suits me more compared to the use of virtual classroom	3.38
5	It is not easy to communicate my thoughts and knowledge via virtual classroom	2.14
6	Using virtual classrooms increases my academic productivity	2.15
7	virtual classroom play a significant role in enhancing communication skills	3.10
8	Virtual classroom provides me plenty of time, so I can discus with students in detail all that they need to know. Moreover, the students who feel shy in a face-to-face class can participate easily	3.54
9	Virtual classroom supports collaborative learning	3.57
10	The use of virtual classroom makes learning more effective	3.39
11	virtual classroom makes learning more diverse	2.97
12	virtual classroom enhance my teaching performance	3.01
	Grand Mean	**3.10**

Classroom for Teaching. Using a bench mark of 2.5 on a 4 point Likert scale, it was revealed

Table 2 shows the mean responses of Faculty Members Perception on the use of Virtual through the responses of faculty members that they hold a positive perception towards the use of virtual classroom for teaching. Item 9 got the highest mean of 3.57 which indicates virtual classroom supports collaborative learning. Item 8 followed suit with a mean score of 3.54 which deduced that virtual classroom provides faculty members with plenty of time to discuss with students in detail all that they need to know. Moreover, the students who feel shy in a face-to-face class can participate easily. The lowest mean score was recorded in item 5 with a mean score of 2.14 indicating that respondents agreed that it is not easy to communicate their thoughts and knowledge via virtual classroom. Therefore, with a grand mean score of 3.1, it can be deducted that faculty members' have a positive perception towards the use of virtual learning for teaching.

Research Question 2: does male and female faculty members' perception differ on the use of virtual classroom for teaching in University of Ilorin?

Table 3: Percentage Reponses of Male and Female Faculty Members' Perception Towards the Use of Virtual Classroom for Teaching

Gender	SA (%)	A (%)	D (%)	SD (%)	Total (%)
Male	35.0	42.6	11.6	10.8	**100**
Female	42.3	34.1	18.5	7.0	**100**

Table 3 show the analysis of responses of Male and Female Faculty Members' perception towards the use of virtual classroom. The table indicates that 35.0% and 42.6% of male respondents have positive perception towards the use of virtual classroom for teaching while 11.6% and 10.8% of male respondents hold a negative perception towards the use of virtual classroom for teaching. Conversely, 42.3% and 34.1% female respondents demonstrated positive perception towards the use of virtual classroom for teaching, while 18.5% and 7.0% indicated a negative perception towards the use of virtual classroom for teaching. Therefore, findings from table 2 has revealed that female respondents demonstrated a more positive perception towards the use of virtual classroom for teaching than their male counterparts, even though, little difference exists between them.

Hypotheses One

Ho₁: There is no significant difference between male and female faculty members' perception on the use of virtual classroom for teaching in University of Ilorin.

An independent samples t-test was conducted to compare the perception of faculty members for males and females. Data collected from the respondents was analysed and tested at 0.05 significant level. Results of the analysis are shown in table 3 with subsequent interpretation.

Table 4:

T-test **analysis of male and female faculty members' perception towards virtual classroom for teaching**

Gender	N	Mean	SD	df	*T*	Sig. (2-tailed)	Remark
Male	142	30.9	2.94				
				268	-.399	.690	Accepted
Female	128	31.1	3.05				

From table 4, it can be deduced that there was no significant difference between male and female faculty members' perception towards virtual classroom for teaching based on gender. This is reflected in the findings of the hypotheses tested as df (268) t=-.399, p > 0.05. Thus, the hypothesis which states that "no significant difference between male and female faculty members' perception on the use of virtual classroom for teaching in University of Ilorin' is accepted. The results presented in table 3 is in line with research question two which reveals that both male and female perceive virtual classroom equally although female students' perception is quite higher than the males.

Discussion of Findings

From research question one, it was deducted that faculty members' have a positive perception towards the use of virtual learning for teaching. The finding is in line with Al-Shamary (2016) who reported that faculty members' perception on the use of the Learning Management System was high, however, there were no significant differences between faculty members' perception and the use of learning management system.

Research question two revealed that female respondents demonstrated a more positive perception towards the use of virtual classroom for teaching than their male counterparts, even though, little difference exist between them. This finding is in line with Hakami (2017) who indicated that male faculty members prefer to use the virtual classroom system rather than teaching via the videoconference system; and although female students like being taught via the virtual classroom, they prefer to use the videoconference system due to Internet connection problems.

The hypothesis which states that "no significant difference between male and female faculty members' perception on the use of virtual classroom for teaching in University of Ilorin. The finding is in agreement with Alshorman and Bawaneh (2018) who reported statistically significant differences in the attitudes and perception of university faculty members due to gender and in favour of the males. Conversely, the finding is not in agreement Mashaqbeh (2009) who revealed that there are no differences of statistical significance due to sex, academic year, program, and previous experience.

Conclusion

Faculty members' have a positive perception towards the use of virtual learning for teaching. Female respondents demonstrated a more positive perception towards the use of virtual classroom for teaching than their male counterparts, even though, little difference exist between them. No significant difference between male and female faculty members' perception on the use of virtual classroom for teaching in University of Ilorin.

Recommendations

Based on the findings the following recommendations were made:
1   Trainings and seminars should be organised periodically, for faculty members so as to acquit them on the emerging technology and the technicality of operation.

2 Female faculty members should be encouraged through orientation programmes that would detail the fundamental importance of the use of virtual classroom for teaching and thus, improve their perception towards the use of virtual classroom for teaching

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UNDERGRADUATE STUDENTS' PERCEPTION ON THE USE OF SOCIAL MEDIA FOR LEARNING IN NIGERIA UNIVERSITIES

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Abstract

Students all over the world are widely engaged using social media because of its rapid growth among the young generation. This study is thus designed to find out the perception of this social media on undergraduate students learning. Specifically, this study assessed the undergraduates' students' perceived usefulness of social media for learning, students' perceived ease of use of social media for learning and students' intention to use social media for learning. University of Lagos and Lagos state universities were used for the survey. Quantitative approach was adapted to collect the relevant data needed for the study; 400 questionnaires were administered among the undergraduates in 6 faculties. It was concluded that students were interested in using social media for their learning. Results also shows that there is a significant difference on the perception of students on the use of social media for learning, there is a significant difference in the students perceived ease of use of social media for learning, there is a significant difference on students' intention to use social media for learning.

Keywords: *Perception, Social Media, Learning*

Introduction

The transformation witnessed in the 21st century through the use of Information and Communication Technology (ICT) have opened-up new media platforms unmatched in history in terms of interconnectedness, interactivity, multiplicity and accessibility [CITATION TOK13 \l 1033] ICT which resulted from the invention, encapsulated the characteristics of the old or traditional media, and extended the potentials and possibilities into which both the old and new media could be put into use. ICT provides near limitless possibilities of increasing the quantity and enhancing the quality, speed and availability of information in a complex but increasingly interdependent world [CITATION Oko101 \l 1033].

ICT propelled and driven by the internet provide platforms for social interactions between and among users in such a manner that no older platforms or media can boast of. ICT display such potentials that the only limitation to the dynamism is ignorance or illiteracy in terms of the ability to use the hardware and software for maximum effects in the realm of communication, education, politics, economics, social or technology. Over the years, *ICT has proven to have a* positive effect on economic growth *with the help of ICT* components *such* as computer *hardware, software* and Internet [CITATION Mar12 \l 1033]. The development of ICT is partly determined by the ability to establish a synergistic interaction between technological innovation and human values [CITATION Dam15 \l 1033]. This allow individuals to interact with one another exchanging details about their lives such as bio graphical data, professional information, personal photos and up to minute thought which is referred to as social media. *Social media are web-based communication tools that enable people to interact with each other by sharing and consuming information* [CITATION Dan21 \l 1033]. Social media has become increasingly essential to our online experience.

Most of the schools and educational systems started providing extensive computer networks for their students and these are increasingly becoming main components of the teaching and learning environment [CITATION Lif18 \l 1033]. There are different social media types with new and innovative social media sites being developed almost every day [CITATION SPW17 \l 1033]. Social media deals with the use of media technologies which we refer to as Information and Communication Technology (ICT) have the potential to accelerate connectivity, within the political, economic and social fabric of the society [CITATION Últ20 \l 1033]. The convergence and pervasiveness of ICT gave a strong role in development and globalization with the rapid rate at which ICT share evolved with social media since 20th century.

Studies found out that academic outcome of students who spent most of their time interacting using social media to get information on their academics are positive because they were able to share and generate ideas and concepts related to their studies [CITATION Gil18 \l 1033]. The primary motives for using social networks by most students are the search for friends, classmates, communication with them, watch videos. But many students spend over 20% of their time on social media visiting informal sites and pages. As educators look for ways to engage and motivate students, social media technologies are becoming a viable supplement to the traditional learning environment. It is expected that social media would be fully integrated into the academic curriculum in order to prepare student for the world of work. Student at different levels of their education use social media for messaging, contact, research, and many more. Student have also begun to rely on the accessibility of information that is available on the social media platforms specifically on the websites in order to get answers at the same time multitasking that is, they are trying to check various social media sites while they study and this can lead to reduced academic performance. Besides, their ability to concentrate on their task at hand due to the distraction that is brought by all these social media sites. Another negative effect of social media on students is that, they spend too much time on social media sites that are not relevant to them. In fact there is a lack of body signals besides other non-verbal cues including tone and inflection in case of social networking sites.

Purpose of the Study

The main purpose of this study is to investigate undergraduate students' perception on the use of social media for learning in Nigeria University. Specifically, this study is to investigate the:

1. Students' perceived usefulness of social media for learning.
2. Students' perceived ease of use of social media for learning.
3. Students' intention to use social media for learning.

Research Questions

In this study, the following research questions were developed to guide the study.

1) How do students perceive the usefulness of social media for learning?
2) What are the perceptions of students based on the ease of use of social media?
3) Do students have the intention to use social media for learning?

Research Hypothesis

H_{O1}: There is no significant difference on students' perception to use social media for learning

H_{O2}: There is no significant difference on students' intention to use social media for learning

H_{O3}: There is no significant difference in the students' perceived ease of use of social media for learning.

Methodology

The population of this study consisted of all students from the Lagos State University and University of Lagos and three faculties were randomly selected from each of the universities. Four hundred and fifty students from the sampled faculties were selected. Two hundred and twenty-five students were selected from each university that is, seventy-five students from different faculties. The research instrument used for this study was a researcher-designed questionnaire drawn based on undergraduates' students perception on the use of social media for learning. The questionnaire contains three sections A, B, and C. section A, seeks information about the demographic attributes of respondent. Section B, of the instrument seeks to measure respondents' perceived usefulness of social media and student's perceived ease of use of social media. This section contains items with section modes of strongly agree (SA), Agree (A), Undecided (U), Disagree (D), Strongly Disagree (SD). Section C, deals with information on the intention of students to use social media for learning.

Table 1: Response Rates

Universities	Response	Percentage (%)	Non-Response	Percentage (%)
University of Lagos	225	56.25	0	0
Lagos State University	175	43.75	50	100

Total	400	100	50	100

Table 2: Distribution of the Respondents based on Gender

Gender	Respondents	Percentage (%)
Male	186	46.5
Female	214	53.5
Total	400	100

Table 2, indicates that 186 respondents, which constitute 46.5% of the sampled population were males while 214 respondents which constitute 53.5% of the sampled population were females.

Table 3: Distribution of Respondents based on their Faculty

Faculty	Respondents	Percentages (%)
Medicine	75	18.75
Engineering	75	18.75
Business Administration	75	18.75
Education	60	15
Art	64	16
Science	51	12.75
Total	400	100

Table 3 showed that 18.75% with 75 respondents were from the faculty of medicine, Engineering and business administration, 15% with 60 respondents from the faculty of Education, 16% with 64 respondents emerged from the faculty of Art while 12.75% with 51 respondents were from the faculty of science

Research Question 1

How do students perceive the usefulness of social media for learning?

Table 4: Perceived Usefulness of Social Media.

S/N	Perceived Usefulness of Social Media	SA	A	U	D	SD	Total
1	Using social media in my learning would enable me to accomplish tasks more quickly	162	234	4	0	0	400
2	Social media would improve my academic performance	179	210	11	0	0	400
3	Social media would increase my academic productivity	127	235	29	9	0	400
4	Using social media would enhance my effectiveness on my academic (communication with my colleagues and lectures)	197	203	0	0	0	400
5	Social networking site allows me to do everything that I need to do as regards my study	169	230	1	0	0	400
6	Overall I find using social media very useful to me	145	250	5	0	0	400
7	Social media will support the critical part of my tasks as a student	162	238	0	0	0	400
8	Using the social media will give me access to a lot of current and accurate information concerning my study	183	212	5	0	0	400
9	It brings more flexible method of learning as it can be done anytime, anywhere	174	223	3	0	0	400
10	Social media makes it easier for me to keep up with issues that are of interest to me concerning my study	210	190	0	0	0	400
Total		1708	2225	58	9	0	4000

Research Question 2

What is the perception of students as regards the ease of use of social media?

Table 5: Perceived Ease of the Social Media

S/N	Perceived Ease of Use	SA	A	U	D	SD	Total
1	Interacting with a social media site is clear and understandable	166	220	11		3	400
2	Learning to use social media sites is easy for me	186	204	9	1		400
3	It is easy for me to become skillful at using social media site	144	244	3	5	4	400
4	It is difficult to use social media site without consulting others	159	230	7	2	2	400
5	It is difficult to learn how to use the social media to make it worth the effort	170	222	6		2	400
6	It is easy to find information on relevant educational groups on social media	164	213	3	20		400
7	Social media sites use understandable terms	188	201	11			400
8	Most social media sites are easy to navigate	160	226			14	400
9	It is easy to remember how to perform tasks using social media	158	234	2	4	2	400
10	It is easy to customize social media for educational uses	148	247	5			400
	Total	1643	2241	57	32	27	4000

Research Question 3

Do students have the intention to use social media for learning?

Table 6: Intention to Use Social Media

Observed Frequencies

S/N	Items	Not Likely			Highly Likely		
		1	2	3	4	5	Total
1	I intend to use social media in my learning as often as possible	9	12	13	234	106	400
2	I will make a social media site my homepage for learning purpose		13	61	235	91	400
3	I plan on using the social media for my learning for future job on a regular basis in the future		8	49	241	102	400

No	Statement						Total
4	I would advocate for the use of social media in education because of its convenience and relevance		4	77	225	94	400
5	To me social media should be social media; yet, I have the intention of using it for educational purposes	4	5	62	228	101	400
6	I will be willing to undertake an educational professional programme to gain competency in the use of social media in education		9	81	211	99	400
7	I intend to use social media for my academic needs	4	15	65	197	119	400
Total		17	66	434	1571	712	2800

Hypothesis Testing: The research hypothesis was tested with the chi-square statistical analysis to decide whether to reject or accept the hypothesis. The testing was based on the values of the chi-square calculated (X^2) compared with the critical value of chi-square (X^2) using the degree of freedom (d.f).

Ho_1: There is no significant difference on the perception of student in the use of social media for learning. Reject the null hypothesis (Ho_1) if X^2 (cal) > $X^2_{(r-1)(c-1), 005}$ = $X^2_{36, 0.05}$ = 49.765, or do not reject if otherwise
Since X^2_{cal} = 412.18 which is greater than X^2_{tab} = $X^2_{0.05,36}$ = 49.765 we therefore reject the null hypothesis (Ho_1) and conclude that there is a significant difference on the perception of students on the use of social media for learning at 5% level of significance.

H_{O2}: There is no significant difference in the student's perceived ease of use of social media for learning
Reject the null hypothesis (Ho_1) if X^2_{cal} > $X^2_{(r-1)(c-1),0.05}$ = $X^2_{(36, 0.05)}$ = 49.765 or do not reject if otherwise
Since X^2 cal = 840.94 which is greater than X^2 0.05, 36 = 49.765, we therefore reject the null hypothesis (Ho_2) and conclude that there is a significant difference in the students perceived ease of use of social media for learning at 0.05 level of significance.

Ho_3: There is no significant difference on student intention to use social media for learning.
Reject the null hypothesis (Ho_1) if X^2 (cal) is greater than 0.05 X^2 (r – 1) (c – 1) = $X^2_{(24, 0.05)}$ = 36.41, or do not reject if otherwise.
Since X^2_{cal} = 173.61 which is greater than $X^2_{(24, 0.05)}$ = 36.41, we therefore reject the null hypothesis (Ho_3) and conclude that there is a significant difference on students' intention to use social media for learning.

Summary
From the data collected, analyzed and interpreted. The major findings of the study revealed that:
1. Majority of the respondent agreed that social media helps in the learning process.
2. It was also discovered that the perceived usefulness of social media in learning enables users to accomplish more task quickly.
3. Findings also showed that social media enhance effective communication and gives room for lots of current and accurate information.
4. It was revealed that there is a significant difference in the students' perceived ease of use of social media for learning.
5. Findings showed that there is a significant difference on students' intention to use social media for learning.

Conclusions
The academic performance of students has been a major concern over the years. This study cocncluded that, students should be encouraged to use online social network practices as to complement

their classroom learning activities which could enhanced their academic performance. And this should be applicable to students at different educational programmes and levels.

Recommendations

Based on the findings and conclusion, it was recommended that:

i. Curriculum developers should make the curriculum flexible so that curriculum implementers can incorporate social media in learning to meet the needs of today's learners.

ii. Universities should be properly funded by the bodies governing it, so that adequate provision for materials can be made to enhance learning.

iii. Workshops and seminars should be organized by educational agencies to promote interaction and exchange of expertise knowledge on how to utilize social media for learning.

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SURVEY OF UNDERGRADUATES' PERCEPTION OF CLASS-MARKER FOR LEARNING IN ILORIN

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Abstract

Educational technology applications for learning abound. The study adopted a descriptive survey research design to evaluate undergraduates' perception of the use of class-marker for learning in a public university in Ilorin, Kwara State. The population for the study comprised all the 400-level undergraduates in the 2019/2020 academic session in the department of educational technology, University of Ilorin. The sample for the study was all 238 students. The class was created by the researchers via: www.classmarker.com and titled 123undergraduate. The instrument for data collection was developed by the researchers titled: "Survey of Class-Marker for Learning (SC-ML)". Cronbach Alpha was employed to determine the reliability coefficient which yielded r=0.89. The instrument cropped into a link using google form and the link was sent to the respondents via the class whatsapp group chat. A total of 233 students which represented 98% responded to the instrument. Data collected were analyzed using frequency counts, percentages and a mean set value of 2.50 to answer the research questions. Findings showed that class marker was perceived as easy to use, efficient and gender friendly amongst others. It was recommended that class marker be integrated into educational technology for learning.
Keywords: Class-marker, Learning, Undergraduates' Perception and gender

Introduction

Learning is an educational activity which results from teaching or impartation of knowledge. Teaching is a process that involves someone who has information, knowledge or skills who is ready and willing to pass it and the learner or student must be ready to pay the price of paying attention or attending classes and some other exercises that may be required. Both the actions of teaching and learning are directed at achieving a particular or stated objectives for the learner(s) to achieve at the end of the process. Teaching and learning involves two groups of person(s). One to teach and the other to receive. In the era of technology, teaching and learning can take place in either face-to-face classroom experience, online and or a combination of both, otherwise known as blended learning (Otaru, 2015). Whichever that is adopted, the purpose remains that some particular objectives are to be achieved in the process.

Before the advent of information and communication technology, teaching and learning was purely conducted on 'face-to-face basis. This implies that the teacher and the learners must have physical contact for teaching and learning to take place. Teaching and Teaching has some peculiar characteristics of engendering effective communication and interaction between the teacher and the students and among the learners in a face-to-face teaching and learning usually conducted in a classroom like manner (Irving, 2015). Teaching and learning is dominated by a two-way communication. Teaching and learning which was strictly conducted on the basis of face-to-face is not be carried out with or without the teacher and the learners seeing or knowing themselves. Information and Communication Technology (ICT) tools have aided the easy conduct of teaching and learning. The bottleneck created by face to face has been eroded by ICT tools of different types. Distance and time are no longer barriers in teaching and learning Ishaq, Zin, Rosdi, Abid, and Ijaz 2020).

Researchers have tried to unravel the great changes that information and communication technology (ICT) has impacted on educational activities. The emergence of ICT in education has improved the

hitherto challenges of space and time. With the use of ICT tools, teachers and students do not necessarily need to meet face-to-face before teaching and learning can take place. Time is no longer an issue, both teachers and students can schedule the time at their convenience, the teacher can carry out the exercise of teaching without the presence of the students, the teaching can be passed on to the students to either listen or watch at their individual convenient time. It could be recorded by the teacher and played by the student at their convenient time (Ishola, 2019).

Among the ICT tools are the online applications that can be used by both the teacher and the students for the purpose of teaching and learning. They are known as online applications, because, to be able to access and put into use, one has to go online. In this method, the teaching exercise is not usually recorded. It could be real time activity by having the teacher at one end and the students at the other end at the same time. These applications provide opportunities for both teachers and learners to also conduct their activities at their convenience. The applications include but not limited to: Kahoot!, quizalize, quizzes, edulastic, socrative, goclass. Flipgrid and animoto. Some of them like flipgrid, class-marker and animoto are online apps that combine video. They allow students to pass information to recipient through voice and video for about 30 seconds after the class has been created and other members of the class registered and given their individual password. Others like the Kahoot!, quizalize, quizzes, edulastic, class-marker among others do not require videos or audio. Classes are created by the teachers and students are invited by distribution the link to join the class. Individual students join the class using their personal information as required.

Course materials are sent for students to study and other instructions passed to them via the platform. Assessment of what the students have learnt can also be conducted and result obtained. Questions and answers can be inputted into the online applications. There are also lessons that have been pre-loaded with questions. The teacher only need to select topic of interest the questions in the item bank would display as applicable to the topics. Answers are also pre-loaded. The teacher if not interested in any of the pre-loaded topics can upload materials of interest and the answers to the questions. These online applications have the capabilities of scoring and grading students' performance.
Katkukah and Okoyefi (2018) saw online learning as the educational process which involves teaching and learning that is carried out by a teacher that is separated from the learners, where nearly all the activities are communication between the teacher and the learners through artificial medium, especially electronic. When online learning applications are used, it gives engenders learning to be learner-paced, learners-paced and is usually piloted using the services provided by network for open communication among the teachers and the students. This removes the bottleneck created by face-to-face classroom interaction.

The Class-marker application is one of the online learning applications which is similar to kahoot!, socrative, edulastic, quizzes and quizalize among others and belong to the class of gamification applications family, they are designed for the purpose of online teaching and learning and can also be used for the conduct of formative assessment in the course of teaching and learning. Class-marker is a unique online application and has the following features and benefits: free, can be personalized, collaborative in nature, has multimedia competences, it is user friendly, works with google classroom and item bank and customizable among others.

Class-marker has different features of questioning; it makes the application fit for different areas of study in education. Such questions as multiple choice response, true or false responses, short answer, matching objects with words, and essay among others. The questions can take the form of text, file, audio and video among others. Option exists where correct answers can be signified. There are also essay questions and free texts that can be manually corrected. This helps enable one to do away with answers that are not correct as wrong spellings that could result in wrong answers to questions are automatically corrected [CITATION Jab16 \l 2057].

Having difficulty in reading from the formative application boards, difficulty in selecting the options and electricity outage. However, CETIN (2018) found and reported no challenges on the use of Kahoot! as

online tools for teaching and learning as perceived by the students/respondents. Likewise, Onasanya, Otemuyiwa and Onasanya, (2019) reported no challenges using quizalize application for teaching and learning. The ways and manner by which students perceived an online educational application will stimulate their interest, either negatively or positive. Their perception about the utilization of Class-marker application in terms of the ease of use, its efficiency and cost effect. Challenges that may be encountered in the use of online application can affect the students' perception of the applications. Samuel, Onasanya & Olumorin (2018) reported that university lecturers had a positive perception of the ease of use, competence and effectiveness in mobile technologies for delivering educational contents to students.

Students' perceptions have been viewed on the basis of gender as it relates to the use of online applications for teaching and learning. Onasanya, Shehu, Oduwaiye & Shehu (2010), Kehinde & Salami (2018), Utoware & Agbonaye (2018), Ebele, Onokpaunu & Ikonomwan (2018) Olayinka & Joshua (2018) have variously conducted researches and found that gender did not significantly affect the perception held by the students. Both male and female students had positive perception about the online. Conversely, Usman, Orji & Sule (2018) reported a significant difference between male and female students in their perception on online applications for teaching and learning. Similarly, Samuel, Onasanya & Olumorin (2018) report that university lecturers had positive perception on the usefulness, ease of use, and adequacy of mobile technologies by Nigerian university lecturers.

Statement of the Problem
Learning can be referred to as the twin of teaching or lecturing in any institution of learning. The art of teaching and learning has been that which brings together the teacher or lecturer and the students or learners. By the emergence of information and communication technology (ICT) into education, activities of teaching and learning assumed a new dimension of not necessary bring the teacher or lecturer to face-to-face encounter for learning to take place. Class marker as an educational application that requires being connected to online for its use to carry out teaching and learning by both the teacher or lecturers' convenience and that of the students. This study is therefore designed to seek undergraduates' perception of the ease of use of class-marker, its effectiveness, cost effect and the interactive effect of gender on the ease of use.

Purpose of the Study
Specifically, the study seeks to:
i.   determine undergraduates' perception on the ease of use of class-marker application for learning;

ii.   assess the efficacy of class-marker application for learning as perceived by the undergraduates in the department of educational technology, University of Ilorin;

iii.   examine the cost effectiveness in the use of class-marker as perceived by the undergraduates of educational technology department, University of Ilorin; and

v.   evaluate undergraduates of educational technology department, University of Ilorin's perception on the use of class-marker on the basis of gender.

Research Questions

1.   What is the undergraduates' perception on the ease of use of class-marker application for learning?

2.   What is the undergraduates' perception of the effectiveness of class-marker application for learning?

3.   What is the cost effect of class-marker application for learning as perceived by the undergraduates?

Research Hypothesis

Ho₁: The undergraduates' of educational technology department, university of Ilorin's perception will not differ significantly on the ease of use of class-marker for learning based on gender.

Methodology

The study adopted a descriptive survey research design to evaluate undergraduates' perception of the class-marker for learning in the department of educational technology, university in Ilorin, Kwara State. The population for the study comprised all the 400-level undergraduates in the 2019/2020 academic session in the department of educational technology of the University. The sample for the study was all 238 undergraduates. A class was created by the researchers via: www.classmarker.com and titled 123undergraduates. The instrument for data collection was developed by the researchers titled: "Survey of Class-Marker for Learning (SC-ML)". The undergraduates were invited to join the class by sending the cropped link via the groups whatsapp. The undergraduates accessed and joined the class through the invitation by logging into the class marker. The face and content validation of the instrument was done by three (3) doctoral Students of the Department. Likert scale rating was adopted for the instrument: Thus, 4 points = Strongly Agreed (SA); 3 points = Agree (A); 2 points = Disagree (D); 1 point = Strong Disagreed (SD). Pilot study was conducted on 30 undergraduates of 300-level. Cronbach Alpha was employed to determine the reliability coefficient which yielded r=0.87. A total of 233 undergraduates which presented 98% of the sample for the study. Frequency counts, percentages, a mean set value of 2.50 to answer the research questions while inferential statistics was involved in the analysis of the only hypothesis in the study.

Results

Research Question 1: What is the undergraduates' perception on the ease of use of class-marker application for learning in educational technology, university of Ilorin?

Table 1: Undergraduates' Perception on the Ease of Use of Class-marker application for Learning in educational technology department, university of Ilorin

S/N	Items	Mean	StD
1	Class-marker application is flexible to interact with in my course	3.64	.62
2	Accessing Class-marker application is without stress	3.58	.66
3	It is easy to use Class-marker application for achieving my course objectives	3.35	.69
4	The use of Class-marker application simple	3.51	.94
5	There is no limit in accessing Class-marker application	3.71	.62
6	Accessing Class-marker is not limited to particular location	3.69	.83
7	Class marker application is user friendly	3.43	.83
8	Using Class-marker application improves my performance	3.66	.85
9	I can use Class-marker application without consultation	3.48	.88
10	The various functions in the Class-marker application are easy to use	3.32	.92

Mean Value Set @ 2.50

The data analysed as shown in Table 1 revealed that, all ten items have mean above the mean value set at 2.50. The highest and lowest mean scores in the table are items 5 and 10 with 3.71 and 3.32 respectively.

Research Question 2: What is the undergraduates' perception of the efficiency of Class- marker application for learning in educational technology department, university of Ilorin?

Table 2: Efficiency of Class-marker application for learning as perceived by Undergraduates of educational technology, university of Ilorin

S/N	Items	Mean	StD
1	Class-marker application assist learners with immediate feedback	3.43	.59
2	Teachers can easily pass information to students data via Class-marker application	3.34	.67
3	Teachers easily monitor students' performance in Class- marker application	3.42	.79
4	Students' responses can be displayed via Class-marker application	3.57	.60
5	Questions and responses can be saved using Class-marker application	3.47	.64
6	Assessment can be on students responses at a later time	3.55	.81
7	Class-marker prompts incorrect responses submitted.	3.69	.64
8	Correct answers are displayed in Class-marker	3.72	.67
9	There is confidentiality in class-marker	3.77	.73
10	Error free scoring is enabled with Class-marker application	2.98	.87

Mean Value Set @ 2.50

The data analysed as shown in Table 1 revealed that, all ten items have mean above the mean value set at 2.50. The highest and lowest mean scores in the table are items 9 and 10 with 3.71 and 2.98 respectively.

Research Question 3: What is the cost-effect of class-marker application for learning as perceived by the undergraduates of educational technology, university of Ilorin?

Table 3: Undergraduates' Perception on the Cost Effectiveness of Class-market for Learning in the department of educational technology, university of Ilorin

S/N	Items	Mean	StD
1	Using Class-marker application for learning is cheap	3.22	.67
2	Class-marker application for learning does not entails much money	3.27	.66
3	Class-marker application for learning is free online	3.29	.70
4	Using Class-marker application for learning does not require payment	3.92	.71
5	As an undergraduate I do not need to spend my pocket money accessing Class-marker application for learnings	3.54	.62
6	I think Class marker application improves my learning habit	3.42	.68
7	Class-marker application for learning is cost-effective	3.38	.63
8	I like using Class marker application in my personal study	3.44	.73
9	I always look forward to classes that employ the use of Class-marker application	3.47	.81
10	Class-marker application makes learning more lively and cheap than the face-to-face method	3.21	.79

Mean Value Set @ 2.50

From the data analysed as shown in Table 3 showed that, all ten items have their mean score above the mean value set of 2.50. The highest and lowest mean scores in the table are items 3 and 10 with 3.92 and 3/21 respectively.

Ho$_1$: The undergraduates of educational technology department, university of Ilorin's perception will not differ significantly on the ease of use of class-marker for learning based on gender.

Table 4: T-test Analysis of Male and Female Undergraduates' Perception on the Ease of Use of Class-marker for Learning in educational technology department, university of Ilorin

Gender	N	Mean	StD	Df	t-cal	P-value (2-tailed)	Decision
Male	139	12.35	2.17				
				236	-2.45	0.15	Accepted
Female	99	13.16	1.92				

Table 4 reveals the analysis t-test analysis thus: t(-2.45) at df=236 and P-value .015. Since P-value is greater than 0.05, the null hypotheses hereby not rejected. Therefore, there is no significant difference in the perception of male and undergraduates on the ease of use of class-marker for learning.

Discussion of Findings

The result as shown in Table1 revealed that most of the undergraduates perceived class-marker application as easy to use for learning. The perception of the respondents is positive. This report made by CETIN (2018) in which it is indicated the Kahoot! as an online application was perceived to be easy to use by the students. In the same vein, this finding also agrees with the report earlier submitted by Onasanya, Otemuyiwa and Onasanya, (2019) that undergraduates in Ilorin had positive perception towards the ease of use of quizalize application for learning.

The analysed data in Table 2 showed that undergraduates agreed to the efficiency of Class- marker application for learning. The finding is in concomitance with an earlier finding reported by Ramsey & Duffy, 2016 that technological applications have the ability to appeal to learners, participants noted that the use of plickers as online application is similar to Class-marker, creates fun and excitement which also aid the learning process. Similarly, the report by Ismail, Abdulghani, & Hala, 2018 that the use of plickers like the Class marker application is efficient and improves students' learning and in turn leads to creating effective learning environment and provides individual students with feedback.

Data analyzed in Table 3 connotes that the respondents see class-marker as cost effective. Class-marker application is a free online application that is easily accessed via the net. The finding agrees with Onasanya, Otemuyiwa and Onasanya (2019) that quizalize application as an online application is a free online and it is cost effective to use for learning.

Conclusion

Class-marker application as an online tool for learning is easy to use, effective and cost effective. The study has also shown that the application is gender friendly as no significance difference was found between the male and female undergraduates' reposes. The application is easy to use, efficient, cost effective, gender friendly and the undergraduates has a positive perception about the application.

Recommendations

Based on the findings of this study, the following recommendation was made:

1. That Class-Marker application be integrated into the learning processes for the undergraduates' learning.
2. Heads of other departments especially in the faculty of education of the university should consider the integration of class-marker for learning in their departments.
3. The use of class-marker should be sustained in the department of educational technology in university of Ilorin.

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PRE-SERVICE MATHEMATICS TEACHERS' PERCEPTION AND SELF-EFFICACY TOWARDS USING SOCIAL MEDIA TO SUPPORT LEARNING IN COLLEGES OF EDUCATION IN NIGER STATE NIGERIA

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Abstract

The study investigated pre-service mathematics teachers' perception and self-efficacy towards using social media to support learning in Colleges of Education in Niger State, Nigeria. The study adopted descriptive survey design. The population of the study consists of 831 mathematics pre-service teachers from Federal College of Education Kontagora and Niger State College of Education Minna respectively. Random sampling technique was used to select 265 pre service teachers (males = 167and females = 98) from mathematics department at both Federal College of Education Kontagora and Niger State College of Education Minna. The research was guided by four research questions and two null hypotheses and tested at 0.05 level of significance. Researchers developed Questionnaire on Pre-Service Mathematics Teachers' Perception and self-efficacy Towards Using Social Media (QPRESMATPSTUSS) with five items each in perception and self-efficacy. A pilot study was carried out to test reliability of the research instrument. A reliability coefficient of 0.74 and 0.83 was obtained on perception and self-efficacy towards Using Social Media to Support Learning respectively by using Crombach Apha. The data collected from the administration of the research instrument was analysed using mean and standard deviation to answer the research questions while (ANOVA) statistics was used to test the research hypotheses. SPSS version 20.0 was used as statistical package. The findings of the study revealed that there was no significant difference between the Perceptions of pre-service teachers towards using social media to support learning. However, significant difference exist in the self-efficacy of male and female mathematics pre-service teachers towards using social media to support learning. Based on the findings, the study recommends among others that Social media should be used as supplementary in the teaching and learning of mathematics in Colleges of Education in Niger State.

Key Word: Perception, self-efficacy and Support Learning

Introduction

The growth of electronic learning environments-where students can learn through using digital technologies and the Internet, allows students the opportunities to engage in lifelong and flexible learning, communicate and connect with others who live far away, and be open minded and self-directed learners. According to Sobaih and Moustafa (2016) social media can be used for the purpose of teaching and learning in higher education. It has an unlimited possibility to be exploited as an idea and information platform for academic-related purposes since students already use these networks. Most recently, the incorporation of web 2.0 technologies and online social media has emerged as the most promising tool for reinventing public education (Seo, 2013). Social media serve prompt communication by monitoring and accessing others with just one click, also facilitate virtual meetings and contacts with other people. The birth of the digital age makes it convenient for people to reach various types of information and get connected. Further internet technology has the potential to advance the existing teaching methods, which will eventually lead towards a better quality of education. Social media also possess greater usability and propriety among the young generation. It is highly preferred in educational arenas both by students and the instructors to improve the learning process. In this regard, social media users are briskly increasing in number (Boahene *et al.*, 2019). Social media tools have positively impacted the educational field and improved learning skills of students. This positive impact and improved learned has occurred because the new tools allow learners to get information at any time, provide reflections, and share their

information and experiences with others. Additionally, these tools help students to learn collaboratively with one another, exchange their opinions and thoughts, and participate with others at any location. According to Seo (2013) "Pictures, audio, videos, and hyperlinks to other online resources make web 2.0 into a network of multiple information dissemination that goes beyond just text. Knowledge is stored, retrieved, created, or amended digitally online in a variety of media forms easily.

Kaplan and Haenlin (2010) opined that social media is an internet-based applications that build on the ideological and technological foundations of Web 2.0 and that allow the creation and exchange of user-generated content. It is a medium for social interaction as a super-set beyond social communication enabled by ubiquitously accessible and scalable communication techniques.

However, there are many classifications and types of tools considered to be social media technologies, which facilitate the social factor and depend on the users' productions and participations. Kaplan and Haenlin (2010) classify social media into six different forms. These forms including: projects produced collaboratively by users (Wikipedia); Social Networking Sites (Facebook); Content Communities (YouTube); Blogs and Microblogs (Twitter); Virtual Social Worlds (Second Life); and Virtual Game Worlds (World of Warcraft).

Social media tools have changed the ways people learn, acquire information, build knowledge, and participate in creating new and different genres of learning practices. Learning through incorporating social media technologies into the learning process is called e-learning web 2.0, which is the second generation of electronic learning. E-learning 2.0 is defined as learning through digital connections and peer collaboration, enhanced by technologies driving web 2.0 (Elsayed, 2011) which can enhance pre-service teachers perception.

Perception is the belief that the use of social media will improve the teaching pedagogy and broaden the knowledge of pre-service teachers about concepts of mathematics. The perception of people, especially pre-service teachers towards the utilization of any material will affect their level of interaction and acceptance of the material (Folarin, 2016). This implies that having a positive perception about the utilization of social media among pre-service teachers can add values to the teaching and learning and consequently, their adoption, which will also be of benefits to the learners and enhance learners' self-efficacy.

Self-efficacy is an individual judgment of one's capabilities to organize and execute courses of action required to attain designated types of performance (Issa., Aladesusi., Udoh., Ajala & Ikupolati, 2018). It is also a belief in one's abilities to arrange and perform courses of action needed to bring about given achievements (Bandura, 1997). Hence, academic self-efficacy refers to individuals' beliefs that they can successfully accomplish given academic tasks at designated levels, and this beliefs could significantly affect the usage of social media platforms.

Statement of the Research Problem

Before the advent of 21st century, the most common use of instructional delivery in Nigeria Colleges of Education has been the conventional method of teaching. Sadly, this form of teaching method has been characterized by numerous problems such as pace learning and learning at any distance apart from been in the classroom, thereby denying slow learners opportunity of having access to instructional delivery repeatedly for better understanding. If instructional contents need to be received by the students' with the use of social media platforms in Colleges of Education in Niger State, what is the perception of mathematics pre-service teachers towards use of social media? More so, what is the self-efficacy of mathematics pre-service teachers towards use of social media? Therefore, It is necessary to look into the current method of instructional delivery which is social media, in order to get a suitable strategy that will lead to effective teaching and learning in Colleges of Education, It is on this note that the researchers intend to find out pre-service mathematics teachers' perception and self-efficacy towards using social media to support learning in Colleges of Education in Niger State, Nigeria.

Aim and Objectives of the Study
The aim of this study is to investigate pre-service mathematics teachers' perception and self-efficacy towards using social media to support learning in Colleges of Education in Niger State, Nigeria. Specifically, the objectives of the study are to;

4. Determine pre-service mathematics teachers' perception towards using social media to support learning in Colleges of Education
5. Find out self-efficacy of pre-service mathematics teachers' towards using social media to support learning in Colleges of Education
6. Determine gender of pre-service mathematics teachers' perception towards using social media to support learning in Colleges of Education
7. Find out gender of self-efficacy of pre-service mathematics teachers' towards using social media to support learning in Colleges of Education

Research Questions

The following research questions guided the study;
3. What is the mean of pre-service mathematics teachers' perception towards using social media to support learning in Colleges of Education?
4. What is the mean of self-efficacy of pre-service mathematics teachers' towards using social media to support learning in Colleges of Education?
5. What is the mean of gender of pre-service mathematics teachers' perception towards using social media to support learning in Colleges of Education?
6. What is the mean of gender of self-efficacy of pre-service mathematics teachers' towards using social media to support learning in Colleges of Education?

Research Hypotheses

The following null hypotheses were formulated and tested at 0.05 alpha level

$H0_1$: There is no significant difference between mean of gender of pre-service mathematics teachers' perception towards using social media to support learning in Colleges of Education

$H0_2$: There is no significant difference between mean of gender of self-efficacy of pre-service mathematics teachers' towards using social media to support learning in Colleges of Education

Methodology

The research adopted the descriptive survey design. The population of the study comprises 831 pre-service mathematics teachers from both Federal College of Education Kontagora and Niger State Colleges of Education. The target population for the study was made up of entire 265 pre-service mathematics teachers from both Federal College of Education and Niger State College of Education Minna. The sample comprises of (167 males and 98 females) pre-service teachers that were used for the study. Random sampling technique was used to arrive at the sample used for the study, the reason for using this technique was for every respondents to be given equal opportunity of being selected.

The instruments used to gather data for the study was researchers developed Questionnaire on Pre-Service Mathematics Teachers' Perception and self-efficacy towards using Social Media (QPRESMATPSTUSS). The questionnaire is a close-ended questionnaire and it consists of three sections (Sections A, B & C). Section A was used in collecting demographic data of respondents, Section B consists of statements on pre-service teachers' perception towards using social media for supplementary learning while Section C was used to collect data on pre-service teachers self-efficacy towards use social media for supplementary learning. Gender was considered as moderating variable. All items was presented using a 5-point Scale in which Strongly Agree (SA) was awarded 5 points, Agree (A) 4 points, Undecided (U) 3 points, Disagree (D) 2 points and Strongly Disagree (SD) 1 point respectively. The questionnaire (QPRESMATPSTUSS) was validated by three experts. Two lecturers from Educational Technology and one lecturer from Science Education both from Federal University of Technology Minna, respectively. The reliability of the research instrument was determined after a trial testing using a simple random sample of 20 respondents (Pre-service teachers) from FCE Kontagora, Niger State, who were part of the population but not part of the sample for this study. The administration was done once and a reliability coefficient of 0.74 and 0.83 were respectively obtained for perception and self-efficacy using Cronbach Alpha formula, which implies the instrument is reliable. The questionnaire was administered on the groups within four weeks of the main study. Mean and standard deviation were used to answer research questions and ANOVA was used to analyze research hypotheses. It was established that there

was no significant difference between male and female pre-service mathematics teachers' perception towards using social media to support learning. Whereas significant difference existed between self-efficacy of male and female pre-service mathematics teachers' towards using social media to support learning.

Results

Research Question 1: What is the mean of pre-service mathematics teachers' perception towards using social media to support learning in Colleges of Education?

Table1: Mean and Standard Deviation of Pre-Service Mathematics Teachers' Perception towards Using Social Media to Support Learning in Colleges of Education

S/N	Item	N	Mean	Sd	Decision
Q1	Social media helps me to learn collaboratively with others who are my class mate in mathematics.	265	3.78	1.217	Agree
Q2	Receiving video lectures in mathematics through social media develops me academically.	265	3.81	1.232	Agree
Q3	Learning mathematics online through social media enhances my self-independent learning skills.	265	3.75	1.196	Agree
Q4	Discussing and exchanging views in mathematics with others using social media develops my critical thinking skills.	265	3.83	1.116	Agree
Q5	I express my opinions and thoughts more freely through social media than in face-to-face discussions with my instructors and classmates in the mathematics class.	265	3.68	1.151	Agree
	Grand mean		**3.77**		

Decision mean 3.0

Table 1 shows the mean and standard deviation of pre-service mathematics teachers' perception towards using social media to support learning. This indicates that all the five items scores more than 3.0 decision mean, since grand mean = 3.77 which implies that all the items were accepted, an indication that pre-service mathematics teachers' perception towards using social media to support learning is positive. The implication is that, pre-service mathematics teachers' perception towards using social media to support learning in Colleges of Education is favourable since all items on perception show agreed based on decision mean of 3.0.

Research Question 2: What is the mean of self-efficacy of pre-service mathematics teachers' towards using social media to support learning in Colleges of Education?

Table 2: Mean and Standard Deviation of Self-Efficacy of Pre-Service Mathematics Teachers' towards using Social Media to Support Learning in Colleges of Education

S/N	Item	N	Mean	Sd	Decision
Q1	I can carry out Video Teleconferencing activities in mathematics for instructional purpose.	265	3.90	1.018	Agree

Q2 I can upload my mathematics assignment to social media platforms	265	3.54	1.161	Agree
Q3 I can carry out media sharing on academic instruction through the use of social media platforms	265	3.65	1.159	Agree
Q4 I can download mathematics instruction through the use of microblogging.	265	3.66	1.373	Agree
Q5 I can use Zoom application platform to receive mathematics instructions.	265	3.75	1.058	Agree
Grand mean		**3.70**		

Decision mean 3.0

Table 2 shows the mean and standard deviation of self-efficacy of pre-service mathematics teachers' towards using social media to support learning in Colleges of Education. This indicates that all the five items scores more than 3.0 decision mean, since grand mean = 3.7 which implies that all the items were accepted, an indication that the self-efficacy of pre-service mathematics teachers' towards using social media to support learning is positive. The implication is that, self-efficacy of pre-service mathematics teachers' towards using social media to support learning in Colleges of Education is favourable since all items on self-efficacy show agreed based on decision mean of 3.0.

Research Question 3: What is the mean of male and female of pre-service mathematics teachers' perception towards using social media to support learning in Colleges of Education?

Table 3: Mean and Standard Deviation of Male and Female Pre-Service Mathematics Teachers' Perception towards using Social Media to Support Learning in Colleges of Education

Group	N	Mean	Sd
Male	167	20.99	3.45
Female	98	21.63	3.87

Table 3 shows mean of male and female pre-service mathematics teachers' perception towards using social media to support learning. Male had mean of $\acute{X}$ = 20.99, SD = 3.45 and Female had mean of $\acute{X}$ = 21.63, SD = 3.87. The mean of female was slightly higher than their male counterpart by 0.63. The implication is that, there is no disparity between mean of male and female pre-service mathematics teachers' perception towards using social media to support learning.

Research Question 4: What is the mean of male and female self-efficacy of pre-service mathematics teachers' towards using social media to support learning in Colleges of Education?

Table 4: Mean Standard Deviation of Male and Female Self-Efficacy of Pre-Service Mathematics Teachers' towards using Social Media to Support Learning

Group	N	Mean	Sd
Male	167	21.20	2.78
Female	98	20.28	4.32

Table 3 shows mean of male and female self-efficacy of pre-service mathematics teachers' towards using social media to support learning. Male had mean of $\acute{X}$ = 21.20, SD = 2.78 and Female had mean of $\acute{X}$ = 20.28, SD = 4.32. The mean of male was slightly higher than their female counterpart by 0.92. The implication is that, there is little disparity between mean of male and female self-efficacy of pre-service mathematics teachers' towards using social media to support learning.

Hypothesis One: There is no significant difference between mean of male and female pre-service mathematics teachers' perception towards using social media to support learning in   Colleges of Education

Table 5: ANOVA Analysis of Male and Female Pre-Service Mathematics Teachers' Perception towards using Social Media to Support Learning in Colleges of Education

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	25.664	1	25.664	1.963	0.162
Within Groups	3438.752	263	13.075		
Total	3464.415	264			

The finding of the analysis of variance on the male and female pre-service mathematics teachers' perception towards using social media to support learning as shown in (table 5) revealed that f (1, 265) = 1.953 p= 0.162. With this finding, the hypothesis was accepted because p-value of 0 .162 on the table was greater than the pre-set level of significant of p>0.05. The implication is that there was no significant difference between male and female pre-service mathematics teachers' perception towards using social media to support learning.

Hypothesis Two: There is no significant difference between mean of male and female self- efficacy of pre-service mathematics teachers' towards using social media to support learning in Colleges of Education**.**

Table 6: ANOVA Analysis of Male and Female Male and Female Self-Efficacy of Pre-Service Mathematics Teachers' towards using Social Media to Support Learning in   Colleges of Education

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	53.195	1	53.195	4.515	0.035
Within Groups	3098.639	263	11.782		
Total	3151.834	264			

The finding of the analysis of variance on the male and female self-efficacy of pre-service mathematics teachers' towards using social media to support learning as shown in (Table 6) revealed that f (1, 265) = 4.51 p= 0.035. With this finding, the hypothesis was rejected because p-value of 0 .035 on the table was lesser than the pre-set level of significant of p<0.05. The implication is that there was significant difference between male and female self-efficacy of pre-service mathematics teachers' towards using social media to support learning.

Discussion of Findings
There was no significant difference between male and female pre-service mathematics teachers' perception towards using social media to support learning. This is in agreement with the study of Olalere., Adekojo., Shopelu., Mary & Koroka (2019) who investigated gender perception of the use of ICT for classroom instruction among biology teachers in Minna metropolis. The study reveals that both male and female biology teachers in Minna metropolis of Niger State have the same perception that is, the use of ICT for classroom instruction is an effective instructional strategy. Also the study concurs with Quadri and Anthony (2021) who carried out study on lecturers' awareness and attitude towards utilization of mobile technologies for instructional delivery in Colleges of Education in Niger State. The findings of the study indicated that there was no significant difference between attitude of male and female lecturers' on the use of mobile technologies for instructional delivery in Colleges of Education. There was significant difference between male and female self-efficacy of pre-service mathematics teachers' towards using social media to support learning. This is in disagreement with the finding of Falode., Nwachukwu., Ogunje & Ilufoye (2019) who carried out study on self-efficacy and behavioural intention of pre-service teachers towards electronic teaching in Niger State, Nigeria. It was revealed that there were no significant difference between male and female self-efficacy and behavioural intention

towards electronic teaching. Also this is in support of study of Kingsley, Jiaming & Frank (2019) who investigate social media usage and tertiary students' academic performance: examining the influences of academic self-efficacy and innovation characteristics. The study makes it more noticeable the effect of academic self-efficacy as a mediator in improving the academic performance of students.

Conclusions

It can be concluded that the pre-service teachers' perception and self-efficacy towards use of social media for supplementary learning is positive. The study reveals that social media can be useful for learning of mathematics in Colleges of Education. The use of social media platforms in education can be extremely beneficial in supplementary teaching and learning of mathematics in Colleges of Education.

Recommendations

- Enabling law should be put in place to legalize social media for instructional delivery in Colleges of Education in Niger State in order to act as supplementary teaching and learning tools.

- Pre-service teachers should be encouraged to attend workshop/conference on how to develop self-efficacy on social media, so as to keep them abreast of new use of social media for supplementary instructional delivery in Colleges of Education.

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PEDAGOGY AND SKILL ACQUISITION FOR INSTRUCTIONAL DELIVERY: A CASE STUDY OF SCIENCE TEACHERS IN TERTIARY INSTITUTIONS IN KOGI STATE-NIGERIA

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Abstract
The quality of a nation's Science and technology development depends largely on the quality of its Science and Technology manpower. To attain global standards in science and technology education, Information and Communication Technology (ICT) must be integrated into the nations Science and Technology Education. This can be done effectively if those who are to train the Science Technology Teachers are themselves role models in the effective use of ICT in science teaching. The study assessed the Science Teacher Trainers in Kogi State; their literacy level in the use of ICT in teaching and learning. A proportionate sample of 108 Science Teacher Trainers drawn from the four tertiary institutions in the State were assessed using an ICT Literacy Assessment Scale (ILAS).Two research questions guided the study. The data gathered from the assessment scale were described using mean scores and standard deviation. The findings of the study were that: Science Teacher trainers were moderately able to perform ICT tasks that support instruction but low in their ability to perform tasks required to Integrate ICT into Instruction. The study concluded that the Science Teacher Trainers in the state were not sufficiently literate in ICT usage in teaching and learning to model same to their students. Based on the findings, recommendations were made among which is the establishment of Educational/Instructional Technology Centers in the University and Colleges of Education in the state for pre-service in-service training on ICT usage.
Keywords: ICT, Teaching, Teachers and Technology

Introduction

Information and Communication Technology (ICT) have become an integral component of the global life style. Almost all formal and informal activities world- wide are powered by ICT. It has become one of the major contemporary factors producing rapid changes in society and shaping the global economy, (Abdullateef, 2018). We are indeed in an ICT era. The social of economic development of the less developed nations may inevitably be consequent on their ability to adopt and integrate ICT in the various facet of their economy.

Education being the tool for development of the necessary human resources that will bring about the nations technological and economic development, should not be left out in ICT integration, ICT in its versatility and all-encompassing nature can provide opportunities for the exploration of high level cognitive and psychomotor activities such as critical thinking, creativity, problem solving and acquisition skills among students. The teacher is able to provide wide and varied learning experiences that extenuate his pedagogical skills, ICT based technologies are able to improve the quality of teaching and learning

and provide opportunities for life-long learning and professional development through e-learning internet, virtual classroom and data base.

However while many nations of the world have effectively integrated ICT into the main stream of their educational practices, Nigeria is still providing "Non-ICT based education, the existence of various barriers to effective ICT integration in education among the less-developed nations such as poor infrastructure, provision of equipment and lack of personnel training, has created a digital-divide among them (Dirsuweit, 2009). Okebukola (2016), among the gaps worthy of note still existing in teacher education in Nigeria is the need to enhance ICT education. If Nigeria is to be at par with other nations in providing quality education, ICT should form an integral part of our educational practices.

Thus, "ICT-based-education" is an imperative for quality education and to achieve this, the existing barriers causing the divide must be decisively and vigorously addressed, in tackling the digital divided. The focus should include the areas of skills, usage and access to these new technologies, especially among, teachers who are to impart the knowledge. The effective integration of ICT into education requires that 'teachers be in the fore front of ICT access and usage so that it can impact on their pedagogical skills and 'thus the quality of education delivery. However, the teacher trainers have the greatest responsibility of setting the pace of competence in ICT usage in education. Until teacher educators model effectively, the use of ICT technology in their own classes, it will not be possible to prepare a new generation of teacher's who will effectively use the new tools for teaching and training. (Adullateef, 2018). As we pursue the integration of ICT in the implementation of the National policy on Education how Proficient are our teacher trainers in these skills?

Literature Review

Technologies in education facilitate skills and knowledge acquisition; enhance learning opportunities and invigorates learning by making it interesting, exciting and concrete. The existence of these technologies set a pace for achieving global standards in education. This poses increased demand on teachers who are now to meet the challenges of integrating the new technologies into teaching and learning. This also in turn compels teacher training institutions to undergo rapid changes in the structure and content of their courses to accommodate the new global standards. Teacher training programmes should not constitute only introductory computer courses which do not permit students to sufficiently acquire any skill in ICT (Asogwa, 2015). Practical integration of ICT into teacher training should encompass courses on the use of computer application softwares for teaching topics in the various subject areas; practical use of multi-media in enhancing lesson delivery; internet surfing and information locating and retrieval. Emphasis on the integration of ICT in teacher education should not out be on skill acquisition but also on the pedagogy behind the effective use of the technologies.

Skill in pedagogical uses of ICT in the various subject areas should be possessed first by teacher trainers to effectively be role models in demonstrating how 1CT can be used effectively in teaching/learning. Educators who are "skilled in the use of technology for learning and are consistently exposed to professional development in the use of the changing technologies for teaching and learning is an essential condition for implementing ICT in the teacher education' (UNESCO, 2012).

The clamor for ICT in education is yet to yield the desired results. However, many educational institutions have through government assistance and private sector donations or independently strived to provide ICT facilities for the use of staff and students. ICT integration must not only revolve wound physical provision of the required technologies and infrastructure, there should be enlightenment, training and capacity building of the teacher educators on the effective use of the new technologies. This forms the basis of a sound foundation for ICT implementation in Teacher Education.

The Nigerian science Teacher Education has a unique task of empowering science teachers with the necessary ICT pedagogical and enhancement skills that would enable them provide meaningful science teaching and learning that can increase students' interest in the Sciences. This makes the task of science teacher educators even more challenging than other subject disciplines and creates a need for ICT based instructional practices in science subjects. This is not only to meet global standards in dedication but also to break the monotony of traditional pedagogical practices and generate more interest in this subject. ICT can make a great impact in the science class. Science subjects are often presented to pupils in a stereo type, mundane manner which make students perceive them as difficult subjects. The infusion of ICT into science teaching can powerfully be used to assist students to explore, develop, express, and critically redraft ideas and concepts. A teacher's possession of ICT skills is vital but an understanding of how ICT support is anti-enhance the learning task may be even more important (La Velle, McFarlane & Brown, 2014). These issues must be put into proper prospective for in this "high tech" era the quality of a nation's science and technological education reflects on the quality of its science and technological man power.

Tella, Toyobo, Adika. and Adeyinka (2007) said ICT can be applied in teaching and learning in several ways; to support instruction in this way it is used to complement delivery. Supportive ICT uses include word processing, internet surfing for information and using e-mail to give assignments. It is also used as a tool to promote learning when it is integrated into the design and planning of instruction. An ICT literate Science Teacher Educator should be able to demonstrate basic, understanding and skills in the various uses of ICT in instruction.

Most science teacher educators in many countries of the globe are in advanced stage of ICT professional development. Whereas the Nigerian science teacher educators are still struggling with basic computer literacy and most likely are unaware of the possible applications of ICT in science instruction, ICT literacy is here being referred as the ability to perform basic ICT tasks that can complement and integrate ICT delivery in Science Teacher Education. As Educationists agitate for the integration of ICTs in Teacher Education, this study looks at thy capacity of Science Teacher Education in Kogi State in the use of ICT, Do they possess basic ICT literacy skills? This should form a platform for the integration of ICT in Teacher Education in the State.

Research Questions
To guide this study the following research questions were generated:
(1) To what extents are Science Teacher Trainers are able to perform basic ICT tasks that support instructional delivery?
(2) To what extents are Science Teacher Educators able to perform 1CT tasks relevant to integrating ICT into instructional delivery?

Methodology

A descriptive survey design was adopted in carrying out the study. The target population of the study was all the Science Teacher Trainers in Kogi State. This comprised of a total of approximately 300 lecturers present in four tertiary institutions in the state. A sample of 120 Science 'teacher Trainers was drawn from these institutions using proportionate sampling. These include 20 Science Teacher Trainers from the Science Department Kogi state University Anyigba; 40 from the State College of Education Ankpa; 20 from the State Polytechnic Lokoja and 40 from the College of Agriculture Kabba. Out of 120 questionnaires distributed 108 were completed and returned.

An ICT Literacy Assessment Scale (ILAS) questionnaire was used to collect data from the respondents. The questionnaire consisted of a total of 30 items divided into two sections. Section I was on demographic information. Section II consisted of 30 questions which solicited information on knowledge and skills of the science teacher trainers on ICT and its uses in science teaching. Items 1 to 15 solicited information from the teacher trainers on their ability to perform basic ICT tasks that can support and enhance their instructional delivery while items 16 to 30 solicited information on their ability

to perform the tasks that are relevant in integrating ICT into the pedagogy. The items on the questionnaire were designed to answer the two research questions generated for the study. The instrument was validated by 5 experts on 1CT application. These were lecturers from the department of computer science, science teacher trainers and an educational technologist. The reliability of the instrument was estimated as 0.88 using Cronbachs Alpha internal consistency reliability measure,

A total of 108 questionnaires out of 120 distributed were retrieved from the respondents. The data were analyzed using means and standard deviation, 'the decision rule was established as: a mean of 2.5 and above indicated high ICT literacy while from 2.0 to 2.5 indicated moderate ICT literacy and below 2.0 indicated a low ICT literacy level.

Results and Discussion

The results in tables 1 and 2 show the mean and standard deviation scores of the Science Teacher Trainers' ratings of their abilities on basic ICT tasks that support instruction and integrate ICT into instruction.

Table 1: Mean Score and Standard Deviation of Science Teacher Trainers literacy in ICT skills that support instruction

S/N	Item	Mean	SD	Decision
1	Identifying the parts of a computer keyboard	3.28	0.65	HIGH
2	Identifying the operations on windows desktop components	2.72	1.05	H
3	Creating a document on a word processor like MS word, Notepad, word pad etc.	2.78	1.15	H
4	Printing of word processor document	2.33	1.34	MODER(M)
5	Saving of word document on CD or flash disk and other strong media.	2.56	1.10	H
6	Creating spread sheets	2.06	1.13	M
7	Writing formula in spreadsheet	1.94	1.13	L
8	Surfing the world wide web	2.17	1.12	M
9	Accessing relevant search engines on the internet	2.17	1.12	M
10	Using search engines to find specific information on the world wide web	2.11	0.99	M
11	Creating an email account	1.8	1.02	L
12	Sending and checking e-mails	2.4	1.22	M
13	Attaching application files to e-mails	2.11	1.17	M
14	Uploading/downloading files to and from the internet	2.22	1.28	L
15	Scanning documents	2.11	1.16	M
	Group Mean	**2.32**	**1.12**	

Source: Field Survey (2020)

Table 1 illustrates mean and standard deviation scores of the Science Teacher Trainers' ratings of their abilities on basic ICT tasks that support instruction and integrate ICT into instruction. The result established that most of the respondents can identify the parts of a computer keyboard with a mean of 3.28. Apparently, it is evident that science teachers trainers possess the adequate abilities on how to use ICT to support their teaching and learning.

Table 2: Mean Score and Standard Deviation of Science Teacher Trainers Literacy in skills of integrating ICT into instruction

S/N	Item	Mean	SD	Decision
1	using graphics software to create images/pictures	2.28	1.18	M
2	using graphics software to create images/pictures	1.94	1.18	L
3	Identifying quality instructional software's	2.17	1.18	L
4	Using instructional software's like Discrete Educational Software	1.8	1.02	L
5	Using interactive video in the classroom	166	1.01	L
6	Using presentation software to create a lesson or lecture	2.0	1.11	L
7	I can use the interactive white board (IWB)	1.94	1.18	L
8	Using the IWB to plan my lesson/	1.66	0.95	L
9	Using multimedia equipment to design lessons.	1.61	0.94	L
10	Ability to use simulations and virtual reality in my lessons	1.56	0.76	L
11	Using modeling software's to simulate laboratory exercises	1.94	0.89	L
12	Using virtual laboratories to perform practical	1.94	0.77	L
13	Using computer software's to compute and stored data generated during practical sessions	1.94	183	L
14	Running/ viewing a video CD on a Video CD player	1.94	1.20	M
15	Using camcorder to tape an event	1.78	0.98	L
	Grand mean	**1.84**	**1.07**	

Source: Field Survey (2020)

Table 2 illustrates mean and standard deviation scores of the Science Teacher Trainers' ratings of their abilities on basic ICT tasks that support instruction and integrate ICT into instruction. The result established that most of the respondents can use graphics software to create images/pictures with a mean score of 2.28. Apparently, it is evident that science teachers trainers possess the adequate abilities on how to use ICT to support their teaching and learning.

Discussion, Conclusion and Recommendation

Table 1 reveals a group mean of 2,32, SD 1. 12 for the Science 'teacher 'trainers literacy on the ICT tasks that support instruction. This revelation is, based on the earlier established decision rule that the Science teacher Trainers exhibited moderate literacy in ICT tasks that are necessary for supporting instructional practices.

Table 2 reveals a group mean of 1.84, SD 1.07 indicating a low literacy level among Science Teacher trainers in the State in skills relevant to the integration of ICT into the Science Education pedagogy.

These results substantiate the fact that there is a skill gap in ICT education (Okebukola, 2016); and that the digital divide (Dirsoweit, 2010) is a reality. In as much as the Science Teacher trainers possess moderately, ICT skills that support and enhance instruction are not integrated into instructional delivery, which is an essential aspect in Science teaching. Science teacher trainers in the state having exhibited these levels of literacy in basic ICT instructional skills do not have the capability to model these ICT skills to

their students as suggested by Abdulateef (2018). This could be an impediment the integration of ICT at all levels of Science Education in the state.

Conclusion

Science Teacher Trainers ICT literacy levels are not sufficient to model the effective use of ICT in teaching their students to achieve the effective integration of ICT in Science teacher education and eventually Science teaching in schools in Kogi state. The professional development of Science Teacher Trainers in ICT skills for teaching and learning must be among the leading priorities.

Recommendations

Based on the findings and conclusion of this study, the following recommendations were made: Science teacher Educators can be professionally trained in ICT usage in science teaching through the establishment of Instructional Technology centers in the university and college of education in the state. These centers will direct departments on the use of ICT tools effectively and will provide continuous in service training for teachers. The centers can also provide consultancy services on ICT procurement. Periodic ICT proficiency examinations for science Teacher Education can also motivate them to learn more about ICT usage.

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PERCEPTION OF BIOLOGY TEACHERS ON THE APPLICATION OF ICT PRINCIPLES TO INSTRUCTION SECONDARY SCHOOL IN OYO STATE

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ABSTRACT

The increasing use of information and communication technology (ICT) for different purposes is evident. However, many teachers are not effectively incorporating it into their teaching considering the major role that teachers play in the classroom, especially in the use of ICT innovations their perceptions must be considered as major factor while integrating ICT for classroom purposes. Therefore this study specifically premised its purpose among others on

(i) Examine the utilization of ICT for teaching biology in secondary school (ii) determine the perceived ease of use of ICT for teaching (iii) Determine the perceived usefulness of ICT for teaching biology.

A quantitative research design of the survey type was employed 45 biology teachers were sampled through a multi usage sampling technique across Oyo State, Nigeria. Data were collected through a validated researcher designed questionnaire generating 0.92 reliability value. Percentage means and rank order were employed to answer research questions, while hypotheses were tested using t-test and scheff post hoc analysis at 0.05 level of significance the findings of the study were Oyo State biology. Teacher utilized ICT for teaching in secondary schools (54.75%, above 50% benchmark).

(ii)   The perceived ease of use of ICT for teaching biology was positive in Oyo State secondary school. Grand mean (2.89 above 2.5 benchmark)

(iii) The perceived usefulness of ICT for teaching biology in Oyo State was also positive (G.M. 3.08 above 2.5 benchmark)

The study concluded that the appreciable characteristics of ICT integration for teaching may be informed and gained by teachers perceived ease of use and perceived usefulness of ICT is positive, then will the purpose of its integration be achieved.

Introduction

Biology is the study of living things and their vital processes. Vision 20 2020 is achievable through the teaching and learning of core science subjects like biology, chemistry, physics and mathematics, but the most like one among the subject is biology (Alebiosu, 2017) despite the fact that biology is most liked one, the students performance in science subjects, particularly biology is not all that too good according to WAEC chief examiner analysis of 2018. The poor performance was found out as a result of teacher's methodology and lack of integration of ICT facilities into the classroom environment (Abanikanda, 2018).

Literature revealed that there are large numbers of ICT facilities are made available in Nigeria secondary that are underutilized due to lack of knowledge of teachers of how to use and operate the ICT facilities (Okoye, 2014). As a result of this teachers need to have knowledge of how to use and operate ICT in the classroom for instruction (Yang, 2015). The teaching and learning of biology in Nigeria has a lot of problems that needs re-appraisal resulting in biology education policy that may positively affect the attitude aptitude and temperament of teachers. Recently, there have been repeated calls for reforms and innovations aimed at improving biology education for the enhancement of STEM education in Nigeria. This made it clearly that there are issues in biology education that needs to be improved upon.

Jonnassen and Tessmer (1996) highlighted that the problem of teaching biology is being associated with qualify of teaching, teacher quality and its indicators and quality teaching and learning resources among other things Oriaifo (2012) explained that inadequate teaching method has been advanced as one of the problems of STEM education in general and biology particular in Nigeria.

Omatsa and Vicient (2013) found that most biology teachers emphasize mostly the theory and neglect the practical aspect of biology while the problem solving aspects of the subjects and adequate knowledge of subject matter and competence to deliver remains a mirage, even the teaching of biology has been reduced to a descriptive exercises through the use of lecture method and very little inquiry which contradicts the enhancement of STEM education.(George, 2008 and Nwago 2012) studies had shown that the use of instructional materials have improved achievement. Instructional materials are wide Vanekes of equipment and materials use for teaching and learning by teachers to stimulate self-activity on the part of the students. One of the innovative facilities that can be used is ICT.

ICT has become a global phenomenon. It has been embraced all over the world due to its importance. Governments all over the world use harnessing the rich potentials of ICT and are using it as a tool for educational development economic recovery and wealth creation (Olaore, 2014), today no nation can attain its height educationally without ICT. With the use of ICT there is an increasing usability of performing impossible experiments by using simulations as well as creating possible avenues for students to have individual learning programs, either than every body having to do the same thing at the same time at the same pace (Olaore, 2014).

The use of ICT has become an integral part of education in many parts of the globe including Nigeria, as ICT is gradually found its way into the educational system. The FRN (2013), and with particular reference to science and technology, considered ICT as an important tool for laying a solid foundation of Science, Technology, Engineering and Mathematics (STEM) education at all levels of Nigeria education system. Despite the limitations brought about by economic disadvantages, it is observed that the influence of ICT on education is to enhance the learners ability to generate, access, adopt are apply knowledge to solve complex problems (Adedokun-Shitu, Ajani, Nuhn & Shitu 2020).

Adetunla (2016) in a study pointed out a critical factors perceived usefulness of ICT believed to affect the use of ICT by the teachers, hence the acceptance or the adoption of TAM technology acceptance model devices by Davis 1986 of two constructs, perceived ease of use and perceived usefulness of ICT were considered. TAM is a profound frame work used in the studies to predue and explain the use of ICT for instruction.

Literature revealed that difficulty of use can affect the adoption of a useful technology Davis 1986. Hence the study embarked upon.

Purpose of the Study

The main purpose of this study is to investigate the perception of biology teachers on the application of ICT principles to instruction in secondary school in Oyo State.

Research question

The following research questions were raised and answered in this study:

- Do biology teachers utilize ICT for teaching in secondary schools in Oyo State
- What is the perceived ease of use of ICT for teaching among biology teachers in Oyo State?
- What is the perceived usefulness for teaching among biology teachers in secondary schools in Oyo State.

Hypothesis

The following null hypothesis were tested in this study:

Ho$_1$: There is no significant difference between male and female biology teachers' perceived ease of use of ICT for teaching in secondary schools in Oyo State.

Ho$_2$: There is no significant differences between male and female biology teacher perceived usefulness of ICT for teaching in secondary schools in Oyo State.

Ho$_3$: There is no significant difference among biology teachers qualification on their perceived ease of use and usefulness of ICT for teaching in secondary schools in Oyo State.

Method

A descriptive survey research design was adopted for the study. The area of study is Oyo State the three senatorial instructs with all biology teachers are in secondary schools in Oyo State both rural and urban

areas the target population was all the public secondary biology teachers in the state multistage samples teachers were employed. Stratigied sampling technique along 3 senatorial districts in Oyo State to sample 3 local government each from each senatorial districts making a local government areas, purposive sampling to select secondary schools where ICT facilities are available from each of the a local government 45 schools were generated both in urban and rural areas. Purposive sampling was used to select 45 biology teachers which means the population of the study comprised 45 biology teachers in the zone. The instruments for data collection was (OTPUICTBI) questionnaire tagged teacher perception on the use of ICT for biology instruction this was designed to examine biology teachers perceived usefulness of ICT in teaching it is a four point likert scale of strongly agreed, agreed, disagreed and strongly disagreed. The questionnaire was face validated by three educators in department of science Education University of Ilorin in Kwara State. Their corrections were effected before final questionnaire was constructed. A Cronbach's alpha method was used to establish the reliability of the instrument. A coefficient of internal consistency estimate of 0.92 was obtained. The questionnaire was administered personally by the researcher after receiving the questionnaire, the mean score of each cluster were determined.

The data collected were analyzed in line with each research questions while independent t-test was used in testing the null hypotheses at the 0.05 level of significance. Any response on the four point scale with mean score 2.50 and above is considered to be in the agreement with the item of the instrument. On the other hand, any response with mean score of 2.49 and below was considered to be in disagreement with the item of the instruments.

Results

Research question 1: Do Biology teachers utilize ICT for teaching in secondary school in Oyo State.

Table 1: Biology teachers utilization of ICT for teaching in secondary school.

S/N	ICT Resources for Biology Teaching	Yes		No		Rank Order
		Freq.	%	Freq.	%	
1.	I use projector to project my lesson contents for my students in the classroom.	34	75.6	11	24.4	1st
2.	I use audio, visual, and audio-visual materials such as recorded voice notes, podcast, television and so on to teach my students	31	68.9	14	31.1	2nd
3.	I use computer in my classroom to surf the internet	29	64.4	16	35.6	4th
4.	I surf the internet to generate lesson contents for my students	30	66.7	15	33.3	3rd
5.	I use the public address system (PAS) in my classroom to teach a larger population	19	42.2	26	57.8	8th
6.	I use computer to typeset the exams, grade the scripts, and generate result.	21	46.7	24	53.3	7th
7.	I use computer to transfer files, video clips, images and so on to my students	27	60.0	18	40.0	6th
8.	I create learning channels and groups for my students through ICT devices like mobile phones	29	64.4	16	35.6	4th
9.	I use teleconferencing and videoconferencing to communicate with my students	14	31.1	31	68.9	9th
10.	I send lesson contents to my students through email	12	26.7	33	73.3	10th
	TOTAL	**246**	**54.7**	**204**	**45.3**	

Table 1 revealed the utilization of ICT for teaching Biology in secondary schools in Oyo state. The table indicated that majority of the respondents utilise projector to project their lesson contents (75.6%); use

audio, visual, and audio-visual materials such as recorded voice notes, podcast, television and so on to teach their students (68.9%); surf the internet to generate lesson contents for their students (66.7%); create learning channels and groups for their students through ICT devices like mobile phones and use computer in their classroom to surf the internet (64.4%);and use computer to transfer files, video clips, images and so on to their students (60.0%).

On the other hand, majority claim that they do not: use computer to typeset their exams, grade the scripts, and generate result (46.7%); use the PAS to teach a larger population (42.2%); use teleconferencing and videoconferencing to communicate with my students (31.1%); and send lesson contents to my students through email (26.7%). In summative, the result indicated that 54.7% indicated that teachers utilise ICT for teaching Biology in secondary schools in Oyo state against 45.3% which indicated that they do not use ICT in their Biology teaching. Therefore, Oyo state Biology teachers utilise ICT for teaching in secondary schools.

Research Question 2: What is perceived Ease of Use of ICT for Teaching among Biology Teachers in Secondary Schools?

Table 2: Perceived Ease of Use of ICT for Teaching among Biology Teachers in Secondary Schools

S/N	Perceived Ease of Use of ICT for Teaching Biology	Mean	Rank Order
1.	Moderate technical skills is needed to operate an ICT gadget such as computer and projector in order to be used in teaching Biology	3.09	2nd
2.	Regular power supply is needed in order to use ICT in teaching Biology	2.83	6th
3.	Navigation on the web spaces that are designed for teaching Biology is easy	2.91	5th
4.	The instructional contents on the Internet are not ambiguous but easy to understand	2.69	10th
5.	Not much of internet connectivity is necessary to surf the internet in order to generate content for my lessons	3.13	1st
6.	The web interface of webpages for learning/teaching Biology online is not clumsy. Hence, locating needed materials are easy to come by.	2.97	4th
7.	Interacting on some of the ICT resources such as videoconferencing and teleconferencing is flexible and easy to use	2.99	3rd
8.	The location of the ICT resources is convenient for me to access and use for my teaching.	2.75	8th
9.	The E-books are structured in an easy way. Thus, I find it easy to move around in different units.	2.84	7th
10.	Creating/joining channels and groups for teaching is easy when I use social media platforms through the computer.	2.70	9th
	Grand Mean	**2.89**	

In Table 2, Biology teachers were solicited to determine the perceived ease of use of ICT for teaching among Biology teachers in secondary schools in Oyo state. The mean responses generated are all above the benchmark of 2.5, indicating that Biology teachers claimed that most of the Items are genuine factors contributing to their perceived ease of use of ICT for teaching Biology. Majorly, most of the respondents claimed that not much internet connectivity is needed to surf the internet in order to generate content for their lessons (3.13); the second ranking mean (Item 1, 3.09) revealed that Biology teachers perceived that to operate ICT gadget, medium technical skills is needed; Item 7 ranking 3rd with

mean score of 2.99 revealed that teachers perceived that interacting on some of the ICT resources such as videoconferencing and teleconferencing is flexible and easy to use.

The 4th highest ranking mean score (2.97) indicated that the web interface of webpages for teaching Biology online is not clumsy. Hence, locating needed materials are easy to come by; The 5th ranking mean (2.91) shows that navigation on the web spaces that are designed for teaching/learning Biology is easy; Regular power supply is perceived to be a factor contributing to the perceived ease of use of ICT for teaching Biology having ranked 6th with mean score of 2.83; The 7th ranking mean score of 2.83 revealed that the E-books that are available for Biology teaching are structured in an easy way. Thus, teachers find it easy to move around in different units.

2.75 mean score ranked the 8th revealing that the location of the ICT resources for Biology teaching is convenient for use of teaching; 2.70 mean score ranking 9th indicated that creating channels and groups for teaching is easy when social media platforms through the computer is use; and the least ranking mean 2.69 revealed that the instructional contents on the Internet are not ambiguous but easy to understand for Biology teachers. Conclusively, based on the benchmark of 2.5, the grand mean score of 2.89 which is above the bench marking dictated that Biology teachers claim that their perceived ease of use of ICT for teaching Biology in secondary schools in Oyo state is positive.

Research Question 3: What is the perceived usefulness of ICT for teaching among Biology teachers in secondary schools in Oyo state?

Table 3: Perceived Usefulness of ICT for Teaching among Biology Teachers in Secondary Schools

S/N	Perceived Usefulness of ICT for Teaching Biology	Mean	Rank Order
1.	ICT resources are a very good resource where expansive instructional materials can be used to enhance my teaching	3.18	4th
2.	The use of ICT for Biology teaching has the potential of providing personalised learning through self-experienced presentation.	3.23	1st
3.	The e-resources that are present on the Internet can enhance learning better than hardcopies of materials that are made available for my teaching.	3.11	5th
4.	The sharing and upload of instructional resources to the Internet by teachers can reduce the work load and time spent in the classroom in order to engage in other productive responsibilities.	3.02	8th
5.	Using ICT can help in keeping Biology students abreast with latest development in the subject	3.10	6th
6.	The use of ICT resources can help Biology teachers in providing relevant material for teaching and research purpose.	3.21	2nd
7.	ICT in Biology teaching is a great educational tool by bridging the gap among learners	3.20	3rd
8.	Using ICT in Biology teaching can make the instructional process relevant to all learners irrespective of individual characteristics	3.05	7th
9.	Instructional resources that are available through the ICT for Biology teaching is more convenient to use than the traditional resources	2.98	9th
10.	Resources for Biology teaching can be easily accessible at all time when needed than the traditional system	2.67	10th
	Grand Mean	**3.07**	

Table 3 examined the perceived usefulness of ICT for teaching among Biology teachers in secondary schools in Oyo state. The table revealed that all the items were responded to positively based on the benchmark of 2.5. Biology teachers claimed that their perceived usefulness of ICT includes: the potential of providing personalised learning through self-experienced presentation (3.23); help Biology teachers in providing relevant material for teaching and research purpose (3.21); bridging the gap among learners (3.20); a very good resource where expansive instructional materials can be used to enhance Biology teaching (3.18); enhancing learning better than hardcopies of materials that are made available for Biology teaching (3.11); help in keeping Biology students abreast with latest development in the subject (3.10); make the instructional process relevant to all learners irrespective of individual characteristics (3.05).

Sharing and upload of instructional resources to the Internet by teachers can reduce the work load and time spent in the classroom in order to engage in other productive responsibilities (3.02); convenient of use of instructional resources that are available through the ICT for Biology teaching (2.98); and easy access to resources for Biology teaching than the traditional system (2.67). Cumulatively, the grand mean of 3.08 indicated that the perceived usefulness of ICT for teaching among Biology teachers in secondary schools in Oyo state is positive.

Summary of Major Findings
The following are the summary of the major findings of this study:
1. Oyo state Biology teachers utilise ICT for teaching in secondary schools (54.7%, above 50% benchmark);
2. The perceived ease of use of ICT for teaching Biology among Biology teachers is positive in secondary schools in Oyo state (Grand Mean 2.89, above 2.5 benchmark);
3. The perceived usefulness of ICT for teaching among Biology teachers in secondary schools in Oyo state is positive(Grand Mean 3.08, above 2.5 benchmark);
4. There was no significant difference between male and female Biology teachers' perceived ease of use of ICT for teaching in secondary schools in Oyo state (df (43), t= -.018, $p > 0.05(.986)$);
5. There was no significant difference between male and female Biology teachers' perceived usefulness of ICT for teaching in secondary schools in Oyo state (df (43), t= -.232, $p > 0.05(.818)$);
6. There was a significant difference in the perceived ease of use and usefulness of ICT for teaching in secondary schools in Oyo state based on qualification" ($F_{(4,44)}$ = 55.10, $p < 0.05(.000)$).

Conclusion

Information and communication technology (ICT) is one of the globally acknowledged learning and teaching space today, as well as, one of the key propellants of globalisation. Development in ICT has vastly transformed every sphere of life and permeated all human actions and endeavours. The use of ICT for instructional purposes is not, and never will be, transformative on its own if educators and learners who are supposed to integrate it into their teaching and learning are not utilising it. Based on this, it is clear that ICT cannot replace teachers and learners since they are the key to whether ICT is used appropriately and effectively.

The effectiveness of ICT is determined not by its mere presence in the classroom but by teachers and learners' perceived ease of use and perceived usefulness of ICT. This assertion revealed that teachers' and learners' role is really critical as they are the ones who have to decide whether or not to use the available ICT resources in schools. The appreciable characteristics of ICT integration for teaching and learning may be informed and gained by teachers and learners when their perceived ease of use and perceived usefulness of ICT is positive, then will the purpose of its integration be achieved. This purpose among others include contribution to the promotion and enhancement of the teaching and learning process. This study has provided empirical evidence towards this.

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PRE-SERVICE TEACHERS' INTEGRATION OF MOBILE LEARNING TECHNOLOGIES FOR INSTRUCTION

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Abstract

Mobile technologies have become attractive learning devices for education. While the majority of the existing research has focused primarily on the value of mobile learning for students. Researchers have recently started exploring its potentials within teacher development. The use of mobile devices has become common among a wide range of age groups due to affordability and availability (Ahmad, et al 2021). It is highly important to find out the status of pre-service teachers in the integration of mobile learning technologies for instruction. Thus, the need for this study which assessed pre-service teachers' integration of mobile technologies for instruction in Ilorin. The study adopted a descriptive research design of the survey type. Random sampling techniques was used to select 150 pre-service teachers in the selected University. The research questions were analysed using mean while the hypothesis was tested at 0.05 level of significance using t-test. The result revealed that majority of the pre-service teachers owned and used smart phones for instruction. The findings thus implied that there would be great improvement in the integration of mobile learning technologies for instruction by the pre-service teachers if proper attention is given to the recommendations made in this study. It was thus recommended among others that pre-service teachers should be sensitized on the benefits of integrating mobile learning technologies for instruction.

Keywords: *Pre-service Teachers, Mobile Learning Technologies, Integration, Smarphone.*

Introduction

In the networked era, mobile devices (smart phones, tablets) are growing and penetrating into everyone's life. Users use mobile devices for many purposes such as making phone calls, surfing the Internet, checking email, setting up work schedule in the calendar, making notes, watching movies and TV shows, listening to music, using GPS function, using utility applications, and playing games. These functionalities make mobile devices become so popular that someone believes mobile devices can actually replace laptops due to their sufficient functionalities and portability.

University students represent one of the largest groups of mobile device users. They are very receptive to new technologies and are always among the first users of the latest model of mobile devices. The main question is that whether pre-service teachers have used mobile devices to enhance instruction. The answer for this question lies within the applications of those devices. Research shows that mobile devices promise a great potential in education (Ayish & Dahdal, 2021)

Mobile learning allows students acquiring their learning materials anywhere and anytime using mobile technologies and the internet. Definitions of mobile learning are numerous.

Mobile learning is a learning that happens when students are not on a fixed location, or a learning that happens when students use learning possibilities of mobile technologies. Other definition describes m-learning as learning through different contexts, through social and content interactions, using personal electronic devices. Context in this definition means learning that is "formal, self-directed and spontaneous"(Viberg, et al 2021). There are some differences when comparing m-learning with e-learning.

Mobile learning allows learning "on the go", while e-learning demands a classroom, a computer lab or a place for a computer with the internet connection to attend or hold the lecture. In instructor to student communication, mobile learning allows instant, synchronous and spontaneous communication, while with e-learning there is a time-delayed, passive and asynchronous communication. Mobile learning enables taking assignments and tests at any location independent of in advance agreed time, E-learning, on the other hand, demands dedicated time of taking the tests,

standard tests and restricted amount of time to answer the questions, with usually delayed feedback (Alkhezzi & Ahmed, 2020). The recent advances in mobile technology are changing the primary purpose from making or receiving calls to retrieving the latest information on any subject. M-learning focuses on the mobility of the learners, interacting with portable technologies.

Using mobile tools for creating learning aids and materials becomes an important part of informal learning. M-learning is convenient in that it is accessible from virtually anywhere. Sharing is almost instantaneous among everyone using the same content, which leads to the reception of instant feedback and tips. M-learning also brings strong portability by replacing books and notes with small devices, filled with tailored learning contents. The use of mobile technology as a tool for enhancing students' learning and teachers' instruction is indispensable. Recognizing the impact of mobile technology on the workplace and everyday life, teacher training institutions try to undergo a rapid change in the structure and content of their training and delivery method of their courses. Mobile tools were found to have potential for helping pre-service teachers understand and develop new literacy (Alkhezzi & Ahmed, 2020).

Student interest is one of the most questioned facets of pre-service teachers' integration of mobile learning in recent studies. In fact, several studies found that mobile learning generated strong interest among the students (Wang, Shen, Novak &Pan, 2009).

In addition, students reported having a strong, positive reaction to integrating mobile learning for instruction (Al-Harthi, et al. 2020). Students also recognize the potential for future mobile learning opportunities as new technologies are integrated into education. Research has shown that mobile learning and teacher education generally considered mobile learning a beneficial approach in extending teachers' learning experiences and enhancing their mobile technology integration skills. In addition to conducting professional development via mobile tools, researchers also investigated the impact of such programs on teachers' inclusion of these technologies in their classrooms. Looi, Sun, Seow, and Chia, (2014) investigated a mobilized science curriculum co-designed by the teachers and observed that pedagogical orientations affected both technology integration and their relationships with students.

In other words, with the use of mobile devices, learners can learn anywhere and at any time (Crescente & Lee, 2011). Mobile learning is considered to be the ability to use mobile devices to support teaching and learning. Mobile learning is certainly not merely the conjunction of 'mobile and learning'; it has always implicitly meant mobile Electronic-Learning and its history and development have to be understood as both a continuation of conventional Electronic-Learning and a reaction to this conventional Electronic-Learning and to its perceived inadequacies and limitations. It is the mobile aspect of mobile learning that makes it stand apart from other types of learning, specifically designing learning experiences that exploit the opportunities that mobility can offer us. This is because mobile devices have features and functionality for supporting learners. For example, podcasts of lectures can be made available for downloading. Learners are to expect to engage with these learning resources whilst away from the traditional learning spaces (Bennett, et al 2020).

Over the past ten years mobile learning has grown from a minor research interest to a set of significant projects in schools, workplaces, museums, cities and rural areas around the world. The mobile learning community is still fragmented, with different national perspectives, differences between academia and industry, and between the school, higher education and lifelong learning sectors (Singh, 2010). Mobile learning using handheld computers is in its infancy in terms of both technologies and pedagogies. It has been found that after being exposed to teacher educators, pre-service teachers began to utilize mobile technologies in their own practices. By encouraging mobility, the teacher educators' role shifted from a content provider at the centre of instruction to a facilitator, engaging pre-service teachers as they collaboratively constructed meanings around content.

Onyema (2019) opined that since technology are so present in the daily lives of teenagers, a class without their use would be completely uninteresting. Over the past decades, it has been recognized the added value of the use of technological tools in the classroom and, since then, efforts have been made by different stakeholders in the field of education, including scientific community and

governments in order to generalize its use and consequently improve the teaching learning process (Liu, 2010). Shrivastava and Shrivastava (2014) attest that "while the emerging political economy of higher education suggests an increase in the diversity of educational contexts, technology assisted learning could indeed offer an important toolkit with which to increase choice and respond to the needs arising." With the numerous technologies available, teachers and students can access a multitude of information and make use of it, exploring their potential.

The use of these technologies in the classroom provides a closer relationship between teacher and student promotes their interaction and leads to a joint and more active learning. The constant presence of tools awakens in student's greater interest in looking for new ways, allowing a larger and more consolidated acquisition of knowledge (Costello, 2010). The ability to easily share information with others, creatively utilize a wide variety of resources and critically evaluate the veracity and value of sources are just a few examples of the activities implicit to everyday use of mobile technology in education.

There is an urgent demand for other forms of education delivery such as m-learning and e-learning in order to make use of high availability of mobile devices as well as to leverage the students' academic usage patterns of their portable device and realise the goal of the education curriculum (Isiaka, Adewole& Olayemi, 2011).Although mobile learning is being introduced gradually in universities across Nigeria, it is a growing form of knowledge delivery and it faces many challenges such as integration of m-learning into the existing educational curriculum and development of highly rich m-learning content. Smith and Santori (2015) opined that technology has been integrated into society at an exceptional rate, and schools are not immune to the expanded use of mobile devices in classrooms.

Smith and Santori (2015) also submitted that the use of mobile devices for learning can enlarge the scope of tertiary education and allow it to better reach students. The use of these technologies for learning is equally capable of providing a more interactive and effective type of learning to meet individuals' learners needs.Mobile technology can be beneficial for higher education due to its ubiquitous nature and ability to shape information processes (Schepman, Rodway, Beattie & Lambert, 2012).Mobile technology offers the ability to engage in learning activities such as communication and content material sharing between students and lecturers, students and subject experts, and among students and their environments. It was also attested that mobile learning "has attracted a great deal of attention from researchers in different disciplines who have realized the potential to apply mobile technologies to enhance learning. Researches have shown that students were very positive concerning the use of tablets in higher education, stating these devices are beneficial for immediate access to information and enhancing learning experiences, according different learning styles and preferences.

Research Questions

The study provided answers to the following research questions:
1. what are the types of mobile technologies owned by pre-service teacher?
2. what are the mobile devices used by the pre-service teachers for instructional purposes?
3. what is the pre-service teachers level of integration of mobile technologies for instruction?
4. what is the pre-service teachers' perceived contribution of mobile learning technologies for instruction?
5. what is the influence of gender on pre-service teachers' integration of mobile technologies for instruction?

Research Hypothesis

The following hypothesis was tested in the study at 0.05 level of significant:

H_{01}: there is no significant difference in pre-service teachers' integration of mobile technologies for instruction based on gender

Methodology

This is a descriptive research design of a survey type, which sought information from pre-service teachers in University of Ilorin, Ilorin Kwara State, Nigeria. A researcher designed Questionnaire was used to collect data from the respondents.

The population for this study comprised all pre-service teachers in University of Ilorin, Ilorin Kwara State. The targeted population comprised all pre-service teachers in Faculty of Education, University of Ilorin. A simple random sampling technique was used to select the 150 respondents.

Data gathered from the instruments were transcript and coded on Excel spread sheet; the analysis and interpretation of data obtained were subjected to descriptive and inferential statistics through the use of IBM Statistical Product and Service Solution (SPSS) version 20.0 software. Percentages values were used to answer the research question raised. Descriptive statistics of frequency counts and Percentage were used to analyze the demographic information of the respondents.

Results

The results of data obtained in respect of the research questions and hypothesis are presented:

Research Question 1: what are the types of mobile technologies owned by pre-service teacher?
The results are as shown on Table 1.

Table 1: Distribution of respondents based on the type of mobile devices owned

Mobile Devices	Mean	Standard Deviation
Smartphone	1.95	0.212
PDA	1.25	0.433
IPod	1.23	0.424
Laptop	1.77	0.420
Mp3 player	1.50	0.540
Tablet Pc	1.65	0.491
Bluetooth	1.45	0.512
Smart Watch	1.33	0.512
Palmtop	1.27	0.487
E-book-reader	1.55	0.512
Grand Mean	**1.49**	

Table 1 indicated the type of mobile devices owned by pre-services. Item 1 with mean score 1.95 revealed that majority of the pre service teachers owned a Smartphone. Item 2 with mean score 1.25 showed that few of the pre-service teachers owned a PDA. Item 3 with mean score 1.23 indicated that majority of the pre-service teachers do not own an IPod. Item 4 with mean score 1.77 indicated that majority of the pre-service teachers owned a Laptop. Item 5 with mean score 1.50 indicated that many of the pre-service teachers do not own anMP3 Player. Item 6 with mean score 1.65 indicated that majority of the pre-service teachers owned a Tablet Pc. Item 7 with mean score 1.45 indicated that many of the pre-service teachers owned a Bluetooth Headset. Item 8 with mean score 1.33 indicated that majority of the pre-service teachers do not own a Smart watch. Item 9 with mean score 1.27 indicated that majority of the pre-service teachers do not own a Palmtop. Item 10 with mean score

1.55 indicated that majority of the pre-service teachers owned an E-book reader. The grand mean was 1.49. It can be deduced that the pre-service teachers owned smart phones.

Research Question 2: what are the types of mobile devices used by pre-service teachers for instructional purposes?

Table 2: Distribution of respondents based on the type of mobile devices used for instructional purposes

Mobile Devices	Mean	Standard Deviation
Smartphone	3.93	0.250
PDA	3.19	0.391
IPod	3.22	0.431
Laptop	3.79	0.406
Mp3 player	3.47	0.501
Tablet Pc	3.58	0.495
Bluetooth	3.39	0.490
Smart Watch	3.27	0.447
Palmtop	3.23	0.420
E-book-reader	3.50	0.502
Grand Mean	**3.46**	

Table 2 showed the different mobile devices used by pre-service teachers for instructional puposes. Item 1 with mean score 3.93indicated that majority of the pre-service teachers make use of Smart phone for instruction. Item 2 with mean score 3.19 indicated that majority of the pre-service teachers do not make use of PDA for instruction. Item 3 with mean score 3.22 indicated that majority of the pre-service teachers do not make use of IPod for instruction. Item 4 with mean score 3.79 indicated that many of the pre-service teachers make use of Laptop for instruction. Item 5 with mean score 3.47 indicated that many of the pre-service teachers make use of Mp3 player for instruction. Item 6 with mean score 3.58 indicated that majority of the pre-service teachers make use of Tablet Pc. Item 7 with mean score 3.39 indicated that majority of the pre-service teachers make use of Bluetooth headset for instruction. Item 8with mean score3.27 indicated that majority of the pre-service teachers do not make use of Smart watch for instruction. Item 9 with mean score 3.23 indicated that majority of the pre-service teachers make use of palmtop for instruction. Item 10 with mean score 3.50 indicated that majority of the pre-service teachers make use of E-book-reader for instruction. The grand mean was 3.46. It was deduced that the pre-service teachers make use of mobile devices for instruction.

Research Question 3: Pre-service teachers' Integration of Mobile Learning Technologies for Instruction.

Table 3: Distribution of respondents based on the integration of mobile learning technologies for instruction.

ITEM	SD	D	SA	A	Mean	Standard Deviation
There's a smooth communication between the learners and instructor	2%	13.3%	42.7%	42%	3.25	0.761
Teaching with mobile technologies makes learning more effective	7%	6.7%	40%	52.7%	3.32	0.6227
I make use of MLT to mark learners attendance	4%	28%	29.3%	38.7%	2.93	0.857
Learners productivity increase when I use MLT for instruction	2%	10.7%	36.7%	50.7%	3.22	0.713
I use MLT for instruction anytime	4%	18.7%	30.7%	46.7%	3.04	0.810
I use MLT to keep record of learners assignment	3.3%	15.3%	32.%	49.3%	3.10	0.775
The use of Mobile Learning technology create an easy communication within the students and their instructor	2%	9.3%	34%	54.7%	3.21	0.688
Learners concentrate more when I use MLT for instruction	4.7%	19.3%	35.3%	40.7%	3.07	0.857
I use MLT to give an instant access to information	2%	10%	44.3%	44%	3.30	0.730

Item	SD	D	A	SA	Mean	Standard Deviation
Learners concentrate more when using MLT for instruction	4%	18.8%	32.9%	44.3%	3.06	0.824
Grand Mean					**3.15**	

Table 3 showed the integration of mobile learning technologies for instruction. Item 1 with mean score 3.25 showed that 42.7% of the pre-service teachers strongly agreed that there's a smooth communication between the learners and the instructor when they use MLT for instruction. Item 2 with mean score 3.32 indicated that 52.7% of the pre-service teachers agreed that teaching with mobile technologies makes learning more efficient. Item 3 with mean score 2.93 showed that 38.7% of the pre-service teachers agreed that they use MLT to mark learners attendance. Item 4 with mean score 3.22 indicated that 50.7% of the pre-service teachers strongly agreed that learners productivity increase when they use MLT for instruction. Item 5 with mean score 3.04 showed that 46.7% of the pre-service teachers strongly agreed that they use MLT for instruction anytime. Item 6 with mean score 3.10 indicated that 49.3% of the pre-service teachers strongly agreed that they use MLT to keep record of learners assignment. Item 7 with mean score 3.21 showed that 54.7% of the pre-service teachers strongly agreed that the use of MLT create an easy communication within the students and their instructor. Item 8 with mean score3.07 indicated that 40.7% of the pre-service teachers strongly agreed that learners concentrate more when they use MLT for instruction. Item 9 with mean score 3.30 showed that 44.3% of the pre-service teachers agreed that they use MLT to give an instant access to information. Item 10 with mean score 3.06indicated that 44.3% of the pre-service teachers strongly agreed that learners concentrate more when they use MLT for instruction.

Research Question 4: what is the pre-service teachers' perceived contribution of mobile learning technologies for instruction?

Table 4: Distribution of respondents perceived Contribution of Mobile learning technologies for instruction

Item	SD	D	A	SA	Mean	Standard Deviation
MLT encourages learners to learn	7%	2.7%	56%	40.7%	3.52	0.588
MLT arouse the interest of learners	7%	6%	54.7%	38.7%	3.31	0.615
MLT encourages individualized learning	1.3%	6.7%	49.2%	42.7%	3.40	0.676

Item	SD	D	A	SA	Mean	Standard Deviation
MLT encourages learners to learn in motion	3.3%	14%	38%	44.7%	3.17	0.792
Learners concentrate a lot when using MLT in comparison with other visual educational multimedia available in the class.	2.7%	26.7%	25.3%	45.3%	2.93	0.791

Item	SD	D	A	SA	Mean	Standard Deviation
I feel learning via MLT increase isolation in educational environment	4%	25.3%	26.7%	44%	2.93	0.825
MLT environment is quiet comfortable	7%	10%	32.7%	56.7%	3.21	0.641

MLT use in class is quiet comfortable	2%	10%	40%	48%	3.26	0.718
MLT motivates learners to learners to learn at their own pace	1.3%	6.7%	47.3%	44.7%	3.38	0.672
MLT has made learning portable	2%	5.3%	41.3%	51.3%	3.32	0.669
Grand Mean					**3.24**	

Table 4 showed the pre-service teachers' perceived contribution of mobile learning technologies for instruction. Item 1 with mean score 3.52 revealed that 56% of the pre-service teachers agreed that MLT encourages learners to learn. Item 2 with mean score 3.31 showed that 54.7% of the pre-service teachers agreed that MLT arouse the interest of learners. Item 3 with mean score 3.40 indicated that 49.2% of the pre-service teachers agreed that MLT encourages individualized learning. Item 4 with mean score 3.17 showed that 44.7% of the pre-service teachers strongly agreed that MLT encourages learners to learn in motion. Item 5 with mean score 2.93 indicated that 45.3% of the pre-service teachers strongly agreed that learners concentrate a lot when using MLT in comparison with other visual educational multimedia available in class. Item 6 with mean score 2.93 showed that 44% of the pre-service teachers strongly agreed that learning via MLT increases isolation in educational environment. Item 7 with mean score 3.21 indicated that 56.7% of the pre-service teachers strongly agreed that MLT environment is quiet comfortable. Item 8 with mean score 3.26 showed that 48% of the pre-service teachers strongly agreed that MLT use in class saves time and effort. Item 9 with mean score 3.38 indicated that 47.3% of the pre-service teachers agreed that MLT motivates learners to learn at their own pace. Item 10 with mean score 3.32 showed that 51.3% of the pre-service teachers strongly agreed that MLT has made learning portable. The grand mean of the distribution was 3.24. Using the average bench mark of 2.5, it can be concluded that mobile learning technologies used by pre-service teachers has a significant influence on instructional delivery.

Hypothesis One: There is no significant difference in pre-service teachers' integration of mobile technologies for instruction based on their gender.

Table 5: t-test of male and female respondents on the integration of mobile learning technologies for instruction.

Gender	NO	Mean	t	Df	(sig)
Male	71	3.20	-159	148	0.874
Female	79	3.22			
Total	150				

From table 5, it can be deduced that there was significant difference between male and female student on the assessment of pre-service teachers integration of mobile learning technologies for instruction. This was reflected in the results of the hypothesis tested; df (123) t = -159, 0.874 > 0.05. This means that the hypothesis which states that there is no significant between male and female student on the assessment of pre-service teachers integration of mobile learning technologies for instruction is rejected.

Discussions

This study had sought to investigate the assessment of pre-service teachers' integration of mobile learning technologies for instruction, University of Ilorin. Education and the use of emerging technologies in education are two inseparable entities because education is dynamic, so is technology fast growing with dynamism. The use of computer technologies in homes, offices, for research and scientific purposes has revolutionised human culture. Undoubtedly, part of the innovative technologies was the development of pulse size mobile devices such as Tablet Pc, Iphones, android phones, blackberry phones etc. which as well are capable of doing virtually all the wonder works a big computer does. Mobile devices have precipitated phenomenal changes in our daily lives, work and society. The prevalence of these technologies among students is transforming the educational system in Nigeria which is regarded as one of the third world countries. The continued growth of mobile technology as an educational tool is as a result of its flexibility and pervasiveness (Smith & Santori, 2015)

The point of discussion that this study has raised is how these technologies can be effectively incorporated into teaching and learning process in and outside the classroom. The numerous advancement in the advancement in the capabilities of mobile devices unavoidably an important tool that should be legally accepted into classroom instruction to foster the needed development in education. Although students abuse of the open opportunities is expected, but check-mate measures would also be put in place to counter up-rising abuse of these opportunities.

Conclusion and Implications

In conclusion, this study has examined the assessment of pre-service teacher's integration of mobile learning technologies for instruction in University of Ilorin. The result obtained from the findings revealed that most of the pre-service teachers' integrate mobile learning technologies into instruction; it also reveals that the use of mobile learning technologies for instruction arouse the interest of learners. It is concluded that there's significant difference on the assessment of pre-service teachers integration of mobile learning technologies for instruction based on their gender.

Recommendations

On the basis of the findings, the following recommendations were made:
1. The pre-service teachers should be sensitized on the integration of mobile learning technologies for instruction.
2. The curriculum designer should incorporate the use of mobile learning technologies as instructional tool into the curriculum
3. The school administrators should create an enabling environment for the integration of mobile learning technologies into instruction

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ASSESSMENT OF NURSERY AND PRIMARY SCHOOLS TEACHER'S ATTITUDE TOWARDS THE UTILIZATION OF E-LEARNING TOOLS FOR INSTRUCTION IN OYO EAST LOCAL GOVERNMENT AREA OF OYO STATE

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Abstract

E-learning grows rapidly over the past few years and has enabled learning to be more accessible. The accessibility feature has provided for pupils' ways to support learning both inside and outside the classroom. E-learning integrates a wider set of tools and application that enable learning to be dynamic so that pupils are no longer limited to only the four walls of the classroom. This study analyzed the Assessment of Teachers Attitude Towards the Utilization of E-learning Tools for Instruction in Oyo east local government area of Oyo State. Specifically, this study determine the attitude of teachers in utilizing E-learning tools for teaching and learning Purpose, to what degree does selected factors affect teachers' use of E-learning tools for teaching in Classrooms. This study was a descriptive and inferential research of the survey type, a total of 125 teachers were chosen randomly from the graphical location in Oyo east local government area of Oyo State. Three research questions and 1 hypothesis was formulated to guide the study and was tested at significant level of 0.05. The instrument used for data collection was questionnaire. Descriptive and inferential statistics of frequency counts and percentage and chi-square was used to analyze the data
The findings reveal that teachers have positive attitude to utilizing E-learning tools for instruction. It was recommended that educational authorities and the school system should encourage the use of E-learning tools for Instruction

Keywords: E-learning tools, Instruction, Teachers attitude.
Introduction
The emergence of information and communication technologies (ICTs) and the ubiquitous connectivity of internet and networks improve man's ingenuity and opportunities given that societies consciously depend on real-time information to be proactive and to discount the effects of environmental changes (Al-Gahtani, (2007); EzeChinedu-Eze, 2018). ICT is an agent of socio-economic changes (Al-Gahtani, 2016) especially in the educational milieu, where the academia and consultants progressed from providing simple teaching aids to interactive learning environments.

The use of electronic learning tools for instructionsplays an important role in Teaching and learning process, the main issue is how to effectively use electronic learning tools in instructional practices in the classroom. Barbara Gruber (2011) investigated Initiative into the Classrooms, she argued that, the successful integration of a new technology is the goal of any instructional delivery initiative and it's especially critical when the initiative has substantial budgetary impact.

E-learnig tools has a chance to be involved in teaching and learning process, since the last 20 years, E-learning took a place in the classrooms as a new trend in teaching and learning process. The E-learning is an important development taking advantage of computer technologies and software, communications and information, to be employed in the process of teaching and learning, where it has become one of the alternatives in the dissemination of education and activating the training, whether direct or indirect, overcoming the obstacles of space and time and risk, and provided for the teacher's experiences effectively, enriched the learning and development teaching, and has become a modern teaching method, employing modern communication mechanisms; to support the educational process, enrich and improve the quality.

Education is a process of bringing relatively permanent change in human behavior. It is the main instrument used to preserve, maintain and upgrade people's culture, norms and values. In any society, education is a veritable tool for determining technological advancement and passing on to the new generations existing knowledge of the physical environment. Education also serves as platform for introducing individual to any organization, giving skills for performing daily jobs, leisure as well as inculcating sounds moral in the people for their own benefit and that of the society. In the summary, education is the platform on which younger generation understand the past heritage as well as participate and contribute meaningfully to the growth and the development of the society.

Conventionally, education has been practice across the world in segregated buildings by carefully regimented and standardize classes of pupils and teachers. This has a consequential effect on both the teacher and learner. For example, education is implicitly restricted only to those who could be in the classroom and follow the teacher rigidly with the pace by which he presents his lectures. Population explosion and mass educational system in every region of the world brought greater challenges to this method of education. For instance, there is problem of inadequate number of human and material resources to cater for the education of the large population. The population of school age citizen in most places has grown tremendously to the extent that only a small percentage can be offered admission. The pupils-teacher and learners classroom have been less effective. The field of education therefore provides the most fascinating application of computing system which has consequently attracted considerable attention from educationists and policy makers since the late 1960s when computer was introduced into classrooms. Various information technologies have been applied in learning and teaching, such as Computer Aided Instruction (CIA), Computer Aided Learning (CAL), Research Packages, Project, Computer Libraries and so on. Computer are now being applied in distance Learning premised on online and real time teaching and instruction.

Online learning results to learning and other supportive resources that are available through android phones, computer, which includes solving home work using WhatsApp messenger, zoom, computer based instruction and technology. The e-learning system use text messages to deliver information and data to learners or e-leaners will be in their tools as if they are in classroom. This has gone a long way helping e-learners to acquire knowledge without physical contact.

Internet as global connection of computers sited around the world forming huge network for information to be shared and disseminated by many millions of people has done so well in information technology and in education so to speak. Virtual classroom and text based e-learning cannot be an exception. Often times teachers experience a lot of difficulty in the quest for basic knowledge not for the fact that the person doesn't have resources to acquire them but the risk that might be involved. In order to reduce these risks, e-learning was introduced.

The word E-learning in October 1999, during a CBT System seminar in Los Angeles, strange new word was used for the first time in a professional environment "E-learning. Associated with such expressions as "online learning" or "Virtual Learning", this word was meant to qualify "a way to learn based on the use of technologies allowing access to online, interactive and some personalized training through the internet or other electronic media (Intranet, television, radio, smartphone, smart board, CD-ROM among others), so as to develop competencies while the process of learning is independent from the time and place".

E-learning has many faces in classrooms; Interactive Whiteboard is one of many equipment's tools of e-learning. Interactive Whiteboard is a large touch-sensitive and interactive display that connects to a computer and projector. A projector projects the computer's desktop onto the board's surface, where users control the computer using a pen, finger, or other device. The Interactive Whiteboard software allows for teacher-cued animation and slides that can be retrieved, dragged, and dropped; projected information that a teacher can highlight, enlarge, or conceal; stored additional resources; and recorded children feedback. The Interactive Whiteboard allow for the creation of collaborative and interactive lessons by combining resources with a trained instructor's ability to move and manipulate objects.

Electronic learning (e-learning) became a vital teaching method for many schools, but still many are not implementing such methods in the educational environment. In e-learning, technology became a channel for interaction and rich communication between teachers and learners. Also, the Internet bridged the place and time gaps and facilitated the teaching/learning process. E-learning involves the use of Internet, online software, textual material, chatting room and other multimedia in teaching

process. So learners have many choices in e-learning environment than face-to-face environment. Some modes of integrating technology into learning are becoming more popular like: information exploration, coordination, mental tools integration, web-based cooperative learning, problem-oriented integration strategies, information technology (IT) integration and learning assessment. Based on that, Jordan implemented the Edu Wave e-leaning portal to help facilitate the education process for public schools. This study tried to explore teachers' perceptions towards the intention to use e-learning system. The following section will explore the methodology, the results of the survey, the conclusions and future work.

E-learning as opposed to distance learning is a term that used to refer to all ICTs, networks, internet and other forms of electronic media that can be used to enhance teaching and learning so as to transfer knowledge and skills. The integration of ICT in education has revolutionized and transformed the education sector worldwide and created positive impacts, provided successful implementation strategies are followed (Intel, 2012). E-learning takes various forms, for instance, it can be web based, computer-based, virtual classrooms and content delivery via e-networks, audio or video tape, television, Video conferencing, CD-ROM, i-pods, E-mails, Wireless and mobile technology among others (Eke, 2011).

The growth in internet characterized by the decreasing costs and increasing bandwidth has facilitated the expansion and increased use of e-learning to offer formal as well as informal educational opportunities that were previously not possible to hundreds of millions of learners (Bonk et al; 2009). Regardless of the level, e-learning can be adopted and applied in the education system. E-learning adoption and usage has been successful in the developed world as the success factors depict to that effect.

The changes in education have led to a paradigm shift from teacher centeredness to learner centeredness. This implies that the teacher can no longer decide what to be learnt but rather the interests of the learner to do so and determine how they should learn it, it is therefore a learner controlled self-paced education environment where the learner has authority over the learning environment; there by allowing the learners to work on their pace, convenience access and assessment (Eke, 2011).

Benefits provided by e-learning are undoubtedly several as discussed by various authors. According to Intel (2012), use of ICTs for effective e-learning leads to a range of educational opportunities to help learners develop needed skills essential to their countries. E-learning further leads to children learning, teaching and administration, family and home, social and community, and economic development.

The Kineo group of Uganda suggests a number of other benefits of e-learning like lower costs to education, fast delivery of education materials, more effective means of learning and lower environment impact by reducing on stationery requirements and minimized wastes Bhuasiri., (2012) summarize the benefits of e-learning in terms of benefits it provides to stakeholders some of which include; an increased accessibility to information, better content delivery, personalized instruction, content standardization, accountability, on demand availability, self-pacing, interactivity, confidence and increased convenience. The use of information and communication technology as a means of improving the efficiency and effectiveness in teaching and learning process. With the introduction of information and communication technology (ICT), there will be changes in pedagogical delivery.

Statement of the Problem

E-learning tools are important tools for teaching and learning in nursery and primary schools. This is because it has been widely used to facilitate learning. However, it has been observed thatElectronic learning (e-learning) became a vital teaching method for many schools, but still many are not implementing such methods in the educational environment. E-learning tools became a channel for interaction and rich communication between teachers and learners. Previous studies carried out to address the use of e-learning tools for teaching and learning were done in other countries and many of them were not carried out among teachers in nursery and primary schools in Oyo East local Government area of Oyo State.

This study therefore was carried out to assess nursery and primary schools teachers attitude towards the utilization of E-learning tools for instruction in Oyo East Local Government area of Oyo State.

Research Questions

1. Are E-learning tools available in nursery and primary schools in Oyo East Local Government area of Oyo State?

2. What is the attitude of nursery and primary schools teachers in Oyo East Local Government area of Oyo State towards the utilization of E-learning tools for instruction?

Research Hypothesis

H_{O1}: There is no significant difference between male and female teachers' attitudes towards the utilization of E-learning tools for Instruction.

Methodology
Research Design

This study is a descriptive research design of the survey type. A researcher designed questionnaire was used to elicit information on nursery and primary Schools Teachers' Attitude towards the Utilization of E-learning tools for Instruction in Oyo East Local Government area of Oyo State.

Population, Sample and Sampling Techniques

The population of this study comprise all Nursery and Primary Schools Teachers' in Oyo East Local Government of Oyo state, the sample for this research was 125 Teachers in Oyo East Local

Government area of Oyo state. Random sampling techniques was used to select the One hundred and twenty five teachers in the selected nursery and primary schools to which the questionnaire was administered.

Research Instrument

The instruments used for this research is Questionnaire, which was titled "Assessment of Nursery and Primary schools Teachers Attitude towards E-Learning in Oyo East Local Government area of Oyo state" It consist of threesectionsA, B, and C.

Section A deals with the respondents' demographical data; checklist was used to determine the availability and attitude of teachers to the use of E-learning tools Oyo East local Government area of Oyo State; Section Baddressed the Utilization, Frequency and teacher's competence on the use of e-learning tools in Secondary schools; Section C determined the Challenges in the integration of e-learning tools in Nursery and Primary schools in Oyo East Local Government area of Oyo state.

Validation of the Research Instrument

The draft copy of the questionnaire was given to senior colleagues in the department of Early Childhood Care and Education, Emmanuel Alayande College of Education, Oyo, Oyo state to help critically examine the questions and make necessary amendments where appropriate. The validity was done in order to determine the appropriateness and suitability of the research instrument to measure the phenomenon under consideration for which the study was meant to assess the Teachers Attitude in the Utilization of E-learning tools in Oyo East Local Government area of Oyo state; after which the correction made was used to improve the quality of the instrument.

Procedure of Data Collection

The questionnaire was administered personally by the researchers to Teachers in nursery and primary schools in Oyo East local Government area of Oyo state. The purpose of the research was explained to the Teachers in order to gain their full support. The administered questionnaires were collected on the spot by the researchers

Data Analysis Techniques

Questionnaires was collated, coded and analyze using Statistical Package for Social Sciences (SPSS) VERSION 20. Descriptive Analysis was adopted in this study. Research Question 1 and 2were analyzed using Mean, Percentage and chi-square for research Hypothesis 1 at 0.05 level

Results

Demographic Information

Table 1: Frequency Distribution of Respondents' Demographic Information

Gender			
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**

Male	67	53.6	53.6	53.6
Female	58	46.4	46.4	100.0
Total	125	100.0	100.0	
Age				
20-30years	26	20.8	20.8	20.8
31-40years	50	40.0	40.0	60.8
41-50years	38	30.4	30.4	91.2
51years and Above	11	8.8	8.8	100.0
Total	125	100.0	100.0	
Teaching Experience				
1-10years	47	37.6	37.6	38.4
11-20years	58	46.4	46.4	84.8
21-30years	11	8.8	8.8	93.6
30years and Above	8	6.4	6.4	100.0
Total	125	100.0	100.0	

From Table 1, it could be seen that there are 67 male respondents making about 53.6% of the dataset, while the females are 58 respondents making 46.4% of the dataset. Also, it could be seen that the majority of the respondents are between 31-40 years old as this makes 40% of the sample size. The respondents that are above 50 years make only about 9% of the entire dataset. Furthermore, 46% of the respondents have 11-20 years teaching experience, then, respondents with 1-10 years of working experience make about 38% (47 of 125) of the dataset.

Table 2: Availability of E-learning Tools

Availability of Flat screen television in School				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Adequately Available	39	31.2	31.2	31.2
Fairly Available	70	56.0	56.0	87.2
Not Available	16	12.8	12.8	100.0
Total	125	100.0	100.0	
Availability of Desktop computer in School				
Adequately Available	37	29.6	29.6	29.6

Fairly Available	53	42.4	42.4	72.0
Not Available	35	28.0	28.0	100.0
Total	125	100.0	100.0	
Availability of DVD player in the Schools				
Adequately Available	43	34.4	34.4	34.4
Fairly Available	62	49.6	49.6	84.0
Not Available	20	16.0	16.0	100.0
Total	125	100.0	100.0	
Availability of Mail Address among the teachers				
Adequately Available	43	34.4	34.4	34.4
Fairly Available	35	28.0	28.0	62.4
Not Available	47	37.6	37.6	100.0
Total	125	100.0	100.0	
Availability of Multimedia Projector in the Schools				
Adequately Available	19	15.2	15.2	15.2
Fairly Available	39	31.2	31.2	46.4
Not Available	67	53.6	53.6	100.0
Total	125	100.0	100.0	

Table 2 describes the views of the respondents on the availability of E - Learning tools. From the dataset, 70 (56%) of the respondents believe that flat screen television are fairly available, also 42% believes that desktop computer are fairly available. Similar pattern is discovered as we look down the table except for Mail Address and Multimedia Projector which are mostly believed to be unavailable.

Table 3: Availability of E-learning Tools

Availability of Internet Connections in the Schools				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Adequately Available	37	29.6	29.6	29.6
Fairly Available	55	44.0	44.0	73.6
Not Available	33	26.4	26.4	100.0
Total	125	100.0	100.0	
Availability of Electricity supply in the schools				
Adequately Available	51	40.8	40.8	40.8
Fairly Available	64	51.2	51.2	92.0

			Valid	
Not Available	10	8.0	8.0	100.0
Total	125	100.0	100.0	
Availability of Interactive Board in the School				
Adequately Available	43	34.4	34.4	34.4
Fairly Available	36	28.8	28.8	63.2
Not Available	46	36.8	36.8	100.0
Total	125	100.0	100.0	
Available of Public Address system in the Schools				
Adequately Available	64	51.2	51.2	51.2
Fairly Available	46	36.8	36.8	88.0
Not Available	15	12.0	12.0	100.0
Total	125	100.0	100.0	

From Table 3; Public address system and Electricity source are believed to be adequately available unlike the interactive board which is not available as believed by the majority of respondents.

Table 4:

Teachers' Attitude, Utilization of E-learning Tools For Instruction

Teachers frequently are engaged with the use of E-learning tools for instruction.				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Strongly Agree	35	28.0	28.0	28.0
Agree	33	26.4	26.4	54.4
Strongly Disagree	24	19.2	19.2	73.6
Disagree	33	26.4	26.4	100.0
Total	125	100.0	100.0	
Teachers are more competent on the use of E-learning tools for instruction.				
-	1	.8	.8	.8
Strongly Agree	35	28.0	28.0	28.8

	Frequency	Percent	Valid Percent	Cumulative Percent
Agree	37	29.6	29.6	58.4
Strongly Disagree	23	18.4	18.4	76.8
Disagree	29	23.2	23.2	100.0
Total	125	100.0	100.0	

Table 5:

Teachers' Attitude, Utilization of E-learning Tools for Instruction

Teachers in the ICT related courses are mostly Male.				
	Frequency	**Percent**	**Valid Percent**	**Cumulative Percent**
Strongly Agree	24	19.2	19.2	20.0
Agree	44	35.2	35.2	55.2
Strongly Disagree	26	20.8	20.8	76.0
Disagree	30	24.0	24.0	100.0
Total	125	100.0	100.0	
Teachers have positive attitude towards the utilization of E-learning tools				
Strongly Agree	45	36.0	36.0	36.0
Agree	45	36.0	36.0	72.8
Strongly Disagree	13	10.4	10.4	84.0
Disagree	20	16.0	16.0	100.0
Total	125	100.0	100.0	
Teachers finds the use of E-learning tools for instruction more easier to the traditional ways of teaching				
Strongly Agree	53	42.4	42.4	42.4
Agree	38	30.4	30.4	72.8
Strongly Disagree	17	13.6	13.6	86.4
Disagree	17	13.6	13.6	100.0
Total	125	100.0	100.0	
Schools management endeavor to provide E-learning tools for instruction among teachers				
Strongly Agree	33	26.4	26.4	26.4
Agree	34	27.2	27.2	53.6
Strongly Disagree	27	21.6	21.6	75.2

Disagree	31	24.8	24.8	100.0
Total	125	100.0	100.0	
The schools encourages the use of E-learning tools for instruction				
Strongly Agree	39	31.2	31.2	31.2
Agree	39	31.2	31.2	62.4
Strongly Disagree	23	18.4	18.4	80.8
Disagree	24	19.2	19.2	100.0
Total	125	100.0	100.0	

Thus, one can now conclude that the teachers have positive attitude towards the use of E-learning tools for instruction in nursery and primary schools in the study area.

Research Hypothesis

H_{O1}: There is no significant difference between male and female teachers' attitudes towards the utilization of E-learning tools for Instruction.

Chi-Square Tests

	Value	Df	Asymp. Sig. (2-sided)
Pearson Chi-Square	25.180[a]	12	.014
Likelihood Ratio	28.513	12	.005
N of Valid Cases	125		

a. 12 cells (60.0%) have expected count less than 5. The minimum expected count is .21.

With the chi-square P-value which is less than 5%, this implies that the view of the respondents on the fact that Male teachers are more functional than their female counterparts on the use of e-learning tools for instruction.

DISCUSSION, CONCLUSION AND RECOMMEDATION

Discussions

The result of the data analysed in Table 2 describes the views of the respondents on the availability of E - Learning tools. From the dataset, 70 (56%) of the respondents believe that flat screen television are fairly available, also 42% believes that desktop computer are fairly available. Similar pattern is discovered as we look down the table except for Mail Address and Multimedia Projector which are mostly believed to be unavailable.

From Table 3; Public address system and Electricity source are believed to be adequately available unlike the interactive board which is not available as believed by the majority of respondents.

Findings of this study indicated that the teachers' attitude towards the utilization of information and communication technology for teaching and learning is positive. Even though there are challenges at every stage of implementation, but the overall response gotten from questionnaire administered to the respondents in order to ascertain the availability and attitude of teachers towards the utilization of e-learning devices for instruction in nursery and primary schools in Oyo East Local Government area of Oyo State was received with more positive result than negative after the result were analysed.

The study also stated that There was substantial difference in the utilization of e-learning tools for instruction based on gender with the significant value of 0.015 at $p<0.05$ confidential level which means that gender is a determinant factor that contribute to the use of e-learning tools for instruction in Oyo East Local Government area of Oyo State. This support the study of Cuadrado–Garcia, (2010) that men are being more prone to the use of new media than females.

Conclusion

The research examined the Assessment of nursery and primary schools'teachers'attitude towards utilization of E- learning tools for instruction in Oyo East Local Government area of Oyo state. The result obtained from the data gathered and analyzed in this study indicated that: Flat screen television, desktop computer, DVD player, printer, mail address, multimedia projector ,internet connection ,electricity supply, public address system are moderately available to the respondents accordingly, Majority of the teachers utilize e- learning tools to improve learning, teachers have good perception towards the utilization of E-learning tools. The study also stated that There was substantial difference in the utilization of e-learning tools for instruction based on gender.

Recommendations

This study recommended that:

1. More female teachers should be trained and motivated to make use of E-learning tools in schools.

2. The government at all levels and Curriculum planners should encourage the use of e-learning tools for instruction in schools.

3. Government should provide adequate funding to acquire E-learning tools for instruction to improve teaching and learning.

4. The government should develop a taskforce across Ministries of education, to ensure effective usage of E-learning tools.

5. The Ministry of Education should put in place, seminars, workshops, conferences and trainings for teachers on the benefit and effectiveness in the use of E-learning tools for instruction to bring about effective learning process.

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INNOVATING TECHNOLOGY IN SOCIAL STUDIES CURRICULUM IMPLEMENTATION THROUGH CREATIVITY FOR THE ACHIEVEMENT OF EDUCATIONAL GOALS

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Abstract

This paper gives a discussion on the implementation of Social Studies with the view to making the teaching and learning of Social Studies a worthwhile one. Specifically, the discussion was on how technology could be innovated being an element in the implementation of social studies in the colleges of education and in particular Emmanuel Alayande College of Education, a target population. This was with the view to enhancing effective implementation of Social Studies to ensure desirable results. Experienced have shown that Social Studies, being a Social Science subject is somehow seen as a curriculum not handled with maximum of seriousness. Curriculum implementation as it were, is all encompassing and thereby gives us the understanding of the fact that, with the trend of technological move in the nation coupled with several challenges on the way of education, it is of a necessity and essential to strive in making teaching and learning of Social Studies curriculum innovative and effective. This could be a way of bringing novelty through creative effort of the application of certain technological tools into the classroom interactions. It is therefore found in this write up a description of what innovation is with the overview of the term technology, highlights of creativity, its process and implementation as a whole was a focus in this write up.

Key Words: Creativity, Curriculum innovation, Implementation, Social Studies and Technology

Introduction

Education is an instrument for change and development and the reason to uphold it with utmost importance. Social Studies, according to the Board of Directors of NCSS (1992), is the integrated study of the social science and humanities to promote civic competence. Civic responsibility is one of the goals of Social Studies. This is supported by the National Council for Social Studies (NCSS, 1992) which has recognized the importance of educating students who are committed to the ideals and values of democratic knowledge about their community, nation and the world. Students who have these commitments, knowledge, and skills are likely to be the most capable in shaping the future as well as sustaining and improving democracy.

Social Studies programmes are capable of producing citizens who should be able to apply knowledge, skills, experiences and attitudes in solving real life problems by harmonizing the resources from their environment for the betterment of themselves and the society. This implies that, the quality of life of the people in a society reveals the level of such society's technological advancement. Technology is defined by the United Nations Educational Scientific and Cultural Organization (UNESCO) as the know-how and creative processes that may assist people to utilize tools, resources and systems to solve problems and to enhance control over the natural and man-made environment in an endeavor to improve the human conditions this means that, technology is the systematized tools used in solving human problems. In addition, technology in education means the arts of using equipment, materials and machines for educational purposes, meaning. Simply put, technology in the service of education (servicing education). In the phase of technology being used as instructional aid in the classroom interaction, a sense of creativity is demanded due to the fact that knowledge is transient and it is expected of an informed individual to be daily and always updated and of course, a divergent thinker. When all of these elements are put together the teacher, the students and materials accordingly, the

implementation of curriculum is achieved and more so, curriculum should wear a new face as time demands.

The challenges in the nation for various reasons could not be undermined due to the fact the challenges cut across almost all sectors in the society and education sector inclusive. Challenges like; issues in education, insecurity, insurgencies, pandemic outbreak of COVID-19, rape to mention but a few. The COVID-19 outbreak called for a national lockdown almost for a year and in that regard, education activities in all sphere was interrupted. However, the re-opening of the schools in Nigeria caused for a re-scheduling of education programs; a need for innovation. To innovate means, to rearrange, to reshape, to redirect and the likes. National demands in time like this call for Social Studies curriculum redirected. For instance, the school closure due to COVID-19 opened door for E-learning which is purely technological oriented. Experienced have shown that Social Studies, being a Social Science subject is somehow seen as a curriculum not handled with maximum seriousness. It is therefore, essential for every teacher and student to be up and doing to embrace technological knowledge in the teaching and learning process for the attainment of the general goals of education in Nigeria. Thus, there is the need to re-intimate the education stakeholders of the importance of effective implantation of social studies Curriculum and with emphasis on the application of technology. Learning experiences should be examined whereby the obsolete ideas to give way for the new ones relevance and significance in meeting the needs of the society.

Concept of Social Studies Curriculum

In the Africa Social Studies Programme (ASSP,1972), Social Studies is defined as the overall name for a group .of Social Sciences and other subjects which include History, Geography, Civics, Religion, Economics, Sociology, Anthropology, Literature and so on which are integrated into the subject called "Social Studies". It is further stated in the ASSP that when Social Studies is systematically provided as a course in schools, it is to make students understand their civic responsibilities and acquire abilities to solve social problems and acquire capabilities to take decisions regarding contemporary issues. The Nigerian Educational Research and Development Council (NERDC,1980) sees the integrated Social Studies as a genuine attempt at an interdisciplinary study of man and his environment. In it, the study focuses on man's problems of survival and how that environment in turn influences man.

The Social Studies curriculum was written and formulated to prepare students to become well-informed citizens who would be able to contribute to the advancement of their community. One great demand made of Social Studies education was that whatever was passed on to the learner would go beyond mere acquisition of knowledge from selected topics and themes in Social Studies. The revised curriculum guide therefore emphasizes a positive influence on the learner that will help to modify his attitude and behaviour in the areas of acceptable norms, values, beliefs and the practices of the Nigerian Society. The learners are to be helped to develop critical thinking skills which can help the educated citizens to make valuable decisions after viewing the pros and cons of issues of personal and national interests.

According to Uche (1980) the purpose of any curriculum is derived from the general aims and philosophy of education aiming at educating the child as a learner and those in the society in general. In Nigerian schools, Social Studies can be well understood if the present aims and philosophy of education of Nigeria are placed in proper perspective. Thus the National Policy on Education (2014) to which Uche's assertion can be linked are:
1. the inculcation of national consciousness and national unity;
2. the inculcation of the right type of values and attitude for the survival of the individual and the Nigerian society;
3. the training of the mind in the understanding of the world around; and
4. the acquisition of appropriate skills, abilities and competence both mental and physical as equipment for the individual to live in and contribute to the development of his society. The general objectives of Social Studies in the Nigeria schools are categorised into four broad aspects (Uche, 1980 p.12):
(a) Humanistic Education – that is, helping the pupil to comprehend his life.

(b)   Citizenship Education – that is, preparing the pupil for social responsibility.

(c)   Intellectual Education –that is, introducing the pupil to the modes of thinking and inquiry of the social sciences.

(d)   Value Education – that is, inculcating in the individual pupil some societal expected behaviours and group activities, attitudes, value and skills.

These categories of Social Studies Education represent the types of knowledge, skills, attitudes and values which Social Studies for Nigerian schools should aim at inculcating in Nigerian pupils. Curriculum according to Ehindero, (2014) is a series of planned learning and unplanned learning experiences deliberately and purposefully organized to maximize the opportunities available for individuals to actualize their inherent genetic blueprint in both formal and informal institutions. Therefore, curriculum is one of the vehicles for implementing educational policies and programmes.

Implementation Issues in School Curriculum

Instructional materials which Dike (1987) describes as alternative channels of communication which a teacher can use to compress information and make them more vivid to his learners is needed for effective implementation of education curriculum. Appreciating the need to provide instructional materials for effective teaching and learning in Nigerian schools, Onyejemezi (1991:67) asserts that: all learners in the various levels of the nation's educational system are expected to be provided with appropriate learning experiences. A systematic integration of variety of resources in a teaching/learning process or environment produces appropriate learning experiences, which in turn result in effective (active) or meaningful learning.

According to Onyejemezi (1991) experience implies activity of some kind –it is not simply something that happens, experiencing for the learners means having them (learners) see, hear, touch, taste, make, do and try. In line with the views of Dike (1987) and Onyejemezi (1991), Ughamadu (1992) opines that curriculum materials are indispensable in the teaching learning process/ curriculum implementation. To that end, Babalola (2004:114) notes that: "instructional materials are designed to promote and encourage effective teaching-learning experiences." Instructional materials are ways and means of making the teaching and learning process easy, more meaningful and understandable. Babalola (2004) notes that as ingredient is to soup, so also is resource materials to curriculum implementation. These instructional materials are lacking in some Nigerian schools, as a consequence, teachers take to teacher marker and talk as they have no visual or audio- visual materials which the students can see, touch, smell and hear in the process of teach Social Studiesing and learning. Onyeachu (2006) observes that when instructional materials are not available learners cannot do well. This means that when learners are not doing well, the set objectives of education cannot be achieved.

Provision of instructional materials is capable of being a barrier to curriculum implementation. It is of a two-edged sword which if available and useful, achievement of effective implementation of curriculum is possible and if otherwise, the negative results are eminent. The problem of could be reversed if teachers of Social studies endeavor to be creative enough to improvised unavailable technological tools for teaching. Also, some teachers are deficient in the technical know-how syndrome. They are competent in the teaching activities but incompetent in the application of technology. Furthermore, there is a lot of contributions which environment could give to effective curriculum implementation and if the learning environment becomes odd to education, it then gives a stain to learning and vice versa.

Model of implementing innovations

Reasons for curriculum innovations can only be achieved by its effective implementation. Ehindero (2014) opines that in order for innovation to be successful, implementation should be rooted in an appropriate mode and the target population should not only be carried along in the initial conceptualization of the innovation, they should accept, personalize eventually own the innovation. It should be one that is politically, socially, culturally and psychologically sensitive, locally relevant and inclusive. Ehindero (2014) discusses three orientations of models of innovations. Empirical rational model assumes that human beings are rational and are motivated primarily by their self-interest. The implementation of innovation (practice, knowledge, product etc.) is assumed to occur provided that (a)

the innovation can be justified rationally to the target group whose practice is being changed (b) the advantages of the innovation and its benefits to the target group can be demonstrated. The source of power in this model is knowledge or 'know how' and the individuals who have and can demonstrate the utility of that knowledge. In the empirical-rationale strategy known barriers to innovation such as values, beliefs, attitudes, personality need-dispositions, and organizational climates which may conflict with the goals and means of the innovation are usually de-emphasized. Such interpersonal and institutional strife are seen to constitute no problem as long as the rationality and utility of the innovation can be demonstrated to the target group.

This model can be successfully used in implementation if the target group is prepared for, ready and willing to accept the innovation i.e. the group's values, attitudes, beliefs, and patterns of behaviour are compatible and thus can accommodate core concepts in the innovation. Prevailing or dominant tradition, socio-cultural values, norms and ethos exist to resist changing from old to new practices regardless of available resources and technology.

The empirical-rational model seems adequate to implement innovations that are concrete products or set of techniques, skills, and practices which do not require a drastic and radical departure from the prevailing/conventional value orientation of the institution or its rule expectations of the key stakeholders. Innovations in curriculum are almost never institutionalized on the basis of their rationality and merit not even by available resources and modern technology. Successful implementation of such innovations is dictated more by the ideological and psychological factors of the target groups and the dynamics and demands of the target groups' competing socio-political and cultural environments.

Nature of Creativity and Process

Creativity is seen as the ability of individuals to generate new ideas that contribute substantially to an intellectual domain (Kaufman and Beghotto, 2008). The authors say each individual is to regularly solve problems, fashion products or define new questions in a way that is initially considered novel. Creativity involves the erase from existing facts and methods to finding new ways of inventing answers and seeing unexpected solution. This therefore, indicates that creativity requires a further element over which is above mere novelty. It is important to note that, for an idea, a product or a novelty. It is important to note that, for an idea, a product or a response to be creative: it must be relevant to the issue at hand, must offer some kind of solutions and must be effective.

Creativity is not a mysterious, innate endowment of rare individual; instead it is a multi-component process, mediated through social interactions that can be explained by reference to increasingly well-understood and mental abilities such as cognitive flexibility and cognitive control that are widely distributed in the population (Uzoechi, 2014). Creativity most often occurs in a "mental state" where attention is defocused, thought is associative and a large number of mental representatives simultaneously activated. Amabile (1996) in Uzoechi (2014) had proposed steps for the development of creativity as; creativity-relevant skills; these include factorial knowledge, technical skills and special talent. Also, creativity as a relevant resource include appropriate cognitive styles, personality trait, conducive work style and knowledge of strategies for generating novel ideas.

Innovation can be perceived as the transformation of creative ideas into useful ways to produce valuable things to the successful or improved product technology or services.

However, one of the fundamental steps in developing creativity is for the Social Studies teacher to have clear knowledge and understanding of the creative thinking process. It is clear from all the definitions presented that creativity is not a single hard to-measure properly or act. There is evidence that the creative process requires both divergent and convergent thinking and that it can be explained by increasingly well understood underlying mental abilities and cognitive processes (Sawyer, 2006; Kaufman and Sternberg, 2007). Divergent thinking is the ability to produce a board range of associations to a given stimulus or to arrive at many solutions to a problem (Sawyer, 2006). On the other hand, convergent thinking refers to the capacity to quickly focus on the best solution to a problem.

Analytical mode thought is also associated with "critical thinking" this process underlies the purpose, self-regulatory judgement that drives problems-solving and decision-making. These thought process or modes of thinking are considered to be under cognitive control coordinated by the brain. There are the functions which cannot activities such as planning, problem solving and reasoning which are referred to as working memory control (mentally holding and retrieving information), cognitive flexibility (i.e. considering multiple ideas and seeing them from different perspective); inhibitory control (resisting several thoughts or actions to focus only on one (Blair and Razza, 2007). There is therefore, need to plan Social Studies, instructions to involve strategies and techniques that will help in developing and sustaining in the learners divergent, convergent, associative and analytical modes of thinking.

Technological Creativeness in Teaching

Teaching for creativity was advocated by Bruner (1960) who maintained that learners should be encouraged to see a task as a problem for which one discovers an answer rather than seeking answers from books. To teach creativity, the Social Studies teacher should teach creatively and this will take a great deal of effort to bring out the most creative thinking in learners. The teacher should also inculcate teaching for creativity principles which are as follows:

- Encourage learners to believe in their creativity identity
- Identify their creative abilities
- Foster creativity by developing some of the common capacities and sensitivities of creativity such as; curiosity, recognizing and becoming more knowledgeable about creative processes especially those that involves hands-on.

To equip students with evidence based on learning skills in Nigerian students. Most Social Studies teachers teach with textbooks incorporating lecture method which are dominated by facts processing rather than by concepts, principles and evidence-based ways of thinking, hence, students gain little new knowledge from these strategies which are not innovative and student-centred. Exposing students to the history of great inventory is enough a factor in helping student to be creative. People's new creative efforts can be inspired by knowledge of results of previous creative effort of other people. Seeing the results of other people, creativity can stimulate their own creativity, however, role model is one of the important factors for creativity development. Brainstorming is a useful tool to develop creative solutions to problem. This is a lateral thinking by which students are asked to develop, ideas or thoughts that may see out of place or unimportant at first.

Social Studies teacher who acts as a facilitator will help to keep the class focused on the problem, ensuring that no one criticize or evaluates ideas during the lesson, even when they see them as impracticable. Criticism dampens the spirit of creativeness at the initial stage of brainstorming. Students generate ideas and each student is encouraged to pick up each idea generated for discussion to create new ones. Building self-reliance and confidence in the learners is essential in making every learner has the capacity to create and experience the joy of having new ideas. They should be helped in their own capacity to be creative. This could be achieved through reward and intrinsic motivation.

Conclusion and Recommendation

In conclusion, available and adequate teaching materials when appropriated aids effective curriculum implementation, simply because content presented to the learners becomes real and practical. On the basis of the above, the following recommendations are stated thus:

Teachers are to manipulate well, the available and adequate teaching facilities and where there is shortage or lack, and they should improvise. Improvisation is more or less indigenous technology and it is well acceptable in the teaching of Social Studies. Provision of improvised materials should be made by the Social Studies teachers and students are to be encouraged too, to develop skills in it. This is to make teaching and learning practical in order to get understanding of real life situations. Social Studies teachers' expertise should be demonstrated in the mastery of the subject matter and be able to provide and apply appropriate technological gadgets for instructions. This is because an informed individual is seen as the one with innovative orientation and thereby capable of being creative.

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A REVIEW OF ARTIFICIAL INTELLIGENT FOR TEACHING, ASSESSMENT AND RESEARCH IN NIGERIAN UNIVERSITIES

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Abstract

This paper presents a review of Artificial Intelligent for teaching, assessment and research in Nigerian Universities. Artificial Intelligence is both a driving force of the fourth educational revolution and a major carrier of the technological progress that is changing societies and economies globally. This review summarises relevant research on meaning of Artificial Intelligence, the major Artificial Intelligence technologies which are machine vision, expert systems, machine learning, natural language processing, deep learning, and robotics, importance of Artificial Intelligence to education, Artificial Intelligence in Nigeria, utilisation of Artificial Intelligence for education which consist of Artificial Intelligence technologies for teaching, Artificial Intelligence technologies for assessment and Artificial Intelligence technologies for research. Artificial Intelligence technologies for teaching which are Gooru, Project Essay Grade (PEG) Writing Scholar, Grammarly, Padlet, Presentation Translator, Smartboards, Intelligent Tutoring System and Intelligent Virtual Reality, Artificial Intelligence for assessment which are Gradescope, Intelligent Essay Assessor, Automated Essay Scoring, Robot, Automated facial recognition, Turn-it-in, and Artificial Intelligence for research which comprises of Scopus, Web of Science, Grammarly Premium and Research gate. The paper concluded by advocating for Government organisations, agencies and Non-Governmental Organisations to fund more researches in Artificial Intelligence in Nigeria, procure Artificial Intelligence technologies that can ease the demanding tasks of Nigerian lecturers. Universities management should provide enabling environment for lecturers and students to effectively use Artificial Intelligence technologies. More conferences, seminars and workshops should be organised for Nigerian scholars to keep them abreast with the global emerging technologies.

Keywords: Artificial Intelligence, University, Teaching, Assessment and Research

Introduction

The innovative, evolutionary and revolutionary growth and development of digital technology and ICT in education have instigated the fourth education revolution (Education 4.0). Education 4.0 has a significant effect on learning opportunities, educational policies, and instructional procedures (Eleyyan, 2021). Education 4.0 is evolutionary in nature since newer technologies and education approaches have been replaced by previous technologies and education approaches. AI is a major player of Education 4.0

Overview of Artificial Intelligence

Artificial Intelligence is both a driving force of the fourth educational revolution and a major carrier of the technological progress that is changing societies and economies globally. Artificial Intelligence refers to the study of intelligent machines and software that can reason, learn, gather knowledge, communicate, manipulate and perceive objects (Verma, 2018**).** Artificial Intelligence is a part of computer science that deals with the design of intelligent systems; that is, systems that exhibit characteristics associated with intelligence in human behaviours (Ocana *et al.,* 2019). Similarly, Strusani and Houngbonon (2019) defined AI as a combined large volume of data with computing power to simulate human intellectual abilities such as reasoning, language processing, perception, vision recognition and spatial processing.

Major Artificial Intelligence technologies

The major Artificial Intelligence technologies include machine vision, expert systems, machine learning, natural language processing, deep learning, and robotics.
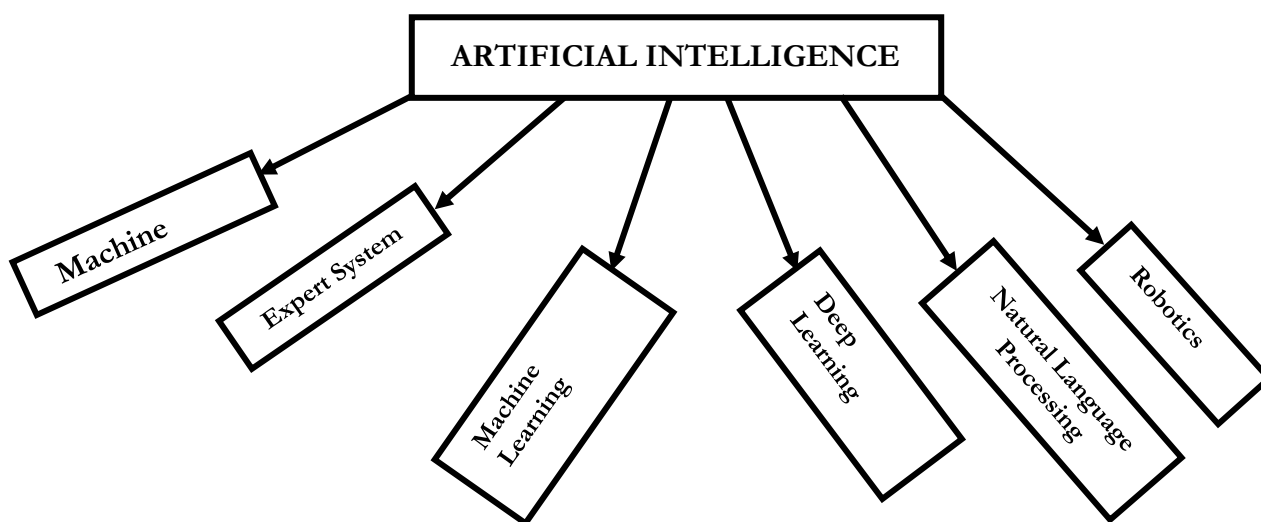
Figure 1: Diagram of major AI technologies

Machine Vision (MV)
Machine vision also known as computer vision is a major technology of Artificial Intelligence that enables software to recognize patterns, make predictions, and apply newly discovered patterns to situations that were not included or covered by their initial design (Richter *et al.,* 2019). Machine vision enables visual perception like human recognition of image characteristics with high speed, high precision, and high accuracy, it uses a camera and computer to perform the functions of recognition, tracking, measurement of objects and image processing. Machine vision technology has been widely adopted in video surveillance, automated facial recognition, and biometric face-scanning surveillance, autonomous driving, medical image analysis, and archaeology (Chen, 2019). Machine vision can be utilised in education for taking attendance records, monitoring facial expressions of students and facial detection of a confused learner.

Automated Facial Recognition (FR) integrated with machine vision has been used for attendance marking in class. The use of the FR system for attendance marking allows teachers and students to use class time more effectively and saves lecturers' time by eliminating the need to cross-check the attendance. Machine vision embedded in cameras are used to track movements and monitor students' facial expressions during classes and examination.

Expert System (ES)
Knowledge based expert system or expert system is the ability of computer software to imitate a human expert on a particular subject area to solve a problem using a well-organized body of knowledge. Nwigbo and Madhu (2016) noted that expert system uses a knowledge base of human expertise for problem-solving and make decisions exactly as a human expert would have done. In education, expert system's applications are embedded into the Intelligent Tutoring System (ITS) which act as professional tutors to provide personalise learning to students considering the students prior knowledge and ability. Artificial Intelligence career coaches are embedded with expert system to provide individualised advice to students based on their history, experience, locational choice, skills combined with career requirements to satisfy students' need to further their study (Khare *et al.,* 2018).

Natural Language Processing (NLP)
Natural language processing is a technology of Artificial Intelligence mainly concerned with the imitation of human natural language and communication methods. The Natural language processing offers ways of communicating with an intelligent system using natural languages such as English,

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French, Swahili, and Chinese in either written or spoken form. Natural language processing is integrated into machines to enable the machines to perform useful activities that require natural human languages.

Natural language processing is integrated into talking calculators to provide oral dictation of punched numbers or signs. It also allowed more users in different countries to have access to either spoken or written information in different languages and persons with visual impairments, hearing difficulties, dexterity and motor difficulties can initiate and manage conversations with others independently. Natural language processing is integrated into commonly used services such as Google Translate and chatbots (Kolodny, 2017). Natural language processing can help learners with spelling and grammatical corrections and also offers automatic online translation for those work with multiple languages. Artificial Intelligence writing assistants based on Natural language processing and Machine learning help users through various steps of the writing process and augment their writing (Pokrivcakova, 2019). These writing assistants can correct grammatical errors within a written text, provide feedback and recommendations for later improvements Examples of AI writing assistants are Grammarly, ProWriting Aid, Textio, AI Writer, Textly AI and Essaybot among others.

Chatting robots (chatbots) allow learners to learn through the process of direct communication with a robot which can also provide customized answers in response to learners´ messages, grade their performance, and provide tips on areas learners need to improve (Pokrivcakova, 2019). Natural language processing is embedded in presentation translator to display lecturer's spoken information below the presentation, thus allowing students to read what is being said on the lecturer's display or on their devices.

Machine Learning
Machine learning (ML) is the most advanced area of Artificial Intelligence, it refers to the designing, training, and deploying of models to applications, processes, and other machines by providing algorithms, Application Programming Interfaces (APIs), development and training toolkits, data, and computing power (Chen, 2019). Goksel and Bozkurt (2019) added that Machine learning is a system in which existing data is used for future predictions. Content providers use machine learning to determine what course material works best in each study area. With machine learning, lecturers make use of feedback and scoring systems to help grade assignments, guard against plagiarism, and assess students' progress.

Machine learning integrated into Natural language processing to provide text-to-speech applications, language-to-language translation applications. For example, Google Translate created from a set of machine learning algorithms rely on Natural language processing to recognize speech and synthesis, allowing students to understand or pronounce words they have never encountered before (Kucak *et al.,* 2018). Machine learning has changed the way information is search for by automating related suggestions to users and making recommendations for information to search with just a click. For example, Google adjusts search results according to geographic location or previous searches, and recommend information to be searched with just one click which will give students and lecturers access to a wide range of information and knowledge on the internet.

Deep Learning (DL)
Deep learning also known as deep neural network is a technology for implementing machine learning. Deep learning is primarily used in pattern recognition and classification applications supported by large data sets (Chen, 2019). Deep learning allows virtual assistants to detect and understand speech, images, sound and videos. Deep learning has increase the efficiency of online learning as adapted educational software are used in online platforms which makes it easy to meet individual needs of students thus fostering personalised learning and offer an opportunity for learners to get extra assistance from tutors.

Robotics

Robotics entails the science and technology of designing, constructing, operating, manufacturing and application of robots. The Robot Institute of America in 1979 defines a robot as a reprogrammable, multifunctional manipulator designed to move materials, parts, tools, or specialized devices through various programmed motions for the performance of a variety of tasks. Robots are built with the ability to sense their environment in ways that are similar to the way that humans sense their surroundings (Odoh, 2018). Robots can be used to provide a synchronous lesson to students who are absent from school. For example, Avatarion, a Swiss company that builds robots connected to the Microsoft Azure IoT Hub to provide physically absent students in a class, with full video and audio connections in their hospital or home to enable them to participate in the learning process, the student uses a tablet to control the robot's movements, and answer questions by raising the robot's hand and speaking through a connected microphone and speaker (Mamudu & Lamido, 2017).

Artificial Intelligence in Nigeria

The government of Nigeria has taken steps to promote the advancement of Artificial Intelligence in the country, this is obvious in the formation of National Agency for Research in Robotics and Artificial Intelligence (NARRAI) in 2018. According to the Minister of Science and Technology, Dr. Ogbonnaya Onu, NARRAI will coordinate and control all researches relating to AI and robotics. Ladeinde (2019) added that the agency will collaborate with international research bodies, work with tertiary institutions and promote Nigeria's ability to leverage Artificial Intelligence technologies for economic growth.

In 2015, a twenty-four-year-old Nigerian, Bobai Ephraim Kato built a fully functional Artificial Intelligence robot for his final year project at the International College of Business and Technology (ICBT) in Sri Lanka, when the directive came to his class to create software that uses Artificial Intelligence for predictions and solutions, the robot has been tested and trusted for puzzle-solving (Ogbonnia, 2017). ScholarX in Nigeria, is a social impact start-up focusing on education to help young Africans from low-income backgrounds have access to quality education through scholarships, crowd-funding and e-learning (Nsehe, 2019). According to Ogbonnia (2017), another AI Innovation can be traced to the Obafemi Awolowo University iLab team when a member of the team, Ishola Babatunde Isaac in July 2016 developed a system called Remote Lab. This Artificial Intelligence system allows students to control real laboratory equipment over the internet without time and space restriction and this Remote Lab has been a great substitute for experimentation in Nigerian Universities. In June 2018, Google established its AI research hub in the University of Lagos, Nigeria (Hussain, 2018).

Utilisation of Artificial Intelligence for education

AI has penetrated education spheres, in the form of intelligent books, web browsers, education apps, and learning platforms (Karsenti, 2019). AI has enable new ways of learning, teaching, assessment and research thus, increasing the efficiency of educational activities and give access to a wide range of information.

Artificial Intelligence technologies for teaching

Gooru: Gooru is a free search engine described as GPS for learning which is used by teachers and students to search for rich collections of multimedia resources, digital textbooks, webpages, videos, games and quizzes created by educators in the Gooru community (Humphry, 2012). Similarly, Hertz (2015) added that Gooru is a very effective way to provide personalised learning as existing collections in the library can adapted to the specific needs of their students or teachers can build their teaching contents from the scratch. Gooru makes it easy for lecturers to address students' needs (Wadhwa, 2017). Courses designed in Gooru empower lecturers to construct personalised learning opportunities

for students, enabling them to organize course content into comprehensible units of study comprise of narrated collections and assessments with access to immediate feedback (Agarwal, 2018).

Project Essay Grade (PEG) Writing Scholar: Project Essay Grade (PEG) Writing Scholar is an online learning environment that also allows users to improve their writing skills, get instant feedback with recommended activities that enable teachers to track the progress of each student (Stanojevic, 2020). Using PEG Writing Scholar, students get immediate feedback to their submitted writings with suggestions to improve the student's writing, the teacher can also monitor the students' progress on the platform.

Grammarly: Grammarly is a free-online proofreading website that can be used to survey documents for grammar mistakes (Karyuatry *et al.,* 2018). Grammarly is integrated with ML algorithms which automatically detects errors, plagiarism and suggest corrections for grammar, style, word usage, spelling, and punctuation (Faller, 2018). In addition, Grammarly as an automated grammar tutor and revision support tool is used by a student to develop essential writing skills in the student while preventing plagiarism, thus allowing the user to focus on the content of the paper rather than grammatical or spelling errors. Grammarly can be used as an appropriate tool to minimize errors and improve students' writing quality. Karyuatry *et al.* (2018) study revealed that lecturers admitted that the use of Grammarly was very helpful to minimise tutor's correction on students' essays and the students actively participated in the writing process.

Padlet: Padlet / Padlet.com is a free web application featuring a virtual wall where multiple users can post comments and media in real-time (www.padlet.com). For teaching and learning purposes, this can be useful to encourage collaboration and knowledge sharing among students, between students and teachers and around particular topics synchronously thereby enhancing whole class discussion and participation. Padlet walls are used for viewing students' work, grading submitted answers and continual assessment of students' progress, viewing teacher's comments, getting feedback, and for revision/reference. Martin (2019) added that Padlet is a suitable tool for brainstorming because it provides an easy and quick way to place students' ideas on the wall which are viewed simultaneously by other students thus contributing to the generation of new ideas.

Presentation Translator: Presentation translator works like PowerPoint but it creates real-time subtitles of what the teacher is saying, displaying them below the presentation, translate the conversation into over 30 languages. Presentation translator allows students to hear and read teachers spoken words in their native language. Similarly, Mamudu and Lamido (2017) noted that Presentation translator can draw students into a conversation and enhance full class participation. In classes where all the learners speak and understand English as the only language spoken, deaf or hard-of-hearing students can follow along with the real-time display, either on the teacher's display or by joining the conversation on their smartphone. With the use of PT, students who speak and understand different languages can learn and participate in a class at the same time.

Smartboards: Smartboards or Interactive Whiteboards (IWB) are potential tools for collaboration, improving students' learning outcomes and streamlining lesson planning (Shi *et al.*, 2012). According to Samsonova (2018), Interactive Whiteboards enhances interactions in combination with a remote device, support collaborative learnings, facilitate learnings, save teacher's time, promote idea sharing, and enhance class management and class preparation. IWB enables teachers to integrate computer applications like graphic design tools, spreadsheet tools, database tools, and use social networking technologies such as YouTube, Wiki, Facebook, and Twitter, to create profiles and share information with the entire class.

Intelligent Tutoring System: Intelligent Tutoring System (ITS) is a program that aims to provide immediate and customized instruction or feedback to learners using human-like interaction and

conversation style dialogues (Goksel & Bozkurt, 2019). Intelligent Tutoring System are designed to simulate one-to-one personal tutoring by providing corrective feedback and tailoring of instructional materials to learners need. Examples of E-Tutor (for learning German as a second language), TAGARELA (for learning Portuguese at the university level), Tabtor, Carnegie Learning and Front Row (Kurshan, 2016).

Intelligent Virtual Reality: Intelligent Virtual Reality (IVR) is an AI-based avatars that can simulate realistic conversations with learners, which enables learners to gain fluency and build confidence through highly personalised practice. IVR is used to create authentic virtual reality and game-based learning environments. Virtual agents (avatars) can act as teachers, facilitators or students' peers.

Artificial Intelligence for assessment
Gradescope: Gradescope is an AI-based grading system used by universities to assess word length, spelling errors, and the ratio of the upper case to lower case letters (Omer, 2019). Similarly, Wiggers (2019) added that Gradescope can reduces grading time by 90 percent. With this automated grading system, students receive immediate grades and feedback on their work after submitting rather than waiting for days or weeks to receive feedback and grades.

Intelligent Essay Assessor: Intelligent Essay Assessor (IEA) is an internet-based tool that automatically user's text structure based on the six traits of writing, which include ideas, organization of texts, conventions, the fluency of sentences, the choice of words and way of writing (Stanojevic, 2020). IEA assesses writing by considering the arrangement of text and the extent in which the written content reflect the provided topic. IEA evaluate factors like the style of writing, comprehensibility and usage of words in essay.

Automated Essay Scoring (AES): Automated Essay Scoring (AES) engines have been integrated into the platforms of many higher education institutions including, providers of massive open online courses, EdX, Coursera, and Udacity, to score the writing of the thousands of students who enrolled in a single course (Murphy, 2019). Automated Essay Scoring engines also provide students with basic immediate feedback, guidance, and model writing samples to help students improve, revise their writing and detect plagiarism.

Robot: A robot is a reprogrammable, multifunctional manipulator designed to move material, parts, tools or specialized devices through variable programmed motions for the performance of a variety of tasks (Mamudu & Lamido, 2017). Robots have been applied in education today for teaching, learning, assessment, providing feedback and as a tour guide for students on the campus. Robots can be used to provide customized answers in response to learners´ messages, grade their performance, and provide tips on what area learners need to improve.

Automated facial recognition: Automated facial recognition like biometric face scanning surveillance can be used to automate attendance roll marking in class and during examination. With machine vision, students face are captured during class and examination and are saved, thereby freeing the instructor the time that could have been spend for attendance roll call. Automated facial recognition enables the instructor to track and keep records of the exact attendance as learners cannot mark attendance for those who are absent from school which is predominate in Nigerian Universities.

Turn-it-in: Turn-it-in is a web-based software that is used for plagiarism detection and is meant to aid and promote the originality of any research publication (Garba, 2017). Turn-it-in is using AI to assess, provide feedback to students' writings and ascertain their level of plagiarism when they "turn it in". Turn-it-in shows the parts that are likely to have been plagiarized, the potential sources, and the percentages of plagiarism from these sources (Karsenti, 2019).

Artificial Intelligence for research

Scopus: Scopus is a multidisciplinary citation and abstract database for research literature and quality web sources. Scopus makes use of AI tools for tracing, analysing and visualising research information. It can be used to generate precise citation search results and automatically create and update researcher profiles thereby enhancing connections between scholars, published ideas, and institutions

Web of Science: Web of Science connects publications and researchers through citations and controlled indexing in curated databases from various disciplines. The cited reference search in Web of science uses AI to track prior research and monitor current developments in over 100 years' worth of content, records and back files that are fully indexed.

Grammarly Premium: Grammarly Premium is an automated proofreading system that can identify errors related to 250 grammar rules while preventing plagiarism. The use of Grammarly premium will enable lecturers to focus and concentrate on the idea they want to convey rather than on spelling or grammatical errors.

Research gate: Research gate is used for collaboration with colleagues and peers of similar interest in research.

Conclusion

The utilisation of Artificial Intelligence for education in Nigeria Universities is still at its amateur state. Hence, the need for Government organisations, agencies and Non-Governmental Organisations to fund more researches in Artificial Intelligence in Nigeria, procure AI technologies that can ease the demanding tasks of Nigerian lecturers. Universities management should provide enabling environment for lecturers and students to effectively use AI technologies. More conferences, seminars and workshops should be organised for Nigerian scholars to keep them abreast with the global emerging technologies. Research institutes in Nigeria should focus on designing and deploying of AI technologies for educational purposes.

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COVID-19 PANDEMIC AND THE NEW EDUCATIONAL PARADIGM

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Abstract

The educational system of Nigeria is now characterized by certain gradual changes of an educational paradigm. The educational paradigm is understood as acknowledged by the concrete period and are the cornerstone of scientific, social science, and arts research. Change of an educational paradigm includes a transition from the education aligned on teaching and learning based on conventional training. The criteria for the change of this paradigm are: the education which is more aligned on the student; change of teachers' role, the further definition of the main goal; transition from potential to result in a change of the training process. The new educational paradigm in education also objectively meets both social expectations in education and the interests of participants of the educational process. At the same time. The practice of teaching at the higher school showed that the existing crisis in the field of education for a long time is not only overcome, but still is not even fully realized by most of the participants of the educational process. The explanatory and illustrative didactic remains the leading model in the educational process where activity is transferred as the unique training content. Moreover, it contradicts new laws of practice. There is an urgent need to train students in thinking (the theoretical, dialectic, logical analysis, synthesis, system approach). They are developing their creative abilities (ability to apply the acquired knowledge in any situation, including definition and search of new ways of tasks solution, increasing teachers' professional skills when they can freely carry out the pedagogical activity in standard and unusual situations.

Keywords: Covid-19, New educational paradigm, Teaching and learning with technology

Introduction

The pandemic of Corona Virus Disease-19 (Covid-19) shutdown almost all institutions including educational institutions. By the end of March 2020, the World Health Organization reported that more than 80% of educational activities have gone moribund with the pre-primary, primary, secondary, and tertiary education shutdown. United Nations Educational Scientific and Cultural Organisation (2020) and World Bank (2020) recommended that learners not be neglected. However, remote Learning Community (RLO) should be built up to effectively and efficiently interact with the students, parents, and other instructors on teaching (Farshid et al, 2020). Such emergency shift in interaction can be real-time, online teacher-learners interaction and interation of computer-based skills known as synchronous and asynchronous instructions like video-conferencing, a system using Zoom, Google classroom, Google meet, Telegram, WhatsApp, etc.(Govender and Kayode, 2020). As the paradigm shift created tension, the need for professional development and supports becomes expedient to mellow the strain and avert the apprehension of online and offline instructional presentation.

The educational system of Nigeria and the rest of the world is now characterized by certain gradual changes of an educational paradigm (Chukwukailo et.al., 2014). Due to the update of this paradigm within the system of high school, the main heading of pedagogical science, social science, and art lies in the field of definition of an activity position which will be conducive to the establishment of a complete and system view of professional activity: It is a system of interaction and the competent solution of new problems and tasks.

Kucharcikowa, (2014), Zakirova & Purik (2016), given the above description of a problem relevant in the justification of a new educational paradigm for a system of higher education, becomes up to date a shift based approach on a row with modern methodological approaches. These modern methodological approaches are laid in the COVID-19 triggered paradigm- teaching and learning with technology and reflective thinking (NSTA, 2020, 2021; UNESCO, 2020; UNICEF, 2020).

Education is intended to have creative and innovative character (Saliceti, 2015). In the world where variability is the feature for not only scientific, social science, and arts but also is a lifestyle for the masses, the main goal for schools and universities became not only to transfer to new generations

earlier accumulated knowledge but also to prepare them for the solution of problems which the personality and society have never met before. Change of an educational paradigm as a result of pandemic includes a transition from the education aligned on teaching to the education aligned on training using technology as a tool (Andreev, 2005; Gabdrakhmanova, Kalimullina & Ignatovich, 2016). In a former paradigm, the main emphasis was placed on the acquisition and transfer of knowledge. The criteria for the change of this educational paradigm are the education which is more aligned on the student; change of teacher's role, the further definition of the main goal transition from potential to result; change of the training process. The education aligned on the student means the shift of accents from teaching (the teachers' prevailing role in the delivery of knowledge) to training (vigorous educational activity of the student).

The new educational paradigm implements its principles by setting forward the process of increasing the time for independent and practical work of students, which allows them to be active at seminars and laboratories, participate in discussions, and seize design techniques (Berulava & Berulava, 2012). In general, the experience of creative activity will develop the necessary abilities to observe, classify, use symbols, carry out reasonable choices, define and measure. Moreover, practical use of knowledge will lead to the development of such skills to mark out a problem, to explain its main points, to reveal cause and effect relations, to plan ways of solution, to carry out experimental inspection, to model, to analyze and the introduction of new educational paradigm in order to improve the educational system in Nigeria and the rest of the world.

Covid-19 and the Challenges in Education

The idea that teachers should adopt digital technologies in a favourable environment is not new (Torres et. al., 2021; Williamson et. al., 2020). An environment that gives confidence, security and the necessary time for the exploration, evaluation, adequacy and improvements of the experiments performed. The history sequence breaks the paradigm and creates the environment and time as if it wanted to go backwards in search of agent demands for strategies to be adopted in all areas of society. There is an ongoing attempt to launch packages of emergency measures, mostly adopting digital technologies most of the world's governments are concerned with safeguarding their economies from the chaos caused by the Covid-19. In the case of educational institutions and teachers, a package is launched.

A package to be ingested in a bombastic dose, both by teachers without experience with digital technologies and by teachers that already adopt digital technologies in their educational practices only with the purpose of saving the educational programmes. However, how many teachers are ready to teach in an online environment. What changes in the traditional paradigm should be observed before application? How to properly switch classes to a virtual classroom? How to properly guide students to perform in virtual environments, with teachers and students in the same boat and some teachers just starting their journey in the virtual world. The logic of going digital is not simple. It has complex ingredients as urgency, readiness to deal with Virtual Management System (VMS) and online teaching tools, digital fluency, and the necessity of dealing with the emotions of fear and boredom of social isolation. The mark of this time is uncertainty.

Therefore, classes must rigorously consider all the already inherent educational challenges; planning linked to learning objectives; diversity of didactic pedagogical materials and resources; motivating activities; students profile; diagnostic and procedural assessment of learning; validation of the effectiveness and relevance of the methodology used. A key issue in these times of pandemic is providing all students with access to the internet and, consequently, online learning platforms and tools. Nevertheless, is this possible, even in times of emergency? A good teacher knows he must work with the syllabus well to succeed with the students' learning to achieve the main objective, communicating the context involves, motivating, involving, and engaging each student in the teaching and learning process.

The logic is one for all and this is represented by many rhythms, stories, differences, evolution, and personalized times. Furthermore, now, everyone is both together and separated by the threat of the Covid-19. In the package of educational challenges, there are many stages. Some of them are done at the same time. It is the teacher's job to establish the one or the all, exercising an education. For life in

a moment that reigns the fear of death, many might think right now the reason for studying if we want to save our lives. It is up to the teachers on stage to prepare the students for the future, remembering that we must have hope and that death or changes, even the radical ones, bring a new beginning. Therefore, we must prepare ourselves for the changes in the best way possible.

Covid-19 Pandemic, Moving from the Classroom to the Virtual Environment- The new educational paradigm

The National Science Teaching Association (NSTA) in America gave the Next Generation Science Standard (NGSS) as teaching science and allied subjects with technology and reflective thinking (NSTA, 2012, 2015, 2020). The COVID-19 pandemic has compelled all institutions including educational industry to imbibe and adapt technology as a medium of interaction. The new educational paradigm is stringent on teaching and learning with technology along reflective thinking (Olagunju & Adesina, 2017; Adebiyi, 2019; Kayode, 2019; Obanya, 2021; okebukola, 2021). Technology enhances, enables, enriches and empowers both the instructional process, the learners as well as the teachers (instructional facilitators) (Olagunju & Adesina, 2017), it heightens the standard and quality of educational instructions (Okebukola, 2021), it stimulates the multi-faceted thinkability of the learners (Adebiyi, 2019; Obanya, 2021), bridges the gap between the curriculum contents and the world knowledge (Ige & Oke, 2019; Adesina, 2019; Aremu, 2019).

Technology Aided Instructions (TAI) as the new educational paradigm allows both the synchronoius and the asynchronous instructional delivery in blended forms, flipped mode, onsite and offsite instructional interactions between the learners and the instructional facilitator (Kayode, 2019). The new educational paradigm triggered and compelled by the COVID-19 pandemic enthuses the learners, stimulates their curiousity, motivates their learnability, sustains and supports learners' interests, heightening the students' disposition to learning and improve academic achievement (Adesina, 2015; Aremu, 2019; Okebukola, 2021). The concept of the educational paradigm is best explained in the Thomas Kuhn (2003) paradigm change.
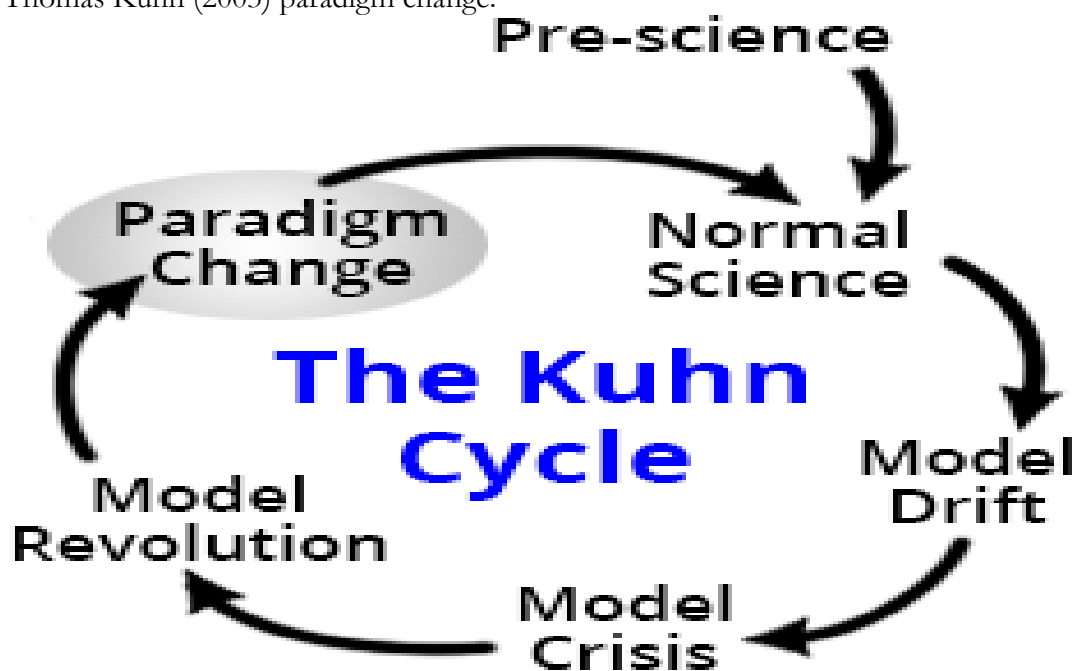

Fig- 1: Conceptual model of paradigm change (Kuhn, 2003)

The above model was developed by Thomas Kuhn (2003) to expatiate the concept of paradigm shift in science. The model is also known as a paradigm shift, *Paradigm change* is the fifth and final step in the Kuhn Cycle. Earlier steps have created the new model of understanding (the new paradigm). In the Paradigm Change step the new paradigm is taught to newcomers to the field, as well as to those already in it. When the new paradigm becomes the generally accepted guide to one's work, the step is complete. The field is now back to the Normal Science step and a Kuhn Cycle is complete.
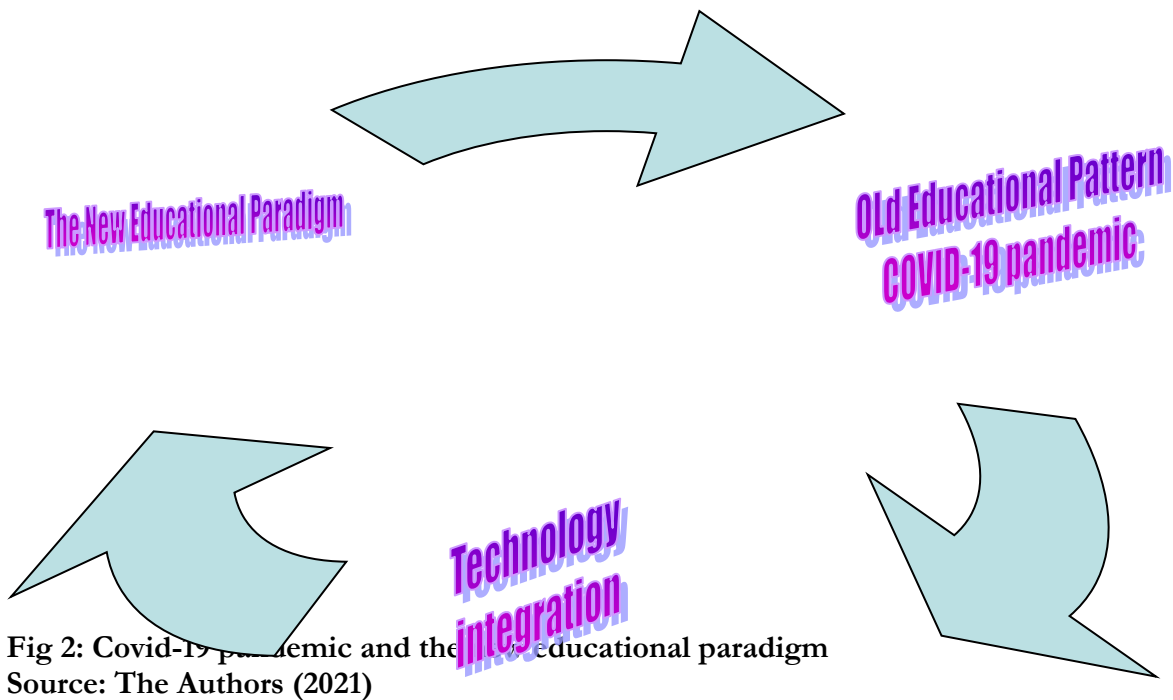
Fig 2: Covid-19 pandemic and the new educational paradigm
Source: The Authors (2021)

Figure 2 depicts the model for the new educational paradigm with the insurgency of COVID-19 pandemic on the old educational pattern, the utmost need of technology integration become paramount in sustaining the educational institutions across the globe. Technology breaks the lockdown created by COVID-19 pandemic to facilitate the birth of a new educational paradigm (educational new normal).

Theoretically, the new educational paradigm is pivoted by the behaviourists' and the constructivists' theories of learning. The experiment of Pavlov presents a typical behaviorists' stand with emphasis on stimulus response (S – R). Pavlov sensitized a dog with the ringing of a bell which is immediately followed by food for the dog. The dog consequently salivated whenever it hears the sound of the bell in anticipation that food will naturally follow. The bell is the educational instructions, the conditional stimulus while the meat is the technology, the unconditional stimulus. Anytime, the unconditional stimulus (technology) is associated with the conditional stimulus (educational instructions) the results, salivation (learning) is usually effective and enhanced. The theory of constructivism is premised on the variations postulated by Vygotsky, Gagne, Piaget and Brunner. Constructivism is a theory of knowledge (epistemology) that holds that humans generate knowledge and meaning from an interaction between their experiences and their ideas, learning is participatory and sharply contrasts with one in which learning is passive transmission of information from one individual to another (Piaget, 1973). Vygotsky (1986) puts forth a situation in which problems would be posed, answers provided, students discuss and work on the real problems posed, direct, thoughtful and open-ended questions will be asked, which will in turn, encourage students to create and ask questions to teach each other. Bruner (1986); Gagne (1985) and Piaget (1973) believed that such knowledge constructed would find useful links with previous ones and utility. All these constructivists' submissions are feasible in the new educational paradigm in teaching and learning with technology and reflective thinking (NSTA, 2015, 2020).

Evidences abound in research that the new educational paradigm, teaching and learning with technology and reflective thinking is highly promising. Eyyam and Yaratan (2014) in a quasi-experimental research design determined the impact of use of technology in mathematics lessons on student achievement and attitudes found that technology improved students achievement and that the students had a positive attitude towards technology use. Brasiel, Jeong, Ames, Lawanto and Yuan (2016) studied the effects of educational technology on Mathematics achievement for K-12 students

in Utah reported that teaching mathematics has long required the use of technology and that educational technology has been developed to support personalized learning through the use of adaptive learning systems in an online learning with great potential for improving students' mathematics achievement.

Viberg, Gronlund and Andersson (2020) investigate integrating digital technology in Mathematics education: A Swedish case study using interviews and observations established that the major obstacle for student learning is a less developed social artifact is the use of the tool effectively when teachers do not work to develop shared practices in technology use, learners do not fully understand how they can learn from it, neither can they help themselves in synthesizing teacher- and tool instructions. The authors reported that the students end up having competing masters rather than integrated teacher instruction and technology assistance.

Novita and Herman (2021) enquired digital technology in learning mathematical literacy, can it be helpful? The study bring into being that the use of digital technology does not mean the presence of teachers in learning is no longer needed. Instead, its role has changed to become a designer and facilitator who will guarantee the creation of learning that can cover mathematical literacy and digital literacy adequately.

Carstens, Mallon, Bataineh and Al-Bataineh (2021)   surveyed K-12 educators to get feedback on how technology affects their classroom. The research determined how technology affects student learning. The findings showed that more training for teachers and students are expedient to better implement technology in the classroom. Borba (2021) identified that the digital technology became a trend in mathematics education in response to the arrival of a different kind of artifact to the mathematics classroom with a promise of positive impacts on performance in the subject.

The existing stigma and prejudice towards online education are overturned by the imperative need to move the classroom to the virtual environment, as the covid-19 pandemic forces everyone into social isolation. However, this drastic and immediate change generates conflicts, confusion, and anxiety among those involved with education since this move is not automatic.

Different learning spaces require different approaches, methodologies, strategies, and views just moving a class once offered face to face into the virtual environment is inappropriate (Heirdsfield et.al., 2011) . In this period of changes, professional interactions and collaboration become relevant and meaningful for developing and improving online teaching; multidisciplinary teachers from different educational institutions can work jointly. Therefore, it is essential to encourage ongoing professional contacts, discussions, and reflections on online practice and strategies to reinforce the need for cooperation and collaboration. There are questions about systems, methods and time for moving the classrooms to the virtual space and the crucial question of how long the constraints will determine face-to-face distancing? What does a teacher have to observe to make moving to the virtual environment successful? How can the work of the online teacher in the design organization and planning of the new educational proposed be a stimulus for students' meaningful learning? All these and many other questions should be rationalized in the shift to the new educational paradigm.

An important issue is a joint work between teachers and students, and students with each other, with the knowledge, such work contributes to the students better qualification since it awakens in them the interest in the search for their path of development as citizens. Therefore, collaborative work in the teaching and learning process is fundamental for active and meaningful learning using the new educational paradigm. Moreover, it is in seeking this collaborative balance, respecting the peculiarities of the group, that the solutions will emerge with the first successes and eventual mistakes.

Conclusion

This paper analyzed the recent challenges in the educational system and the Covid-19 pandemic crisis and addressed their sustainability in the post-Covid-19 era in Nigeria with the new educational paradigm. It showed that the spillover of the Covid-19 pandemic into Nigeria's educational system coupled with declining oil price, which were external shocks, caused the economic crisis and social crisis in Nigeria in 2020. The structural problems in Nigeria at the time prolonged the educational

crisis. This is a time for us to enrich our physical skills, methodology, and emotional health and not just focusing on avoiding the coronavirus create a new normal daily routine by developing new educational paradigm, enrich our mind by reading some great books learning a new skill, visualize and document your long-term planning and plan to pursue those plans with passion when the Covid-19 pandemic is over.

Suggestions for enhancement of the new educational paradigm

This study suggests the following for the effective and efficient enhancement of the new educational paradigm:

1. Policy-makers should introduce educational reforms to strengthen the new educational paradigm of teaching and learning with technology and reflective thinking;
2. Policy-makers in Nigeria should invest in educational care by providing necessary technological facilities in schools to improve the implementation of the national policy of the new education paradigm to withstand the problems of the Covid-19 pandemic;
3. There is also a need to build an appropriate digital educational system to facilitate the transition from classroom-to-classroom activities to a digital, online, technology-aided teaching and e-learning process that can help grow the digital educational system;
4. The government needs to re-focus on capacity-building institutions, training and re-training the teaching and the non-teaching staff in order to pay more attention to the new educational paradigm and the Nigeria Centre for Disease Control (NCDC) requirements.

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INVESTIGATION INTO STUDENTS' UTILIZATION AND PERCEIVED BENEFITS OF WEB BASED RESOURCES IN COLLABORATIVE LEARNING ACTIVITIES AT FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA, NIGERIA

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Abstract

The study examined students' utilization and perceived benefits of web-based resources in collaborative learning activities at Federal University of Technology, Minna. Four research questions were raised. The study adopted a descriptive survey research design. The study area was limited to eight academic schools with a population of 16,000 students as at 2015/2016 session. Amongst the eight schools, four were purposively selected for the study. The sampled students were stratified along variables of gender and course of study. For the stratification, random sampling technique was used to select the undergraduate students from each of these schools. In all, a total of one hundred and sixty (160) students which represents 0.1% of the entire student's population in the University were used for the study. Out of this sample, fourteen (14) students each were sampled in all the twelve Departments in the four schools. However only 140 copies were retrieved back from the students. The instrument used for this study was a researcher designed questionnaire. After the questionnaire had been drafted, it was taken to three experts to validate. Thereafter, the instrument was tested for reliability. To ensure the reliability of this instrument, Cronbach alpha formula was employed and the value of 0.81 was obtained. Data were collected by direct administration. The instrument was administered to the respondents and retrieved after the respondents had filled them. Data obtained was analyzed using descriptive statistics of frequency counts and percentages. Results from the study revealed that web-based learning resources have positive influence on students collaborative efforts in Federal University of Technology, Minna. The study also revealed that majority of the respondents (students) uses google.com, others rarely uses or have never used other search engines. Based on findings of this study it was recommended that students should adopt web-based learning resources in teaching than depending only on conventional resources. Students should explore other search engines as they can get useful information for learning.

Keywords; Web based resources, Students' Utilization, Collaborative learning, Perception.

Introduction

The trend in educational development is adjudged to be increasing worldwide where emphases are now laid on improvement in learning rather than teaching which the conventional mode is. The search for a 'more effective' approach to teaching and learning has persisted over the years. Badmus (2012) noted that the search has actually led to a variety of suggested instructional approaches. He also observed that there is an emergence of new approaches to teaching and learning which has resulted in an unprecedented improvement in education.

The influx of ICT gadgets in education must have necessitated the review of the definition of educational technology by the Association of Education and Communication Technology (AECT). Thus, educational technology is referred to as the study and ethical

practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources (Badmus, 2012). Januszewski and Molanda (2008) asserted that the focus of educational technologists now is on designing, developing, utilizing and managing appropriate technological processes and resources. The conventional form of learning do not create an engaging and interesting learning environment for students. With the advent of modern technology, learning are made easy as the students Interest is on the increase. Brown and Ford, (2002) concluded that in recent years the delivery of university courses has shifted from pure classroom-based instruction to the use of web-based learning resources (WBLR). Such resources include lecture recordings, on-line discussion boards, on-line quizzes and pure web-based instructions. The use of web-based learning resources (WBLR) for students have several potential advantages which include; provision of students with additional learning materials which they are able to revise; provision for students with the opportunity to share their knowledge; allow students to catch up on course material if they miss a face-to-face lecture and, provide students with flexibility on when they learn. Ojoye (2012) asserted that every facet of Education has been affected by ICT, whether formal, informal or semi-formal settings, It has influenced curriculum content, resource utilization, curriculum structuring, assessment and evaluation and even substantial reforms in access to education. The introduction of e-learning and online resources enables a greater degree of flexibility in providing support for the diverse demands of these students. Ginns and Ellis (2007) acknowledged the increasing pressure for greater integration of new technology into the student learning experience. Wells de Lange and Fieger (2008) found that the use of technology in educational settings assists in the achievement of learning outcomes. Sanders and Morrison-Shetlar (2002) and Buzzetto-More (2008) reported that student attitudes toward technology are influential in determining the educational benefits of online learning resources and experiences. Research conducted by Perera and Richardson (2010) suggested that the quality of the actual time spent online may influenced learning outcomes. This corroborates an earlier study by Davies and Graff (2005) which found that students interacting less frequently with online resources performed less well academically.

Lou, Abrami, and d'Apollonia, (2001) affirmed that the use of collaborative tools help group activities by providing ease of communication and coordination among members of the group. They showed that collaborative tools could be useful to equip, develop, and expand educational options for students. The use of collaborative tools in the group learning also gave a positive impact on cognitive processes and effective results when compared to individual learning. The use of collaborative tools also proved to improve

the quality of social interaction between students and students, and students and teachers. This is caused by the interaction between users are becoming more visible, to improve understanding of each other (Ma, 2009).

Web based resources can be classified based on functionality and format. Functionality aspects includes search engines, massive open online courses (MOOC), and social media. Examples of search engines includes google.com, doaj.com and ask.com; MOOC include coursera.com; Social media include; WhatsApp, Facebook and twitter. Classification based on format simply means the form of presentation. There are various formats in which web based resources can be presented, these incudes text, animation, audio, text. This present study is aimed at examining the influence of the use of web-based resources on the student's utilization and collaborative activities at the Federal University of Technology, Minna.

Statement of the Problem

Availability of teaching and learning facilities in various schools is reducing at alarming rate. This is so because of the dearth of textbooks and where available, it is insufficient to go round both the teachers and the students. Where it is available, the usage is restricted and this makes teaching and learning boring.

With the advent of the internet, teaching and learning becomes more interesting as there are numerous resources online which can be accessed anywhere, anytime it is required the portability of mobile devices makes teaching and learning more interesting and this leads to improvement in instructions.

1.3   Purpose of the Study

The purpose of this study is to assess the influence of web based learning resources on students' utilization and collaborative learning activities in Federal University of Technology, Minna, Nigeria. Specifically, the study sought to:

i.   determine the influences of WBR on students utilization in collaborative efforts

ii.   determine which online search engines is frequently used by students

iii.   determine the usage of Massive Open Online Courses (MOOC) by students

iv.   determine which of the social online network students frequently use

1.4   Research Questions

The following research questions were asked to guide the study;

1. How does web based resources influence students collaborative efforts in Federal University

   Of Technology Minna for learning?

2. Which of the online search engines is frequently utilized by the Students of Federal University of Technology Minna?

3. Which of the massive open online courses do students of Federal University of Technology Minna frequently utilize?

4. Which of the social networks do students of Federal University of Technology Minna use for learning?

1.5   Research Methodology

This study adopted a descriptive survey research design. The choice of descriptive research was relevant because it reports things as they are, (Olumorin, 2008). The population for the study was undergraduate students of Federal University of Technology, Minna. Federal University of Technology, Minna comprises of eight (8) schools with a population of 16,000 students as at 2015/2016 session. The sampling technique used was multi-staged sampling technique. Amongst the eight schools, four were purposively selected for the study, they are; School of life Sciences, School of Physical Sciences ,School of Science Technology Education and parts of School of Information and Communication Technology. The sampled students were stratified along variables of gender and course of study. From the stratification, random sampling technique was used to select the undergraduate students from each of these schools. In all, one hundred and sixty (160) students which represents 0.1% of the entire student population in the University were used for the study. Out of this sample, fourteen (14) students each were sampled in all the eleven Departments in the four schools. However only 140 copies were retrieved back from the students.

The instrument used for this study is a structured questionnaire called Influence of Web Based Learning Resources on Students Utilization and Collaborative Learning Activities (QIWBLRSUCLA). In order to assess the influence of Web Based Learning Resources on Students Utilization and Collaborative Learning Activities, the questionnaire was divided into three major sections. Sections A, B, and C. Section A dealt with the students Bio data (respondents faculty/school, Department, gender, level and course of study.

Sections B of the instrument dealt with items related to WBLR influence on students' collaborative efforts while sections C would deal with identification of search engines, MOOC and social networks majorly used by students. In view of the above, care has been taken by the researcher in the process of validating the questionnaire. After the

questionnaire had been drafted, it was taken to three experts to validate. Thereafter, the instrument was tested for reliability.

To ensure the reliability of this instrument, Cronbach alpha method was employed and the value of 0.81 was obtained.

Data were collected by direct administration. The instrument was administered to the respondents and retrieved after the respondents had filled them. Data obtained were analyzed using descriptive statistics of frequency counts and percentages.

1.6   Results and Discussion

Research Questions 1

1. How does web based resources influence students' collaborative efforts in Federal University

of Technology Minna for learning?

Table 1: Students responses on influence on web based learning resources

S/N	Item	A	D	(%)A	(%)D	Decision
1	Working with Web Based Learning Resources helps me learn with my peers	137	3	98	2	Agree
2	The quality of graphics and animations from WBLR encourages collaborative learning	119	21	85	15	Agree
3	Using WBLR is more interesting to learn with others than the teacher writing on the board.	107	31	76	24	Agree

4	I could proceed on my own from the teacher without taking instructions	92	48	66	34	Agree
5	Web based resources are easy to use (easy to learn new concepts)	133	7	95	5	Agree
6	WBLR make the collaborative learning process more effective.	107	33	76	24	Agree
7	I share information and knowledge when collaborating with my friends	109	31	78	22	Agree
8	I would appreciate if lecturers would adopt any web based resources in teaching than depending only on classroom white boards	113	27	81	19	Agree
9	Lecturers should adopt any web based resources for instruction and receiving of feedback from students	105	35	75	25	Agree
10	I could use WBR for learning in the absence of lecturers with my mates	97	43	69	31	Agree
11	WBLR become communication media to give feedback to group members on group assignments	111	29	79	21	Agree

12	My curiosity to acquire more knowledge arises when I use WBR	138	2	99	1	Agree
13	WBR makes me understand better the concept taught in the classroom	128	19	91	9	Agree
14	WBR fasten the rate at which I do class assignments and projects with my friends	124	16	89	11	Agree
15	I learn at the same pace with my teachers with WBR.	88	52	63	34	Agree

Table 1 shows that the students agreed on all the items. Specifically, 98% ,85%, 76%, 66%, 95%, 76%, 78%, 81%, 75%, 69%, 79%, 99%, 91%, 89%, 63% of the students agreed with items 1, 2, 3….15 respectively. However, most students (99%) agreed with item 12. This implies that the curiosity to acquire more knowledge arises when students use Web based learning resources to engage in collaborative learning. This simply means that web based learning resources have positive influence on students collaborative efforts in Federal University of Technology, Minna.

Research Questions 2

2. Which of the online search engines is frequently utilized by the Students of Federal University of Technology Minna?

Table 2: Usage of Search Engines

SEARCH ENGINES	FREQ. USED	OCA. USED	RARELY USED	NEVER
GOOGLE	99(71%)	26(19%)	10(7%)	5(3.5%)
ASK.COM	44(31.4%)	61(43.6%)	20(14.3%)	15(10.7%)
BING.COM	27(19.3%)	25(17.9%)	59(42.1%)	29(20.1%)

Table 2 shows the responses of respondents on the usage of search engines. The result revealed that 99 respondents representing 71% frequently use google.com for learning, 26 respondents representing 19% said that they occasionally use google. 10 respondents

representing 7% rarely use google.com and 5 respondents representing 3.5% have never used it. 44 respondents representing 31.4% frequently uses ask.com, 61 respondents which represents 43.6% occasionally uses ask.com, 20 respondents representing 14.3% rarely used ask.com and the remaining 15respondents (10.7%) rarely uses ask.com. As for bing.com, 27 respondents which represents 19.3% frequently uses it, 25 respondents which represents 17.9% occasionally uses it, 59 respondents representing 42.1% rarely uses it and 29 respondents which represents 20.1% have never used it. This implies that most of the respondents (students) frequently uses google.com

Research Questions 3

3. Which of the massive open online courses do students of Federal University of Technology Minna frequently utilize?

Table 3: Massive Open Online Courses

MOOC	FREQ. USED	OCA. USED	RARELY USED	NEVER
www.coursera.org	**18(12.9%)**	**35(25%)**	**40(28.6%)**	**47(33.5%)**
www.edu.org	24(17.1%)	29(20.7%)	54(38.6%)	43(30.7%)
www.alison.org	14(10%)	14(10%)	88(62.9%)	24(17.1%)

Table 3 revealed that 47 respondents representing 33.5% have never used www.coursera.org, 54 respondents representing 38.6% rarely used www.edu.org and 88 respondents representing 62.9% of the respondents rarely used www.alison.org. This implies that most of the students do not frequently use massive open online courses.

Research Questions 4

4. Which of the social networks do students of Federal University of Technology Minna use for learning

Table 4: usage of social network

SOCIAL NETWORK	FREQ. USED	OCCA.USED	RARELY USED	NEVER
FACEBOOK	40(28.6%)	67(47.9%)	20(14.3%)	13(9.%)
TWITTER	10(7%)	12(8.6%)	85(60.7%)	33(23.65%)
WHATSAPP	76(54.3%)	53(37.9%)	6(4.3%)	5(3.5%)

The result in Table 4 shows that 67 respondents representing 47.9% occasionally uses Facebook, 8 respondents representing 60.7% rarely uses twitter and 76 respondents representing 54.3% frequently uses WhatsApp for learning. This implies that most of the respondents uses WhatsApp for and rarely uses twitter for learning.

1.7   Discussion

Table 1 revealed students agreed with all the items. Specifically stating items 1-15 in percentages as 98% ,85%, 76%, 66%, 95%, 76%, 78%, 81%, 75%, 69%, 79%, 99%, 91%, 89%, and 63% respectively. However, most students (99%) agreed with item 12. This implies that web based learning resources influences undergraduate students' collaborative activities.

Table 2 shows that 71% of the respondents frequently use google.com for learning, 19% occasionally uses google, 7% rarely use google.com and 3.5% have never used it. 31.4% frequently uses ask.com, 43.6% occasionally uses ask.com, and 14.3% rarely used ask.com and the remaining 15respondents (10.7%) rarely uses ask.com. As for bing.com, 19.3% frequently uses it, 17.9% occasionally uses it, 42.1% rarely uses it and 20.1% have never used it. This implies that majority of the respondents (students) uses google.com, others rarely uses or have never used other search engines.

Table 3 revealed that 47 respondents representing 33.5% have never used www.coursera.org, 54 respondents representing 38.6% rarely used www.edu.org and 88 respondents representing 62.9% of the respondents rarely used www.alison.org meaning that only a few students frequently use (participated and completed) massive open online courses, others rarely use and the others have never used it. This implies that most of the students do not frequently use massive open online courses.

Table 4 shows that 47.9% occasionally uses Facebook, 60.7% rarely uses twitter and 54.3% frequently uses WhatsApp for learning. This implies that most of the respondents uses WhatsApp for and rarely uses twitter and ask.com for learning. Student uses various social network however they do not use them for learning. It was however revealed from the study that most of the students uses WhatsApp only for learning.

The result of this findings corroborate the findings of Lou, Abrami, and d'Apollonia, (2001) where they affirmed that the use of collaborative tools helps group activities by providing ease of communication and coordination among members of the group. They showed that collaborative tools can be useful to equip, develop, and expand educational options for students. The use of collaborative tools in the group learning also gave a positive impact on cognitive processes and effective results when compared to individual learning.

Majority of the respondents (students) uses google.com, others rarely uses or have never used other search engines.

Only a few students frequently use (participated and completed) massive open online courses, others rarely use and the others have never used it.

Students are ahead of their teachers as seen in the work of Balogun, (2016) which stated that teachers are aware but do not participate in MOOC.

Majority of the respondents uses WhatsApp for but rarely uses twitter and ask.com for learning

1.8   Conclusion

The present study reveals that the use of web based learning resources is a veritable tool in the enhancement of learning in the classroom and based on this premise, we are able to acertain the   influence of web based learning resources on students' utilization in a collaborative learning activities. The response of the students revealed that web based learning resources have positive influence on students utilization in collaborative learning activities. As such the usage of such resources in teaching/ learning will certainly improve Students' Performance. Also, web based learning resources have positive influence on students collaborative efforts in Federal University of Technology, Minna. Therefore, the usage of WBLR in teaching/ learning will certainly improve Students' Performance; therefore the study will serve as a tool to better reposition teaching and learning and enhances students' performance in the 21st century classroom.

1.9   Recommendations

Based on the findings of this study, the following recommendations were made.

1. Lecturers should adopt web based learning resources in teaching than depending only on conventional resources.

2. Students should explore other search engines and not limit themselves to google only as they can get useful information for learning.

3. There is need for enlightenment or training workshop where students and teachers would have the opportunity of looking into the benefits of the use of web based learning resources such as social networks and MOOC.

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A STUDY OF THE PERFORMANCE OF SENIOR SECONDARY SCHOOL CHEMISTRY STUDENTS' ON CO-OPERATIVE LEARNING OF ELECTROLYSIS IN MINNA METROPOLIS, NIGER STATE.

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Abstract

The study investigated the Performance of Senior Secondary School Chemistry Students' on Co-operative Learning of Electrolysis in Minna Metropolis, Niger State. A quasi-experimental design using pretest-posttest non-randomized, non-equivalent control group design was adopted for the study. The population of the study consist of all Senior Secondary School students in Niger State. Multi-stage sampling technique was employed in the study. The sample for the study consisted of 308 SSII students. The study was guided by three research questions and three corresponding hypotheses which were tested at 0.05 level of significance. A validated Electrolysis Performance Test (EPT) was used for data collection which was piloted using test retest method, the data obtained was analysed using Pearson Product Moment Correlation (PPCM) and a reliability coefficient of 0.82 was obtained. The research questions were answered using mean and standard deviation while the hypotheses were tested using Analysis of Covariance (ANCOVA). The findings revealed that students taught Electrolysis with Jigsaw Cooperative Learning Strategy performed better. The result of the findings also revealed that Jigsaw Co-operative Learning Strategy enhances younger (13-14 years) students' performance than the older ones (15-16 years, 17 years and above). Findings emanating from this study also revealed that conventional Instructional Strategy enhanced students' performance irrespective of age differences. It was recommended that Jigsaw Cooperative Learning Strategy should be used to enhance younger students' performance. Chemistry teachers should use Jigsaw Cooperative Learning and Conventional Instructional Method for teaching Electrolysis at senior secondary schools.

Keywords: Co-operative Learning, Chemistry, Electrolysis, Convectional Method, Age

Introduction

Chemistry is one of the science subjects taught from the Senior Secondary School (SSS) level through Colleges of Education and Polytechnics to the University level in Nigeria because of the important roles it plays in the intellectual and career development of an individual. Chemistry is the branch of science that deals with the study of the structure and composition of matter (Igboegwu & Okonkwo, 2012). At Joint Admission Matriculation Board examination, no candidate would be admitted into science, technology and engineering related courses in Nigerian universities without acquiring a credit pass in Chemistry at the senior secondary school level (JAMB, 2019).

Despite the importance of Chemistry in the Secondary Schools curriculum in Nigeria, the performance of students in the subject is quite poor (Obamanu, & Onuoha, 2012). For instance, a review of the performance of students in Chemistry at the West African Senior School Certificate Examination (WASSCE) and National Examination Council (NECO) from 2014 to 2019 established that the failure rate in the subject has been quite high (Nja *et al.,* 2019; NECO, 2019; WAEC, 2019). However, this situation is not in the best interest of Nigeria as a nation that wants to catch up with the developed nations by the year 2020. Persistent use of ineffective teaching strategies employed by chemistry teachers lead to abstractness of the concepts which forces students to memorize and regurgitate during examinations (Nja *et al.,* 2017).

The traditional method of teaching has primarily been a teacher-centred approach where instructors focus on conveying information, assigning work, and leaving it to the students to master the material. This type of instruction forces students to be merely receptors of information rather than participants in their own learning processes through active learning. To overcome these problems, there is need for paradigm shift from teacher-centred approach to a more collaborative learning environment (student-centred) (Costouros, 2020; Gambari &Yusuf, 2017).

Student-centred approach has been identified by researchers to be effective and efficient in promoting and maximizing science learning outcome. Cooperative instructional strategy is a teaching strategy in which small teams, each with students of different levels of ability use a variety of learning activities to improve their understanding of a subject. Each member of a team is expected not only to learn what is taught but also to help teammates learn, thus creating an atmosphere of performance (Gambari & Yusuf, 2017). Studies that examined cooperative instructional strategies showed that it helps students improve their academic and social skills by ensuring their active participation in learning processes (Johnson & Johnson, 1999; Van Dat, 2016).

Jigsaw cooperative learning strategy is one of the instructional strategies. In Jigsaw cooperative learning strategy, students are assigned to 3-member teams to work on academic materials. Initially all students are assigned to study and understand the basic concepts of the materials. Later, each student is given a section/topic on which to become an expert. Students with the same section/topic meet in expert groups to discuss after which they return to their original teams to teach what they have learnt to their team-mates. Then students take individual quizzes which result in team score based on the improvement score system (Aydin & Biyikli, 2017; Gambari & Yusuf, 2017; Yapici, 2016). Jigsaw cooperative learning could be adopted for teaching and learning at any level of education irrespective of age.

There is also clear evidence that age is a factor that often affects educational attainment and students' performance. Many researchers (Momanyi *et al.*, 2015; Nja *et al.,* 2019) presented evidence that older children fare better academically than their younger age appropriate peers. Additionally, Momanyi *et al.* (2015) using research evidence about the relationship between age and performance argued that the older and/or more mature students in a class fare better than younger classmates. In contrast, some studies (Voyles, 2011) found no significant relationship between age and performance, while other (Momanyi *et al.,* 2015; Nja *et al.,* 2019) found significantly higher performance of the oldest as compared to the youngest students at age nine but this difference disappeared by age seventeen. Studies on age difference as it affects academic performance are presently inconclusive. It is on this basis that this study has been undertaken to determine the influence of age on the performance of secondary school Chemistry students' taught Electrolysis using Jigsaw Cooperative learning in Minna Metropolis, Niger State.

Statement of the Problem
The importance of Chemistry in science and technology related courses cannot be over-emphasised. It is a pre-requisite for entering into university to study Sciences, Technology and Engineering related courses. Despite the importance of chemistry in Nigerian schools, students' poor performance at internal and external examination has been a major concern. Students encounter problems in some abstract concepts such as electrolysis. Electrolysis is one of the aspects that students find difficult to pass, thereby, leading to poor performance whenever questions on the concept were asked. This problem cut across the performance of the students in Nigeria secondary schools in the

West African Senior Secondary Certificate Examination (WASSCE) results. The poor performance was evident in the WAEC and NECO examination of 2014 to 2019 where many students could not secure admission into universities due to the failure in Chemistry.

The conventional method of teaching employed by Chemistry teachers at senior secondary school in Niger State in particular and Nigeria at large has been identified as one of the problems causing poor performance in Chemistry subject. The need to determine a suitable strategy for solving this problem is no longer merely desirable but compelling. This has precipitated the efforts to use the Jigsaw Cooperative learning strategy for the teaching of the Electrolysis concept.

There were several studies on implementing Jigsaw Cooperative learning strategies in secondary schools, but in different subjects and content areas. Some researchers have worked on effects of the Cooperative learning strategies on students' performance and retention in other subjects but most of these known to the researcher were not in electrolysis especially in Nigeria. Studies that consider the influence age using Jigsaw cooperative learning strategy to determine chemistry students' performance in electrolysis are very scanty. Therefore, this study investigated the performance of senior secondary school chemistry students' cooperative learning of electrolysis in Minna Metropolis in Niger State.

Research Questions
The following research questions were raised to guide the study:
(i)   Is there any difference in the performance of senior secondary school chemistry students taught electrolysis with Jigsaw Cooperative and conventional instructional strategies?
(ii)   What is the influence of the students' age on academic performance of secondary school students taught with Jigsaw Cooperative learning strategy?
(iii)   What is the influence of the students' age on academic performance of secondary school students taught with conventional instructional strategy?

Research Hypotheses
The following null hypotheses were formulated and tested at 0.05 significance level:
HO_1: There is no significant difference in the performance of senior secondary school chemistry students taught Electrolysis with Jigsaw Cooperative and conventional instructional strategies.
HO_2: There is no significant age difference on the performance of secondary school students taught with Jigsaw Cooperative learning strategy.
HO_3: There is no significant age difference on the performance of secondary school students taught with conventional learning strategy.

Methodology
This research employed quasi-experimental design using pretest-posttest non-randomized, non-equivalent control group design. Two levels of independent variables (Jigsaw & Traditional Method), one moderating variable of age groups (13-14, 15-16, 17 and above) and one dependent variable (academic performance) were employed in the study. The two groups were subjected to pretest and posttest using Electrolysis Performance Test (EAT). Experimental group one was subjected to treatment using Jigsaw Cooperative Learning Strategy while the control group was taught with Traditional Method of Teaching. Figure 1 shows the Design Layout of the study.
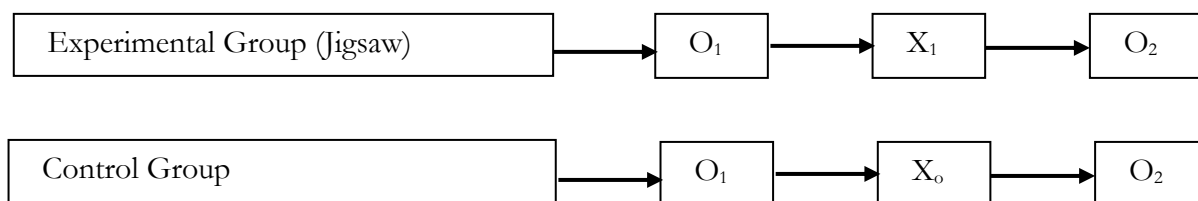
| Experimental Group (Jigsaw) | → | O_1 | → | X_1 | → | O_2 |

| Control Group | → | O_1 | → | X_o | → | O_2 |

Figure 1:   Research Design Layout

Where:
O_1 and O_1: are pre-test scores for experimental and control groups
O_2 and O_2: are post scores for experimental and control groups
X_1 and X_o: are treatments for experimental and control groups respectively.

The population for this research was made up of all senior secondary school Chemistry students in Minna metropolis of Niger State. The target population were senior secondary school class (II) Chemistry students with a population of 7385 students from 36 secondary schools in Minna metropolis, made up of 5126 male and 2259 female students in the 2018/2019 academic session. Multi-stage sampling technique was employed. Firstly, purposive sampling technique was employed in selecting the six senior secondary schools and this was done based on criteria of: equivalence (school facilities and manpower), gender composition (mixed schools), school location (urban, semi-urban, and rural), school type (public school), and candidates' enrolment (enrolling students for Secondary School Certificate Examination for a minimum of ten years). Eighteen senior secondary schools met the above criterion. Simple random sampling technique was also used in selecting six of the senior secondary schools.

Secondly, the six selected schools were assigned to experimental and control groups using simple random sampling technique. Thirdly, in each school, one stream of SSII class was randomly selected from five streams using simple random sampling technique. Therefore, an intact class of each stream was used for the study. Finally, students in each class from each selected school students were grouped according into their ages (13-14, 15-16, 17years and above). The instruments adopted for the study is categorized into treatment (Electrolysis Lesson Note) and test instrument (Electrolysis Performance Test). These Electrolysis Lesson Note was prepared by the researcher with reference to the approved textbooks and contributions from some chemistry teachers from selected schools. The Electrolysis Performance Test (EPT) was made up of 40-item multiple choice objective questions with four options A – D, with only one correct answer and three distracters. EPT was drawn from past WAEC and NECO chemistry past examination question papers which are specifically based on SSII chemistry curriculum.

Pretest was administered to determine the entry level of the sample students while posttest was administered to determine the effect of the treatment on the experimental and control groups. To reduce the pre-test effects, the questions were reshuffled and administered in a different random order in the posttest. The content of electrolysis (lesson note) and Electrolysis Performance Test (EPT) were validated by three senior lecturers from Chemistry Department, Federal University of Technology, Minna, Niger State, three Chemistry secondary school teachers and three subject officers from National Examination Council (NECO) Headquarters, Minna. The specialists assessed the face and content validity of the lesson note and EPT. From the validation report, some spelling errors, language and grammar errors, formatting errors, structure of the contents among others were pointed out. All corrections pointed out were effected as reflected in the final copy of the instrument.

A pilot test was conducted on 55 senior secondary school class two (SSII) students from Government Day Secondary School (GDSS), Minna metropolis, Niger state which is part of the study population but not among the sampled schools to ascertain the reliability of the Electrolysis Performance Test (EPT). The data obtained from pilot testing was subjected to data analysis using Pearson Product Moment Correlation (r) (PPMC) coefficient and 0.82 reliability coefficient was obtained which was considered reliable.

The research questions were answered using mean and standard deviation while the hypotheses were tested using ANCOVA with Statistical Package for Social Sciences (SPSS) version 21. Sidak post-hoc test was used to determine where the differences exist among the variables. The significance of the various statistical analyses was ascertained at 0.05 alpha level of significance. The choice of ANCOVA was to control errors of initial non-equivalent arising from the use of intact classes as subjects for the study. This was observed from the pretest analysis which showed that there was significant difference.

Results

Research question one: Is there any difference in the performance of senior secondary school chemistry students taught electrolysis with cooperative and conventional instructional strategies?

In answering the research question one, mean scores of students in experimental and control groups were analysed using mean and standard deviation.

Table 1: Pretest, Posttest and Mean gain scores of students taught Electrolysis using Cooperative learning and Conventional instructional strategies

Group	N	Pretest		Posttest		Mean Gain
		Mean	SD	Mean	SD	
Cooperative	108	9.69	4.257	20.50	4.050	10.81
Conventional	104	8.17	3.389	19.07	4.113	10.90

Table 1 shows the mean and standard deviation of the pretest and posttest scores of the students taught with electrolysis and those taught with cooperative learning conventional instructional strategies. The result revealed that the students in the cooperative learning strategy group had a mean score of 20.50 with standard deviation of 4.050 at posttest. The results also revealed that the students in the conventional instructional strategy group have 19.07 as the mean with standard deviation of 4.113 at the posttest. From the result, it can be deduced that students in the cooperative learning strategy group had higher posttest mean score than those in the conventional instructional strategy group.

Research question two: What is the influence of the students' age on academic performance of secondary school students taught with cooperative learning strategy?

In answering the research question two, mean scores of students' performance in cooperative learning strategy based on their ages were analysed using mean and standard deviation.

Table 2: Pretest, Posttest and Mean gain scores of students in Cooperative learning strategy based on their ages

Group	N	Pretest		Posttest		Mean Gain
		Mean	SD	Mean	SD	
13-14yrs	19	9.21	3.489	22.42	2.457	13.21
15-16yrs	19	12.00	4.726	21.37	3.547	9.37
17yrs and above	70	9.19	4.161	19.74	4.333	10.55

Table 2 shows the mean and standard deviation of the pretest and posttest scores of students taught with cooperative learning strategy based on their ages. The result revealed that the students within ages 13-14years had a mean score of 22.42 with standard deviation of 2.457 at posttest. The results also revealed that the students within ages 15 to 16years had the mean score of 21.37 as the mean score with standard deviation of 3.547 at the posttest. In addition, the results also revealed that the students of 17 years and above had19.74 mean score with standard deviation 4.333 at the posttest. From the result, it can be deduced that students within ages 13-14yrs had the highest mean gain, followed by those in the ages 17-years and above, and followed by those within the ages 15-16years.

Research question three: What is the influence of the students' age on academic performance of secondary school students taught with conventional instructional strategy?

In answering research question three, students taught electrolysis using conventional instructional strategy based on ages were analysed using mean and standard deviation.

Table 3: Pretest, Posttest and Mean gain scores of students in Conventional instructional strategy based on their ages

Group	N	Pretest		Posttest		Mean Gain
		Mean	SD	Mean	SD	
13-14yrs	16	8.50	3.224	20.37	5.058	11.87
15-16yrs	22	9.45	4.361	19.09	4.252	9.64
17yrs and above	66	7.66	2.968	18.74	3.812	11.08

Table 3 shows the mean and standard deviation of the pretest and posttest scores of students taught with conventional instructional strategy based on their ages. The result revealed that the students within the ages 13-14years had a mean score of 20.37 with standard deviation of 5.058 at posttest. Similarly, the results also revealed that the students within the ages 15 to 16years had the mean score of 19.09 with standard deviation of 4.252 at the posttest. In addition, the results also revealed that the students of 17 years and above had 18.74 mean score with standard deviation 3.812 at the posttest. From the result, it can be deduced students within ages 13-14yrs had the highest mean gain, followed by those in the ages 17-years and above, and followed by those within the ages 15-16years.

Hypothesis one: There is no significant difference in the performance of senior secondary school chemistry students taught electrolysis with Jigsaw cooperative and conventional instructional strategies.

In testing hypothesis one, the performance scores of students taught electrolysis with cooperative and conventional instructional strategies were analysed using ANCOVA

Table 4: ANCOVA results of students performance scores in cooperative learning and conventional instructional strategies

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	549.285[a]	2	274.643	18.777	.000
Intercept	8921.853	1	8921.853	609.968	.000
Pretest	440.536	1	440.536	30.118	.000
Treatment	38.134	1	38.134	2.607	.108[ns]
Error	3056.993	209	14.627		
Total	86695.000	212			

Corrected Total	3606.278	211	

NS: Not Significant at p > 0.05

Table 4 shows the ANCOVA results of the performance scores of the two groups taught using Cooperative Learning and Conventional Instructional Strategies. From the table, the F (1,209) = 2.607, p > 0.05. This indicates that there is no significant difference in the performance scores of students in Cooperative Learning and Conventional Instructional Strategies. Hence, hypotheses one is not rejected. This reveals that the treatment has no effect on the students' academic performance in the two groups.

Hypothesis two: There is no significant age difference on the performance of secondary school students taught with cooperative learning strategy.
In testing hypothesis two, the retention mean scores of students in Cooperative Learning Strategy based on their ages (13-14yrs, 15-16yrs, 17yrs and above) were analysed using ANCOVA

Table 5: ANCOVA Results of Students Performance Taught Electrolysis in Cooperative Learning Strategy based on their Ages

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	303.297[a]	3	101.099	7.243	.000
Intercept	4639.722	1	4639.722	332.390	.000
Pretest	178.721	1	178.721	12.804	.001
Age	106.994	2	53.497	3.833	.025*
Error	1451.703	104	13.959		
Total	47142.000	108			
Corrected Total	1755.000	107			

*: significant at p > 0.05

Table 5 shows the ANCOVA results of the performance scores of students taught Electrolysis using Jigsaw Cooperative Learning Strategy. F (1,104) = 3.833, p < 0.05. This indicates that there is significant difference in the performance mean scores of students of 13-14yrs, 15-16yrs, and 17yrs and above taught Electrolysis using Cooperative Learning Strategy. Hence, hypothesis two is rejected. Moreover, Sidak's post-hoc analysis was done to determine the direction of the difference among the three age groups and the result is shown in Table 6

Table 6: Sidak Post hoc analysis of significant difference among students' of different ages

(I) Age	(J) Age	Mean Difference (I-J)	Std. Error	Sig.[b]	95% Confidence Interval for Difference[b]	
					Lower Bound	Upper Bound
13-14yrs	15-16yrs	1.928	1.237	.323	-1.073	4.929
	17yrs and above	2.670*	.966	.020	.325	5.016
15-16yrs	13-14yrs	-1.928	1.237	.323	-4.929	1.073
	17yrs and above	.743	.997	.841	-1.678	3.163
17yrs and above	13-14yrs	-2.670*	.966	.020	-5.016	-.325
	15-16yrs	-.743	.997	.841	-3.163	1.678

Table 6 shows the Sidak post hoc analysis on performance of students taught Electrolysis with Jigsaw Cooperative Learning Strategy. From the Table, there was no significant difference established between the mean scores of students of 13-14years and 15-16years because the mean difference of 1.928, p<0.05) with an upper bound of 4.929 was obtained. However, there was statistically significant difference in the mean performance scores of students of ages 13-14years and 17years and above with mean difference of 2.670 with upper bound of 5.016 in favour of 13-14years students. Similarly, there was no statistically significant difference in the mean performance scores of students with ages 15-16years and 17years and above with mean difference of .743, p>0.05 with upper bound of 3.163. Jigsaw Cooperative Learning Strategy enhanced younger (13-14yrs) students' performance than the older ones (15-16years,17years and above).

Hypothesis three: There is no significant age difference on the performance of secondary school students taught with conventional learning strategy.
In testing hypothesis three, the performance of secondary school students taught with conventional learning strategies based on their ages (13-14yrs, 15-16yrs, 17yrs and above) were analysed using ANCOVA

Table 7: ANCOVA results of students' performance taught Electrolysis in conventional instructional strategy based on their ages

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	290.362[a]	3	96.787	6.665	.000
Intercept	3001.769	1	3001.769	206.710	.000
Pretest	256.023	1	256.023	17.630	.000
Age	29.220	2	14.610	1.006	.369[ns]
Error	1452.167	100	14.522		
Total	39553.000	104			
Corrected Total	1742.529	103			

ns: not significant at $p < 0.05$

Table 7 shows the ANCOVA results of the performance scores of students taught Electrolysis using Jigsaw Conventional Instructional Strategy. From the table, there is no significant difference in the performance scores of the students of 13-14yrs, 15-16yrs, 17yrs and above at 0.05 level of significance, $F_{(1,100)} = 1.006$, $p > 0.05$. Hence, the hypothesis three was not rejected. This indicates that there is no significant difference in the performance mean scores of students of 13-14yrs, 15-16yrs, 17yrs and above taught Electrolysis using Conventional Instructional Strategy. This implies that Conventional Instructional Strategy enhanced students' performance irrespective of age differences.

Discussion of Findings
Findings of this study revealed that students taught Electrolysis with Jigsaw Cooperative Learning Strategy and those taught with Conventional Instructional Strategy performed equally better. This finding agrees with the finding of Roseth *et al.* (2019) who found no significant difference between students taught using Jigsaw cooperative approach and conventional method. However, the study disagrees with that of Van Dat (2016) who reported that students in the jigsaw group had greater long-term performance than those did in the lecture group. Similarly, Gambari and Yusuf (2016) reported that students taught physics using computer-assisted Jigsaw II performed better and retained the physics concepts longer than those taught using individualized computer instruction.

Findings by Hamadneh (2017) found that students taught using Jigsaw cooperative learning strategy performed better than those taught using conventional strategy.

Jigsaw Cooperative Learning Strategy enhanced younger (13-14yrs) students' performance than the older ones (15-16years, 17 years and above). This finding is in agreement with that of Nja *et al.* (2019) who reported that the young students outperformed the matured students. However, study by Melkonian and Areepattamannil (2018) found that the younger age student groups demonstrated significantly lower performance in mathematics, reading and science than their older peers. Similarly, findings by Ahmet (2019) revealed that the youngest children have the worst performance than the older children.

Conventional Instructional Strategy enhanced students' performance irrespective of age differences. The findings contradict that of Okereke and Onwukwe (2007) who reported that age of students can greatly affect the academic performance of individuals. Similarly, study by Vong, (2020) reported that the developmental trajectory of age has an overall influence on the performance of the students.

Conclusion
From the findings of this study, it was deduced that the use of Jigsaw cooperative learning strategy produces the same learning output with the conventional method. The Jigsaw cooperative learning strategy was not superior to conventional method of teaching when used for teaching electrolysis at senior secondary schools in Minna metropolis, Niger State.
Jigsaw Cooperative Learning Strategy enhanced younger (13-14yrs) students' performance than the older ones (15-16years, 17 years and above). However, in Conventional Instructional Strategy enhanced students' performance irrespective of age differences.

Recommendations
In light of the findings of the research, the following recommendations were made:
(i).   Chemistry teachers should use Jigsaw Cooperative Learning and Conventional Instructional Method for teaching Electrolysis at senior secondary schools.
(ii)   Jigsaw Cooperative Learning should be used for teaching younger students (13-14years) than older or mature students in order to improve their performance at senior   secondary school certificate examination and for future application of the acquired   knowledge.
(iii)   In a heterogeneous class where students of various ages were mixed together, Conventional Instructional Method should be employed because it enhances students'   performance irrespective of age differences.

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