Conference Proceedings of the AITIE 3rd International Conference and Workshop on Innovation, Technology and Education (ICWITE, Abuja 2019)

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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

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. AITIE maintains the highest professional standards and expects the status, compensation, and respect due to all professionals.

Presidential Address at the 2019 AITIE Conference

I wish to welcome you all, our distinguished hosts, resource persons, guests, and participants to the 3rd International Conference and Workshops on Innovation, Technology and Education (ICWITE, 2019) in the City of Abuja, the *Centre of Unity*.

Since our inaugural conference and workshops at the University of Ilorin (24th – 27th July 2017), AITIE as an Association had been focused on the cognitive, affective and psychomotor development of our members. As members of AITIE, we aspire to inspire. We aspire to develop ourselves to be the leading integrators of technology in education. We inspire others to make productive use of technology to create value within the educational circle. We don't just theorise about technology integration, we put into practice what we have learnt.

In line with our established practices, this year's pre-conference workshops, the keynote and lead paper presentations are meant to deepen the knowledge and competence of our members on how Information and Communication Technology (ICT) can be used to democratise education and ensure quality at the same time. The democratisation of education connotes the provision of greater access to education, irrespective of location, physical ability, commitments, and so on. It must be underscored that technologies in themselves cannot assure access to quality education. While the availability of technological infrastructure and support may be a strong factor for providing access to quality education, only the development of the human capacity to integrate technology will ensure success.

This year's conference features a keynote and three lead paper presentations. Prof. Is-haq O. Oloyede, the Registrar of JAMB is our distinguished keynote presenter. He is the foremost Nigerian educational administrator in the integration of ICT for education. This is evidenced in his trailblazing achievements as a University Vice-Chancellor and as the Chief Executive of an examination board. Prof. Ismail Junaid as an educational administrator had made significant contributions in ensuring that the Nigerian educational system moves in line with the 21st-century knowledge needs. Dr. V. Odumuyiwa and Prof. Rasheed Jimoh are proved leaders and emerging initiators of contemporary ideas in ICT integration in education. Our workshop tracks: *Augmented Reality Using Open Source Apps; Mobile Apps Development for Massification of Education; and AMOS Statistics Solution or R-Statistical Package* were selected to further enrich and deepen our members' knowledge and competence in exploring and exploiting the potentials of the digital ocean, to permanently change the nation's educational landscape.

We thank the Administration of the Federal Capital Territory College of Education, Zuba, Abuja, under the able leadership of our Chief Host, Dr. Mohamad Gambo Hamza, and the Dean School of Education, Dr. (Mrs.) Eunice U. Orji, for their provision of institutional resources and personal support that made the 2019 AITIE 2019 Workshops and Conference events possible. We are also thankful to the Local Organising Committee, under the able leadership of Dr. Lateef Olawale Kareem, Dr. Bamidele Ogunlade, Local Organising Secretary; and the entire LOC Team for their commitments and sacrifices to plan and execute the wonderful workshops and convention within a short time. I also wish to thank members of the National Executive Committee and other members of the Association for their commitments. Finally, we thank all authors who submitted their work to ICWITE, 2019, and the reviewers without whose expert input this conference would not be possible.

Participants, I hope during your time at the conference that you explore the opportunity to engage with your colleagues and peers across the nation, to discuss your ideas, and to explore the potentials for collaborative research and practice.

By the grace of God, I hope that we will meet again at the next AITIE Conference and Workshops. Wishing you a happy and fruitful time in Abuja, and safe journey back to our destinations.

Prof. Mudasiru Olalere Yusuf
National President

The Local Organizing Committee Welcomes Participants to Abuja, the Centre of Unity for 2019 AITIE Conference and Workshop

It is my pleasure to welcome members and other stakeholders to this unique conference and workshop taking place in the Federal Capital Territory (FCT), Abuja. FCT has a land area of 8,000 square kilometres. It is bounded on the North by Kaduna State, the West by Niger State, the East and Southeast by Nassarawa State and the Southwest by Kogi State. It is the home of the capital city of Nigeria. Unlike the States of Nigeria, which are headed by elected Governors, FCT is headed by a Minister appointed by the President. The territory is currently made up of six(6) Area Councils, namely: Abuja Municipal, Abaji, Gwagwalada, Kuje, Bwari and Kwali Area Councils.

FCT College of Education, Zuba-Abuja, the venue for the 2019 AITIE Conference was established in 1996 to provide qualitative teacher education. The mission of the College is to train teachers with high morale and academic excellence for primary and post-primary institutions with an emphasis on Sciences, Vocational and Technical Subjects in consonance with international standards.

The Association for Innovative Technology Integration in Education **(AITIE)** is an Association of the academic and professional media specialists, instructional designers, distant education specialists, researchers and other stakeholders interested in improving education service delivery through the innovative and creative use of technology. The membership of the association cuts across specialists in tertiary institutions, governmental ministries, departments and agencies**,** industry, museums, libraries, and several other places where members creatively plan and implement innovative technology integration for instruction.

The topic for this conference, ***Massification and Quality: ICT in the Service of Education,*** is most timely and of national interest. The theme reflects growing recognition of the power and vital role digital technology plays in bringing quality education to teeming youths and adults in Nigeria. In fact, the proliferation of smartphones in Nigeria can be a game-changer for unserved and under-served citizens to have access to quality education at all levels.

A glance through the list of papers submitted to the Editorial Committee for presentations in the next few days reveals the amazing diversity of the deployment and application of technologies and innovation for educational administration and instructional delivery. Several resource persons were involved in the review of the manuscripts and we appreciate them for their immense contributions.

This third Conference of AITIE will not be just another "talk shop". By the end of the event, we intend to formulate a set of recommendations, to be known as the 'Abuja Statement'. This statement, to be crafted as communiqué based on the discussions during the conference, will focus on recommendations on the following key aspects of innovation in the education sector:

- Development of an operational guideline for promoting partnership between AITIE and relevant ministries, Departments and Agencies on the implementation of programmes and initiatives for quality education service delivery;
- Collaboration with government at all levels, educational institutions, the private sector and development partners to devise plans of action for building a sustainable stock of pedagogical and technical expertise to implement ICT policy in order to make Nigerian educational institutions 21st century compliant.

- Conduct of a comprehensive situation analysis of the good practices on the deployment of ICT for instructional delivery with a view to adopting strategies to place Nigeria education system on a pedestal of functionality in the 21st century.

- Participation of AITIE in the formulation, implementation, monitoring and evaluation of policies and initiatives of the National Council on Education that have bearing on massification and quality;

The Abuja Statement will be a benchmark for the future activities of AITIE. All conference delegates are encouraged to get involved in its development through the exchange of views and information over the entire duration of the conference. I have no doubt that this conference will spark off insightful discussions on the modalities we can adopt to confront our educational challenges headlong.

I wish to use this opportunity to thank the Local Organising Committee for their hard work and effort in planning and coordinating this event. Let me also express our sincere gratitude to the Provost of the host institution, FCT College of Education, Zuba-Abuja, Dr. Mohamad Gambo Hamza and the entire management of the College for their support in making this conference possible.

You are all welcome to the Centre of Unity.

Dr. KAREEM Olawale Lateef
Federal Ministry of Education, Abuja
Chairman, Local Organizing for AITIE 2019 Conference

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Lead Paper I

BASIC AND SECONDARY EDUCATION CURRICULA: IMPLICATIONS FOR ICT DEPLOYMENT IN THE NIGERIAN SCHOOL SYSTEM

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Introduction

It gives me great pleasure to address this distinguished audience. I thank the Association of Innovative Technology Integration in Education **(AITIE)** for giving me the opportunity to share my thoughts with you on this important topic. This topic is important, not because Information Communication Technology (ICT) is now the language of the world, but because ICT is increasingly becoming a significant component and foundation of our education system.

ICT, through its various modes of deployment, is valuable for its transforming effects on the roles of teachers and school leaders, as well as for making education accessible to the learners with special needs, marginalized groups and the difficult to reach. The prevalence of ICT in our society today, and its powerful influence on the lives of people also brought into focus the urgency the education industry in Nigeria has to leverage the endless possibilities of ICT, to improve all aspects of teaching, learning, assessment practices and procedures, etc.; and for targeting the cognitive preferences of variety of learners.

Ladies and gentlemen, effective learning which translates into the acquisition of valuable knowledge, skills and competencies requires carefully planned and effectively implemented curriculum for actualisation. In the same vein, the way and manner ICT is deployed in schools is of utmost importance if learners are to derive optimal benefits from ICT deployment in the education system. Hence, this paper is more or less a snapshot of the various educational and curriculum efforts in Nigeria; the challenges for their success; and implications for ICT deployment in schools.

Specifically, the discourse in this paper focuses on:

- global and national protocols for the massification in Nigeria and the associated challenges to quality education,
- addressing the challenges through curriculum reform measures at the basic and secondary education levels for addressing; as well as
- the enabling factors and support for optimal deployment of ICT to:
    a. make education accessible to all the categories of learners (the marginalized, disadvantaged and hard to reach; and
    b. improve the quality of teaching and learning in the schools.

The Massification of Education Provisions in Nigeria

The massification of education in Nigeria can be traced to the Addis Ababa Declaration of 1961 which states that: African Countries should aim at providing Universal Primary Education; at the same time, special attention should be given to adult education and on-the job-training.

The World Conference on Education for All (WCEFA) in Jomtien, Thailand in 1990; and the World Education Forum (WEF) held in Dakar, Senegal also declared education (particularly, basic education) as a fundamental right of every child and citizen. These global and national reaffirmations of the universal right to education promoted an expanded vision of basic education

with a renewed commitment to ensure that the basic learning needs of children, youth and adults are met in all countries. Other global and national protocols that gave further impetus to the massification of education in Nigeria, include the Millennium Development Goals (MDGs); the National Empowerment and Development Strategies (NEEDS) and very recently, the Sustainable Development Goals (SDGs) and the Education 2030 Agenda.

Nigeria responded to global and national protocols on the citizens' rights to education by introducing the Universal Primary Education (UPE) in 1976. The UPE, metamorphosed in 2004, into the Universal Basic Education (UBE) Programme. The UBE programme is free and compulsory. The purpose is to provide uninterrupted access to 9 years of formal schooling for every child of school going age and subsequently reduce school drop-out. However, mere going to school is not a guarantee of the universal right to education, unless the people actually acquire the useful knowledge, reasoning ability, skills and values from those opportunities. In other words, the success or otherwise of the UBE is to be measured by the quality of education received by its beneficiaries.

The Challenges of the UBE Programme in Nigeria

The free and compulsory basic education programme came with some attendant challenges. These challenges range from very large class sizes, teacher quality and variations in learner capabilities; to equity, standards and quality issues; as well as the differential implementation of the UBE programme across the States; in rural and urban settings; as well as in private and public schools.

In addressing the challenges of free and compulsory education in Nigeria, a number of new policies and curriculum reform initiatives have emerged. Notable amongst such policies are the:

- integration of primary and junior secondary schools (JSS) into a 9-Year continuous system of schooling;
- vocationalisation of the 3-year post basic education (senior secondary school (SSS);
- development of relevant curriculum for the 9-years of continuous schooling;
- abolition of the present selection and screening examination into JSS;
- building the capacity of school teachers in new ways of teaching and learning, including the deployment of ICT for effective classroom instruction; and
- planned use of ICT to enhance learning outcomes.

Basic and Secondary Education Curriculum Reforms in Nigeria

In Nigeria, and as a major component of the ongoing curriculum innovation and reform measures, the Nigerian Educational Research and Development Council (NERDC) have had the opportunity to develop new basic and secondary education curricula, reviewed the existing ones as well as revise the reviewed 9-Year Basic Education Curriculum (BEC). These are the experience we wish to share with you at this gathering. In presenting our experiences in curriculum innovation we shall examine the new (revised) basic and secondary education curricula with the view to highlight the role of ICT:

(i) in improving the quality of teaching and learning in the schools; and

(ii) for making education accessible to the all categories of learners (the marginalized, disadvantaged and hard to reach).

The 9-Year Basic Education Curriculum

In December 2005, the National Council on Education (NCE), the highest decision-making body in education in Nigeria, introduced a major policy shift by approving a new curriculum structure for basic education (see Appendix I). Immediately, the Nigerian Educational Research and Development Council (NERDC) as part of its statutory responsibilities developed the 9-Year Basic Education Curriculum in line with the new basic education curriculum structure.

The 9-Year Basic Education Curriculum addressed amongst other things, the issues of value re-orientation, poverty eradication, critical thinking, entrepreneurship and life skills; while tackling the specific issues of providing quality education to all categories of learners. The new basic education curriculum structure also gives prominence to computer studies by making it compulsory for all learners at the basic education level. In addition, teaching and learning is expected to be technology driven with a view to making the products of the basic education system capable of competing favorably anywhere in the world.

What About The Senior Secondary Education Curriculum?

To further consolidate the educational gains of the new basic education programme as well as ensure the actualisation of 2030 agenda, NERDC also restructured the curriculum for senior secondary education (SSE) in Nigeria. The development of entrepreneurial skills was key to the restructuring of the SSE curricula. The intent is to prepare graduates at this level for self- reliance as well as for higher education. Consequently, the structure of the new SSE curriculum comprises of a group of four (4) compulsory core cross-cutting subjects that must be offered by all students made up of English Language, General Mathematics, Civic Education and one Trade and Entrepreneurship subject to be selected from the available 34 Trade and Entrepreneurship subjects. Other subject listings at the senior secondary education level were clearly grouped into four (4) fields of studies namely Science and Mathematics; Humanities; Technology and Business (See Appendix II).

Like the revised 9-Year BEC, the restructuring of the SSE curriculum emphasised:

- continuity and congruence with the curriculum used in Universities, Polytechnics, and colleges of Education;
- student-centered learning for creativity and the development of inventive mind sets; and
- Information Technology (IT) driven knowledge management.

Ladies and gentlemen, the new orientation and focus of basic and secondary education curricula are not without implications for both the teacher and learner. First and foremost, the emphasis is on life-long learning. Presently among Nigerians, there is a heightened awareness of the need to produce a dynamic human capital that can meet the present and future challenges of globalization and knowledge economy. Globalization and emerging technologies are fundamentally transforming every society (developing and developed societies alike) by creating a knowledge economy that influences the way people live and interact with one another.

The challenges of globalization and emerging technologies are real in Nigeria. The trend is no-longer life-long employment with a single employer but lifelong employability. Effective teaching and learning in the present dispensation would rely heavily on the capability of both teachers and learners to maximally deploy and maximize the numerous benefits and opportunities that ICT offers.

The Role of ICT

The potential of ICT to raise the quality of teaching and learning is limitless. Multimedia technologies that combine text and sound with colorful moving images are valuable for getting across abstract concepts and logic to the children in a short span of time. The envisage roles of ICT for assuring the success of basic and secondary education curriculum reforms include:

- providing universal access to high quality education.
- teachers' professional development.
- efficient education management in terms of governance and administration.
- promoting equity and inclusiveness in education;
- developing innovative contents, materials and ideas for teaching curriculum contents.

Ladies and gentlemen, permit me to caution at this point that the general assumption that ICT integration will automatically follow, once computer hardware and software are made available in schools, is not true in its entirety. Integrating ICT into teaching and learning process

requires a whole lot of ground work by curriculum planners, policy makers, ICT content developers, teachers, etc. This brings us to the types and nature of support required to effectively deploy ICT for teaching and learning the contents of basic and secondary education curriculum.

Support for ICT Deployment in Nigerian Schools

(a) Institutional Support:

In the past, the common practice is for policies to be ignored or not implemented at all due to the absence of a systematic plan for implementing the innovations. Since 2004, and beginning with the establishment of the Universal Basic Education Commission (UBEC) government has systematically planned for the implementations of basic and secondary education in Nigeria.

Presently, there is also the Ministerial Strategic Plan of the Federal Ministry of Education (FME); for ensuring results-focused implementation of basic and secondary educational policies and innovations at the school level. Bearing in mind that functional basic and secondary education is key to the security and stability of the country; as well as for fighting youth unemployment, the Strategic Plan is built around nine pillars namely:

- Addressing the out-of-school children phenomenon;
- Strengthening basic and secondary school education;
- Teacher education, capacity building and professional development;
- Adult literacy and special needs education;
- Education data and planning;
- Curriculum and benchmark minimum academic standard;
- Technical and vocational education and training;
- Quality and access to higher education; and
- e-learning.

For efficiency, the implementation of curriculum and other reform measures contained in the Ministerial Strategic Plan will involve stakeholders from all tiers of Government, the organised private sector, civil society organisations (CSOs) as well as international funding partners. The critical success factors being the buy-in by the numerous stakeholders, parents and learners.

(b) Teacher Preparation

A key determinant of the success of any educational initiative is the teacher. Thus, in deploying ICT for successful implementation of basic and secondary education curricula, effective teacher preparation is paramount. Presently, computer studies and ICT is a compolsory component of general studies in pre-service teacher education programmes. ICT is also part and parcel of the National Teachers Institute's (NTI) annual teacher capacity building programme for inservice teachers; and the mandatory professional teacher capacity development programme of the Teachers Registration Council of Nigeria (TRCN).

Nevertheless, just as teachers' pedagogical knowledge alone is not sufficient to succesfully deploy ICT for effective curriculum delivery; teachers' ICT content knowledge alone cannot also deliver same. Rather, succesful deployment of ICT for basic and secondary education delivery, calls for systematic integration of technological, pedagogical and content Knowledge (TPCK). Consequently, NERDC now prepares and distributes Teachers Guides for each subjects' curricula as well as build the capacity of teachers on the effective utilization of these curricula.

(c) Curriculum and School Infrastructure

In the spirit of the reform and for fostering synergy in education delivery, issues concerning curriculum adaptation and innovation are left with the Nigerian Educational Research and Development Council (NERDC), while the up-grading of essential infrastructure, facilities and services in schools, (e.g. the provision of classroom blocks, libraries, etc.) are to be provided by the Universal Basic Education Commission (UBEC).

Ladies and gentlemen, curriculum like the society it serves is dynamic. NERDC is continually improving and updating the basic and secondary education curriculum for relevance and serving the society better. For example, as we talk, NERDC and the Public and Private Development Centre (PPDC) have developed an Online Safety Curriculum and Teachers Guides for Basic and secondary education in Nigeria. The articulation and introduction of an online safety curriculum for Nigerian schools will educate, protect and keep children and young people safe online. I would like to inform listeners that Online Safety is not a Stand-alone school subject. In other words, we are not and have no intention of introducing a new subject in the schools. The plan is to infuse its contents into relevant themes of existing subject curricula such as Basic Science and Technology, Computer Studies, and so on.

(d) Textbooks Production

Textbook review and development are also a core mandate of the Nigerian Educational Research and Development Council (NERDC). Our primary role in this regard is to assure the quality of books and other educational materials meant for teaching and learning of curriculum content standards in schools. Thus, NERDC is expected to provide a level playing ground for local authorship to thrive in partnership with indigenous authors and publishers.

Ladies and gentlemen, I wish to use this forum to invite the AITIE to be part of the ongoing effort in improving the quality of basic and secondary education curriculum delivery in schools. This you can do by developing quality textbooks, digital contents, etc. that are not only aligned with the curriculum contents, but also effectively deploy ICT for basic and secondary curriculum delivery. There is no other body better qualified to do this than the AITIE. Our doors are open to AITIE for collaboration in this area.

(e) E - Learning Initiative:

In 2010, the Federal Executive Council approved the implementation of e-learning initiative in education. In addition to being a viable platform both for developing the nations human capital base for technological advancement and socio-economic transformation, the e-learning initiative is expected to also address the various challenges of the education sector, including the enhancement of teaching and learning environment for effective curriculum delivery.

Specifically, e-learning initiative in education is expected to:

(i) provide limitless access to information (both for teachers and learners);
(ii) improve the quality of teaching and learning through the provision of content learning standards and e-resources;
(iii) service the educational community by enhancing access to instructional resources(e-resources, e-course ware, e-library, e-lessons, etc;)
(iv) promote lifelong learning through the permanent access to and sharing of digital learning resouces.

Albeit government funding needed to jumpstart the e-learning initiative; for sustainablity and cost effectiveness, a public Private partnership is being explored for the administration amd management of e-learning in the education sector. The AITIE should also leverage on this opportunity and support optimal deployment of ICT for curriculum delivery at basic and secondary education level. Again our invitation is open.

The Flash Points

Ladies and gentlemen, in discussing the basic and secondary education curriculum development, review and innovation processes, I have been able to highlight the ideals and specific challenges of basic and secondary education curriculum in Nigeria. The need for optimal deployment of ICT in curriculum delivery vis-à-vis the urgency to reposition basic and secondary education to play a central role in the economic, social and security stability of the nation was discussed. The paper also examined the nature and support required for optimal deployment

of ICT in basic and secondary curriculum delivery process. Finally, and most importantly, I am inviting the AITIE to join the NERDC and other stakeholders to effectively deploy ICT in basic education curriculum delivery. We are waiting.
Thank you for listening.

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MASSIFICATION AND QUALITY: ICT IN THE SERVICE OF EDUCATION – THE NIGERIA PERSPECTIVE

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Permit me to stand on already established protocol

The use of ICT in education can never be over emphasized since 21st century skills and knowledge can only be delivered with appropriate use of innovative technologies. There is need to conceptualized basic keyword in the topic given.

Massification of Education

Massification is the education that is made available to everyone within a nation which results in overwhelming numbers of students' enrolment and proliferation of schools to cater for the tremendous population of students. The concept of massification of education brings a lot of policy on access to education. Access to education is a pivot point of discuss in the concept of massification of education. In the past education access started with provision for mainly the elite which are very few individuals prepared to take certain responsibilities within the society. This is followed by supply of education for those who develop interest in education. This off course brings about mass enrolment that calls for a high supply of education. The last access to education makes it compulsory and requirement for the citizen to have education to certain level or all level.

Many higher education systems worldwide expanded extensively in the last decades, and have undergone wide and deep structural changes. Most notably, the diversity of many higher education systems has increased dramatically, both horizontally and vertically. The term massification was first used by (Scott, 1995) to describe increase in student enrolment in the latter part of the twentieth century. Trow, (1999) presents a typology to this term, massification and coined the terms elite, mass and universal higher education, with elite representing a national enrolment ratio up to 15%, mass representing a ratio of up to 50%, and universal a ratio in excess of 50%. However, Massification has been defined as the mass production of a phenomenon by the suppression of its distinguishing features.

There are indications signifying rapid increase in actual numbers of students enrolled in higher education in Nigeria (Ademola, Ogundipe, & Babatunde, 2014), that should be considered as massification. Nigerian Government have since taken several corrective measures to address the consequences of massification through creation of new higher institutions (Government and Private).

In the recent time, most public higher education institution in Nigeria, in respect to historical condition, have enrolled students in excess of their capacity, resulting in massification and negative consequences on educational quality. Likewise, a noticeable "systemic failure enrolment" - a situation whereby candidate with more than enough requirements denying admission, resulting in negative consequence on the society and nation at large.

Though, massification of higher education leads to development of a country that embrace it; but the equally important issue is training quality graduates that leads to development; this seems to has received limited attention in Nigeria higher education. Likewise, issue of systemic failure enrolment requires urgent attention in mostly public higher education in Nigeria.

Background to Higher Education

Nigeria as a nation came into being in 1914 through amalgamation of Southern and Northern protectorates. The period between 1882 and 1929 could be described as the beginning of modern education in Nigeria and this period was marked by intensive missionary activity and expansion in southern Nigeria. Children are the prime focus as they are regarded as bundle of possibilities and every society puts in place a strong system of education to ensure that these children are prepared to understand and cope with the unknown future. Here is the summary of the structure of education among the three major groups in Nigeria. The Hausa ethnic group centered the structure of education around a strict moral code which is religious based and pursued to achieve submissive behavior. The Igbo children were taught to basically to achieve through competition. The Yoruba education focused on the production of what they call "Omoluwabi" – meaning a well-developed personality who can stand in all spheres of life on his/her own with particular emphasis on strong moral base (Babarinde & Bankole, 2011; Majasan, 1967).

General Overview of Higher Education in Nigeria

Nigeria is rated to be most populous country in Africa with high average relative growth rate of 3.24%. This has contributed to the difficulty in having access to tertiary education as shown in in Table 1.

Table 1.
Application Vs. Candidate Admitted between 2015-2018

Year	No of Application	No of Candidate Admitted
2015	1,428,379	415,500
2016	1,579,027	492,675
2017	1,720,000	566,719
2018	1,650,000	549,763

Table 1: Statistics of Applicants and Admitted students

Nigeria: The Top African Sender of Students Abroad

Within African continent, studies show most public universities is messy and the quality of teaching and learning are at risk (Mohamedbhai, 2014), of which Nigeria is not exempted. Many, especially in Nigeria that can avoid the cost of education abroad, do send their children overseas. According to data from the UNESCO Institute of Statistics, the number of Nigeria students abroad increased by 164 percent in the decade between 2005 and 2015 alone from 26,997 to 71,351 as shown in Figure 1.

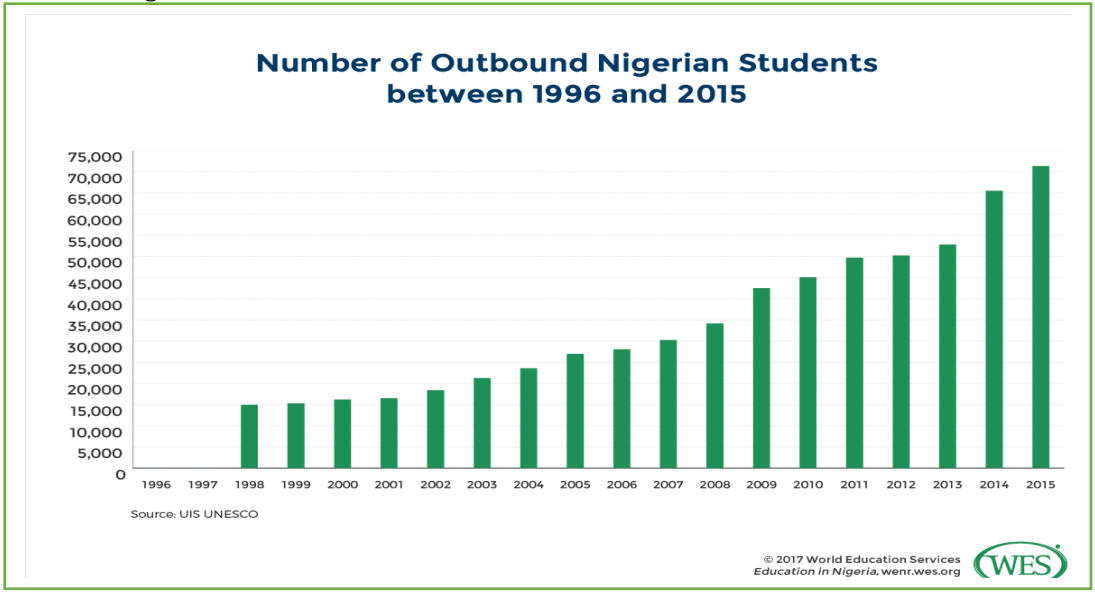

Figure 1: Statistics of Nigerians accessing education outside Nigeria

In the recent past, there have been tremendous increase in the number of students enroll for the UTME exam. According to the statistics JAMB provides on its website, a total of 1,579,027 students sat for the UTME exam in 2016. Out of which 69.6 % were made to federal universities, 27.5% to state universities, and less than 1% to private universities. This translate to the fact that the number of applicants currently exceeds the number of available university seats by a ratio of two to one. (i.e. 2:1). In 2016, only 415.500 out of 1.428,379 applicants were admitted to university, according to the data provided by JAMB. The year 2017 witness another increment in enrolment with a total of 1.72 million, and 1.65 million in 2018 as shown in Table 2.

Every year, admissions crisis continues to be one of Nigeria's biggest challenges in higher education, especially given the strong growth of its youth population. It is obvious, Nigeria system of education presently experience a systemic failure, as over a million qualified college-age Nigerians deny postsecondary education on an annual basis. This represent nearly 75% applicants in Nigeria fail to get admission year, Quartz an online magazine reported.

Information and Communication Technology (ICT)

ICTs stand for information and communication technologies and are defined, as a diverse set of technological tools and resources used to communicate, and to create, disseminate, store, and manage information. These technologies include computers, the Internet, broadcasting technologies (radio and television), and telephony.

In recent years there has been a groundswell of interest in how computers and the Internet can best be harnessed to improve the efficiency and effectiveness of education at all levels and in both formal and non-formal settings. But ICTs are more than just these technologies; older technologies such as the telephone, radio and television, although now given less attention, have a longer and richer history as instructional tools. For instance, radio and television have for over forty years been used for open and distance learning, although print remains the cheapest, most accessible and therefore most dominant delivery mechanism in both developed and developing countries. The use of computers and the Internet is still in its infancy in developing countries, if these are used at all, due to limited infrastructure and the attendant high costs of access.

ICTs and Access to Education

ICTs are a potentially powerful tool for extending educational opportunities, both formal and non-formal, to previously underserved constituencies scattered and rural populations, groups traditionally excluded from education due to cultural or social reasons such as ethnic minorities, girls and women, persons with disabilities, and the elderly, as well as all others who for reasons of cost or because of time constraints are unable to enroll on campus.

Anytime, anywhere: One defining feature of ICTs is their ability to transcend time and space. ICTs make possible asynchronous learning, or learning characterized by a time lag between the delivery of instruction and its reception by learners. Online course materials, for example, may be accessed 24 hours a day, 7 days a week. ICT-based educational delivery (e.g., educational programming broadcast over radio or television) also dispenses with the need for all learners and the instructor to be in one physical location. Additionally, certain types of ICTs, such as teleconferencing technologies, enable instruction to be received simultaneously by multiple, geographically dispersed learners (i.e., synchronous learning).

Access to remote learning resources: Teachers and learners no longer have to rely solely on printed books and other materials in physical media housed in libraries (and available in limited quantities) for their educational needs. With the Internet and the World Wide Web, a wealth of learning materials in almost every subject and in a variety of media can now be accessed from anywhere at any time of the day and by an unlimited number of people. This is particularly significant for many schools in developing countries, and even some in developed countries, that have limited and outdated library resources. ICTs also facilitate access to resource persons, mentors, experts, researchers, professionals, business leaders, and peers all over the world. How does the use of ICTs help prepare individuals for the workplace? One of the most commonly cited reasons for using ICTs in the classroom has been to better prepare the current generation of students for a workplace where ICTs, particularly computers, the Internet and related technologies, are becoming more and more ubiquitous. Technological literacy, or the ability to use ICTs effectively and efficiently, is thus seen as representing a competitive edge in an increasingly globalizing job market.

ICTs and Learning Environment

Research has shown that the appropriate use of ICTs can catalyze the paradigmatic shift in both content and pedagogy that is at the heart of education reform in the 21st century. If designed and implemented properly, ICT-supported education can promote the acquisition of the knowledge and skills that will empower students for lifelong learning.

When used appropriately, ICTs especially computers and Internet technologies enable new ways of teaching and learning rather than simply allow teachers and students to do what they have done before in a better way. These new ways of teaching and learning are underpinned by constructivist theories of learning and constitute a shift from a teacher-centered pedagogy in its worst form characterized by memorization and rote learning to one that is learner-centered.

Active learning. ICT-enhanced learning mobilizes tools for examination, calculation and analysis of information, thus providing a platform for student inquiry, analysis and construction of new information. Learners therefore learn as they do and, whenever appropriate, work on real-life problems in-depth, making learning less abstract and more relevant to the learner's life situation. In this way, and in contrast to memorization-based or rote learning, ICT-enhanced learning promotes increased learner engagement. ICT-enhanced learning is also "just-in-time" learning in which learners can choose what to learn when they need to learn it.

Collaborative learning. ICT-supported learning encourages interaction and cooperation among students, teachers, and experts regardless of where they are. Apart from modeling real-world interactions, ICT-supported learning provides learners the opportunity to work with people from different cultures, thereby helping to enhance learners' teaming and communicative skills as well

as their global awareness. It models learning done throughout the learner's lifetime by expanding the learning space to include not just peers but also mentors and experts from different fields.

Quality ICT Approach to Massification Challenges

ICT can be a powerful tool for coping with massification challenges in the Higher Institutions in Nigeria. However, it is high time for the public higher Institutions in Nigeria to devised several approaches and strategies to cope with the challenges of massification through;

i. Decentralization: To meet the demand of increased enrolment, higher institutions should deploy a strategy of decentralization or the delocalization of their activities from the main campus.
ii. Video-conferencing: One interesting approach is the inter-connection of several lecture rooms so that a lecture delivered in one can be simultaneously transmitted in the others by video-transmission. This solves the problem of a lecturer having to deliver the same lecture to different groups.
iii. Processing Examination: This could be achieved through a multiple-choice type of test. University of Ilorin, has since been committed to the use of this software because of the very large cohorts of students. This facilitates the task of both the lecturers, who have rapid access to the results which can then be quickly distributed to all staff concerned, and the students who obtain their results quickly and do not have to queue up outside the lecture's office.
iv. The use of ICT in learning is another effective way of alleviating the problems associated with massification. First, through the creation of an online database of resources, including lecture notes, which is linked to other resources, for use by students for a particular subject. Second, it uses e-learning to complement face-to-face learning.
v. Online learning approach to some courses: This approach gives staff and students access to lecture materials, assignments, tests etc.
vi. Using ICT to facilitate administrative work: Administrative work in most of public higher institutions of learning across Nigeria need to be readdressed through the use of ICT, rather than manual operation which has been order of the day. Some of the areas need to be readdressed are: Improve the efficiency of processes such as admission of students, registration for programme and examinations.
vii. Automating library services: The use of VubisSmart software to convert manual catalogues into an electronic database; enhance of exchange of research information and, promoting access to international scientific journal through the internet.

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INTEGRATION OF INFORMATION AND COMMUNICATION TECHNOLOGY IN EDUCATION: IMPLICATION FOR NTI OPEN AND DISTANCE LEARNING PROGRAMMES IN NIGERIA

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Abstract

Teaching in Open and Distance Learning Programmes in Nigeria like any other human endeavor requires continuous improvement to move along with current technological advancement to be able to tackle new challenges. Information and Communication Technology (ICT) have continued to transform the economy and Society. The role of ICT in the transformation of Nigeria is immense. Efforts at integrating Information and Communication Technology (ICT) into the Nigerian educational system started in 1987 at the 32nd Ministerial Council Meeting of the National Council on Education. This led to the inauguration of a National Committee on Computer Education which later drafted a policy on computer education. This paper therefore traces the integration of ICT in Education: Implication for NTI Open and Distance Learning Programmes in Nigeria.

Keywords: *Information and Communication Technology, National Teachers Institute, Open and Distance Learning Programmes.*

Introduction

Open and Distance Learning (ODL) has been considered as one of the educational innovations rapidly growing in Nigeria. Open and Distance Learning has provided opportunities to Nigerians who would have previously been denied access to educational opportunities based on their work, where they live, poor-economic circumstances and social status to attend to full time conventional educational system. It has a lot of benefits over conventional education which includes accessibility, flexibility, cost effectiveness, uninterrupted studies and freedom from cultism. The use of Information and Communication Technology (ICT) in Open and Distance Learning in Nigeria remains a major role for easy implementation of Open and Distance Learning (ODL).

Open and Distance Learning is very significant in today's knowledge-based and global world of education. It is a field of education that focuses on Open and Distance method of teaching with the aim of delivering teaching often on individual basis, to students who are not always physically present in a traditional educational setting (Isyaku, 2015). Teaching is carried out through self-driven learning among the students through different platforms, vis-à-vis learner – learner, tutor – learner and instructional – media interactions.

National Teachers' Institute (NTI) is however one of the most widespread Institute for which ODL has been adopted for training, retraining and upgrading of existing teachers. Such teachers have the opportunity to be re-trained in their schools, save on resources and bring immediate benefits to their classrooms (OECD, 2007). One of the major factors which have given rise to this type of learning is that most people do not have access to training in conventional Institutions in Nigeria. They also lack adequate time to undergo such a programme in the conventional way. Thus, teachers have seen ODL programmes as viable ways of acquiring

education even in a more convenient environment (Dabu & Jem, 2016). Due to the unconventional methodologies adopted in ODL, the printed medium is basic, supported by ICT. Therefore, the complex nature of the ODL form of education should be ICT-driven. Thus, NTI which is mandated to continually train and re-train teachers for effectiveness through ODL, integrated ICT into her programmes.

Integrating Information and Communication Technology (ICT) into classrooms has been an important aspect of preparing teachers for an ever-changing educational environment. In fact, an increasing acceptance and use of information and communication technology (ICTs) by the population occurred in the last decades (Hopkins, 1998). In particular, a great acceptance of using e-learning is seen as the use of ICTs to deliver a broad range of learning opportunities to enhance knowledge and performance (Beadle & Santy, 2008).

But one goal of using ICT for the professional development of teachers is to help them prepare students to become productive members of the dynamic society and help teachers build skills that prepare students to become productive members of the workforce in a technologically advanced world (Osisoma & Ogunsola-Bandele, 2009).

Information and Communication Technology and Open and Distance Learning

The term Information and Communications Technology (ICT) came into broader light in the early 1990s to replace Information Technology (IT) as a result of the communicating abilities and facilities offered by the computer (Akudolu, 2007), Clarke (2006) states that ICT covers a wide range of applications, techniques and systems such as Word processing, Internet, Email, Spreadsheets, File navigation, Presentation packages, Database, and Curriculum Manager as well as work with teaching aids like camera, television, radio, projector etc. ICT therefore became relevant in teacher education to keep the contemporary teacher abreast with the dynamics of knowledge in the 21st Century (Otuka, 2012). Lallana and Margaret (2003) affirms that ICT refers to a broad field encompassing computers, communications equipment and the services associated with them. Clarke (2006) went further to state that ICT is not just considered as applications and systems but also as skill for life. It is in line with literacy and numeracy as a fundamental skill which every individual need so as to live "confidently, effectively and independently in a modem society (Akudoiu, 2007).

There are different definitions of Open and Distance Learning (ODL). Abrioux (2009) defined ODL as the type of education that takes place outside the conventional school system; it is imparted without necessarily having personal interaction with students or learners. According to UNESCO (2000), ODL is one of the most rapidly growing fields of education, and its potential impact on all education delivery systems has been greatly accentuated through the development of Internet-based information technologies, and in particular the World Wide Web (WWW) presenting approaches that focus on opening access to education and training provision, freeing learners from the constraints of time and place and offering flexible learning opportunities to individuals and groups of learners.

The Federal Ministry of Education (2004) defines ODL as any form of learning in which the provider enables individual learners to exercise choices over any one or more of a number of aspects of learning and distance learning as an educational process in which a significant proportion of the teaching is conducted by someone removed in space and/or in time from the learner. It can be deduced from these definitions that open and distance learning aims at increasing access and provides educational opportunities needed by anyone, anywhere and at any time. It provides

increased educational opportunities to a larger population in different situations and needs. Both students and employees with distance problem can benefit because it is more flexible in terms of time and can be delivered anywhere.

Training Teachers in Nigeria Through the Use of Information and Communication Technology

No meaningful development can take place in any country without well-trained teachers who will, in turn, produce adequate workforce for the nation. The National Policy on Education (2004) addressed this by the following statement, among others. The goals of teacher education shall be to:

- produce highly motivated, conscientious and efficient classroom teachers for all levels of our educational system
- provide teachers with the intellectual and professional background adequate for their assignment and make them adaptable to changing situations

The National Teachers' Institute play great roles in teacher education in Nigeria. A holistic overview of how ICT training is carried out in the Institute no doubt provides a picture of ICT and ODL in Nigeria. This has revolutionized the equipment, materials and strategies for teaching. Emphasis has shifted from the teacher and the textbooks to ICT materials that call for the learner to be responsible for his or her own learning where the teacher serves as a facilitator, moderator or assistant. Though ICT tools and resources may be expensive when compared with the chalk and chalkboard of today in Nigeria, they are no luxury items but a necessity for teacher effectiveness. Fully integrating technology into teaching and learning requires well qualified teachers that is ICT complaint and are able to use the following ICT applications: Word processing, Internet, Email, Spreadsheets, File navigation, Presentation packages, Databases, and Curriculum Manager as well as operate a host of other items like camera, television, radio, projector, etc.

Otuka (2012) states that the uses of ICT in teacher training are as follows: -

- It promotes the competence of the teacher.
- The teacher develops interest and confidence in his/her work.
- It improves the teachers handling of large classes.
- Teachers studying by distance or long vacation programmes have access to information from their course facilitators e.g. the Internet.
- It enhances the quality of teacher education by exposing in-service teachers to resources and information beyond their immediate horizon.
- It provides opportunities for teachers who might want to combine work and learning to do so at their own pace.
- It sustains life-long learning.
- As a social process it enhances interaction and collaboration not only among institutions but also teachers either trainees or serving.
- Trained ICT school heads and managers will appreciate ICT knowledge.
- It promotes the teachers' capability to carryout meaningful research.
- Trainees have the option to select learning materials that meet the level of their knowledge and interest.
- It helps the teacher to develop computer and other interest skills that are transferable to other facets of the trainees' lives.
- It promotes effective and efficient education administration.

The Status of Information and Communication Technology in Teacher Education In Nigeria – Impact Of National Teachers; Institute

The teacher in the 21 Century faces a challenge of having to update his/her knowledge to be able to make appropriate use of ICT either as a teacher who uses ICT in the classroom or as an e-teacher or e-moderator of open and distance learning.

Teacher educators and teachers are concerned more with efficiency rather than effectiveness when they adopt ICT in Education. Thus, ICT is used to make their jobs easier instead of making learning more effective. As a result, the teaching/learning process is embracing current educational paradigm which emphasizes student-centered instruction with the teacher as the facilitator rather than teacher as the source of knowledge.

At all levels in Nigeria, lecturers/teachers have generally been polarized in their acceptance of the new technologies, while some have enthusiastically integrated technologies into their classrooms, others have totally rejected it. Otuka (2012) has observed that over 80% of teachers at the Post-basic and Basic levels who attended the Science Teachers Association of Nigeria's (STAN) ICT Annual Workshops (2004-2010) had no knowledge of the basic applications of the computer. No wonder teachers act as roadblocks against the implementation of new technologies and often not ready to accept any changes in their roles.

The NTI included ICT among other subjects like teaching methods and techniques, classroom management skills, language communication skills in the SDGs, produced manuals for the subjects and followed up with facilitation of these subjects during the SDGs retraining of Teachers.

The reason for these was for the teachers to benefit from the latest technological advancement in both subject matter, content knowledge and innovative best practices in pedagogical skills.

Information and Communication Technology Education and Information and Communication Technology in Education

ICT has three positions in curriculum and these are:

- learning about ICT,
- learning with ICT and
- ICT in education.
- Learning about ICT refers to ICT concept as a subject of learning in the school curriculum while learning with ICT is concerned with the use of ICT as a medium to facilitate instruction. This implies that one can learn ICT as any other subject in the curriculum. It can also be an instructional medium or a source for learning. This leads us to the need to clarify the differences and intersections between ICT in Education and ICT Education.
- ICT in education involves a comprehensive approach to innovative education systems, methods and management through ICT.

ICT		
Learning About ICT	Learning With ICT	ICT In Education
ICT concept as a subject of learning in the school curriculum	The use of ICT as a medium to facilitate instruction	A Comprehensive approach to innovative education systems, methods and management through ICT

According to Kim (2009), the scope of ICT in education among others includes:

- ICT as a tool to innovative teaching - learning practice (i.e. digital content, multimedia, teaching-learning methods, learning environments)
- ICT as an administrative tool (Education management information systems)
- ICT as an expanding learning opportunity (Distance Learning, e-learning)

- ICT as a facilitator of higher order thinking skills (learner-centered, self - directed learning, tailored learning)

Again, ICT education refers to ICT conceptual and functional skills needed to prepare learners to further participate in work and society in the future. There is a symbiotic relationship between ICT education and ICT in education as the latter foster's ICT skills and competence among learners. In learning with ICT, students indirectly acquire ICT competence. It should be noted that basic ICT skills are needed to integrate ICT into education thus, ICT education is the foundation of ICT in education.

Education Related Policies of Information and Communication Technology in Nigeria

Four education related ICT policies exist in Nigeria:

- The National Computer Education Policy had the objective to bring about a Computer literate society in Nigeria and, to enable school children to appreciate and use computers in various aspects of life and future employment. The Policy further proposed the teaching of computer studies and computer aided Instructions at Junior Inferior School (JSS) level.
- The National Information Technology Policy had as its vision statement 'to make Nigeria an Information Technology (IT) community in Africa and a key player in the information society using IT as the engine for sustainable development and global competitiveness". The policy's mission statement had the catch phrase "USE IT" and also necessitated the use of IT in education among other sectors. Even though the policy was not formulated solely for the educational sector, some of its objectives included empowering youths with ICT skills and preparing them for global competitiveness and, integrating IT into the mainstream of education and training.
- The National Policy on Education is the first to include ICT components in ICT policy. ICT was introduced into primary, secondary, science, technical and vocational education. Computer education became a pre-vocational elective in JSS and a vocational elective in SSS.
- The National Science, Technology and Innovation Policy objective is to build a strong Science, Technology and Innovation capability and capacity needed to evolve a modern economy. In relation to the educational sector, strategies were proposed to facilitate national ICT innovation competition at all levels of education, encourage and support collaborative Research and Development activities among industry, higher educational institutions as well as private and public research institutions for software and hardware development.

Information and Communication Technology Integration in Teacher Education: National Teachers' Institute Experience

The National Teachers' Institute, Kaduna was established in 1976 by the Federal Government to produce qualified teachers for Nigerian Schools. The Institute's enabling law National Teachers' Institute Act, CAP N79 LFN 2004 (originally Decree **No. 7 of 10th April 1978)** established the Institute, charged it, to among other things; provide courses of instruction leading to the development, upgrading and certification of teachers as specified in the relevant syllabus using Distance Education Techniques.

With the launching of the Universal Basic Education (UBE) programme by the Federal Government in 1999, the Institute was further tasked to produce qualified teachers to meet the new challenges posed by the acute shortage of teachers to implement the programme.

The Institute's Act (Ibid) further mandates it in section 3 (a-j) to carry out the following functions:

(a) Upgrade under-qualified and untrained teachers;
(b) Provide refresher and other upgrading courses for teachers;

(c) Organize workshops, seminars and conferences, which would assist in the improvement of teachers;
(d) Conduct examinations;
(e) Carry out research in conjunction with other bodies on any matter relevant to educational development in the country;
(f) Formulate policies and initiate programmes at all levels of education designed to improve by way of research the quality and content of education in Nigeria;
(g) assess from time to time the training programmes offered by institutions controlled by or associated with the Institute, with a view to ascertaining the professional competence of those institutions;
(h) offer such assistance, either alone or in co-operation with other educational bodies as may be requested by the institutions controlled by or associated with the Institute;
(i) foster and enhance international co-operation in the education of teachers; and
(j) perform such other functions as necessary or expedient for the full discharge of all the functions of the Institute under the Act.

In addition, in *section 7(2)*, the enabling Act states "without prejudice to the generality of the provisions of the Act, the Institute's Governing Council shall have and exercise the powers to":

(a) Establish and maintain such schools, extra-moral departments and other teaching units within the Institute as the Council may from time to time decide.
(b) Provide such courses of instruction either alone or in association with such Universities and other Institutions whether in Nigeria or not, as the Council may determine, and to conduct examinations, and award Diploma and Certificate to those reaching a certain standard as a result of those examinations as may seem appropriate to the Council;
(c) Institute and award fellowships, medals, prizes and other titles;
(d) Mount exhibition and displays designed to foster an appreciation of trends in, and the scope of the requirement for education.
(e) Create lectureship and other academic posts and offices and to make appointments there to,
(f) To encourage and make provision for research in the Institute and
(g) Erect, provide, equip and maintain such educational, recreational and residential facilities as the Institute may require.

Teachers teach the way they are taught and not in the way they are told to teach. Teachers that will use ICT to assist instruction must have first of all experienced ICT based curriculum in their initial teacher preparation (Jegede, 2006). In other words, student teachers need to experience ICT use in their own learning before such technologies will be adopted for use with the children they teach. This idea is underpinned by the Social Learning Theory otherwise known as observational learning. Absolute learning comes from observational learning and instruction. Underwood (1996) underscored this when he opined that the bane of ICT education for teachers is that of poor role models for student teachers. This placed the primary responsibility at the door step of teacher education and educators. In a situation whereby teacher educators themselves cannot teach with computers; it then becomes difficult to envision an ICT integrated classroom with the teachers they produce.

Training till now has focused on application i.e. how to use Word, excel, PowerPoint etc. Trainings that are now needed must include ICT integration into teaching and learning. This is the beginning of transformation.

- The National Teachers' Institute does not compromise quality in her programmes and had integrated ICT in her course books for students and facilitators in all the programmes – B.Ed., PGDE, NCE and SDGs.
- The NTI Radio station is also airing the courses books.
- The Institute's application for admission and registration is done and processed on-line.
- The Institute's Café, manages the official e-mail of NTI info@nti.edu.ng.

- The Institute's on bi-monthly basis published her news in the news bulletin which is uploaded to the Institutes' website.
- The Institute's E-Learning centre conducts e-examinations for example the TRCN and JAMB e-examinations.
- The NTI has introduced free on-line course on Environmental Education and this is called 'Waste To Wealth (WTW).
- The Institute has an on-line Advanced Diploma Programme in Environmental Education (Green teacher).
- The Institute uploaded her course materials on the newly introduced Science Courses viz: Physics, Chemistry, Biology, and Agricultural Science.
- The Institute is also updating her portal to ensure that students check their results on-line.
- The Institute offers technical support on ICT in teacher and teacher education to all that needs their services.

Benefits of Information and Communication Technology in Teacher Education

Information and Communication Technology has changed the role of the teacher. Twenty years ago, the teacher was basically limited to providing class notes, showing a video, and using a limited variety of other tools to try and make learning fun and interesting. Thus, teachers were expected to reach a variety of learning styles simultaneously without the proper tools to help them accomplish this task. Today, a teacher's role has changed to facilitator and supporter as students collaborate and use apps that suit their learning style. This enables the teacher to be more proactive about providing individual help when needed without having to worry about hindering other students in the classroom that are ahead in the learning process. Otuka (2010) list the benefits of ICT to teacher education as follows:

- It enhances and promotes the competence of the teacher.
- It makes the teacher to have interest and confidence in his/her work.
- Teachers access teaching and learning material through internet.
- Teachers' quality is enhanced, hence their exposure in pre-service and in-service training to resources and information beyond their immediate reach.
- Teachers who wish to combine work and learning do so at their pace and convenience.
- The teachers' life-long education through training and retraining is sustained.
- It enhances interaction and collaboration among teachers and school heads administration.
- Teachers are better equipped and enhanced to carry out meaningful research.
- Teachers are better placed to select teaching and learning materials suitable for the level of students/pupils under them.
- Teachers are able to develop good ICT skills which are translated to their students.

Recommendations

It is worthy of note to recommend the following:

- Mandatory supply of a prescribed number of computer systems by the local government to primary schools in their area.
- Special budgetary allocation by Federal and state governments for ICT in ODL teacher and teacher education.
- Encouraging private ownership to invest in ICT for ODL teacher and teacher education.
- More importantly as strategized in National IT Policy (2000), encouraging IT companies with appropriate incentives and compelling them to invest in ODL teacher education and re-training of teachers by the NTI.
- Connecting the schools with information superhighway by grouping schools.
- Providing safety for the provided gadgets.

- ❖ Encourage the development of indigenous software that are compatible with Nigeria's educational system.
- ❖ Teacher education and development by the following strategies:
  - ✓ In-service training for serving teachers.
  - ✓ ICT-immersed training for In-service teachers.
  - ✓ Re-training of teachers from time to time.
  - ✓ Laptop loans and rebate for primary and secondary school teachers.
  - ✓ Training and re-training of teacher educators.
  - ✓ Training to focus more on teaching with computers rather than on mere technicalities

Conclusion

Judging from the above, it can be deduced that the relevance of ICT in the classroom represents a win-win situation for educational Institutions. This paper has revealed the steady growth of ICT in this regard. Thus, teachers now have the tools they need to reach each student and students can choose the way they wish to consume lesson content. The Nigeria's government are hereby appreciated for encouraging the NTI ODL Institute by making ICT study materials and equipment available so that teacher trainees will be updated with the 21st Century ICT classroom skills. This in essence will go a long way in improving the standard of education in Nigeria.

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Conference Papers

ASSESSMENT OF SCIENCE AND TECHNOLOGY EDUCATION LECTURERS' PARTICIPATION IN MASSIVE OPEN ONLINE COURSES (MOOC) AT FEDERAL UNIVERSITY OF TECHNOLOGY, MINNA, NIGERIA

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Abstract

The study examined the Science and Technology Education lecturers' participation in Massive Open Online Courses (MOOC) at Federal University of Technology, Minna, Niger State. It employed survey research using a 25-item in five sections' questionnaire. From the Population of 56 lecturers, 21 Science and Technology Education (STE) lecturers were conveniently sampled. The questionnaire was validated and found reliable for collection of data with reliability coefficients of 0.9, 0.8, 0.91, 0.70 and 0.86 for sections A to E respectively. The study answered five research questions and tested five hypotheses. The data collected were analyzed using mean, standard deviation, ANOVA and Chi-square at 0.05 significant levels. The result revealed that most of the Science and Technology Education Lecturers are limitedly aware of Massive Online Open Courses (MOOC), and that majority of the STE lecturers have neither participated nor completed any course in MOOC talk more of receiving a certificate for it. It also revealed that lecturers' views are different on extent and reasons for participation in MOOC with respect to their departments. STE lecturers' years of experience and gender does not affect their responses on extent and readiness for participation in MOOC respectively. It was recommended that lecturers should search for more information about MOOC and create time for enrollment and completion of at least one session of MOOC irrespective of their departments, gender or years of experience.

Keywords: Massive Online Open Courses, Science and Technology Education, Professional development, awareness and participation.

Introduction

There is virtually no industry sector that has not experienced a technological paradigm shift from the traditional way of doing things to digitalization; ranging from e-banking to e-health, to e-commerce, to e-governance and then to our own constituency which is education that has e-learning. In recent times, science and technology education has experienced technological advancement which has created novel ways of doing things and has by implication generated new contents for teaching and learning. Many educational institutions are using online tools, virtual learning environment and also incorporating e-learning into their traditional methods of teaching in conventional or distance education as part of the technological revolution in education.

Over the past few years, there is a phenomenon gathering momentum in many educational institutions called Massive Online Open Courses (MOOC). It is the nexus of social networking, the facilitation of an acknowledged expert in a field of study and a collection of freely accessible online resources. MOOCs are open online courses that generally allow anyone to register and follow a course without a fee or at little cost. It is an innovative, novel method of extending access to education to everyone and everywhere through the use of internet technology. MOOC entails the development of course; long-term and short-term, certificated and non-certificated, free and low-cost, online and downloadable.

The role of online courses in higher education cannot be over-emphasized. Digital technologies have exponentially increased the rate at which knowledge is created and distributed and this has propelled the popularity of MOOC. According to Clow (2013), MOOC is interpreted as Massive-Unlimited number of participants. Open- Freely accessible to all at no charge and also open in terms of learning goals, choice of subject and form of participation. Online- could be online teaching only or blended learning. Course- Course-like organization, the emphasis is on "community", "communication", and "collaboration".

The MOOC follow the standard curriculum for known courses. It allows new courses to be developed and exposed to the global audience easily. A course week or unit is typically composed of lecture videos, texts and images, and a range of assessment tools and supported and enhanced by the discussion forum. The interaction platform could be embedded or rely on external social media tools to facilitate interaction in the course. Sometimes, other resources such as textbooks are also recommended to participants to aid their studies. Access is via websites on personal computers and mobile applications on personal digital assistants and mobile devices. The requirement for access is simple and relatively cheap, allowing for low-income earners to have the opportunity of accessing educational courses online. Apart from providing course materials, MOOC provides interactive user forums to support community interactions among students, professors, other lecturers and teaching assistants.

The 2000s saw changes in online, e-learning and distance education, with the increasing online presence and open learning opportunities. Participants are made aware that when registering for MOOCs, they are enrolling for a course only and not the actual university delivering the course. Unlike university courses, they do not have enforced prerequisites for anyone to undertake the courses. It is for everyone; male, female, non-professionals, young professionals and people with many years of experience in their professions. Canada has a distinct and disproportionate advantage in expertise in the burgeoning field of digital openness. Canadian researchers and practitioners in open education are respected as leading international authorities and innovators (McAuley et al. 2010). Universities in the UK and other advanced countries have proved themselves to be flexible, resilient and entrepreneurial by embracing MOOC as an opportunity to develop their education provision and profile.

The term MOOC was coined in 2008 by Dave Cormier of the University of Prince Edward Island in response to a course called Connectivism and Connective Knowledge (also known as CCK08) (Cormier & Siemens, 2015). According to Jobe, Östlund and Svensson, (2014), the structure of the MOOC was based on connectivist notions of knowledge building and the central principles of autonomy, diversity, openness and interactivity. The emergent and self-defined nature of the MOOC capitalizes on the strengths that individuals bring to it in terms of their experiences, knowledge and skills, with a range of collaborative software environments and perhaps most importantly, with the "soft skills" essential for successful negotiation and collaboration. In all these dimensions, successful participation in MOOC parallels and scaffolds successful participation in the larger digital economy (McAuley, Stewart, Siemens, & Cornier, 2010). The rapid development of MOOC is currently generating considerable excitement in the world of higher education (HEFCE, 2014). The number of undergraduates participating in this programme around the world is amazingly increasing day-by-day. MOOC offers a chance for millions of people around the world, whoever they are and wherever they are to follow courses led by distinguished scholars and at the same time connect with a community of like-minded fellows around the globe (Weller, 2011).

The first generation (cMOOCs) started in 2008, focusing on knowledge creation and generation (e.g., CCK08) (Welsh & Dragusin, 2014) Learners' creativity, autonomy, and networking are encouraged; learners are expected to enrich the course's content. The second-generation (xMOOCs) started in 2012, are based on a more traditional format, with fixed structured content, centralized discussion forum support, and automated or peer-graded evaluation (e.g., Coursera and edX); students are required to master what they are taught. Some providers of

Massive Online Open courses are Coursera, Edx, Udemy, Khan Academy, Peer-to-Peer University (P2PU), OpenSAP, FutureLearn, Eduonix, ALISON and +Acumen, Udacity and MITx.

In Nigeria, a survey of awareness and participation in MOOCs in Ogun state revealed a relatively high awareness and low participation among academic librarians (Soyemi & Babalola, 2018). It also revealed that most participants enrolled to gain skill, knowledge or certification, while some enrolled for fun. Another study on the awareness and adoption of MOOCs by Nigeria University students shows that awareness is low among students due to inadequate infrastructure caused by the high cost of hardware and internet facilities (Adebo & Ailobho, 2017). Orolade and Oyewusi (2017) reported in another study that; though there is a prevalence of digital internet-enabled devices among Nigerian postgraduate students, their level of awareness and enrolment towards MOOC is still very low.

Researchers have confirmed that MOOCs have been having significant positive effects on all sectors of life. Students, Lecturers and other professionals around the world are learning so much in their fields through online programmes, and Nigeria should not be left out. However, STE lecturers in Nigeria need to improve on their professional development strategies in other raise their status and that of Nigerian students, for them to be on the same page with their counterparts in other countries. Nigeria as a well-respected country in the world should not be left out of this new development. As Science and Technology is the backbone of the national and economic development of the country, its teaching and learning should be handled by lecturers that are constantly in tune with ongoing technological advancement. It is against this background that the researcher sets out to investigate the participation of Science and Technology Education lecturers in Massive Online Open Courses.

The Objectives of the Study

This study set out to assess the participation of Science and Technology Education (STE) lecturers in Massive Online Open Courses at Federal University of Technology, Minna. It is also to find out if the opinion of the lecturers would be different with respect to their department, years of professional experience or gender.

Research Questions

i. Are Science and Technology Education lecturers aware of MOOC?
ii. What is the extent of participation of Science and Technology Education lecturers in Massive online open courses?
iii. Why do lecturers participate in MOOC programmes?
iv. What are the reasons for non-completion of the sessions by STE lecturers?
v. Are lecturers ready to participate in the in future?

Research Hypotheses

Ho_1 There is no significant difference in the mean responses of the Science Education lecturers and the Technology Education lecturers on Massive Open Online Course awareness.

Ho_2 There is no significant difference in the mean responses of the Science Education and the Technology Education lecturers on the extent of participation in MOOC.

Ho_3 There is no significant difference in the mean responses of the Science Education and the Technology Education lecturers on reasons for participation in MOOC.

Ho_4 There is no significant difference in the mean responses of the STE lecturers on the extent of participation in MOOC based on years of professional experience.

Ho_5 There is no significant association between STE lecturers' gender and their responses on readiness for participation in MOOC.

Methodology

The study employed a survey research design; the questionnaire was used to collect the

required information because it is considered the most appropriate tool to objectively get the opinion, response and perception from respondents considered to be a representative of the entire population.

The study was conducted among the Science and Technology Education lecturers in Federal University of Technology, Minna, Niger State with a population of 56 lecturers. The sample was made up of 21 lecturers from the School of Science and Technology Education at the University. Using convenience sampling (accidental sampling), the researcher made use of the STE lecturers who were readily available and agreed to participate in the study.

Table 1:
Sample for the Study

Gender	Years of Professional Experience	Departments	
		Science Education	Technology Education
Male	1-5		1
	6-10	1	1
	10 and above	6	8
Female	1-5		1
	6-10	1	
	10 and above	2	
Total		10	11

Research Instruments

The survey instrument that was used to collect data for the study was a researcher-developed questionnaire administered to the STE lecturers. The questionnaire consisted of two parts; the first part is on the characteristics of the respondents (department, gender and year of experience) while the second part was in five sections. Section A focused on the MOOC awareness of the STE lecturers. Section B dealt with the level of MOOC participation by STE lecturers. Section C was on reasons for participation in MOOC. Section D dealt with reasons for non-completion of MOOC sessions by participating lecturers. Section E was used to get their response on readiness for MOOC participation in future. The sections consisted of majorly positive and very few negative statement items with responses as Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). The responses were rated 4, 3, 2 and 1 respectively.

The instrument was validated by three experts in the area of Test and Measurement. The reliability coefficients of the sections A, B, C, D and E are 0.92, 0.80, 0.91, 0.70 and 0.86 respectively. 24 copies of the questionnaire were distributed to 24 STE lecturers that agreed to be respondents in the study. 21 copies of the distributed questionnaire were returned and used for data analysis.

Data collected were analyzed in line with the research questions and hypotheses using mean, standard deviation (SD), Analysis of Variance (ANOVA) and chi-square. A mean score of 2.5 was selected as the decision points between agreement and disagreement, ANOVA was used to test the significant differences at 0.05 level, and the significant level of association was established at 0.05.

Results

Research Question One: Are Science and Technology Education lecturers aware of MOOC?

Table 2:
Mean response of Science and Technology Education Lecturers' awareness on MOOC

	Items on MOOC Awareness	N	Mean	SD	Decision
1	I am aware of the Massive Online Open Courses	21	2.90	1.0	Agree
2	I have enough information about MOOC	21	2.57	1.07	Agree
3	Many Lecturers in my department are aware of MOOC	21	2.52	0.6	Agree
4	I am aware of MOOC that offers courses on Professional Development.	21	2.86	0.85	Agree
5	I am aware of MOOC that offers courses on Personal Development.	21	2.71	1.01	Agree
	Grand Mean		**2.71**		**Agree**

Table 2 shows that all the items have a mean of above 2.50 and a grand mean of 2.71, which revealed that majority of the respondents agreed that they are aware of the Massive Online Open Courses for personal and professional development, and also have enough information about it.

Research Question Two: What is the extent of participation of Science and Technology Education lecturers in courses?

Table 3:
Mean response of Science and Technology Education Lecturers on participation in the courses

S/N	Items on MOOC participation	N	Mean	SD	Decision
1	I have ever enrolled in personal development course(s) in MOOC	21	1.62	0.50	Disagree
2	I have ever enrolled in a professional development course(s) in MOOC	21	1.90	0.83	Disagree
3	I have ever completed personal development course(s) in MOOC	21	1.86	0.85	Disagree
4	I have ever completed course(s) in MOOC for professional development	21	2.0	1.04	Disagree
5	I have received a certificate for completion of a course in MOOC	21	1.57	0.51	Disagree
	Grand Mean		**1.79**		**Disagree**

Table 3 shows that all the items have a mean below 2.50 and a grand mean of 1.79. This indicated that respondents disagreed with their participation in MOOC for personal and professional development. It also indicated that they have never participated, completed or received any certificate in Massive Online Open Courses.

Research Question three: Why do lecturers participate in MOOC programmes?

Table 4:
Mean response of lecturers on reasons for their participation in Massive online programmes

S/N	Items on reasons for lecturers' participation	N	Mean	SD	Decision
1	I participate in MOOC to learn new things in my field	21	2.1	0.94	Disagree
2	I participate in MOOC to explore new technology	21	2.1	0.94	Disagree
3	I participate in MOOC to explore new areas	21	1.86	0.73	Disagree
4	I participate in MOOC to connect with my students	21	1.86	0.73	Disagree
5	I participate in MOOC to obtain verifiable certificate	21	1.67	0.66	Disagree
6	I participate in MOOC to get a job in future	21	1.67	0.66	Disagree
7	I participate in MOOC to communicate with other people of the same interest	21	1.95	0.92	Disagree
	Grand Mean		**1.85**		**Disagree**

Table 4 indicates that all the items have a mean below 2.50 with a grand mean of 1.85. This implied that the lecturers disagreed with the researcher's reasons for participation in the courses.

Research Question Four: What are the reasons for non-completion of the sessions by STE lecturers?

Table 5:
Mean response of lecturers on reasons for non-completion of MOOC sessions

S/N	Items on reasons for non-completion of MOOC sessions	N	Mean	SD	Decision
1	I don't have enough time	21	3.05	0.92	Agree
2	I have too much work	21	3.0	0.95	Agree
3	I am not interested in the topics	21	1.81	0.68	Disagree
4	I have problem accessing the lectures for technical reasons	21	2.24	1.0	Disagree
	Grand Mean		**2.5**		

Table 5 shows the mean response of lecturers on reasons for non-completion of MOOC sessions. The respondents agreed with items 18 and 19 and disagreed with items 20 and 21 all having means of 3.05, 3.0, 1.81 and 2.24 respectively and grand mean of 2.5. This revealed that the lecturers agreed that not having enough time and having too much work to do are reasons for not completing MOOC sessions by the participating lecturers which could also be the reason for the non-participation of others. They disagreed with the fact that they are not interested in the topics and courses or having a technical problem accessing the lecturers. This actually shows that their non-participation is a temporal situation.

Research Question five: Are lecturers ready to participate in the MOOC in future?

Table 6:
Mean response of lecturers on readiness for MOOC participation in future

S/N	Items on readiness for future participation in MOOC	N	Mean	SD	Decision
1	I will like to have more information on MOOC for professional development	21	3.5	0.60	Agree
2	I will like to enroll in MOOC for professional development	21	3.2	0.51	Agree
3	I will like to enroll in MOOC for personal development	21	3.3	0.56	Agree
4	I will like to complete (at least) a session in MOOC	21	3.1	0.62	Agree
	Grand Mean		**3.3**		**Agree**

Table 6 shows the mean response of lecturers on readiness for future participation in MOOC sessions. The respondents agreed with all the four items in this section with mean responses of 3.5, 3.2, 3.3 and 3.1 respectively and mean responses of 3.3. This is an indication that the STE lecturers are ready for future participation in the sessions. The STE lecturers agreed that they would like to know more about MOOC, enroll in it for personal and professional development and even complete at least a session in future.

Hypothesis One

H_{O1}: There is no significant difference in the mean responses of the Science Education and the Technology Education lecturers on Massive Open Online Courses awareness.

Table 7:
ANOVA of mean responses of the Science and the Technology Education lecturers on MOOC awareness

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	50.634	1	50.634	3.610	0.073
Within Groups	266.509	19	14.027		
Total	317.143	20			

NS = not significant at 0.05 level

Table 7 shows the ANOVA comparison of the Science and Education lecturers' responses. The table with F (1, 19) = 3.610, p = 0.073. This revealed that there is no significant difference in the mean responses of the Science and the Technology Education lecturers on MOOC awareness.

Hypothesis Two

H_{O2}: There is no significant difference in the mean responses of the Science Education and the Technology Education lecturers on the extent of participation in Massive Open Online Courses.

Table 8:
ANOVA of mean responses of the Science and the Technology Education lecturers on the extent of participation in MOOC

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	58.625	1	58.625	10.096	0.005
Within Groups	110.327	19	5.807		
Total	168.952	20			

* = significant at 0.05 level

Table 8 shows the ANOVA comparison of the Science and Education lecturers' responses. The table with F (1, 19) = 10.096, p = 0.005. This revealed that there is a significant difference in the mean responses of the Science and the Technology Education lecturers on the extent of participation in MOOC.

Hypothesis Three

HO_3: There is no significant difference in the mean responses of the Science Education and the Technology Education lecturers on reasons for participation in Massive Open Online Courses.

Table 9:
ANOVA of mean responses of the Science and the Technology Education lecturers on reasons for participation in participation in MOOC

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	221.929	1	221.929	21.813	0.000
Within Groups	193.309	19	10.174		
Total	415.238	20			

* = significant at 0.05 level

Table 9 shows the ANOVA comparison of the Science and Education lecturers' responses. The table with F (1, 19) = 21.813, p = 0.000. This revealed that there is a significant difference in the mean responses of the Science and the Technology Education lecturers on reasons for participation in MOOC.

Hypothesis Four

H_{O4}: There is no significant difference in the mean responses of the STE lecturers on the extent of participation in MOOC based on years of professional experience.

Table 10:
ANOVA of mean responses of the STE Lecturers on the extent of participation in MOOC based on years of experience

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1.786	2	0.893	0.096	0.909
Within Groups	167.167	18	9.287		
Total	168.952	20			

NS = not significant at 0.05 level

Table 10 shows the ANOVA comparison of the STE Lecturers' responses in sections based on years of experience. The table with F (2, 18) = 0.096, p = 0.909, revealed that there is no

significant difference in the mean responses of the STE lecturers on MOOC based on years of experience.

Hypothesis Five

H_{O5}: There is no significant association between STE lecturers' gender and their responses on readiness for participation in MOOC.

Table 11:
Chi-Square analysis of lecturers' gender and their responses on MOOC participation

	Value	Df	P-Value
Pearson Chi-Square	0.297[a]	1	0.586
Likelihood Ratio	0.291	1	0.590
Linear-by-Linear Association	0.283	1	0.595
N of Valid Cases	21		

NS = not significant at 0.05 level

Table 11 reveals that there is no significant association between STE lecturers' gender and their responses on readiness for participation in MOOC, X (1) = 0.297, p = 0.586.

Discussion of Findings

Findings that emanated from this study revealed that there is limited awareness on Massive Open Online Course among STE lecturers. It also revealed that majority of the STE lecturers have neither participated nor completed any course in MOOC talk more of receiving a certificate for it.

From the findings of the study, the lecturers agreed that having too much work to do and the fact that time is not enough, is responsible for non-completion of MOOC session, which could also be their reasons for low participation. However, most STE lecturers are ready to know more about, participate and complete at least one MOOC session in the near future irrespective of their gender.

Findings that emanated from this study also revealed that though; there is an indication that the Science Education lecturers had a different opinion from the Technology Education lecturers on the extent and reasons for participation in MOOC, their years of experience did not influence their decisions on MOOC participation.

Conclusion

The study has critically examined MOOC and STE lecturers' participation. It was obvious that though most lecturers were aware of Massive Online Open Courses before the study, but very few have participated in MOOC sessions. This implies that they have been missing the rich contents delivered by professional and well-experienced facilitators using the latest technologies from best Universities around the globe. It was also revealed that the non-participation was not because they are not interested in the courses or having technical issues in accessing it, but it is due to their busy schedule. However, with the little enlightenment created by this study through the interactions between the researchers and the respondents, the STE lecturers actually demonstrated a positive attitude to personal and professional development by agreeing to participate and complete at least one MOOC session in the nearest future.

Recommendations

Based on the findings of the study, it was recommended that; irrespective of their gender or years of experience, STE lecturers should search for more information about MOOC. The lecturers should create time and enroll in the MOOC; it is free and could easily be accessed at any time;

either online on websites or through mobile applications. MOOC is with rich contents and could contribute to personal and professional development. They should also try and complete at least one session and even obtain a verifiable certificate either in their field or other areas of interest.

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EXAMINING PERFORMANCE EXPECTANCY AND EFFORT EXPECTANCY AS DETERMINANTS OF SECONDARY SCHOOL TEACHERS' BEHAVIOURAL INTENTION TO USE MOBILE TECHNOLOGIES FOR INSTRUCTION IN KADUNA STATE, NIGERIA

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Abstract

Mobile technologies have significant impact in our daily activities and it has improved how people gathered and make use of information. In spite of its significant for improving instructional process, the factors that influence teachers' behavioural intention have not yet been given due attention. The study therefore aimed at examining the determinants of secondary school teachers' behavioural intention to use mobile technologies for instruction in Kaduna State. The study benefited from the Unified Theory of Acceptance and Use of Technology (UTAUT) model choosing two constructs from this model (performance expectancy and effort expectancy) to investigate teachers' behavioural intention to use mobile technologies for instruction. Data was collected from 958 teachers from four education zone in Kaduna State which include Giwa, Kaduna, Sabon-Tasha and Zaria. A descriptive study of cross-sectional survey was employed in the study. Researcher designed questionnaire was used to gather information. Descriptive statistics of mean was used to analyze the research questions while multiple regression was used to analyze the formulated hypothesis. The findings indicated that PE and EE of the respondents have positive influence on the behavioural intention to use mobile technologies with grand mean of 3.14 and 3.18. Also, there was significant relationship between the independent variables (PE & EE) and the dependent variable (BI). Based on the findings of this study, it was concluded that PE and EE are strong determinants of teachers' behavioural intention to use mobile technologies for instruction. It was therefore recommended that secondary school teachers should be given adequate training on the use of mobile technologies for effective instructional delivery.

Keywords: Mobile Technologies, Performance Expectancy (PE), Effort Expectancy (EE), UTAUT, Behavioural Intention.

Introduction

In recent years, countless improvements have been recorded in the area of mobile and wireless technologies. The introduction of mobile technology has brought about greater changes in the lifestyles of mobile users around the world, including the field of education. Mobile technologies have a significant part of daily activities and it has improved how people gather information and make appropriate use of information. Mobile technologies enhance extension of education beyond school timing and confines of the physical classroom. These technologies enable learners to engage in learning activities sending information to the instructor and work with other people through the internet. Mobile technologies are no longer just a functional accessory but it is a device used at anytime and anywhere. It is design- learning contexts that allow learning to be situated in a real-world context.

Mobile technologies are devices that are capable of performing a variety of tasks as they are small, self-directed and modest enough to assist instructional activities. The ability of mobile technology to improve the instructional process is so significant that it is at the forefront of technological advancement in education. Mobile technologies can be the best in mobile learning.

The most important aspect of mobile learning is its ability to make learning mobile, away from the classroom or workplace. These Wireless and mobile technologies provide learning opportunities to learners who do not have direct access to learning in these places. Most learners in the remote place of the developing countries have trouble accessing the internet, or experience difficulty in affording technology that enables learning in an e-learning environment, this is as a result of epileptic supply of electricity and power voltage. Mobile devices are a cheaper alternative compared to traditional e-learning equipment such as PCs and Laptops (Master, 2017).

Trifonova and Ronchetti (2006), described mobile devices as any electronics device that is portable, self-directed and able to frequently assist both students, teachers in an instructional activity. Mobile devices are small enough to be kept in the user pocket and should be carried by the user in a habitual way. Mobile devices are equipped with suitable instructional platforms as they have resourceful applications that teachers and learners can use in learning. Mobile devices are digital, easily portable, usually connected to a network and can facilitate any number of tasks including communication, data storage, video and audio, and many more (UNESCO, 2013) Mobile devices offer learning capabilities to users in such a way that it provides connectivity, individualized learning, social interactivity, portability and affordability (Murphy, 2011)

Mobile technologies can be useful in different ways because it allows interaction with people via voice, written messages, still and moving images. Mobile technologies are tools for evaluating content, which can be stored locally on the device or can be reached through an interconnection (Trifonova & Ronchetti, 2006). Educational institutions and businesses are increasingly using mobile technology from wireless networks to personal communication devices, in a different setting for different reasons (Alex, 2011). As a result of the influence of technology throughout the world, teachers around the world have taken notice of the need to equip young people with 21stcentury technological skills. Mobile technology help teachers to receive feedback from students, encourage participation, makes asking and answering questions less intimidating and motivate students learning (Scornavacca & Marshall, 2007; Market, Sanchez, Weber, & Tangney, 2006). Mobile technology has the ability to build interesting learning environments that engage learners in learning activities (Shorff & Narasipuram, 2009).

In Nigeria, secondary school education is the second level of educational training after primary school. Secondary education prepares the student for higher education and useful living within the society (Federal Republic of Nigeria, 2013). The objective of secondary school education cannot be achieved if the student is not properly trained while they are in school. Studies have shown that the introduction of media technology into secondary schools cannot by itself improve the quality of education or raise learner's attainment. Borris, Michael, Leigh and Peter (2011) believed that one important measure of the success of any educational reform is the extent to which it is adopted by teachers.

The emergence of technologies leaves a significant impact on educational development and the acceptance by teachers has a greater influence on the successful introduction of mobile learning. Unified theory of acceptance and use of technology (UTAUT) is a model that has been found very significant in determining perception on the use of a technology. UTAUT is a model that accounted for more variance on behavioural intention (Venkatesh, Morris, Davis and Davis, 2003). Venkatesh, et al (2003) developed the Unified Theory of Acceptance and Use of Technology (UTAUT) model to consolidate previous TAM related studies. The model was developed in order to explain user intentions to use a new technology. The UTAUT model comprises of four core constructs which are performance expectancy, effort expectancy, social influence, facilitating conditions and four moderators which are gender, age, experience and voluntariness of use that influence behavioural intention and use behaviour. This model has been widely used to investigate mobile learning acceptance in both developed and developing countries. Majority of studies that adopted the UTAUT model have extended the model by including new variables or reducing the existing variables to suit the purpose of their study. This is done because mobile devices usage and adoption is not the same in all countries (Nassuora, 2012).

Based on the UTAUT model, the researcher adopted only two constructs which includes: performance expectancy and effort expectancy (Venkatesh, et al 2003). The two selected constructs are therefore the predictors of user behavioural intention. The behavioural intention has been described as predictors on the individual possibility of executing an action. Dillon and Morris (1996) opined that behavioural intention is the willingness of a user towards the use of technologies. It was explained further that willingness can also be evaluated through intention or actual use of information technology (Martocchio, 2005). Also, Chan and Hu (2002) described behavioural intention as an individual likelihood of deciding to accept technology. It is the degree to which a person has formulated conscious plans to perform or not to perform some specified future behaviour (Warshaw & Davis, 1985).

Performance expectancy as one of the major determinants of behavioural intention to use technology is the belief held by a teacher that using the system will help him or her to attain gains in job performance (Venkatesh et al., 2003). In this study, performance expectancy is the extent to which teachers believe that mobile technology will be useful for improving their classroom teaching. Also, it will be helpful for the teacher to teach effectively and be highly productive.

Effort expectancy can be described as the degree of ease that teachers think they will have when using an information system (Venkatesh et al., 2003). Effort expectancy in this study represents teachers' perception on the ease that is associated with the use of mobile technology and their self-efficacy to use it for teaching. The ease that teachers believe to get from mobile technology will encourage their acceptance of mobile technology.

The integration of mobile technology into teaching and learning is expected to have great influence on the performance of teachers in their teaching activities. However, it is the acceptance of teachers that have the potential to have the greatest influence on the successful introduction of mobile learning (MacCallum, 2010). Liu, Han and Li (2010) stated that the presence and accessibility of mobile technologies do not guarantee that their potential will be realized in educational contexts. But it should be noted that the success of mobile learning depends on human factors in the use of mobile devices (Kukulska-hulme, 2007). The need to understand factors that contribute towards teachers' behavioural intention to integrate mobile technologies into teaching is critical for successful implementation in a given context. Hence, this study aims to examine performance expectancy and effort expectancy as determinants of secondary school teachers' behavioural intention to use mobile technologies for instruction in Kaduna State.

Purpose of the Study

The main purpose of this study was to examine performance expectancy and effort expectancy as determinants of secondary school teachers' behavioural intention to use mobile technologies for instruction in Kaduna State, Nigeria. Specifically, the study:

1. explored performance expectancy as a determinant of secondary school teachers' behavioural intention to use mobile technologies for instruction;
2. examined effort expectancy as a determinant of secondary school teachers' behavioural intention to use mobile technologies for instruction and;
3. examined behavioural intention of secondary school teachers on the integration of mobile technologies for instruction.

Research Questions

The following research questions were answered in the study;

1. What influence does performance expectancy have on teachers' behavioural intention to use mobile technologies for teaching?
2. What influence does effort expectancy have on teachers' behavioural intention to use mobile technologies for teaching?

3. What effect does behavioural intention of teachers have on the integration of mobile technologies for instruction?

Hypothesis

Ho_1: There is no significant relationship among secondary school teachers' performance expectancy, effort expectancy and their behavioural intention to use mobile technologies for instruction.

Methodology

This study was a descriptive research using cross-sectional survey method. Data was collected from 958 teachers from four education zone in Kaduna State which include Giwa, Kaduna, Sabon-Tasha and Zaria. Researcher designed questionnaire was used to gather information. Descriptive research type was adopted, using four-point Likert scale response modes: Strongly Agree (SA=4), Agree (A=3), Disagree (D=2), and Strongly Disagree (SD=1). Three research questions were answered using mean and standard deviation and considering 2.5 as the benchmark. Thus, hypothesis was tested using multiple regression analysis.

Results

Research Question 1:

What influence does performance expectancy have on teachers' behavioural intention to use mobile technologies for teaching?

Table 1:
Teachers Performance Expectancy and Behavioural Intention to Use Mobile Technologies

S/N	Performance Expectancy	Mean	Std. Deviation
1	Mobile technologies will be useful for my teaching	2.81	.954
2	Mobile technologies will help to improve the quality of my teaching	2.83	.987
3	Using mobile technologies will reduce my teaching workload	3.00	.867
4	Mobile technologies will enable me to teach quickly and effectively	3.17	.764
5	Using mobile technologies will increase my teaching productivity	3.24	.674
6	Using mobile technologies will fit in with my method of teaching	3.23	.674
	Mobile technologies will give me easy access to students even after school.	3.22	.695
8	Using mobile technology will enable me to cover the school syllabus in good time	3.46	.582
9	Using mobile technologies will encourage interaction between me and my students	3.16	.657
10	Using mobile technologies for teaching will make my teaching more interesting	3.32	0.91
	Grand Mean	**3.14**	

It could be noted from Table 1 that the respondents were of the opinion that using mobile technology will enable them to cover the school syllabus in good time and that using mobile technologies for teaching will make my teaching more interesting as the mean score were 3.46 and 3.32, respectively. Furthermore, it was revealed that using mobile technologies will increase my

teaching productivity with a mean score of 3.24. On the other hand, the respondents expect that using mobile technologies will increase their teaching productivity with a mean score of 3.23. Also, it was expected that mobile technologies will give me easy access to students even after school and that mobile technology will enable me to teach quickly and effectively with a mean score of 3.22 and 3.23, respectively.

On the final analysis, the grand mean score for the influence of teachers' performance expectancy on their behavioural intention to use mobile technologies for teaching is 3.14. With 2.50 as the benchmark which is less than the grand mean score, it means that the performance expectancy of the respondents has a positive influence on the behavioural intention to use mobile technologies for teaching.

Research Question 2:
What influence does effort expectancy have on teachers' behavioural intention to use mobile technologies for teaching?

Table 2:
Teachers Effort Expectancy and Behavioural Intention to Use Mobile Technologies for Teaching

S/N	Effort Expectancy	Mean	Std.D
1	I will find mobile technologies easy to use	3.28	.596
2	Using mobile technologies will not require much effort	3.31	.588
3	Using mobile technologies will make my teaching clearer and understandable	3.28	.627
4	It will be easy for me to become skilful at using mobile technologies for teaching	3.18	.677
5	Mobile technologies will make my teaching easier	3.15	.666
6	I will find it convenient to use mobile technologies	3.00	.000
7	I will be able to operate mobile technologies easily	3.11	.34
	Grand Mean	**3.18**	

Table 2 presents the influence of effort expectancy on the behavioural intention to use mobile technologies for teaching. The table reveals clearly that item two has the highest mean value of 3.31, meaning that using mobile technologies will not require much effort. This was noted to be followed by a mean score of 3.28 against the statement that they found mobile technologies easy to use and that using mobile technologies will make their teaching clearer and understandable. The respondents also believed that it was easy for them to become skillful at using mobile technologies for teaching, this having a mean score of 3.18. Furthermore, it was revealed that mobile technologies will make my teaching easier with a mean score of 3.15. This was closely followed by a mean score of 3.11 against the statement that they will be able to operate mobile technologies easily. However, item seven which revealed that some of the respondents still find it convenient to use mobile technologies had a mean score of 3.00.

On the general note, the grand mean score for the influence of teachers' effort expectancy on their behavioural intention to use mobile technologies for teaching was 3.18. Using 2.50 as the benchmark, it could be deduced that the influence of teachers' effort expectancy on their behavioural intention to use mobile technologies for teaching was positive. This implies that teachers' effort expectancy depends on their behavioural intention to use mobile technologies for teaching.

Research Question 3:
What influence does behavioural intention have on the integration of mobile technologies for teaching?

Table 3:
Influence of Behavioural Intention on the Integration of Mobile Technologies for Teaching

S/N	Behavioural Intention	Sum	Mean	Std.Deviation
1	I prefer to use mobile technologies for teaching in my school	1876	2.00	.000
2	I plan to use mobile technologies frequently	2987	3.19	.635
3	I intend to increase my use of mobile technologies	3002	3.20	.588
4	I will recommend mobile technologies to my fellow teachers	3004	3.40	.64
	Grand Mean		**2.94**	

Table 3 presents the results on the effect of behavioural intention of teachers on the integration of mobile technologies for teaching. The findings showed that secondary school teachers recommend mobile technologies to their fellow teachers and they intend to increase the use of mobile technologies with the mean score of 3.40 and 3.20 respectively. It was also revealed that secondary school teachers plan to use mobile technologies frequently with the mean score of 3.19. The lowest mean score was 2.0 against the statements that the teachers prefer to use mobile technologies for teaching in their school. However, using a benchmark of 2.5, the grand mean score on the effect of the behavioural intention of teachers on the integration of mobile technologies for teaching was 2.94 which is greater than the benchmark it can then be established that behavioural intention of the teachers can affect the integration of mobile technologies for teaching.

Hypothesis One

There is no significant relationship among secondary school teachers' performance expectancy, effort expectancy and their behavioural intention to use mobile technologies for teaching. To test for a relationship between predictors variables of performance expectancy and effort expectancy on the criterion variable behavioural intention, the multiple regression analysis was carried out using the enter method. The results derived from the analysis are shown in Tables 4, 5 and 6

Table 4:
Adjusted R square value for the Model Summary on Behavioural Intention

Model	**R**	**R square**	**Adjusted R square**	**Std. An error of the Estimate**
1	.147[a]	.022	.017	.3649148

a. Predictors: (Constant), performance expectancy and effort expectancy

From the result in Table 4, the Adjusted R Square (.017) has a poor fit. This revealed that the constructed multiple regression models of the independent variables (performance expectancy and effort expectancy) account for .017% variance in the dependent variable (behavioural intention). The results of the analysis of variance (ANOVA) for the model are as shown in Table 5

Table 5:
ANOVA for Independent Variables on Behavioural Intention

Model	Sum of Squares	Df	Mean Square	F	Sig.
Regression	2.744	2	.686	5.152	.000[b]
Residual	124.241	956	.133		
Total	**126.985**	**958**			

a. Dependent Variable: Behavioural Intention
b. Predictors: (Constant), performance expectancy and effort expectancy

The results of the analysis of variance (ANOVA) which revealed that F (2, 956) = 5.152, $p < 0.05$, indicated a statistically significant relationship (less than 0.05) between the independent variables (performance expectancy and effort expectancy) and dependent variable (behavioural intention). Based on this significant relationship, the coefficient for the Beta weight for the amount of standard deviation unit of change in the dependent variable for each standard deviation unit of change in the dependent variable was calculated. The results are as shown in Table 6.

Table 6:
Coefficient of Independent Variables on Behavioural Intention

Model	Unstandardized Coefficients		Standardized Coefficients	T	Sig.
	B	Std. Error	Beta		
(Constant)	2.422	.136		17.815	.000
PE	.028	.029	.036	.988	.032
EE	.003	.036	.003	.083	.034
				.	

a. Dependent Variable: Behavioural Intention

The standardized coefficients in Table 6 revealed that;

(a) The independent variable (performance expectancy) has strong positive effect on behavioural intention because the Beta (β = .036, .032) shows statistically significant relationship because the significant value was less than 0.05 alpha value.
(b) The independent variable (effort expectancy) has strong positive effect on behavioural intention because the Beta (β = .003, .034) shows statistically significant relationship because the significant value was less than 0.05 alpha value.

Discussion of the Findings

Influence of teachers' performance expectancy on behavioural intention to use mobile technologies for teaching was examined using research question one. The results of the mean score established that performance expectancy of the respondents has a positive influence on the behavioural intention to use mobile technologies for teaching. These findings agree with the previous findings of Venkatesh et, al, (2003) whose findings established that performance expectancy is a major determinant of behavioural intention to use a technology. The authors further affirmed that Performance expectancy is the individual believes that using the system will help him or to attain gains in job performance. However, the findings reveal that mobile technology support teachers in teaching and encourage its adoption for teaching.

Influence of effort expectancy on teachers' behavioural intention to use mobile technologies for teaching was determined using research question two. Such effort expectancy includes it will be easy for me to become skilful at using mobile technologies for teaching, mobile

technology will make my teaching easy, among others. The result of the mean score established that Influence of teachers' effort expectancy on their behavioural intention to use mobile technologies for teaching was positive. These results were however in support with the findings of Gao and Deng (2012), who investigated the determinants of Chinese users' acceptance of mobile e-book and found out that there is a significant relationship between effort expectancy and behavioural intention to use the mobile e-book. The ease that teachers believe to get from mobile technology will encourage their acceptance of the mobile technology.

Effect of behavioural intention on the integration of mobile technologies for teaching was examined using research question three. Such effect includes I plan to use mobile technologies for technologies, I plan to use mobile technologies frequently in my school, I intend to increase my use of mobile technologies among others. The result of the mean score on behavioural intention established that behavioural intention has an effect on teacher's integration of mobile technologies in teaching. These findings agreed with the findings of Maldonado et al. (2009) who found behavioural intention to significantly predict use of mobile technology.

Relationships among secondary school teachers' performance expectancy, effort expectancy and their behavioural intention to use mobile technologies were examined using hypothesis 1. The results of the findings revealed that there is a strong relationship among secondary school teachers' behavioural intention, effort expectancy and performance expectancy to use mobile technologies for teaching. These findings agreed with the findings of Maldonado, (2009) who found behavioural intention to significantly predict user behaviour.

Conclusion and Recommendation

The study concluded that there is strong relationship between secondary school teachers' behavioural intention, effort expectancy and performance expectancy to use mobile technologies. Based on the findings and conclusion of this study, the study recommends that secondary school teachers in the selected education zones should be given adequate training on the use of mobile technologies for effective instructional delivery.

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BIG DATA: NEXT LEVEL EDUCATIONAL PLANNING FOR NATIONAL DEVELOPMENT IN ICT

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Abstract

It is public knowledge that the Nigeria educational system has suffered many set backs as a result of a series of policy somersaults or failed programmes and projects with its untold negative impacts on her citizens dealing with Information Communication and Technology. Big Data which presents a potent recipe for proper educational planning in this regards is still in its nascent stage and as such is yet to take firm root in the system. Instruction in many facet of the country's education is also majorly teacher-centered, this accounts for the slow take off of the Big data initiative in ICT implementation. This paper sheds light on the affordances of the big data architecture and the need for its introduction in the sector for the collection of roboust data which finds relevance in higher levels of educational planning in the country. The place of the integration of ICT in learning as an enabler and driver of the big data concept was also highlighted.

Key words: Big data, Integration of ICT in Instruction, Educational Planning, Policy somersault

Introduction

Proper planning is key ingredient in the administration of any public educational system. The Nigerian National Policy on Education described education as a powerful tool for the overall development and societal transformation of a people (FGN, 2013). A nation's educational system can only play this role effectively if and only if her policies, programmes and projects are on point to address the issues that are bedeviling the system. The past few decades in the country have witnessed a number of policy somersault due to lack of or inadequate data which makes proper planning and by extension effective delivery of quality education a tall order.

Educational Planning is a process of administering education through logical procedures and analysis with the aim of engendering educational development by making the system respond more effectively and efficiently to the yearnings of the populace (FGN, 2018). Modern day planning is far more than the usual experienced or intuition-based planning. The Federal Ministry of Education, as the general overseer of the education industry needs to step up her game, go beyond the traditional or administrative data analysis and come up to higher levels of educational planning which promises more direction by virtue of its actionable insights in ICT.

Just as it is impossible for a father who hardly knows the number of his own offspring to adequately provide for their upkeep, so also it is for a government without good information and knowledge of its citizens to be able to offer a helping hand at least such as is expected of a government to her people.

Stakeholders in the Nigerian educational system are growing increasingly impatient with the system as they do not know any good reason why the country's Knowledge industry should not deliver on her mandate and place the ICT at an enviable height like her counter parts in other climes despite the magnitude of resources that have been buried in the sector over the years. An International Labour Organization (ILO) Mission to Nigeria in 1981 likened policy making without accurate and timely data to a man running around in the forest in the middle of the night without a touch light (FGN, 2018).

It is a known fact that a credible, accurate, timely and comprehensive data has a prominent role to play in all of these changes brought about by an efficient educational planning on ICT (UNESCO, 2017). Often times, non-implementable policies are traceable to inaccurate data and resources committed to such policies ends up in the drain hence evidence-based planning saves cost since resources would be allocated efficiently (UNESCO, 2017).

Statement of the Problem

Armed with adequate data about the populace, things work better in most advanced countries' education sector especially on ICT. Hardly can you see a classroom scenario where only 44 students would sit comfortably while 66 colleagues of theirs would be standing or sitting on the window while a lecture is going on, yet no one expects them to fail. Inconsistencies in policy formulation such as is commonplace in this clime is unheard of over there. Decision making are precise and in accordance to the issue on ground. Their educational policies are data driven, of course, ICT devices have been incorporated into every aspect of school activity, so data collection or falsification, politicization of data seizes to be an issue since these technological devices automatically records everything, structured, semi structured or unstructured are gathered and processed. It also provides a platform where students can learn and study under one online learning environment.

The fact that the Nigerian educational system has tried her hands on a number of unsuccessful policies and programmes in the past and present is public knowledge. The inconsistencies in policies and major decisions had devastating effects on her products not being able to rub shoulders with their peers in other climes. Below are some of the national progammes/policies that cannot be described as successful. The Universal Primary Education (UPE) was launched in 1976 but failed before it could be said to have taken off, this was followed by the 6-3-3-4 system introduced in 1989, the most important aspect of that policy which attempted to introduce youngsters to vocational education with a view to encouraging young Nigerians to do things on their own thereby reduce the unemployment problems was never implemented. The next in line is the 9-3-4 system or Universal Basic Education launched in September, 1999. The aim of this particular policy was to align with the Education for All (EFA) policy of the UN, World bank and the Millennium Development Goals (MDGs). As we speak, with a total of 10.2 million, Nigeria is one of the countries with the highest Out of School Children (OOSC) despite the aforementioned interventions (Aluko, 2019). One of the reasons behind the failure or near failure of some of these educational policies is due to the lack of adequate and reliable projections (data) (Elechi, 2016).

Iyilade (2015) posited that the development and transformation which Nigerians clamor for is data-dependent. Big data is where the paradigm is shifting to, the earlier we accept and take action in this regard the better for all of us. As a matter of urgency, instruction must be technology mediated, the only way to unlock big data potentials as data is automatically generated with every interface with ICT devices for teaching and learning purposes.

What is Data?

Data, in everyday language refers to unprocessed information. In line with Merriam-Webster (2019)'s definition, data are information that are real such as statistics or measurement which can be taken as a basis for decision, discussion or calculation. It also described data as information output that include both relevant and irrelevant information which needs different levels of cleaning up or processing. Kale (2017) stated that data is a collection of facts that can be converted into useful information. It is noteworthy however that data is of different types, the common type is the structured, traditional or administrative data, which comprises of majorly of figures and texts, unstructured data on the other hand includes images, sounds, ideas, pictures, recordings, facts, and so on.

Educational Management Information System (EMIS) and ICT, remain very instrumental to the achievement of SDGs Goal 4 which pertains to provision of quality education for all.

Montoya (2018) posited that EMIS can and should do more than mere collection of administrative data bothering on enrolment and other related data. An effective EMIS should among other functions: be a source of accurate and reliable data for stakeholders, thereby enhance decision making; Promote robust planning and policy development at all levels of the educational system; by so doing EMIS helps to enhance the efficiency of the operations of the system; Generally EMIS assists in propelling education towards its stated goals. (Government of Khyber Pakhtunkhwa (KP), 2018) views EMIS simply as the Information System for Educational Managers. However, FGN (2018) considers EMIS as the method of data gathering, warehousing, processing, and retrieval, distribution of information for effective and efficient policy formulation, monitoring, planning and administration of the knowledge industry.

NEMIS on the other hand is the arm of the Federal Ministry of Education saddled with the responsibility to carry out the functions mentioned above on behalf of the country's education industry. SEMIS and LEMIS represents the state and local government version of NEMIS respectively performing similar functions for onward transfer to NEMIS. (FGN, 2018)

Having said this, it is imperative to stress that the Nigerian Education Management Information System (NEMIS) has to step up to higher levels of educational planning if Nigeria is to be where more developed nations of the world are in terms of educational planning (FGN, 2006) The way up when it comes to provision of adequate, accurate, timely and comprehensive data for the smooth running of the sector is to leverage Big Data so that policy formulation will be based on actionable insights rather than experience, estimation, subjective reasoning or mere intuition. (Daniel, 2015). The World Economic Forum (WEF) likened Big Data to a precious mineral such as 'Black Gold' or 'Crude Oil' with potentials to make things happen in every sectors of the economy (Iyilade, 2015; Slade & Prinsloo, 2017).

What is Big Data?

The concept of Big data has been defined differently by scholars from their respective perspectives; (Slade & Prinsloo, 2017; Daniel, 2015)'s idea of big data is from a technical point of veiw; the partners defined big data as huge datasets that cannot be processed with the traditional techniques {Database Management Sytem (DBMS)} but with the use of some sophisticated software like NoSQL databases and Hadoop not just because of its size but also as a result of rate at which data is being generated (velocity) and the diverse nature of these data (variety). Iyilade (2015) defined Big Data as datasets that are massive and varied in nature and can be analyzed in order to bring out a trend or actionable information from it. Cope & Kalantzis (2016) opined that Big Data deals with keeping records of all learning activities and interactions in a digitally mediated environment, it also refers to different data types that are analyzable and actionable. (Daniel, 2015; Daniel, 2016; Iyilade, 2015; Slade & Prinsloo, 2017; Dietrich, Heller, & Yang, 2015; Morabito, 2015) posited that Big data comprises of huge, massive or humongous and complex datasets, usually containing both structured and unstructured datasets that may be processed to understand trends, patterns and associations as well as deviations from trends that are not known or seen before.

They are so called because they are usually too large and are generated too quickly for any kind of traditional or computing processing, and requires some complex computer applications to bring up meaningful or actionable insights for educational improvement (Cope & Kalantzis, 2016; Vaitsis, Hervatis & Zary, 2016; Daniel, 2015) Likewise, (Iyilade, 2015) also described Huge or humongous data as big data is also called as a very important base for modern day IT related economic as well as educational activities.

Big Data seeks to draw useful inferences from huge volumes of data regardless of the nature, be it structured or unstructured. Apart from the quality of being large and being of various types, Daniel (2019) further stated that big data usually originate from human, applications and machines unlike regular data that are usually generated strictly by humans. Perry (2017) opined that big data is not about the volume but rather about the insights derivable from such a data. Zango (n.d.) corroborated this view in his definition of big data which included the veracity and variety

nature of big data, hence he explained the concept as the process of making meaning and value out of a humongous dataset comprising of different varieties with a characteristically high rate of generation (velocity).

Big Data Analytics

Data Analytics is interested in working through data sets with a view to bringing out trends for actionable insights with the aid of sophisticated instruments and software. (Rouse, 2018) it could also be described as a complex way of measuring, interpreting and analyzing massive data sets with a view to unraveling salient information, trends, patterns and hidden correlations which could assist managers of organizations or educational institutions make precise and accurate decisions which results in efficient and effective systems (Rouse, 2018; Iyilade, 2015). Big Data involves advanced analytics techniques such as text analytics, machine learning, predictive analysis, data mining, statistics and natural language processing (IBM, n.d). The following are some of the prominent big data analytical tools: NoSQL databases, Hadoop and co such as YARN, MapReduce, HBase, SPARK, Hive and Pig (Rouse, 2018).

Types of Big Data Analytics

Three types of Big Data Analytics will be examined in this paper:

Descriptive Analytics: When a system has just gone through a particular event or incident, for instance, a major policy failure. It is imperative to do a post mortem of the policy. A descriptive analytic helps to summarize and describe what actually led to the failure of the policy or programme (Iyilade, 2015; Acadguld, 2018). Doing this ensures the mishap does not repeat itself in future.

Predictive Analytics: As the name suggests, can alert an educational institution on what might likely happen in the nearest future. It makes use of machine learning, statistical analyses and modelling techniques to inform of the probability of an event occurring, an example of this is Scenario analysis (Iyilade, 2015). Descriptive Analysis can forecast how government policies or Government programme would play out long before it is rolled out. If this was done prior to the launching of

Prescriptive Analytic: Prescriptive Analytics is the best of them all as it does more than describe what took place in the past or forecast about the future, it actually does recommend some courses of action to be taking with the corresponding likely outcomes of such actions. As a result of this, data propelled policies, projects and programmes can be formulated and decisions taken that will work well for the populace (Iyilade, 2015; Ingram, 2017).

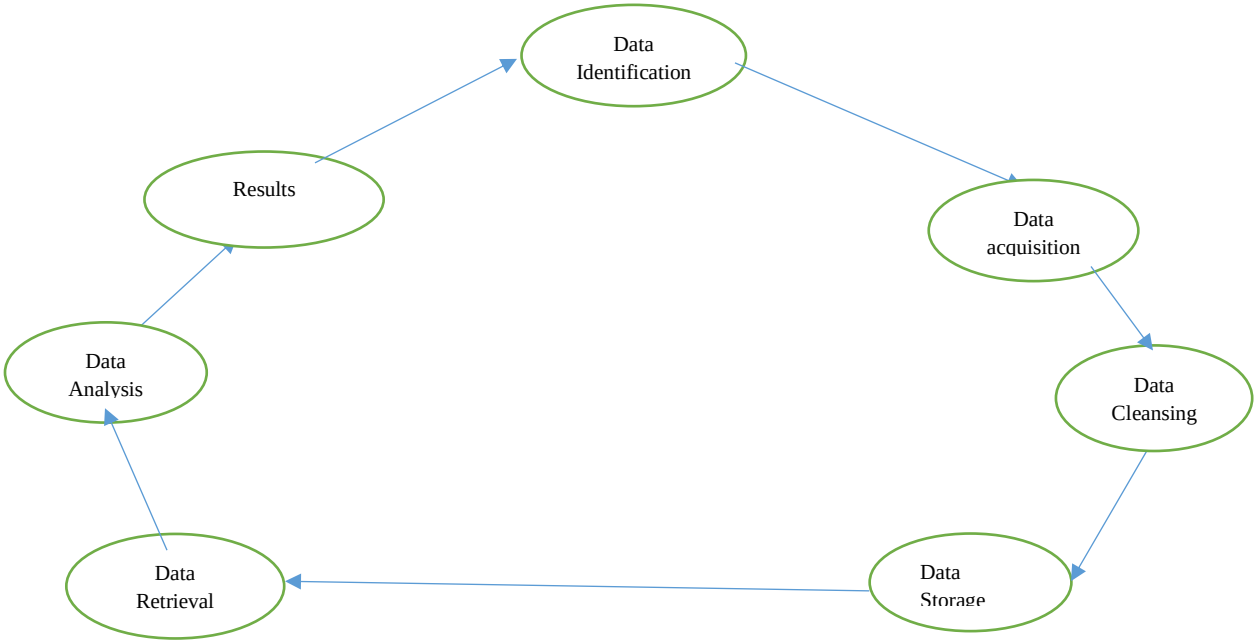

Figure 1: Big Data life cycle as put forward by Minimol (2018)

Before the affordances of big data can be unlocked, the cycle which starts with Data identification and ends in data analysis and results must be completed.

Characteristics of Big Data

The following are the characteristic features of Big Data, they are also known as the '3Vs':

Volume: As the name suggests, the volume of this kind of data is usually humongous or massive, it can be in gigabyte, terabyte or zerabyte, and so on. (Cope & Kalantzis, 2016). Although it has been said that it is not the massive nature of modern-day data that warrants the name 'Big Data', rather the very essence of big data is the big meanings that are extracted from it. (Perry, 2017)

Velocity: this has to do with the rapidity of motion or the rate at which these data is being generated as well as the different directions from which they came. Big data are mostly generated in real time or near real time. (Iyilade, 2015). The application of sophisticated ICT devices in promoting an increased generation of data by organizations which is relatively cheaper to run

Variety: Big data possesses different types of data, structured, semi-structured and unstructured. This data is derived from various online platforms like LMS, WhatApps, smart phones.

Aside the '3Vs', there are yet other important features of big Data as outlined below:

Veracity: Deals with abnormality that are present in datasets; It is noteworthy that there exist an inverse relationship between the first three characteristic features, namely the rate at which data is being generated (velocity), the size (volume) the diverse nature of the datasets (variety) and veracity which has to do with the issue of trust. Invariably, as the volume, variety and velocity of any dataset increase, so does the reliability or credibility of it reduces. (Firican, 2017; Daniel, 2015)

Validity: This deals with how accurate or appropriate the particular dataset is for the intended purpose. This underscores the importance of a good data governance policy to ensure appriopriate data for analysis. (Kanya, 2019; Firican, 2017)

Volatility: Handles how long a dataset will be before it is deemed irrelevant or outdated in respect to a particular research

Value: Another striking feature of Big data is that it adds value by helping to solve many issues in an educational instuitution, weak students are helped to bring out their best, it is also of value to

educational administration and research. Whether a dataset is capable of producing a good return on investment is also of value here (Firican, 2017; Kanya, 2019).

Differences between Regular and Big Data

It is of essence to outline some of the distinguishing features of the Regular and Big data as identified by Kalota (2015).

i. Regular data are easier to analyze, big data on the other hand is not simple and can only be processed with the aid of complex computer applications as a result of its unstructured nature.
ii. The traditional or regular data is highly structured comprising mainly of figures and texts. Big data quite different from that, it consists of different varieties, structured, semi structured and unstructured.
iii. Its common with the regular data for the user to collect, collate and analyze the data, unlike the big data situation whereby different stakeholders collect data for different purposes and any interested party can process for their use,
iv. The cost of processing a typical regular data is usually cheaper than what is applicable to big data which could be prohibitively expensive to undergo.
v. It is not easy to identify individual data points by tracing their rows and columns on the spreadsheet as it with ordinary or regular data. Locating data points can be quite technical
vi. While big data is usually kept for long if not forever because analyses is expected to continue, administrative/regular/ordinary data is discarded once the aim is achieved.

Leveraging Big Data for Next Level Educational Planning in Nigeria

- It is imperative to state that the potentials of big data can only be fully unlocked where there is full application of ICT in education, such that every aspects of learners activities are captured and recorded, these is inclusive of all contributions made in class, assignments submitted or not submitted; questions answered and the time taken; even learners moods and inter relationships among peer groups are all under the big data radar (Cope & Kalantzis, 2016) It provides up to date information on student's activities within the campus such as students usage of the sick bay, dining halls, libraries, bus services etc by so doing, the school authorities are fully aware of who is doing what and when, which of these facilities are mostly used and which needs an expansion, this arrangement puts the school authorities fully in charge of happenings on campus;
- Nigerian educational system has had her fair share of unsuccessful policies which has affected her products negatively. The advent of big data ensures processing the massive data available at its disposal to extract value, meanings and trends that informs formulation of public policies, programmes or projects (Daniel, 2015). It is also able to state in clear terms what happened or led to the failure of some policies,
- Big data represents an opportunity for a learner centered type of education whereby teachers are facilitators or supervisors which provides the necessary guidance and assistance but by and large, the student is in charge of his academic activities and not the teacher, this invariably supports ICT furthered education;
- Big data provides a platform where students learning experience can be boosted with the aid of technology mediated gadgets like phones, tablets, laptops and other devices which uses the internet. The teacher can create an online platform where Learners are taught, assessed and graded all in one learning environment through computer applications like Learning Management Systems (LMS) etc. (Daniel, 2015);
- Instead of the old-fashioned sampling of a population of interest in educational research, it is now possible to use up the entire population in order to get a sharper and clearer view of the situation of things;

- Big data helps to address the need to take accurate, precise and evidence-based decisions rather than administering the educational system with intuitive and subjective reasoning or even experience;
- Dropout rates can be drastically reduced with Big Data, using Predictive Analysis on all available data in order to figure out future retention rates (Rouse, 2018);
- Big data has the potentials to improve the quality of academic programmes and ensure the right materials are being passed down to students (Daniel, 2015);
- It is also possible to ascertain how a particular course, policy, programme or project would fare even before it is introduced in school or an entire educational system (scenario building);
- This new trend of big data also finds relevance in recruitment exercises. Employers of labour are also able to analyze and study applicants before they are brought into their organizations, it also arms international students with every information they might require to choose institutions of their choice faster and easily (Joshi, 2017)
- As it is often said, 'torture the data, and it will tell you whatever there is to know' (Coarse, 2019) It is with the aid of data that Governments in advanced countries are always ahead of the system. Data gives an idea what enrolment would look like in the next couple of decades or what expansion projects will be necessary, what challenges will likely emerge as a result of the expected growth in enrolment. This is because educational policies and decision making in those countries are data driven with no room for guess work. The Nigerian Educational system has been bedevilled with a lot of hiccups which has made achievement of stated goals and objectives a mirage.
- Big data is one innovation which has come to change many spheres of our lives, it is bound to influence educational systems worldwide especially technologically mediated environments, it is also capable of transforming our thinking processes and lifestyles (Cope & Kalantzis, 2016; Slade & Prinsloo, 2017)
- The society will also be spared the destabilizing effects of repeated failed policies because the effects as well as the implementation and implications of public policies can be ascertained long before they are introduced to the system
- Prescriptive analysis suggests the best programme or project for an educational system, based on historical and present data, big data is able to recommend appropriate courses of actions that will suit that situation.

Implications of the Implementation of Big data in the Nigerian education system

- Invasion of Privacy through increased surveillance of students' and staff's activities, the major price to be paid in exchange for the affordances of big data is our privacies, since the teaching and learning process is going to be done online, ICT devices captures every moment of the child in and out of class especially within the campus, the positive side to this development is that school authorities are able to notice truant or students with deviant behaviours at the nip of time before such aberrant activities spreads to others;
- The Government will need to address the issue of inadequate skilled manpower to manage the big data architecture. The services of Data Scientists, Statisticians etc would be required as well as training and re-training of NEMIS staff for efficiency;
- There is bound to be a high cost implication to the whole big data idea, considering the fact that teaching and learning will have to be done in a technology mediated environment. But if the Cost Benefit Analysis (CBA) of big data is undertaken, it will be obvious that the benefits accruable to the nation, especially in terms of resources that would be saved via efficient allocation of resources and the boost which instruction will receive will make the costs worthwhile. Former President Benjamin Franklin was quoted to have said 'an investment in education pays the highest interest' (Franklin, n.d.).

Way forward?

Every exploit that we read and see in other continents concerning advancement in education did not just happen, but were brought about through conscious and deliberate planning. If the Nigerian system is to take us higher, educational policies, programmes and projects must be data driven for maximum impact.

The Education industry is one industry that has and keeps evolving, big data provides a platform where an education system can engage in higher level, long term planning desirable for the growth of the sector.

But it is necessary to ask a question; how does big data get its inputs? The body of data that forms what is being referred to as big data is far more than just the traditional figures and text comprising majorly of enrolment, continuous assessment scores, attendance, sex etc. Big data derives from the massive volume of data that is generated with interface with ICT devices like LMS, smart phones, tablets, laptops etc. This is made possible as a result of the inbuilt capacities of these devices to collect data by recording all learning activities which users of those devices engage in.

It suffices to say that the traditional data which NEMIS warehouses does not possess the attributes of big data and cannot provide actionable insight capable of arriving at precise and well-designed policies which by extension is useful for higher levels of educational planning. Kalota (2015) pointed out that the amount of data that is generated every other day by virtue of the use of technology mediated devices is equal to the amount of traditional or regular data that has been created over the past two centuries! This serves to imagine the rate at which data are being produced.

The Nation's education system needs to as a matter of urgency, to integrate Information Communication Technology (ICT) into all facets of learning. At least, secondary and post-secondary (Tertiary) education should be fully technology-mediated. Gadgets like smart phones, tablets, laptops should be provided with application software like Learning Management System (LMS) either by the Government or parents so that this can be used to deliver and manage instruction as well as assess and grade the performance of learners and by so doing build a pool of data which higher levels of planning rely on.

Conclusion

Data is the answer to effective and efficient planning of the Nigerian educational system, however, the type of data that is being referred to here is not the traditional or regular data but BIG DATA. It is the ingredient to data driven policies, programmes and projects. Moore (n.d.) stated that 'without big data, we are like blind and deaf men in the middle of a race course'. How terrifying can this be! As of today, big data seems a far cry from the Nigerian educational system, but if we start from somewhere as suggested in this work, before long we shall get there.

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TEACHERS' PERCEIVED UTILIZATION OF ELECTRONIC MEDIA FOR ACADEMIC ENHANCEMENT AMONG PUPILS IN UPPER PRIMARY SCHOOLS IN LAGOS, NIGERIA

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Abstract

This study examined the utilization of electronic media for academic enhancement among upper primary school pupils in Lagos, Nigeria using a questionnaire as a tool for obtaining data. It targeted 300 primary school pupils of 155 males and 145 females between 8 to 12 years old. The study adopted a descriptive research design of survey type. Purposive sampling technique was used to sample the 300 upper primary school pupils from the target population. The questionnaire was validated and tested for reliability and it yielded 0.85. Two research questions were raised for the study. Percentages and charts were used to analyse the responses from the respondents. Two third of the sample size 183(75.0%) claimed that electronic media utilization development pupils towards their academics. Furthermore, majority of the respondents 161(58.5%) believed that electronic media help in solving academic problems of the pupils. Apart from these positive effects, negative impacts of electronic media outweigh the positive impacts according to the teachers included. 80.0% of the respondents indicated that electronic media negatively affect pupils' academic enhancement. 216(78.5%) submitted that the excessive use of electronic media causes low academic grades. It was therefore recommended that primary school pupils should be monitored by their parents on the type of content of electronic media their children are exposed to in order not to be influenced negatively. Effort should be geared towards the enhancement of media literacy at all level. There is a need for improving the quality of programme content for students especially primary school pupils.

Keywords: Electronic Media, Utilization, Enhancement, Upper primary

Introduction

Primary school pupils are children of tender age between four to ten years. This is a time when the child becomes conscious of television and movie characters. Historically, familiar characters have attracted children from an early age. The expansion of children's media in recent years through sources such as cable TV and video games has greatly increased the number and variety of such characters and their related toys. The electronic media are designed to expand the pupil's knowledge of society and the larger world, develop creativity, encourage problem-solving, role-playing, and improve literacy and vocabulary.

A typical example of such a media application is the flipped classroom. The flipped classroom is a classroom where homework is done by the pupils at school and school work is done at home. The school work is the recorded lessons' videos adopted or adapted by the teachers on all the topics in any subject of interest. The pupils will need to watch the video at home online or offline through electronic media like internet, TV with DVD player in the absence of the teacher. Then, do the homework (assignments) in the class in the presence of the teacher who will render assistance in the area of difficulties and monitor their learning progress (Yusuf, Makinde & Malik, 2017).

Newton (2009) identifies some functions of electronic media as: (i.) it provides reliable, verifiable, adequate and complete information's but further objectivity is needed in arranging the information for the audience; and (ii.) it provides education that is a powerful and economical tool

for knowledge and has great potential if used imaginatively and with vision. The media can also be used to raise awareness and educate the masses to overcome various social problems and the development of civic sense; (iii.) it is considered as the power of electronic media that Influence Public Opinion. Electronic media have a great potential to influence and analyze various national and international issues, suggest various options, weigh the best option to arrive at the correct solutions to guide their audience; and (iv.) it caters for a wide range of entertainments for tastes and requirements of almost all the segments of the society.

The study by Shabi and Udofia (2009) explicate that as Obama in his speech pinpointed that children cannot accomplish unless they raise their expectations and turn off television sets. Active learning from books is better than passive learning such as watching televisions and playing games. Furthermore, Anonymous (2008) in one of his study opines that students who watched four or more hours of television decline their grades from 36% to 29% while the students watching an hour or less per weekday mostly increased their grades from 20% to 29%. Schmidt and Vandewater (2008) concluded that children who are at liberty viewer of TV are found to lose their concentration as compared to the children watch less the media. Apart from the negative effects of electronic media over viewers, they further established that educational programs are positively associated with academic outcomes while the entertainment programs negatively affect academic performance.

Researches indicate that children in Nigeria and in Lagos which is the limited area of this work using a wide variety of audio-visual media. This has become part of children's environment, as television programmes are being made for infants, toddlers and teenagers. On the positive side of it, there is evidence that carefully designed TV programme used at an adequate time and period can be educational.

The electronic media contributes immensely to the academic enhancement of learners by providing important sources of information. It also plays a role in the transmission of attitudes, perception and beliefs. Dominick (2003) emphasises that television was an influential force when the following factors are operational:

i. The same ideas, people or behaviours recur consistently from programme to programme;
ii. Heavily exposure of a child to TV content; and
iii. A child limited interaction with parents and other influencing agents and lacks a standard against which to assess media portrayals.

The need to remodel scientifically based practical answers to important questions about media effects on the physical and mental of children was now very necessary. However, the study so far did not consider electronic media utilization like Internet, Radio, Cable TV and Handsets on primary school pupil's academic enhancement which is the gap this research come to fill.

Statement of Problem

The electronic media and all air programmes for children's consumption are to fulfil their social responsibility theory. But electronic media create a problem by showing exaggeration and tricks which poses a wrong impression on the minds of the children. It hard for primary school pupils to make tangible decisions for themselves concerning their total well-being, academics and future because of what they learn from the electronic media usually leads them to confusion and melancholy. Thus, this study focused on the likely effect of usage of the electronic media on the academic enhancement of primary school pupils in Lagos state, Nigeria.

Objectives of the Study

The main purpose of this research was to study the utilization of electronic media on the academic enhancement of upper primary school pupils in Lagos state, Nigeria. In this regard, the following objectives were designed:

1. to examine the use of electronic media by upper primary school pupils in Lagos state, Nigeria
2. to find out the influence of electronic media usage on the academic enhancement of upper primary school pupils in Lagos state, Nigeria

Research Questions

1. What is the use of electronic media by primary school pupils in Agege, Lagos State?
2. What are the influences of electronic media usage on the academic enhancement of upper primary school pupils in Agege, Lagos State?

Methodology

The research design that was adopted for the study was descriptive of survey type. A descriptive research design is a scientific method which enables the researcher to observes and describes the behaviour of a subject without influencing it in any way. Therefore, the descriptive design of survey type which allows for the use of the questionnaire was considered as being appropriate for this research which aimed at finding out the relevant media effect on primary school pupils' utilization and academic enhancement as well as giving accurate and dependable results.

The population for this study consists of all primary school pupils in Agege, Lagos. The target population consisted of upper primary school pupils (Primary 4 – 6) from five public primary schools in Agege, Local Government Area of Lagos State. This category of pupils fully aware of the independent variable, electronic media and are able to answer questions when they asked.

Purposive sampling technique was adopted for this study. In deciding on sample size, the sizes of the population were also considered. According to the figures got from SUBEB in education district I Agege, Lagos, primary school children of aged 6 - 8 years were 573,902 in number and those of aged 9 - 12 were 500,843 in number. Citing Nwana in Okoro (2011), if a population is of several thousand, 5% or fewer samples will do. Therefore, the researchers used a sample size of 300 upper primary pupils of age range 8 - 12 years drawn from 5 public primary schools in Agege, Lagos metropolis because it was a fair representation.

Instrument for Data Collection

The researchers used a researcher-designed questionnaire titled "Electronic Media Utilization and Pupils' Academic Enhancement (EMUPAE). The instrument comprises section A for demographic data and section B of segments A – C of 19 items to elicit information from the respondents on their views and feelings about the issues, 'electronic media utilization by primary school pupils' and their academic enhancement'.

Validation of Research Instrument

The researchers and three other experts in the area of study validated the instrument for face and content validity. The research questionnaire titled "Electronic Media Utilization and Pupils' Academic Enhancement (EMUPAE)" questionnaire was critically scrutinized and necessary corrections were made based on the clarity, structure and contents. The reliability coefficient for the research instrument was established. The virtuousness of the questionnaire items that was employed was measured with the inter-item consistency reliability test. The pilot test of the research instrument was carried out on other 100 upper primary school pupils other than the sampled one for the research to determine the Cronbach alpha value of the instrument at 0.05 level of significant which yielded 0.85. The value was compared with the suggested criteria as mentioned by Ogunkola and Archer-Bradshaw (2013), that a benchmark of 0.7 is acceptable. Therefore, the research questionnaire is reliable based on the test-retest reliability value of the instrument at 0.85.

Data Presentation

The completed questionnaire was numbered for easy coding and to prevent missing questionnaire from the respondents. Out of the 300 questionnaires administered only 275 were well filled and returned given 91.7% return rate. Data were entered into the excel sheet and saved into a computer to prevent loss of data. The analysis is carried out using descriptive statistics, that is, the social demographics of the respondents and other appropriate statistical tools.

Table 1:

Socio-Economic and Demographic Characteristics of the Respondents

Sex	Frequency	Percentage (%)
Male	145	52.7
Female	130	47.3
Total	**275**	**100**

Source: Fieldwork (2018)

Table 1 illustrates that 145(52.7%) of the respondents are male while 130(47.3%) are female. The researchers try as much as possible not to be gender bias in the selection of the sample and sampling technique for the study.

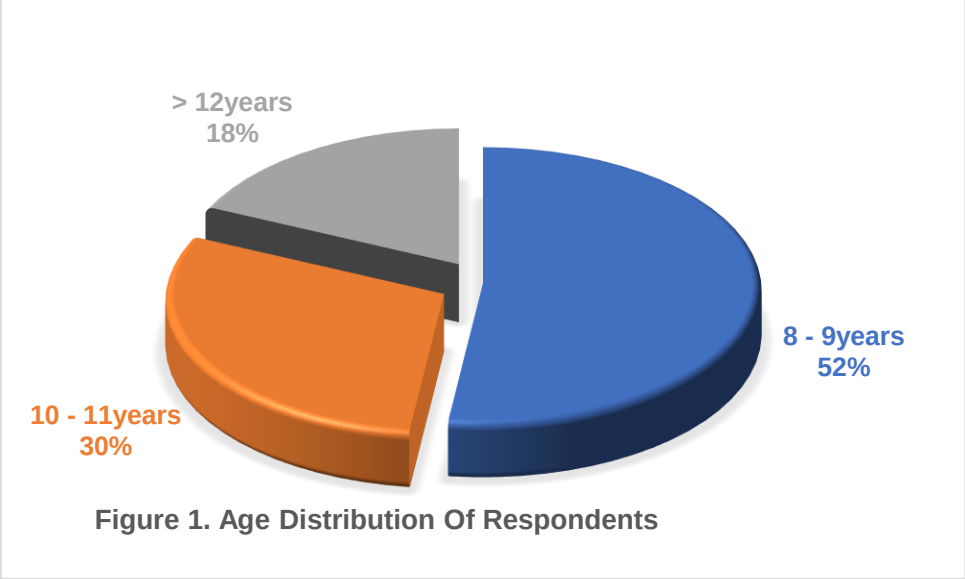

Figure 1. Age Distribution Of Respondents

Source: Fieldwork (2018)

Figure 1 indicated that 143(52%) respondents were between the ages of 8 - 9, 80(30%) respondents were between 10-11 while 50(18%) respondents were between the ages of 12 and above.

Questions 1. what is the level of use of electronic media by primary school pupils in Agege, Lagos State?

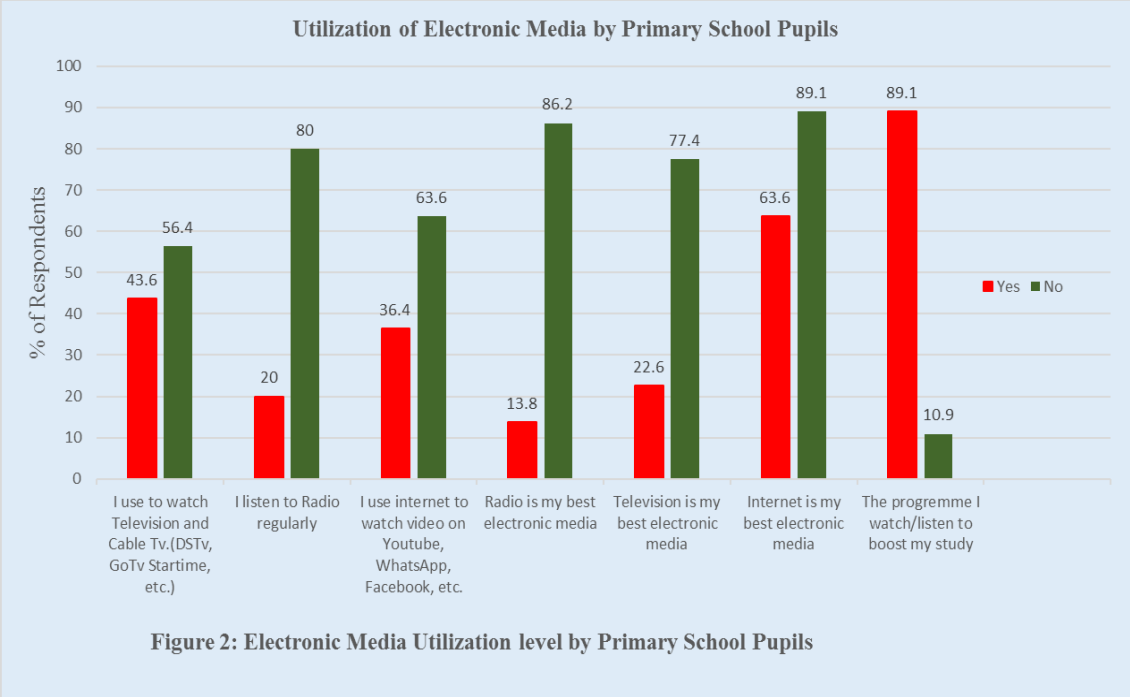

Figure 2: Electronic Media Utilization level by Primary School Pupils

Source: Fieldwork: 2018

Figure 2 above revealed that 43.6% of the respondents used to watch TV, 20% listen to the radio and 36.4% use the internet to watch video on YouTube, WhatsApp, Facebook, etc. Also, 13.8% of the respondents choose radio as their best electronic media, 22.6% picked internet while TV/Cable TV is the best for 63.6% of the respondents. In addition, 89.1% of the responded confirmed that the programme they watch/listen to make them interact with people well.

Questions 2. What are the influences of electronic media usage on the academic enhancement of upper primary school pupils in Agege, Lagos?

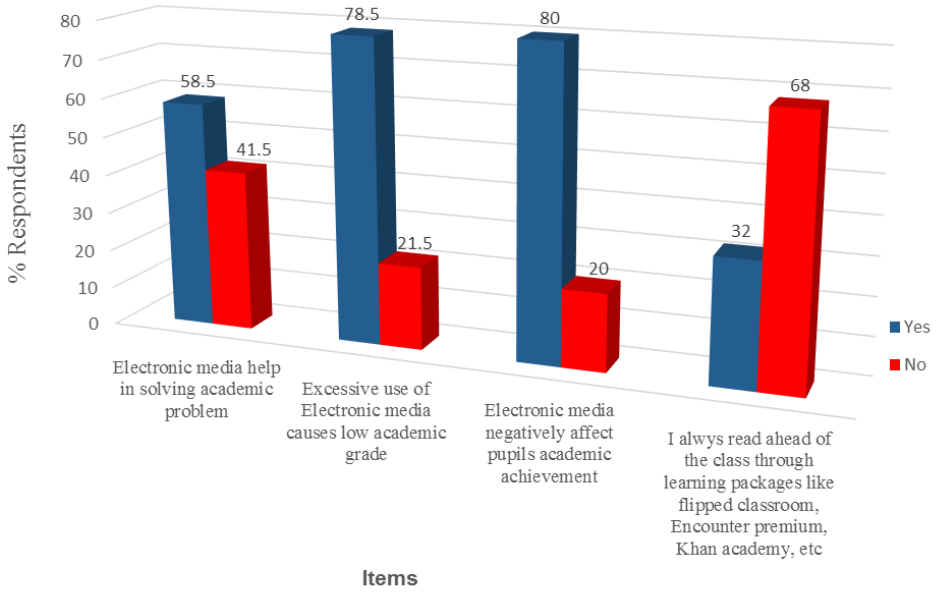

Figure 3. **Electronic media effect on Academic Enhancevement of Primary School Pupils**

Source: Fieldwork: 2018

From Figure 3, 161(58.5%) of the respondents claimed that electronic media help in solving the academic problem while 114(41.5%) of them said no. Also, 216(78.5%) of the pupils said the excessive use of electronic media causes low academic grade while 59(21.5%) do believe that excessive use of electronic media cannot cause low academic grade of pupils in primary schools. 220(80%) of the respondents confirmed that electronic media negatively affects pupil's academic achievement while just 55(20%) of them do not agree that electronic media affect the pupil's academic enhancement. Also, only 88(32%) of the respondent do read ahead of the class through the use of flipped classroom, encounter premium and Khan Academy while 187(68%) of the respondent do not read ahead of the class through the use of the flipped classroom, encounter premium and Khan Academy. Using 50% as the benchmark, it can be deduced that electronic media like internet, Television/ Cable TV and educational apps like the flipped classroom, Khan Academy, encounter premium can improve student learning if properly use because the majority of them use electronic media somehow.

Discussions on Findings

Findings show that a major part of the sample respondents out of 275(100%), 245 (89.1%) have access to electronic media and make them interact with people while the rest not. Out of 275(100%) respondents, 120(43.6%) used to watch TV, 55(20%) listen to the radio and 100(36.4%) use the internet to watch video on YouTube, WhatsApp, Facebook, etc. Also, 38(13.8%) of the respondents choose the radio as their best electronic media, 62(22.6%) picked the internet while TV/Cable TV is the best for 175(63.6%) of the respondents. Some of the pupils viewed the influence of the electronic media as being educative which helps to broaden their horizon.

Furthermore, the outcome of this study was in agreement with Newton (2009) who identified some functions of electronic media as (1) links to reliable, verifiable, adequate and complete information to solve educational problems; (2) it can become a powerful and economical tool for education and has a great potential if used imaginatively and with vision. The findings on

electronic media usage on the academic enhancement of upper primary schools reveal that 161(58.5%) of the respondents claimed that electronic media help in solving the academic problem. Also, 216(78.5%) of the pupils said the excessive use of electronic media causes low academic grade. 220(80%) of the respondents confirmed that electronic media negatively affect the pupil's academic enhancement. The outcome of this study was in line with Anonymous (2008), in one of his studies, it was found that students who watched four or more hours of television fall off in their grades from 36% to 29% while the students watching an hour or less per weekday mostly improved their grades from 20% to 29%. Similarly, the research carried out by Bushman and Anderson (2001) opined that child having undue habits of television use score lesser than those light viewers.

Schmidt and Vandewater (2008) also added that entertainment programs have negative influences on academic performance while educational programs are advantageous to academic performance. Also, only 88(32%) of the respondent do read ahead of the class through the use of flipped classroom, encounter premium and Khan Academy while 187(68%) of the respondent do not read ahead of the class through the use of flipped classroom, encounter premium and Khan Academy. Similarly, Faisal, Ch. Aqeel, Muh'd SherJuni, Irfan, SohailSattar Gujjar, Javeria, and Malik (2014) affirm that children don't actually use electronic media for studies but having gratuitous habits of television use score lesser than those light viewers especially among young female members of the society.

Conclusion

Mass media are essential tools for academic enhancement of children most especially the electronic media. It is concluded from the study findings that electronic media especially TV plays an essential function in our daily life, it has some negative as well as a positive influence. Mass media (electronic) usage is a way to development but most of our little children adopt negative traits from them. Research finding affirms the fact that electronic media is a powerful agent of academic enhancement, it can educate, aware the masses and it can also help learners in their studies more than any other resource. But its positive impacts are less significant than the negative impacts. It is observed in this research finding that if on one side electronic media utilization aid in learning new ways of education, it is advantageous for students in their curricular activities and support students in solving their academic problems; on other hands, it also negatively affects their academic enhancement. Its negative upshots can be looked in to from the psychological and physiological problems and finally, the study findings show that at liberty viewer of media programs cause low academic enhancement among most of the primary school students.

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INVESTIGATION OF STUDENTS' ATTITUDE TOWARDS WEB-QUEST INSTRUCTION AMONG PRE-SERVICE TEACHERS IN COLLEGES OF EDUCATION KATSINA, KATSINA STATE

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Abstract

This study investigated the pre-service teachers' attitudes towards web-quest instruction in Colleges of Education Katsina state. A Survey research design was adopted to conduct the study. Related literature was reviewed after the conceptual framework based on the major variables of the study. The population of the study comprises of all the pre-service teachers' in Colleges of Education in Katsina State. 6,840 and a sample size of 364 pre-service teachers were used for the study; using cluster, simple random and proportional sampling techniques. Data collected on the basis of the research questions set in chapter one were analyzed using descriptive statistics (i.e. frequency, percentage, and mean). Mann-Whitney Independent test is used to answer hypotheses one and three while Kruskal-Wallis test is used to answer hypotheses two and three. The null hypotheses one and three were rejected and null hypotheses two and four were accepted. The findings of this study revealed that age has no significant influence in the pre-service teachers' attitude towards web-quest instruction for learning geography concept and also gender has a significant influence on the pre-service teachers' attitude toward web-quest instruction for learning geography concept. This study recommends, among others, that the Government, National Commission for Colleges of Education and the management of Colleges of Education should join hands together and ensure that computer laboratories are available in COE with adequate functional computer hardware and software and functional internet facilities that will cater for the need of both staff and students.

Introduction

Information and Communication Technologies (ICTs) have become key tools and have a revolutionary impact on how people see and live in the world. The place of ICTs in education and the world, in general, cannot be ignored. Modern day businesses are conducted and facilitated through the use of telephones, fax machines, and computer communication networks through the internet. This phenomenon has given birth to the contemporary e-commerce, e-government, e-medicine, e-banking, and e-education among others. Bandele (2006) summed up that ICT is a revolution that involves the use of computers, internet, and other telecommunication technology in every aspect of human endeavor. He posited that ICT is simply about sharing and having access to data with ease. It is regarded as the super highway through which information is transmitted and shared by people all over the world.

Web-Quests have become an effective method of incorporating technology with educational concepts. In an interview, Dodge stated his intention for creating a Web-Quest sparked from an interest in allowing his students to further connect with his in-class lesson (Starr, 2000). Using his knowledge of educational technology, Dodge was able to gather information and resources online to support his lesson plans. His creation of a student-centered activity had the ability to integrate online resources with activity-based learning (Dodge, 1995). The development of higher-order thinking skills with content-based learning in the Web-Quest format may prove to be successful, but further research is needed in this area. March (2000), one of the co-developers, states that Web-Quests "allow students to construct meaning on a complex topic, preferably in a way that motivates working together and testing ideas in a real-world context" (2000, p.55). March has been another

major proponent of Web-Quests in education and has contributed to the understanding of their use. His research addresses basic uses of Web-Quests in scaffolding, prompting, and procedural facilitation with various content areas.

Successful implementation of Web-Quests, particularly in geography education, lends credibility to the simplicity of the concept – increasing student learning through active experimentation. This implementation of Web-Quests in various other fields of study continues to make a major impact on the instructional strategies employed by faculty (Seamon, 2001; Lipscomb, 2003; Peterson, 2003). In addition, the concept of Internet discovery has improved the ability of the student to construct his/her own learning through Web-Quest activities (Seamon, 2001). Essential in this process of discovery is the instructor's ability to create effective navigation through a web page storyboard. In this process, the instructor is able to create a flowchart to identify the natural progression a student will follow through a Web-Quest project. Ease of navigation is one of the most central concepts that must be implemented in order to facilitate online learning. In this process, an instructor must guide a student through the question, search, interpretation, composition, and sharing to take the online information and synthesize a meaningful output. This discovery method promotes ownership of the student's learning.

Web-Quests continue to be a successful method of allowing the student to connect with material through online resources. The primary concern, as an instructor, regards setting up a problem or task for the student to accomplish. Setting up a task also requires adequate prompting to ensure that the student investigates the correct online references. Currently, much of the research published on Web-Quests describes methods of implementing this tool into classroom instruction. Although instructors have developed most Web-Quests, some research has revealed that student-developed Web-Quests are also being implemented in classes (Peterson, 2003). This method of student-centered instruction relies on the technological ability of the students and the instructor in order to create an effective outcome and remains in the infancy of Web-Quest implementation.

Using Web-Quests in education with pre-service and in-service teachers may yield similar results to King's study with the MUTEBI instrument. Future analysis of Web-Quest effectiveness may include additional evaluations of the product with the student's ability to integrate the activity into a classroom setting. An assessment of the Web-Quest produced by pre-service and in-service teachers combined with additional evaluation with the course implementation may yield the most statistically significant results.

Student attitudes toward Web-quest influence the future use of computers in instruction (Sanders and Morrison-shetler, 2001). This issue encourages many researchers to assess students' overall attitude toward web-quest instruction. Variables such as gender, age, and prior computer experience were found to influence student's attitude toward web-quest instruction (Hill, 2000; Price and Winiecki, 1995; Smith and Necessary, 1996; Moon, 1994). Attitudes of students toward web-quest instruction have influence over the future use of web-launched instructional materials. They, also determine the extent to which web-based resources are educationally beneficial for students in classroom learning environment (Sanders & Morrison-shetler, 2001). Some studies (e.g. Bangert, 2004; Foster, 2003; Hill, 2000), have concluded that one important indicator of future web use is providing useful information appropriate to the course being thought. Moreover, a positive correlation was found between instructors of web-quest training materials and students' participation in the use of web-based recourses, consequently influencing student learning through the web.

Self-efficacy (SE) is the belief or perception of a person that he or she is capable to perform a specific task. It is a dynamic element that influences other concepts such as goals, performance and is influenced by them. SE is an essential element in Social Cognitive Learning Theory. it plays a role in connecting goals, performance, and motivation concepts especially in the areas of e-learning and instruction. it is one of the individual related concepts that function as a mediating mechanism among these concepts. Various research results show that SE may be a good predictor of performance. Since SE may be a good predator of performance, managers may try to assess the

SE of candidates to predict their potential performance in the area of e-learning and instruction, thus regulating their human resources practices such as selection, adjustment, manager development etc.

Gender and age difference in the attitude toward technology use has long been a concern in education. The last meta-analysis on this issue covered the empirical studies up to about 20 years ago. Since then, technology use has increased exponentially, and many more empirical studies have examined this issue but showed inconsistent findings. As a result, there is a lack of clear understanding about if such gender and age difference still persist. The purpose of this research is to re-examine this issue by meta-analyzing the empirical research studies on this issue in the last two decades and to examine the potential moderators that may have contributed to the heterogeneity of the research findings. A total of 50 articles from 1997 to 2014 were identified and used in this meta-analysis. The findings indicated that males still hold more favorable attitudes toward technology use than females, but such differences would be characterized as small effect sizes. The comparison between this study and the last meta-analysis of about two decades ago suggested that there was an only minimal reduction in the gender and age attitudinal gap in general. But when the general attitude was broken down to different dimensions of attitude, the present study showed a reduction of gender difference in the dimension of *Affect* and *Self-efficacy*, but not in the dimension of *Belief*. The limitations of the study were noted, and the implications and future research directions were discussed.

The emergence of the World Wide Web as a pipeline for learning will have a profound effect on the manner in which our students learn and we teach. As Koone (2000) states; “from web-based technology are converging in rapid and radical ways. Specifically, web-quest instruction (WQI) can be used to meet the needs of a more diverse student group. Typical classes consist of students with varying abilities and previous knowledge, and web-quest instruction (WQI) can help a student to address these differences. Web-quest instruction (WQI) also allows students to work a pace that is more comfortable - some students work faster than their peers while others may wish to take longer. In addition, the use of web-quest instruction (WQI) provides the opportunity for multiple grade levels to be accommodated in the same classroom at the same time, also an added bonus of Web-quest Instruction is the fact that it can offer students a "virtual teacher" because students can access the instructional materials anytime, anywhere. This allows students who were absent the opportunity to access instructional materials away from school, and even the possibility to accommodate students in a course when their schedule is full. This study, therefore, investigates pre-service teachers’ attitude towards web-quest instruction among pre-service teachers in colleges of education Katsina State.

Statement of the Problem

It is evident that many pre-service teachers in Colleges of Education in Nigeria still rely much on the traditional lecture method of teaching neglecting the intrinsic value of the use of ICT. There is still low level of enlightenment among pre-service teachers on access and utilization of the emerging trends of ICT for the better Educational enterprise. A large number of pre-service teachers rarely access and utilize the tremendous intrinsic value of ICT in discharging their responsibilities as teachers. It has been observed that their inadequate computers as well as internet facilities in use in most of the colleges of education in Nigeria. In that sense, the traditional lecture method persistently dominates most of the teaching and learning activities. This clearly shows that pre-service teachers are still left behind from the emerging trends of ICT. Therefore, teachers and students are too large extent deprived of exploiting the potentials offered by ICTs in teaching-learning process for better achievement of the Educational goals.

Attitude has been found to be a barrier toward web-quest instruction among pre-service teachers in colleges of education Katsina State because most of the pre-service teachers in those institutions are not exposed to the use of the web-quest application by their lecturers that is why most of the pre-service teachers’ shows a negative attitude toward it. This study, therefore, was

carried out to investigate the student's attitude toward web-quest instruction among pre-service teachers in colleges of education Katsina, Katsina state after they have been exposed to web-quest application package of geography concept.

Research Questions

The following research questions were raised to guide the study:

i. what is the attitude of pre-service teachers towards the use of web-quest instruction for learning geography concept?
ii. what is the pre-service teachers' self-efficacy on the use of web-quest for learning geography concept?
iii. what is the difference between male and female pre-service teachers' attitude towards web-quest instruction for learning geography concepts?
iv. what is the influence of age on pre-service teachers' attitude towards the use of web-quest instruction for learning geography concepts?
v. What is the difference between male and female pre-service teachers' self-efficacy on the use of web-quest instruction for learning geography concepts?
vi. What is the influence of age on pre-service teachers' self-efficacy on the use of web-quest instruction for learning geography concept?

Hypotheses

$Ho_{1:}$ There is no significant difference between male and female pre-service teachers' attitude towards the use of web-quest instruction for learning geography concept.

$Ho_{2:}$ There is no significant difference in the pre-service teachers' attitude towards the use of web-quest instruction for learning geography concept based on the age difference.

$Ho_{3:}$ There is no significant difference between male and female pre-service teachers' self-efficacy on the use of web-quest instruction for learning geography concept.

$Ho_{4:}$ There is no significant difference in the pre-service teachers' self-efficacy on web-quest instruction for learning geography concept based on age difference.

Methodology

This study adopted descriptive survey research design. The choice of this design was to allow the researcher to gain an insight of pre-service teachers' attitude towards web-quest instruction in colleges of education Katsina State. The target population of this study comprises of all pre-service teachers (students) of the Colleges of education Katsina state, Nigeria, which are, Federal College of Education Katsina, and Isa Kaita College of Education Dutsin-ma. The Federal College of Education Katsina has a total number of (3350) pre-service teachers, while Isa Kaita College of Education has a total number of (3490) pre-service teachers. The total population of this study, therefore, is (6840) pre-service teachers (student). Their Distribution is presented in Table 3.1 as follows:

Table 1: Distribution of Population in Colleges of Education in Katsina state Nigeria.

	Name of Colleges	**Number of students**
1.	Federal College of Education Katsina State.	3350
2.	Isa Kaita College of Education Dutsin-ma Katsina State	3490
	Total	6840

Source: Planning research and statistics (PRS) Federal collage of education Katsina and Isa Kaita College of Education Dutsin-ma

Sample and Sampling Technique

The sample size of this study consists of pre-service teachers in colleges of Education Katsina state. The sample size estimation was based on the recommendation by (Krejcie and Morgan 1970) table of sample size.

Stratified is used in sampling the pre-service teaches, therefore every pre-service teacher is assumed to have an equal right and chance to be selected. Out of a total number of 6840 pre-service teachers in the Colleges of Education Katsina state, only 364 pre-service teachers were selected to make the sample as recommended by Krejcie and Morgan table of sample size.

The Colleges of Education used during this study and the number of samples per institution is indicated in Table 2.

Table 2:
Distribution of Sample from the Population of Colleges of Education in Katsina state, Nigeria.

S/N	Name of Colleges	Sample Frame	Sample Size
1	Federal College of Education Katsina State.	3350	182
2	Isa Kaita College of Education Dutsin-ma Katsina State	3490	182
	Total	6840	364

Instrumentation

Two research instruments were used to collect data for the purpose of this study. They were constructed questionnaire termed: Students' Attitude and Self-efficacy Towards Web-quest instruction and a Web-Quest Application Package designed by the researcher on geography concept Covering on three topics: rocks, transportation, and settlements. The pre-service teachers used the web-quest package for one week before giving them the questionnaire to answer.

The questionnaire was designed under three different sections and harmonized in one single questionnaire; Section A required the respondents' demographic information that includes: Sex and age of the respondents, while Section B has 20 items and C contains 11 items on "Attitude of pre-service teachers toward utilization of web-quest instruction for learning geography concept and the influence of self-efficacy on pre-service teachers' toward web-quest instruction in Colleges of Education Katsina, Katsina state. It was also designed on a five-point Likert scale type in which the respondents will choose from the options provided. The Respondents were required to respond to the items by a tick (√) against the appropriate option that reflects or show their personal opinion as seen in Appendix I.

Validity of the Instrument

The face and content validity of the instrument were ascertained.

Pilot Testing

Thirty-five copies of the questionnaires were pilot tested in Usufu Bala Usman College of legal and advanced studies Daura, Katsina state to ascertain the reliability of the instrument.

Reliability of the Instrument

The Cronbach's Alpha Reliability Coefficient was used to obtain the reliability coefficient of the instrument. The reliability co-efficient of 0.92 for section B and 0.88 for section C was obtained.

Procedure for Data Analysis

In view of the data generated from the research questionnaires, a number of statistical techniques were used for the analysis. Frequency counts and the percentage was used to explain the demographic data of the study. Data collected on the basis of the research questions set in chapter one was analyzed using descriptive statistics (i.e mean and standard deviation). The limit

for decision rule: An average mean of 2.50 and above was considered as agreed, while an average mean of 2.49 and below was considered disagreed with respect to research questions.

Null hypotheses one, and three was tested using Mann Whitney test and null hypotheses two, and four were tested using Kruskal-Wallis test at 0.05 (95%) level of significant.

Result

Demographic Data

Table 1.

Frequency and Percentage Distribution of the Respondents by Gender

Gender	**Frequency**	**Percentage**
Male	208	58.50
Female	150	41.50
Total	358	100%

The data in Table 1 shows that out of 358 respondents, 208 (58.50%) are male while 150 (41.50%) are female. This means that the male pre-service teachers form the majority of the respondents that took part in the study.

Table 2.

Frequency and Percentage Distribution of the Respondents by Age

Respondents Age		Frequency	Percentage
Low	(16-20)	157	43.50%
Medium	(21-25)	191	53.50%
High	(26-above)	10	3.00%
Total		358	100%

The data in Table 2 shows that out of 358 respondents, 157 (43.50%) are of lower age 191 (53.50%) are of medium age while 10 (3.00%) is the oldest in age. This means that the pre-service teachers with middle age form the majority of the respondents that took part in the study.

Research Question One: What are the attitudes of pre-service teachers towards the use of web-quest instruction for learning geography concepts?

To answer this question, respondents were asked to rate themselves on the items provided on the attitude towards the use of web-quest instruction for learning geography concept. Items 1– 20 of the instrument were used to answer this question. The result is presented in table 4.3 as follows.

Table 3.
Pre-service teachers' attitude towards the use of web-quest instruction for learning geography concepts

S/N	Rating Items	Mean	SD	Decision
1	The use of web-quest improves my learning	3.54	0.50	Agreed
2	Web-quest instruction ensures accuracy in lesson presentation.	3.38	0.67	Agreed
3	Web-quest ensures time management in learning Geography concept.	3.22	0.81	Agreed
4	Web-quest Instruction as a tool promotes instructional delivery.	2.30	0.78	Disagreed
5	I enjoy learning with web-quest	3.11	0.80	Agreed
6	Web-quest helps to use the computer more effectively than before.	3.25	0.83	Agreed
7	I prefer web-quest for learning than conventional method	3.23	1.06	Agreed
8	Web-quest enables me to cover more concept within a short period	2.12	0.75	Disagreed
9	Web-quest enables me to learn at my own pace	3.33	0.79	Agreed
10	Web-quest enables me to navigate from one topic to another	3.35	0.81	Agreed
11	I think that introducing web-quest instruction in teaching and learning would be useful in my school	3.34	0.81	Agreed
12	Web-quest serves as promoter of conducive teaching and learning environment	3.37	0.75	Agreed
13	Web-quest software is supplied for instructional purposes in your institution	3.14	0.95	Agreed
14	Web-quest instruction is used for instructional purposes in your institution	3.15	0.96	Agreed
15	Using web-quest instruction makes it easier for me to remember what I learn in the classroom	2.10	0.86	Disagreed
16	Web-quest make courses more enjoyable	3.28	0.79	Agreed
17	Web-quest can be used with various instructional method and techniques	3.31	0.91	Agreed
18	Effective utilization of web-quest encourages integrative learning that promotes thematic and reduces traditional classroom	3.04	1.00	Agreed
19	Because of using web-quest, I feel more prepared for instruction	3.30	0.83	Agreed
20	Effective utilization of web-quest facilitates discussions on the content in classroom presentation	3.11	0.96	Agreed
	Cumulative mean	3.09		

Decision mean= 2.5

Table 3 shows the pre-service teachers' attitude towards the use of web-quest instruction for learning geography concept. It was discovered that pre-service teachers are in agreement with the 17 items, only 3 were not in agreement base on the pre-service teachers' attitude toward the use of web-quest instruction. The cumulative mean of 3.09 in all the 20 items is higher than the decision mean of 2.50. Specifically, item1which state that "the use of web-quest instruction improves my

learning" attracted the highest mean value of 3.54. While item 15 which state that "using web-quest instruction makes it easier for me to remember what I learn in the classroom" attracted the lowest mean value of 2.10.

Research Question Two: What are the pre-service teachers' self-efficacy towards the use of web-quest instruction for learning geography concept?

To answer this question, respondents were asked to rate themselves on the items provided on the self-efficacy towards the use of web-quest instruction for learning geography concept. Data from items 21– 31 of the research instruments were used to answer this question. The result is presented in table 4 as follows:

Table 4.
Pre-service teachers' self-efficacy on the use of web-quest for learning geography concepts.

S/N	Rating Items	Mean	SD	Decision
21	you have the skills of using web-quest for your learning	2.05	1.29	Disagreed
22	you have the skills of using web-quest for motivating your learning	2.89	1.36	Agreed
23	You have the skills to manipulate the use of web-quest for your learning	2.87	1.36	Agreed
24	You learn faster when your lecturer use web-quest instruction application skills to teach	2.49	1.58	Agreed
25	You have the skills of using web-quest for gathering learning information.	2.87	1.47	Agreed
26	You have the skills of using web-quest application for conducting research.	2.10	1.41	Disagreed
27	Using web-quest instruction makes it easier for me to remember what I learned in a classroom presentation.	2.93	1.13	Agreed
28	I have the skills of using web-quest for marking instruction/presentation more interested.	2.78	1.39	Agreed
29	I notice my computer skills are improving day by day when using web-quest instruction.	2.88	1.45	Agreed
30	My institution has the policy to promote or support computer-based innovations by teacher trainers in their learning.	2.91	1.27	Agreed
31	We need to be attaining workshops or other learning activities about pedagogical use of computer provided to teacher trainers	3.24	1.27	Agreed
	Cumulative mean	**2.72**		

Table 4 reviled pre-service teachers' self-efficacy towards the use of web-quest instruction for learning geography concept. It was observed that pre-service teachers are in agreement with the 9 items while 2 were not in agreement base on self-efficacy toward the use of web-quest instruction. The cumulative mean of 2.72 of the 11 items is higher than the decision mean of 2.50. Specifically, item 21 which state that "we need to be attaining workshops or other learning activities about the pedagogical use of computer provided to teacher trainers" attracted the highest mean value of 3.24. While item 16 which state that "I have the skills of using web-quest application for conducting research" attracted the lowest mean value of 2.10.

Research Question Three: What is the difference between male and female pre-service teachers' attitude towards the use of web-quest instruction for learning geography concept?

In response to research question three, the responses on item number 1– 20 of the research the instrument was computed to determine the mean and standard deviation of male and female pre-service teachers' attitude toward web-quest instruction for learning geography concept. The result is presented in table 4.5 as follows:

Table 5:
Male and female pre-service teachers' attitude towards the use of web-quest for learning geography concepts

Gender	**N**	**Mean**	**Std. Deviation**
Male	208	3.23	0.376
Female	150	3.35	0.027

Table 5 shows the mean and standard deviation between male and female Pre-service teachers' attitude towards the use of web-quest instruction for learning geography concept. Female pre-service teachers had a greater mean value of 3.35 and a standard deviation of 0.027 compared to male pre-service teachers with 3.23 mean values and a standard deviation of 0.376.

Research Question Four: What is the influence of age on pre-service teachers' attitude towards the use of web-quest instruction for learning geography concept?

In response to research question four, the responses on items number 1– 20 of the instrument was computed to determine the mean and standard deviation of pre-service teachers' attitude toward web-quest instruction for learning geography concept based on age differences. The result is presented in table 4.6 as follows:

Table 6.
Influence of age on pre-service teachers' attitude towards the use of web-quest for learning geography concepts

Age	N	Mean	Std. Deviation
Low (16-20)	157	3.27	0.385
Medium (21-25)	191	3.28	0.348
High (26-above)	10	3.30	0.296

The result from Table 6 revealed the attitude of pre-service teachers mean and standard deviation between the three age groups (high, medium, and low) towards the use of web-quest instruction for learning geography concept. Pre-service teachers within the 26 and above age bracket (High) recorded the highest mean value of 3.30 and standard deviation 0.296, followed by pre-service teachers within 21-25 (Medium) with 3.28 mean value and standard deviation of 0.348, thus slightly ahead pre-service teachers within 16-20 age bracket (Low) with mean value of 3.27 and a standard deviation of 0.385 being recorded with the lowest mean value.

Research Question Five: What is the difference between male and female pre-service teachers' self-efficacy on the use of web-quest instruction for learning geography concept?

In response to research question five, the responses on item number 21– 31 of the research instrument was computed to determine the mean and standard deviation of male and female pre-service teachers' self-efficacy toward web-quest instruction for learning geography concept. The result is presented in Table 7 as follows:

Table 7:
Pre-service teachers' self-efficacy on the use of web-quest for learning geography concepts base on gender

Gender	N	Mean	Std. Deviation
Male	208	2.80	0.926
Female	150	3.06	0.756

Table 7 shows the difference between the male and female Pre-service teachers' self-efficacy toward the use of web-quest instruction for learning geography concept. The mean value for male pre-service teachers was 2.80 and standard deviation of 0.926, while female pre-service teachers have the mean value of 3.06 and standard deviation of 0.759. Therefore, female pre-service teachers recorded the higher mean value from the Table.

Research Question Six: What is the influence of age on pre-service teachers' self-efficacy towards the use of web-quest instruction for learning geography concept?

In response to research question six, the responses on items number 21– 31 of the instrument was computed to determine the mean and standard deviation of pre-service teachers' self-efficacy toward web-quest instruction for learning geography concept base on the age difference. The result is presented in table 4.8 as follows:

Table 8:
Influence of age on pre-service teachers' self-efficacy on the use of web-quest for learning geography concepts

Age	N	Mean	Std. Deviation
Low (16-20)	157	2.94	0.851
Medium (21-25)	191	2.89	0.894
High (26-above)	10	2.88	0.586

Table 8 revealed the pre-service teachers mean difference and standard deviation between the three age groups (high, medium, and low) towards the use of web-quest instruction for learning geography concept base on self-efficacy. Pre-service teachers within the low class (16-20) age bracket recorded the highest mean value of 2.94 and standard deviation 0.851, followed by pre-service teachers within the medium age of 21-25 years have 2.89 mean value and standard deviation of 0.894, thus slightly ahead pre-service teachers within the high class 26 years and above age bracket with mean value of 2.88 and standard deviation of 0.586 being recorded with the lowest mean value.

Result

Hypothesis One: there is no significance difference between male and female pre-service teachers' attitude towards the use of web-quest instruction for learning geography concept.

To test this hypothesis, Mann-Whitney test is used to test the difference between male and female pre-service attitude towards the use of web-quest instruction for learning geography concept to present the result in table 4.8 as follows:

Table 9.
Mann-Whitney Test of male and female pre-service teachers' attitude towards the use of web-quest instruction for learning geography concept

Ranks

Test Variable	N	df	Mean Rank	Sum of Ranks	U(1)	p-value
Male	208	1	167.72	34719.00	1.319	0.015
Female	150		194.56	29184.00		
Total	358					

Table 9 results of the Mann-Whitney test showed the male and female pre-service teachers' opinions on the attitude toward the use of web-quest instruction for learning geography concept in the college of education Katsina State. The result showed that significant differences exist between male and female pre-service teachers' attitude towards the use of web-quest instruction for learning geography concept. This is because the p-value of 0.015 is lesser than 0.05 alpha value of significance. Therefore, the null hypothesis is thereby rejected.

Hypothesis Two: there is no significance difference in the pre-service teachers' attitude towards the use of web-quest instruction for learning geography concept based on the age difference.

To test this hypothesis, Kruskal-Wallis test was used to test the pre-service attitude towards the use of web-quest instruction for learning geography concept base on the age difference. To present the result in Table 10 as follows:

Table 10.
Kruskal-Wallis test of the mean rating of pre-service teachers' attitude towards the use of web-quest instruction for learning geography concept based on age difference (low, medium and high)

Ranks

Test Variable	Age range	N	df	Mean Rank	X2(2)	P-value
Attitude of pre-Service teachers toward web-quest	Low	157	2	176.54	.244	0.885
	Medium	191		181.62		
	High	10		185.60		
	Total	**358**				

Table 10 shows the result of the Kruskal-Wallis test with the mean rankings of three age groups of the respondents (low age, medium age, and high age) in their opinions on the attitude towards the use of web-quest instruction for learning geography concept base on the age difference. The result indicates that there is no significant difference in their mean rankings. This is because the p-value of 0.885 is greater than the 0.05 alpha value of significance. Their mean ranking based on age difference is 176.54, 181.62, and 185.60 for the low, medium and high level of age respectively. This shows that irrespective of respondents' age their mean ratings on attitude based on age difference is not significantly different. Therefore, the null hypothesis which states that there is no significant difference in the pre-service teachers' attitude toward the use of web-quest instruction for learning geography concept based on age difference is hereby not rejected.

H_{03}: there is no significance difference between male and female pre-service teachers' self-efficacy on the use of web-quest instruction for learning geography concept.

To test this hypothesis, Mann-Whitney Test is used to test the difference between male and female pre-service teachers' self-efficacy towards the use of web-quest instruction for learning geography concept as presented in Table 4.10.

Table 11.
Mann-Whitney Test of the difference between male and female pre-service teachers' self-efficacy towards the use of web-quest instruction for learning geography concept.

Test Variable	N	df	Mean Rank	Sum of Ranks	U(1)	P-value
Male	208	1	167.31	34632.50	1.310	0.012
Female	150		195.14	29270.50		
Total	358					

Table 11 result of Mann-Whitney test showed the male and female pre-service teachers' opinions on the self-efficacy toward the use of web-quest instruction for learning geography concept in Colleges of Education Katsina, Katsina state. The result revealed that significant differences exist between both groups of students in their opinions on the difference between male and female pre-service teachers' self-efficacy towards the use of web-quest instruction for learning geography concept. This is because the p-value of 0.012 is lesser than the 0.05 alpha value of significance. Therefore, the null hypothesis is thereby rejected.

Null Hypothesis Four: there is no significance difference in the pre-service teachers' self-efficacy towards the use of web-quest instruction for learning geography concept based on the age difference.

To test this hypothesis, Kruskal-Wallis test is used to test the pre-service teachers' self-efficacy towards the use of web-quest instruction for learning geography concept based on age difference as presented in Table 12.

Table 12.
Kruskal-Wallis test of mean rating of pre-service teachers' self-efficacy towards the use of web-quest instruction for learning geography concept based on age difference (low, medium and high)

Test Variable	Age range	N	df	Mean Rank	X2(2)	p-value
Pre-service teachers' self-efficacy towards the use of web-quest.	Low	157	2	183.16	0.736	0.692
	Medium	191		177.68		
	High	10		156.90		
	Total	**358**				

Table 12 ahows the result of Kruskal-Wallis test with the mean rankings among the three group of age range (low age, medium age, and high age) in their opinions on the self-efficacy towards the use of web-quest instruction for learning geography concept base on the age difference. The result indicates that there is no significant difference in their mean rankings. This is because the p-value of 0.692 is greater than the 0.05 alpha value of significance. The mean rating of pre-service teachers' self-efficacy base on the age difference is 183.16, 177.68, and 156.90 for the low, medium and high level of age respectively. This shows that irrespective of respondents' age their mean ratings on attitude based on age are not significant differences. Therefore, the null hypothesis which states that there is no significant difference in the pre-service teachers' self-efficacy toward the use of web-quest instruction for learning geography concept based on age difference is hereby not rejected.

Discussion

The study revealed that pre-service teachers have a positive attitude towards the use of web-quest instructional package for learning geography concept. This is in agreement with Taylor, (2003) finding that the pre-service teachers perceived web-quest as a useful creative, motivating and pedagogical tool for learning.

The results of the study revealed that pre-service teachers showed a positive response on self-efficacy toward the use of web-quest instruction for learning geography concept in Colleges of Education Katsina, Katsina state. This is in agreement with Liaw, Huang, and Chen (2007), which revealed that computer self-efficacy influenced pre-service teachers' use of web-quest in teaching and learning. Similarly, (Yuen and Ma, 2002) revealed that the Hong Kong teachers' implementation of web-quest instruction was depended on the simplicity of computer use and perceived teacher self-efficacy.

There is a significant difference between male and female pre-service teachers' attitude towards the use of web-quest instruction for learning geography concept in favor of the female. This is in disagreement with (Erdamar 2016) who conducted a study on the effect of gender on attitudes of pre-service teachers towards the use of web-quest instruction and found that female pre-service teachers have a positive attitude towards the use of the web-quest instructional package.

The study also revealed that pre-service teachers' attitude towards the use of web-quest instruction for learning geography concept based on age difference was not significant. The finding is in agreement with Halat (2014) which reported that there was no statistically significant difference found in the motivational level between lower age and higher age pre-service teachers who designed web-quest- based applications.

The study also revealed that female pre-service teachers' have higher self-efficacy towards the use of web-quest instruction for learning geography concept than their male counterpart. This is in agreement with the (Abbitt and Klett 2004) which found male and female pre-service teachers demonstrated a significant increase in self-efficacy beliefs.

The study revealed that there was no significant difference among pre-service teachers irrespective of the age difference. This is in agreement with (Halat & kellet 2014) who reported that there was no significant difference in self-efficacy level between lower ages and higher age pre-service teachers who designed web-quest- based application.

Conclusion

The findings of the study revealed that the pre-service teachers' attitude and self-efficacy toward web-quest instruction in colleges of education Katsina State are low. This phenomenon will definitely affect the quality of pre-service teachers from these institutions. In spite of the awareness of the place of web-quest application in instructional delivery, it is yet to record the same impression among lecturers and pre-service teachers in Colleges of Education Katsina State.

Recommendations

Based on the findings of this study, the researcher makes the following recommendations:

1. Pre-service teachers should be exposed to new technologies that can improve their attitude for learning geography concepts. This could be achieved if Government, National Commission for Colleges of Education (NCCE) and other Education stakeholders to respond positively and provide enough ICT infrastructures in all the Colleges of Education across the country so as to encourage pre-service teachers to utilize them in their learning.
2. Government and non-governmental organization should provide adequate training and workshop on the use of web-based teaching and learning technique to promote effective teaching and learning in the tertiary institution.
3. The government, National Commission for Colleges of Education and the managements of Colleges of Education should join hands together and ensure that both male and female pre-service teachers are given equal opportunity to use computer laboratories and also should

ensure that adequate functional computer hardware and software are provided in the institutions.

4. The government should provide adequate infrastructure and enabling an environment that will promote teaching and learn with innovative technologies.
5. The NCCE should introduce and implement oriented policies that will support web-quest related teaching methods. This will encourage both students and lecturers to use web-quest in their teaching/learning activities.
6. Emphasis should be given to the pedagogy behind the utilization of web-quest instruction for teaching/learning activities in colleges of education.
7. The government should increase funding for the educational sector with emphasis on ICT that will help improve the level and the use of ICT innovation in teaching and learning in colleges of education.

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USES AND CHALLENGES OF INFORMATION AND COMMUNICATION TECHNOLOGY IN TEACHER EDUCATION OF PUBLIC SENIOR SECONDARY SCHOOLS IN KATSINA METROPOLIS, KATSINA STATE

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Abstract

This study was a descriptive survey in which questionnaire was used to get respondents' perceptions on the uses and challenges of information and communication technology in teacher education of public senior secondary schools in Katsina metropolis, Katsina State The population of the study consisted of all the teachers teaching in the twelve public senior secondary schools in Katsina metropolis. The study covered a population of about 400 teachers in the twelve public senior secondary schools in Katsina metropolis. The sample for the study was made up of 200 teachers. 40 teachers were randomly selected from each of five schools in the study area through random sampling technique. Two research questions guided the study were used and data were analyzed by the use of frequency and percentage. Findings revealed the uses of ICT among others to include: for teaching and learning by making students learn in unique learning styles; prepares students for future occupation and social life and for making assignment, collecting data and documentation. The outcome of the study also revealed among others things that: poor funding of teacher education by the government; obsolete or outdated ICT facilities; unavailability of skilled manpower for application of ICT; unavailability of technicians to repairs ICT equipment. The study recommends among others that: the government should provide adequate funds for teacher education. In addition, the needed skilled manpower for the application of ICT should be provided for schools.

Key Words: Uses, challenges, information and communication technology, teacher education

Introduction

The central theme in human and societal development today is technology, most especially information and communication technology. Information technology refers to the use of computer, telecommunication equipment and other technologies associated with automation (Yang and Kent, 2014). Information and communication technology (ICT) is the integration of telecommunication with information technology (IT), the most important component of information technology s the computer. Kent and Taylor (2014) describe information and communication technology (ICT) as a process of transferring news, reports, intelligence and skills to the recipients through technological and electronic devices, usually over a distance. It is a modern communication device, which has made distance irrelevant in line of communication.

Information communication technology has embraced all aspects of educational, business and economic sectors. ICT is the application of high-speed digital communication network, giving required information in education and services to schools, homes, and offices among others (Levi & Oke, 2006).

ICT promotes improvement in the quality of learning, teaching and research in Nigerian schools. Teachers are expected to use them to serve their students. Hardware are acquired by schools so that teachers and their students can apply telecommunications to teaching and learning

in education. So many schools today are acquiring necessary hardware so that teachers and their students can apply telecommunications to teaching and learning in education. Communication between teachers and students can be enhanced through computer conferencing and e-mail connections (Nguyen and Nguyen, 2014). Nguyen and Nguyen further argued that teaching with the help of computer prepares the teacher to answer students' questions and provide brief tutorial for students facing some challenges.

The application of computer in teaching cannot be overemphasized. The drill and practice program which is described by the teacher allows the students to perform a particular set of discrete skills in learning. Students learn unique learning styles and the teacher opens the way to knowledge chat through sharing from everyone when information technology is adapted to teaching and learning.

The uses of ICT according to Manu (2012) includes: ICT as object, ICT as an assisting tool, ICT as a medium for teaching and learning and ICT as tool for organization and management in schools. Omorin (2016) agreed with Yang and Kent (2014) that there are grounds to believe that ICT will improve education like using it as a substitute for almost anything like book, pencil, biro among others in the classroom. For our country to catch up with the rest of the world the use of information technology cannot be overlooked. The use of ICT in secondary level of education is now seen globally as a tool for educational institution to succeed mightily. The use of ICT in schools provides the information needed on request, easily and without burdensome trial and error searching (Aliede, 2015).

Manu (2012) opined that, the use of ICT on teaching makes teaching and learning easy everywhere and anytime. Manu stated that even children or young people today gather information and access knowledge in much different way than people of the past generations. In fact, the use of ICT in teaching and learning has become very important.

The emergency of ICTs is seen as one of the best things to ever happen to humanity. Still not withstanding the jubilant heralding of their entrant globally, developing countries somewhat bemoans the inadequacy of these innovations and essential resources. Nworgu (2008) affirms this by contending that information and communication technologies are still essential commodities to some parts of the world.

The applications of ICT in teacher education have many challenges. These challenges according to Levi and Okeke (2006) include: inadequate infrastructure/funding, lack of skilled manpower, over-stretching facilities due to population upsurge, shortage of computer system and government policies. Similarly, Muntax and Becta in Alade (2006) stated the following as obstacles/ barriers to the use of ICT by teachers and education practitioners, these include: teacher factor, organizational factor (school, management), access factor, availability factor, support service factor, psychological factor (bothering or perception and attitude towards technology), resistance and capability factor and social and environmental factors.

Consequently, teachers are sometimes unable to make use of ICT because they lack the time required to fully prepare and research materials for teaching and many teachers are not aware of online and multimedia materials. Fluctuations in power supply and technical faults with ICT equipment are likely to lead to lower levels of ICT use by teachers (Nguyen and Nguyen, 2012). The lack of available technical support can lead to lower levels of ICT use by teachers. Resistance to change, finance, poor salaries of teachers and the application of ICT are some of the challenges of teacher education (Kent and Taylor, 2014). Dajal, Sulaiman and Abubakar (2018) stated that, inadequate funding, teachers' factor, corruption and insecurity, lack of stable power supply and teachers' salary are some of the problems militating against ICT application even in developed countries of the world.

Levi and Okeke (2006) pointed out the followings as problems of computer and ICT in teacher education: the purchase installation, maintenance and replacement costs are so high that even in higher education it may seem impossible for some time to come; the dearth of personnel to operate, service and develop them when they develop problem; lack of constant power supply and

Nigeria teachers may look at ICT as increasing his classroom burden. He may also nurse the fear of being displaced by the computer. This study therefore, designed to investigate the uses and challenges of ICT in teacher education of public senior secondary schools in Katsina metropolis, Katsina State.

Purpose of the Study

The purposes of the study were to:

1. Investigate the uses of ICT in teacher education of public senior secondary schools in Katsina metropolis, Katsina State.
2. Identify the major challenges of ICT in teacher education of public senior secondary schools in Katsina metropolis, Katsina State.

Research Questions

The study was guided by two research questions as follows:

1. What are the uses of ICT in teacher education of public senior secondary schools in Katsina metropolis, Katsina State?
2. What are the major challenges of ICT in teacher education of public senior secondary schools in Katsina metropolis, Katsina State?

Methodology

The research design for this study was descriptive survey research design. The population of the study consisted of all the teachers teaching in the 12 public senior secondary schools in Katsina metropolis, Katsina State. The study covered a population of about 400 teachers in the 12 public senior secondary schools in Katsina metropolis, Katsina State. The sample for the study was made up of 200 teachers (100 males and 100 females) from five public senior secondary schools in Katsina metropolis, Katsina State. Forty (40) teachers were randomly selected from each of the five public senior secondary schools within the Katsina metropolis through a random sampling technique. The instrument used for data collection in the study is title, "Uses Challenges Information Communication Technology Teacher Education Questionnaire (UCICTTEQ) developed by the researcher.

The instrument was vetted and validated by experts in Educational Management, Measurement and Evaluation. The instrument has three (3) sections, A, B and C. Section A is basically on the demographic information of the teachers like name of school, gender and year of teaching experience. Section B and C of the instrument contains a total of 20 items on options of "Agreed", "Disagreed" and "Undecided" soughing information on respondents' views on uses and challenges of information and communication technology in teacher education of public senior secondary schools in Katsina metropolis, Katsina State respectively. The instrument was pilot tested among 14 teachers of two (2) public senior secondary schools in Batagarawa Local Government Area of Katsina State that were not part of the study in which the reliability coefficient of 0.80 was obtained using Chrombach Alpha Statistics. The researcher administered the questionnaire to the sample schools by himself. Two research questions guided the study. Frequencies and percentage were the statistical tools used to analyze the research questions.

Results

Research Question One: What are the uses of ICT in teacher education of public senior secondary schools in Katsina metropolis, Katsina State?

Table 1:
Ratings of Teachers' Responses on the Uses of ICT in Teacher Education of Public Senior Secondary Schools in Katsina Metropolis, Katsina State.

S/No	Statements	Agree		Disagree		Undecided			
		F	%	F	%	F	%	Total	%
1.	ICT help students to learn in a unique learning styles that pave way to knowledge chat that can be shared by everyone.	190	95.0	0	0.0	10	5.0	200	100.0
2.	ICT prepares students for future occupation and social life.	185	92.5	10	5.0	5	2.5	200	100.0
3.	ICT is used for making assign-ment, collecting data and docum-entation, communicating and conducting research.	190	95.0	5	2.5	5	2.5	200	100.0
4.	ICT is a medium through which teachers can teach and learners can learn through drilling and practice exercises and education-al networks.	185	92.5	15	7.5	0	0.0	200	100.0
5.	ICT is used for handling school cores and records ranging from time table to attendance, results to fees and general communication.	185	92.5	10	5.0	5	2.5	200	100.0

Data Source: Field Work (2019).

Results in Table1, showed that respondents on items number 1, 2, 3, 4 and 5 agreed that: When ICT is adapted to teaching and learning students learn in unique learning styles and the teacher opens door to knowledge chat that can be shared by everyone; ICT prepares students for future occupation and social life; ICT is used for making assignments, collecting data and documentation, communicating and conducting research; ICT is a medium through which teachers can teach and learners can learn through drilling and practice exercises and educational networks; and ICT is used for handling school cores and records ranging from time table to attendance, results to fees and general communication were considered to be the uses of ICT in public senior secondary schools in Katsina metropolis with highest percentage scores of 95.0, 92.5, 95.0, 92.5, and 92.5 respectively. Only the percentage scores of 0.0, 5.0, 2.5, 7.5 and 5.0 of respondents disagreed respectively, while the percentage scores of 5.0, 2.5, 2.5, 0.0 and 2.5 of respondents' undecided respectively on the items.

Research Question Two: What are the major challenges of ICT in teacher education of public senior secondary schools in Katsina metropolis, Katsina State?

Table 2:
Ratings of Teachers' Responses on the Major Challenges of ICT in Teacher Education of Public Senior Secondary Schools in Katsina Metropolis, Katsina State

S/No	Statements	Agree		Disagree		Undecided			
		F	%	F	%	F	%	Total	%
1.	Poor funding of teacher education by the government has led to shortage of facilities and instructional materials in my school.	180	90.0	10	5.0	10	5.0	200	100.0
2.	Where the ICT facilities are available in my school most of them are obsolete or outdated.	155	77.5	30	15.0	15	7.5	200	100.0
3.	The needed skilled manpower for the application of this ICT is not readily available in my school.	150	75.0	40	20.0	10	5.0	200	100.0
4.	Technicians that could repairs this ICT equipment are not available in my school.	180	90.0	10	5.0	10	5.0	200	100.0
5.	Due to population upsurge in my school students now are divided into many groups thereby over-stretching the ICT materials.	175	87.5	20	10.0	5	2.5	200	100.0
6.	As a result of many hands using the few ICT equipment in my school has led to frequent maintenance and replacement at regular intervals.	120	60.0	60	30.0	20	10.0	200	100.0
7.	There is acute shortage of computer systems to aid teaching and learning in my school.	190	95.0	10	5.0	0	0.0	200	100.0
8.	Lack of computer application devices for academic researches, computerization of students' records/results in my school.	170	85.0	15	7.5	15	7.5	200	100.0
9.	Changes in government policies towards the development of ICT is a worrisome situation in my school.	115	57.5	60	30.0	25	12.5	200	100.0
10.	Majority of teachers in my school are not computer literate and have remain in that condition for a long time.	110	55.0	70	35.0	20	10.0	200	100.0
11.	Many of the few computer teachers either because of their low income could not afford one or they did not see the need for it.	165	80.5	25	12.5	10	5.0	200	100.0

S/No	Statements	Agree		Disagree		Undecided			
		F	%	F	%	F	%	Total	%
12.	Money meant for the purchase of ICT equipment are mismanaged and misappropriated by the school authority.	65	32.5	95	47.5	40	20.0	200	100.0
13.	Many teachers in my school have created an unreadiness to attend computer seminars, workshops, conferences and refreshers courses on computer.	80	40.0	95	47.5	25	12.5	200	100.0
14.	Electric power supply is not reliable in my school.	145	72.5	50	25.0	5	2.5	200	100.0
15.	Poor remuneration affects the morale of teachers, distracts and hinders their comm.-itment and effectiveness in their jobs.	170	85.0	10	5.0	20	10.0	200	100.0

Data Source: Field Work (2019).

Results of findings in table 2 above showed that respondents' on items number 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 14 and 15 agreed that: Poor funding of teacher education by the government has led to shortage of facilities and instructional materials in my school; where the ICT facilities are available in my school most of them are obsolete or outdated; the needed skilled manpower for the application of this ICT is not readily available in my school; technicians that could repairs this ICT equipment are not available in my school; due to population upsurge in my school students now are divided into many groups thereby over-stretching the ICT materials; as a result of many hands using the few ICT equipment in my school has led to frequent maintenance and replacement at regular intervals; there is acute shortage of computer systems to aid teaching and learning in my school; lack of computer applications devices for academic researches, computerization of students' records/results in my school; changes in government policies towards the development of ICT is a worrisome situation in my school; majority of teachers in my school are not computer literate and have remain in that condition for a long time; and many of the few computer teachers in my school don't have personal computers either because of their low income could not afford one or they did not see the need for it; electric power supply is not reliable in my school; and poor remuneration affects the morale of teachers, distracts and hinders their commitment and effectiveness in their jobs were considered to the major challenges of ICT in teacher education of public senior secondary schools in Katsina metropolis with highest percentage scores of 90.0; 77.5; 75.0; 90.0; 87.0; 60.0; 95.0; 85.0; 57.5; 55.0; 80.5; 77.5 and 85.0 respectively. Only percentage scores of 5.0; 15.0; 20.0; 5.0; 10.0; 30.0; 5.0; 7.5; 30.0; 35.0 12.5; 25.0 and 5.0 of respondents' disagreed respectively, while percentage scores of 5.0; 7.5; 5.0; 5.0; 2.5; 10.0; 0.0; 7.5; 12.5; 10.0; 5.0; 2.5 and 10.0 of respondents' undecided on the items. Respondents' on items number 12 and 13 disagreed that: Money meant for the purchased of ICT equipment are mismanaged and misappropriated by the school authority; and many teachers in their schools have created an unreadiness to attend computer seminars, workshops, conferences and refreshers' courses on computer were not consider as major challenges of ICT in teacher education of public senior secondary schools in Katsina metropolis with highest percentage scores of 47.5 and 47.5 respectively. Only 32.5 and 40.0 percentage scores of respondents agreed, while 20.0 and 12.0 percentage scores of respondents on the items undecided respectively.

Discussion

The findings on research question one attempt to find out the uses of information and communication technology (ict) in teacher education of public senior secondary schools in Katsina metropolis. The result of finding revealed that the respondents' agreed that: one of the uses of ICT are: to help students learn in unique learning styles and the teacher opens the door to knowledge chat that can be shared by everyone; ICT helps in preparing students for future occupation and social life. The finding is in tandem with the assertion of Manu (2012) and Aliede (2015) that, ICT facilitates students' learning in unique learning styles that pave way to knowledge sharing and as well prepares students for future occupation and social interaction among people. The finding also revealed that; ICT is used for making assignment, collecting data and documentation, communicating and conducting research; it is use as a medium through which teachers can teach and learners can learn through drilling and practice exercises and educational networks. The finding is in agreement with the findings of Omorin (2016) who opined that ICT helps students' in doing assignment, collecting data and conducting research.

The result of findings also indicated that, ICT is used for handling school cores and records ranging from time table to attendance, results to fees and general communication. The finding supports the finding of Nguyen and Nguyen (2012) which indicated that ICT is very vital for efficient management of students' records and general communication. The findings on research questions two attempt to find out the major challenges of ICT in teacher education of public senior secondary schools in Katsina metropolis. The result of finding revealed the following as major challenges of ICT in teacher education of public senior secondary schools in Katsina metropolis: Poor funding of teacher education by the government which has led to shortage of facilities and instructional materials; where ICT facilities are available most of them are obsolete or outdated; lack of skilled manpower for the application of ICT; unavailability of technicians in their schools that could repairs the ICT equipment and students' population upsurge thereby over-stretching the ICT materials.

The findings is in consonance with the finding of Aliede (2015); Dajal, Sulaiman and Abubakar (2018) opined that inadequate funding of teacher education, obsolete ICT equipment; lack of technicians to repairs ICT facilities as well as students' increase in enrolment led to frequent usage of facilities which results to damages of facilities are some of the problems of ICT in teacher education of public schools. The findings further revealed that; as a result of many hands using the ICT equipment has led to frequent maintenance and replacement at regular intervals; acute shortage of computer systems to aid teaching and learning; lack of computer application devices for academic researches, computerization of students' records/results; changes in government policies towards the development of ICT; and computer illiteracy of majority of teachers are some of the major challenges of ICT in teacher education of public senior secondary schools in Katsina metropolis.

The finding is in agreement with the finding of Kent and Taylor (2014) who view that, when many hands have accessed to ICT facilities it will result to over-stretching the facilities as well as acute shortage of computer systems in schools; unavailability of computer application devices for computerization of students' records/results; changes in government policies towards the growth of ICT and illiteracy of the teachers in operating computer have pose as threat to ICT teacher education. Results of findings also revealed that the few computer teachers in public senior secondary schools of the study area do not have personal computer either because of their low income could not afford one or they do not see the need for it; lack of reliable electric power supply in schools and poor remuneration of teachers which affects their morale and hinders their commitment and effectiveness in their job are some of the major challenges of ICT in teacher education of public senior secondary schools in Katsina metropolis.

The findings are in tandem with the finding of Mohammed and Sulaiman (2013); Kent and Taylor (2014) who asserted that, some computer teachers do not possess a personal computer due to poor income or interest to have it; lack of electric power supply in schools are some of the

problems of ICT in teacher education. The result also revealed that: school authorities do not mismanage or misappropriate fund meant for the purchase of ICT equipment in their schools and lack of readiness for teachers to attend computer seminars, workshops, conferences and refreshers courses on computer. The findings contradict the findings of Levi and Okeke (2006) who opined that many school authorities mismanaged the fund meant for the purchase of ICT equipment for their schools and that teachers are not to go for computer training such as seminars, conferences, workshops and so on in order to upgrade themselves.

Conclusion

The relevant of Information and Communication Technology (ICT) to teacher education and national development cannot be overemphasized. Hence, information and communication technology is the greatest tool to achieve a worldwide scholastic research and acquisition of knowledge and skills. ICT facilitates teaching and learning process. Although, ICT teacher education has so many challenges as revealed from the study, these challenges among others include: poor funding of teacher education; obsolete ICT facilities in schools; lack of skilled manpower for the application of ICT; shortage of computer systems in schools; changes in government policies; low income of teachers to purchase a personal computer; illiteracy rate of teachers in the use of computer and lack of power supply in schools.

Recommendations

Based on the findings of this study, the following recommendations among others were made:

1. The government should provide adequate funds for teacher education in public secondary schools in order to purchase facilities and instructional materials.
2. Obsolete or outdated ICT facilities should be replaced with new and current ones.
3. The needed skilled manpower for the application of ICT should be provided for public schools.
4. More computers systems should be provided for public schools so as to facilitate teaching and learning.
5. Government should ensure continuity in its policies in areas of promoting ICT in the education system of the nation.
6. Government should provide soft loan for teachers to purchase a personal computer.
7. Government should also make it compulsory for all teachers to be computer literate.
8. The government should provide adequate supply of electric power for use in schools as much fuel is prone to be consumed on generator on the account of using ICT in teaching.

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INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN THE 21ST CENTURY EDUCATION: THE ROLE OF GOOGLE APPLICATION FOR EDUCATION (GAFE)

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Abstract

Information and Communication Technology (ICT) plays vital roles in the development and progress of the educational sector. It is an all-encompassed term using computer network which includes facilities like the Internet, computer and multimedia equipment which when properly harnessed, will enrich teaching and learning. This paper however explored ICT in the 21st century education with specific focus on the role of Google Application for Education (GAFE). It equally discussed the benefits and barriers to its effective adoption. The paper however observed that the technology will greatly improve the 21st century educational system when adequately adopted. Its benefits include but not limited to provision of faster student feedback, distance learning convenience, making possible collaborative teaching and learning among others. Some of the barriers to its effective adoption are resistance to implementing active learning techniques within active learning classrooms, inadequate access to technologies required for deployment, problem of students' proficiency and teacher professional development requirements. It was however recommended among others that provision of enabling program and facilities for proper integration is un-negotiable, in-service training for all lecturers in our institutions for them to be up-to-date in their instructional delivery and provision of equipment for easy access to ICT resources for easy adoption of the technology in our educational system.

Keywords: Information and Communication Technology, 21st Century Education, Emerging Technologies, Google Apps for Education, Google Classroom

Introduction

Education and technology have historically evolved together and will continue to do so. Though, technology has the potential to help alleviate many of the challenges facing today's higher education system, but technology alone is insufficient to address the many challenges students and educators face today. New technology is but a part of the broader solution that should include new business models, reform of the tenure system, greater incentives for teaching, and a variety of other critical changes to the global higher education system. Only with such a comprehensive approach will we be able to educate and train today's students to become tomorrow's leaders. ICT is an efficient tool for accelerating, enriching, and deepening skills; motivating as well as engaging students in learning; it also helps in linking experiences in the school to practices in work place, thereby creating a viable economy. Hence, to be successful in the implementation of ICT policy, the importance of sectoral application to education and sustainable implementation must be accorded needed recognition.

Literature Review

Information and Communication Technology

ICT has within a very short time become a basic building block of modern society. Many nations of the world now regard understanding and mastering of ICT, its basic skills and concepts a major part of their education, coupled with literacy and numeracy skills (UNESCO, 2002). ICT includes computers, the Internet, and electronic delivery systems which include radios, televisions, and projectors among others (Jo, 2013). The penetrating influence of ICT has affected the field of education (Abanikannda, 2011).

Undoubtedly, ICT has impacted greatly on teaching, learning, and research as well as the quality in traditional as well as open and distance forms of education. ICT is a vibrant tool for quality teaching and learning development; it speeds up the change in existing school practices and helps in preparing the students for the future. Using ICT and its tools in all fields has witnessed a great growth in the recent past, because technology incorporation to the classroom has become component of instructional process such that emerging technologies like GAFE now challenges the old systems of instruction, and how education is managed (Willie, 2006).

Emerging Technologies

Emerging Technologies is often used without a clear meaning or definition. They are evolving organisms that experience hype while at the same time being potentially disruptive, not yet fully understood, and not yet fully researched. These ideas bring to the surface important issues relating to the use of technology in education. However, combining previous conceptualizations of the term, emerging technologies are tools, concepts, innovations, and advancements utilized in diverse educational settings to serve varied education-related purposes (George, 2014).

Technological innovation and advancements have brought about massive societal change. In comparison, technology's impact on education, teaching, and learning has been rather limited, while expectations have run high about instructional radio, television, personal computers, computer-based instruction, the Internet, Web 2.0, e-learning, m-learning, the latest technological innovation of our times, and the impact of these tools and technologies (Bull, Knezek, Roblyer, Schrum, & Thompson, 2005). Hence, in rethinking education to cope with rapid changes at the threshold of the twenty-first century, innovation, technology, and research are indispensable tools of education as failure to innovate by and large means repeating yesterday's educational programmes and strategies (Sequeira, 2012).

Google Application for Education (GAFE)

One of the emerging technologies for higher education in the 21st century instructional delivery as identified by Ahalt, and Fecho (2015) is Google Application for Education (GAFE). GAFE is a cloud-based system, offering online productivity tools for classroom collaboration. It is a free suite of hosted communication and collaboration application provided by Google for educational institutions featuring several Web applications with parallel functionality to traditional office suites, including Gmail, Google Groups, Google Calendar, Talk, Docs, Slides, Drive, and Sites, for communication and collaborative study anytime, anywhere (Brown, 2002). GAFE provides a flexible access to higher education, reducing barriers of time and place of study as well as the size of audiences. It also provides students and teachers with unlimited cloud storage in Google Drive, Docs, Sheets and Slides (Amadin, Obienu, & Osaseri, 2018). Google Apps are useful for learner-centred environments. It embraced the shift paradigm from teaching to learning and from teacher-centred instruction to learner – centred, this allow teachers act more systematically as advisors, guides and supervisors, as well as providers of the frameworks for the learning process of their students. With these facilities, the students have greater responsibility for their own learning in this learning environment, as they seek out, find, synthesize and share their knowledge with others (Railean, 2012). The achievements (used peer, self and collaborative methods) are useful both for teaching and assessment. The focus of collaborative

assessment is problem –solving. Chalmer (2001) notes that collaborative conversations among the people involved with the problem, focused on how they are affected and how they have been effective against it. Standardized tests are used to provide additional descriptive data about the problem. The product of collaborative assessment is solutions generated and implemented by the people affected by the problem; a written summary or other documentation, when required, written in everyday language. In collaborative assessment, the facilitator works from the assumption that life as lived by real people is far richer in its details and potential meanings than any possible description or generalization of it and that therefore can capture all of the possibilities inherent in a situation that people experience as problematic. The role of Google Apps for assessment can be proved by different models like: Social Learning Model (Bordogna & Albano, 2001), Statistical Learning Theory (Guergachi & Patry, 2002), Neo-Vygotskian sociocultural perspective (Zbiek & Conner, 2006), the algorithm to form the group in collaborative learning and others. GAFE also provides student email and other modern online communication tools, representing a suite of free email and collaborative tools for teachers and students to create high-level educational experience. The role of these tools for teachers is to provide a learning environment for team work as a need for each child in order to develop self – regulated skills (imitation, cooperation, confrontation, discussions and sharing) which are all part of the development of the individual and his or her socialization (Elena, 2012).

Application of GAFE (Google Classroom) to Instruction

Google Classroom, which one of the many tools offered by Google Application for Education helps to increase efficiency, collaboration, assists lecturers to create and organize assignments, provide feedback efficiency and easily communicate with students so as to cope with 21st century educational demand (Amosa, Ogunlade, Obielodan & Nasiru, 2017). Similarly, it provides all that is needed to connect with class and teachers collaborate and complete assignments all online in the cloud. With Google Classroom, students can join classes in minutes, saving time to focus on learning. Teachers can share resources with students, post announcements and assignments for students to complete all online in a web browser. Classes all have their own stream to collaborate and share ideas with classmates. Assignments can also be stored, completed and submitted online.

The Processes of Google Classroom Application

Join a Class: Before a student can join a class, the teacher needs to create a class. After the teacher has created the class, the students will be invited to join and you will receive a notification in your Gmail inbox. Open your email and log in with your username and password. Once inside your inbox, open the notification email and click the link to join. A student can also join a class from his page using a Google Classroom enrolment code. Go to https://classroom.google.com and click the + icon in the upper right corner. Ask your teacher what the Google Classroom code is to join the class. This is displayed to the teacher in the class **Stream**. Enter the code and click **Join**

Post to the Class Stream: The teacher can decide on the posting permissions for students in the class. Students may be allowed to either: post and comment on other posts; only comment on posts the teacher makes; or not allowed to post or comment, and allow only the teacher to. Go to the class **Stream**. If you have posting permissions, you will be able to click "Share with your class" and post something.

Turn in an Assignment: Go to the class **Stream** and click the assignment you want to turn in. You can also access your assignments through the Assignments page. To attach a file from Google Drive or your computer, click **Add** and follow these steps:

Select **Google Drive** or **Upload file**.

Select the file and click **Add**.

To attach a link, select Link, enter the link and click **ADD LINK**.

If you decide that you don't need an attachment, click **X** next to it to delete it.

To create a new Google Drive item, click **CREATE** and select the file type.
If you want to add a private comment about the assignment, enter it in the box and click **POST**.
After you upload everything for the assignment, click **TURN IN**.

View Assignments: You can view assignments in the class stream and on the Assignments page. On the Assignments page, you can sort your assignments by class, by those that you need to do, or by those that are done. You can also see the assignments that have been graded and returned.
To view assignments for a specific class:
Go to **https://classroom.google.com** and select the class.
To view assignments on the Assignments page:
Go to **https://classroom.google.com** and click the menu icon ≡ in the upper left corner.
TO-DO is automatically selected and the assignments that are due soon are displayed first.
Click an assignment to access it.
Click **DONE** to see the assignments you've already submitted. If an assignment is graded, the grade is listed. If your teacher provided other feedback, you can see it by clicking the assignment. **Mark an Assignment Done:** Go to the class **STREAM** and click the assignment you want to mark as done. You can also access your assignments through the Assignments page. Click **MARK AS DONE** twice.

Benefits of Using GAFE For Instruction

- ❖ It allows teachers post class resources, assignments, announcements and due dates so they are visible to all class students. Even students can post announcements if the teacher enables it.
- ❖ Connects to your Google Drive to automatically create and manage folders for each of your classes.
- ❖ Classroom adds any assignments and materials to the right folder all on its own.
- ❖ Can be accessed from anywhere online, on any device with a modern browser.
- ❖ Simple to setup, use and manage, allowing users to work smarter and focus on what really matters.
- ❖ Enables real-time learning all in the web. Teachers can view a student's work live and students can receive feedback as they go, even before they've submitted.

Barriers to the Adoption of GAFE for Instruction

1. Resistance among educators to implementing active learning techniques within Active Learning Classrooms is a major challenge. This is because, the effective use of these classrooms and techniques requires considerable educator training and experience (Walker, 2008).
2. Equally, a significant challenge is the wide variety of student needs and learning styles and differences in time zones, which greatly hinders attempts to simultaneously engage students from disparate geographical locations (Miller & Padgett 1998; Brindley, 2009).
3. Some institutions have challenges on access to bandwidth required for quality service delivery in terms of ICT deployment.
4. Some students and educators lack appreciation of emerging technologies especially when they believe that intellectual proficiency is required for their usage.
5. Communication limitations especially for special needs students

Recommendations

There must be enabling program for proper integration. Management of the Nigerian educational institutions should provide equipment for easy access to ICT resources to allow for easy adoption of the technologies in our educational system. There should be in-service training for all teachers/lecturers in our institutions for them to be up-to-date in their instructional delivery. Government at all levels must wake up to their responsibilities by providing required facilities to adequately take care of the identified challenges.

Conclusion

There is no doubting the fact that this technology has the potential to address many problems our educational system is facing today. Hence for a successful adoption of this emerging technology in Nigerian educational system, it requires proper planning, sincerity of purpose by all education stakeholders as well as periodical involvement and support for teachers/instructors, students, administrators and parents in education.

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INFORMATION AND COMMUNICATION TECHNOLOGY TOOLS FOR INSTITUTIONAL MASSIFICATION OF HIGHER EDUCATION

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Abstract

In recent times, there have been efforts to increase access to higher education all over the world. Available literature has revealed the benefits and challenges of massive access to higher education. One of the challenges of massification of higher education includes quality education. It is in the view of this; the authors identify Information and Communication Technology (ICT) tools that can be used to foster quality education in the process of massification of higher education in Nigeria. This paper begins with the concept of massification of higher education, benefits and barriers to the massification of higher education. Also, the authors examine the challenges of massification vis-à-vis quality education and identify ICT tools that can be used to bring about quality education in the process of massive access to higher education in Nigeria. It is, therefore, recommended that management of higher education institutions should develop an institutional ICT model and innovative ICT -based learning strategies that can be used to ensure quality in the process of increasing access to higher education.

Keywords: Information and Communication Technology Tools; Institutional Massification; Higher Education

Introduction

Higher education is the education programmes given to students who are willing to proceed for further education after completing secondary education. In this paper higher education and tertiary education will be used interchangeably. In Nigeria, higher education is the education given after Post Basic Education in institutions such as Universities, Polytechnics and Colleges of Education. Other tertiary education institutions include Inter-University Centres (such as Nigeria French Language Village and National Institute for Nigerian Languages), Monotechnics and Innovation Enterprise Institutions (FRN, 2014). The objectives of higher education in Nigeria among others are to contribute to national development through high-level manpower and to promote national and international understanding and interaction among others (FRN, 2014). In pursuance of these objectives, the Federal Government of Nigeria (FGN) emphasised flexible learning modes such as full time, part-time, block- release, day-release and sandwich programmes (FRN, 2014). The attempt to used different learning modes is based on the premise of making higher education accessible to all citizens.

The benefits of increased access to higher education has documented (Mok & Jiang, 2017) revealed that increase access to higher education would increase a nation's population and enhanced national competitiveness in the globalizing world. Despite the benefits of increase access to higher education, this process has some barriers and challenges both within and outside Nigeria. It is in the recognition of the challenges pose by increasing access to higher education; the authors bring to the attention of stakeholders (lecturers, students, management of tertiary education institutions, higher education regulatory bodies and government) Information and Communication Technology Tools that can be used to enhance quality education in the face of increased access to higher education at institutional level in Nigeria.

The Concept of Institutional Massification

In recent times, there have been efforts in both developed and developing nations across the world on the need to transform higher education. The processes of globalisation and internationalization and massification of higher education are some steps taken, which have led to radical change to higher education for national development and international competitiveness. To better understand the concept of institutional massification, the authors examine the meaning of massification of higher education. Massification of higher education according to Obiorah, Ofor and Emmanuel (2014) is the referred to as mass media-driven access to tertiary education. In the view of Obiorah, et al. (2014) massification of higher education is the use of mass media such as radio and television to capture a large proportion of the productive population to contribute to the national development project. Massification of higher education is a term used to describe increase access to post-secondary education (Mok & Jiang, 2017). Massification of higher education has also been described to mean a massive expansion of higher education (Hawkins, Mok & Nuebauer, 2014).

With all the efforts to make higher education accessible to all citizens, country overall number of candidates admitted as against those seeking admission to higher education institutions in Nigeria is very low when compared to other countries of the world such as China, USA and UK. For instance, out of 1, 662,762 candidates that sat for Unified Tertiary Matriculation Examinations in 2018, 200,000 candidates which represents 12.5% were admitted (Olowolagba, 2018). In 2017, University of Ibadan (UI) admitted 3,783 out of 56,000 candidates applied into the institution. According to the vice chancellor, the university has 7,000 quota, but due to lack of enough hostel accommodation, only 3,783 could be admitted (Warami, 2018). In some universities such as University of Ilorin, the number of candidates seeking admission keeps increasing. Despite the dwelling national overall enrolment and in some universities, the situation is not the same in some universities. Some universities are experiencing number of candidates seeking admission into them. For instance, 104,000 candidates sought admission into University of Ilorin were admitted in 2017/2018 session (Nwosu, 2017). In this paper, institutional massification is taken to mean increasing enrolment of candidates to higher education based on institution. Institutional massification can be positive or negative, it is positive when educational facilities and infrastructures are adequate and negative when they are not (Mohamedbhai, 2017).

The inability of some universities to accommodate a large number of candidates seeking admission is not unconnected with barriers such as admission policy in terms of carrying capacity, inadequate lecture theatres and inadequate hostel accommodation. Other factors that serve as barriers to increase enrolments of students in higher education institutions include loss of accreditation for some courses, financial constraints and inadequate human/non-human resources. With the application of ICT to teaching and learning, more candidates could be admitted, even where there no not adequate physical facilities and infrastructures for learning without compromising quality education.

Challenges of Institutional Massification

There are challenges to institutional massification like other processes. Available literature (Mok & Jiang, 2017) on the massification of higher education revealed some challenges pose by higher education to include admission, job opportunity, equal access to quality education and improved quality education. Challenges pose by institutional massification have impact on the quality of education and the products of the higher education institutions. Lack of quality education will lead to mass production of unlearned and hopeless graduates for a country. Quality education according to Jegede (2016) is when education output conforms to the planned goals, specification and requirement. Quality education has been one of the major challenges facing the massification of higher education across the world. In view of this, the country cannot afford to overlook quality in the mass provision of higher education. Some of the factors that affect quality education include

non-existence or inadequate infrastructural facilities, teachers' quality and quantity and motivation, and curriculum delivery method.

In order to maintain a high standard by higher education institutions, there is a need for ICT. The use of information and communication technology (ICT) for teaching and learning in the process of increasing enrolment will lead to declining cost and will reinforce physical and human resources.

Information and Communication Technology Tools for Institutional Massification

The role of information and communication technology in education cannot be over emphasised as it has made education available irrespective of status, location and individual differences. The use of ICT tools such as radio and television have equally allowed the large population of productive citizens to have access to higher education through sandwich and DLS programmes. Aside, the application of ICT to teaching and learning has made it possible to teach a large number of students in a lecture theatre. ICT has been used to complement the traditional classroom system at little or no cost. In this subsection, the authors examine ICT tools that can be used to tackle the challenges posed by the massification of higher education at the institution level. ICT tools such as eBook, offline app, and Virtual laboratory are discussed in this paper.

Higher education institutions are likely to be faced with the problem of not enough books for the students when a large number of students is admitted. One of the major challenges posed by increase enrollment of student into higher education is the problem of not enough textbooks, due to a limited number of textbooks. For instance, the ideal textbook per student ratio is between 1:1 to 1:3 (UNESCO, 2005; The National, 2014). In the face of the declining budget for education in most of the developing countries, this may not be possible. To solve this problem, an institution of higher learning can adopt the use of eBook. EBook is a book in an electronic format. EBook could be downloaded using different devices such as laptop, tablet, PDA, and Smartphone. This technology could be used by institutions of higher learning where students are faced with the challenge of the inadequate textbook. One of the impediments to textbook per student ratio is the cost of textbook and loss of textbooks over time (United Kingdom's Department for International Developments, 2011).

Some of the benefits that institutions can derive in the use of ebook in the view of Kelly (2016) are: purchasing and downloading eBook is very easy for students as this can be done through the Internet at any day and any time; students don't need the internet to again to read the book after downloading; eBook can as well be printed, it is portable as students don't need to panic of carrying it about; eBook can be personalised to accommodate individual learning style; searching for a word or phrase and bookmarking are possible for student on eBook with little; and eBooks don't require physical space to store them.

Another important ICT tool required by institutions of higher learning where students are many is the virtual laboratory (virtual lab). The use of a virtual lab for teaching and learning in the massification of higher learning is based on the premise that technical means of learning as compared to the traditional method of teaching science, technology and engineering courses is required in this 21st century.

Main reasons for using virtual lab according to Boboev, Soliev and Asrorkulov (2018) are: that the existing laboratories and workshop are not sufficiently equipped with modern appliances, devices and tools; equipment in the laboratory do not meet modern requirement and thus outdated, which can distort results and serve as a potential source of danger to the students; lack of fund to upgrade laboratory and workshop; lack of fund to procure equipment, consumables, raw materials and reagents; need for modern equipment for observation in the laboratories; carrying out experiment that are fundamentally impossible in the laboratory condition; another important reason is the issue of safety in case where students are to work with dangerous chemicals and high voltage. Time constraint is another factor for using the virtual lab in the face of increased student enrolment. For instance, under allotted time for practical courses, time constraints pose the challenge of

carrying out repeated analysis or verification in some laboratory equipment. With the application of a virtual lab, these challenges could be eliminated while providing quality education for students.

The advent of the Internet has made teaching and learning possible both within and outside the four walls of the classroom. Despite this advantage of Internet making online educational resources available, students are still faced with the problem of stable Internet connectivity. In order to solve this challenge of Internet connectivity which may arise due to an increase in enrolment, there is a need for ICT tool such as offline apps. Offline apps are the learning apps that work even when the Internet connection gets disconnected and resumes when the Internet is restored (Olusanjo, Buraimoh, Aderele & Adefuye, 2018). Different terms such as offline-first (Melaned, 2018) and native apps (SMBC, 2017) have been used to describe offline apps.

Benefits of offline apps in massification of higher education at the institution level in the view of Pappas (2018) are that: offline apps will provide instructional contents to students both within and outside institution of higher education; the use of offline apps will lead to improved motivation and satisfaction to learn when students have access to online educational resources, as a result of this, Internet connection is no longer a concern; offline apps for teaching and learning in institution of higher learning will reduce online distractions that are characterized by Internet connection. For instance, students may be distracted by social media, online videos and virtual games from achieving their goals. With offline apps, these distractions are eliminated. Another benefit of offline apps for teaching is access to educational contents for students when it is convenient for them. That is, students do not need to be in the range of Internet or wifi connection before accessing online educational contents.

Recommendations

In this paper, the authors examined massification of higher education, institutional massification, identified and discussed benefits of ICT tools such as eBook, virtual lab and offline apps in the face of massification of higher education. This discourse has both managerial and regulatory implications in the face of a number of candidates been denied admission every year. In view of the benefits of ICT tools identified in this paper, an institution of higher learning can still accommodate more productive candidates to our institution of higher learning without compromising quality education with the application of ICT tools. It is, therefore, recommended that management of HE institutions should develop an institutional ICT model and innovative ICT-based learning strategies such as blended learning to accommodate more candidates seeking admission to their institutions, which can be used to ensure quality education in the process of increasing access to higher education. With pressure to increase enrolment, regulatory bodies should increase institution's quota so as to cater for more candidates to have access to higher education.

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TECHNICAL DRAWING COMPUTER AIDED DRAWING (CAD) PACKAGE FOR SECONDARY SCHOOL IN NIGERIA: DESIGN AND DEVELOPMENT PROCESS

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Abstract

Computer Aided Drawing is a set of methods and tools to assist product designers in creating a geometrical representation of artifacts by means of a computer system. This has also been in use in the teaching of Technical Drawing in secondary schools in Nigeria, since computer has come to stay in instructional process. However, CAD packages such as AUTOCAD, QCAD, ARCHICAD, SURVEYCAD and many more have been developed for various purposes such as general professional purpose and specific/ specialized purposes based on environment and context of instruction and as a design tool but not as a learning tool. It has been found that none of these packages have been developed specifically putting into consideration the context and environment of teaching and learning in Nigeria and Africa at large. This study determines to use the ADDIE model to look into analyzing, designing and development process of Computer Aided Drawing (CAD) package as a learning tool, to enhance the integration of modern technology into Technical Drawings curriculum and to improve learning outcome of students offering Technical Drawing at secondary school level in Nigeria.

Keywords: Computer Aided Drawing, Technical Drawing, ADDIE model, teaching and learning process

Introduction

Nigeria as a country is facing the inevitability of the fast-technological transformation of industries and must therefore continue to evolve with new policies to accommodate convergence and maximize the potential of technological tools for national development (National ICT Policy, 2012). Computer and digital tools have become very vital in almost all sectors, economy, education, and in the lives of individuals (Oviawe, 2016). In recognition of this necessity, the Federal Republic of Nigeria, in 2012 formulated an ICT policy, to determine the modes of integrating ICT into every system in the country of which education system is one and had their mission statement as; to fully integrate ICT into the socio-economic development and transformation of Nigeria into a knowledge-based economy.

Uwaifo and Edigin (2011) stated that in order to reduce ignorance about technology, a solid foundation for national development and increase in computer skill acquisition, technology-based subject must be offered. And as listed in the NERDC (2013); the technology-based subjects include; Technical Drawing, General Metal work, Basic Electricity, Electronics, Auto Mechanics, Building Construction, woodwork, Home Management, also Food and Nutrition. Since Technical Drawing is one of the technology-based subjects, it is expected to be taught at the secondary school level if technological ignorance must reduce and learners must be prepared for the university and future profession (Curriculum Research and Development Division 2010).

In Abraham and Otuaga (2017) following NERDC recommendations, stated that in order to enhance this technological development in Technical Drawing students, Information Communication Technology (ICT) tools that can be applied to drawing (Matthew, Joro & Manasseh, 2015). Tools such as; Revit, AutoCad, 3DMax, Qcad, FibreCad and Draftsight should be used to teach Technical Drawing content. This will enhance the better integration of Technical Drawing students to the 21st century work place (Winn & Banks, 2009). The advancement of the

computer technologies has allowed the introduction of computer-aided design drafting (CAD) software packages such as AutoCAD, CAD Key, DraftSight, Qcad and others software for depicting two dimensional and three-dimensional objects (Chedi, 2015) to most instruction processes. Computer-Aided Drafting/Design (CAD) was introduced into Western Australian schools during 1987, on the basis of trialing specific hardware and software with respect to its appropriateness to the Manual Arts Curriculum (Beagley, 1990).

Technical Drawing in most Nigerian schools till now have been characterized by the use of traditional teaching and learning methods, manual equipment and materials, part of which are; drawing board, dividers, compasses, set-squares, protractors, drawing paper, drawing pen, pencil, scales, and eraser among others. These manual tools and materials make drawing to be more time and energy consuming (Abraham & Otuaga, 2017). Technical Drawing students' and teachers' mode of teaching-learning needs to be upgraded from the usual traditional method to a more recent method in order to meet up with the demand of the society in the future and to bridge the technological gaps which exist between West Africa countries as a developing economy and the developed countries. The use of Computer Aided Design (CAD) system will reduce the needs for pencil, eraser and other drafting tools. (Abraham & Otuaga, 2017). However, this does not imply a total scrap of manual graphics, which could be a prerequisite to the use of CAD package which reduces difficulty in visualization of drawings.

Computer Aided Design is a software application for writing and designing two dimensional (2D) and three dimensional (3D) images. The computer aided design machine has been a great help to engineers and also for several architectures that are finding it impossible to deal with drawings and plans of the project engineering work and then bring on the verge of perfection (Oyebode, Adebayo & Olowe, 2015). Even though designers have benefited so much from most of these softwares, not many secondary school learners have been able to find them as learning tools that can easily help them to learn drawings and designs. According to Abraham and Otuaga, (2017), the Computer Aided Design (CAD) tools save time, ensure precision, and details of standard in drawings. In the realization of this plausible ventures, contentious and skills acquiring strategies such as demonstration or 'doing' method should be employed by the teacher in other to inculcate both hands-on and brains-on coordination by which active involvement is expected by the learners.

The adoption of use of CAD package and the design and development of such as a learning tool, will help bridge the gap between the use old and modern technology in instructional process and lots more of benefits at the secondary school level. If the skills expected at this level as related to some drawing professions will be acquired, it is expedient to have a CAD instructional package as a learning tool, to be designed and developed, putting the context and environment of learners of Technical Drawing in Nigeria and West Africa at large into consideration. Hence, this study intends to design, develop and evaluate CAD package which will act as a learning tool for teaching and learning Technical Drawing in order to improve the learning outcome of students.

Purpose of the study

The purpose of this study is to design, develop and evaluate Computer Aided Design Instructional package for the learning outcome of Technical Drawing students in Lagos state.
The study will specifically:

1. Design, develop and evaluate a CAD instructional package based on context and environment for teaching Technical Drawing in Lagos State.
2. Examine how teachers and learners perceive the ease of use, usability and their beavioural intention to CAD package for teaching and learning.

Research Question

1. What are the processes involved in the design of a CAD instructional package?
2. What are the processes involved in the development of a CAD instructional package?
3. How do teachers and learners perceive the use of CAD package for teaching and learning?
4. How do teachers and learners perceive the ease of use of CAD package for teaching and learning?

Review of Related Literatures.

Technical Drawing in Nigerian Secondary Schools has it root in Basic Technology formerly known as Introductory Technology at the junior secondary school level. It was structured to assist learners to develop interest in technology. The aim is that at the end of junior secondary school, technological appreciation would have been attained and solid foundation laid for students' entrance into a vocation of their choice (Uwaifo and Edigin 2011).

The conventional teaching and learning of technical drawing in most Nigerian educational institutions have been characterized by the use of manual facilities such as drawing board, dividers, compasses, set-squares, protractors, French curves, drawing paper, drawing pen, pencils, scales, eraser, among others. These manual tools make drawing to be more time and energy consuming. The arrival of information and communication technologies (ICTs) has present a more interesting and efficient facilities for the teaching and learning of Technical Drawing in educational institutions in Nigeria (Oviawe, 2014). Most of the ICT programs for technical Drawing.

The advancement of the information and communication technologies have allowed the introduction of computer-aided design drafting (CAD) software packages such as AutoCAD, CAD Key, DraftSight, Qcad and others software for depicting two dimensional and three-dimensional objects (Chedi, 2015). Computer Aided Design (CAD) packages are application software for writing and designing two dimensional (2D) and three dimensional (3D) images. The CAD machine has been a great help to engineers and other professionals that finds it hard and sometimes impossible to deal with drawings and plans of the project engineering work, by bringing designs/drafts of projects to the verge of perfection (Oyebode, Adebayo & Olowe, 2015). According to Abraham and Otuaga,

Chedi (2015), Oviawe (2016), Abraham and Otuaga (2017) are a few studies that have examined the use of CAD packages and their effect on Technical Drawing students' learning outcome generally. It has also been observed that most of the CAD packages used are not readily available in schools, due to the cost of getting them, In this study, a CAD instructional package, which will act as a learning tool, peculiar to West Africa Examination Council (WAEC) curriculum will designed, developed and evaluated on the learning outcome of Technical Drawing students in Nigeria. If the skills expected at secondary school level as related to the identified drawing professions will be acquired, we can't do without having a CAD instructional package to be adapted and adopted as a learning tool into the Technical Drawing curriculum in Nigeria and West Africa at large.

Instructional System Design

Instructional systems development (ISD) is a set of procedures for systematically designing and developing instructional materials (Villiers, 2002). Instructional design (ID) is the link between descriptive learning theory and prescriptive educational practice (Reigeluth, 1997 in Villiers, 2002). ID thus comprises prescriptive instructional-design theories and models which set out methods for developing instruction, along with the conditions under which each should be used to produce a desired learning outcome. Instructional designers should be versed both in descriptive learning theories and prescriptive design theories, so that theory and practice can be integrated (Villiers, 2002).

Villiers, 2002……as a framework to facilitate effective learning in systems which use computer technology as a tutor, tool, or environment. This framework can be used as a design aid

by instructional designers and instructor-designers, or as a tool to examine existing learning events from the viewpoint of learning and instructional-design theory.

Research Model and Hypothesis

Thomas *(*2010) Instructional Design Model Instructional Design is a construct referring to the step-by-step prescriptive procedure for creating instructional materials in a consistent and reliable fashion in order to facilitate learning most effectively. Crawford in Thomas (2010) defines instructional design as "the distinct systematic process through which evolves a superior instructional product…as delineated through an instructional design model. It guides designers to work more efficiently while producing more effective and appealing instruction suitable for a wide range of learning environments.

McGriff (2000) Instructional design is the systematic approach to the Analysis, Design, Development, Implementation, and Evaluation of learning materials and activities. Instructional design aims for a learner-centered rather than the traditional teacher-centered approach to instruction, so that effective learning can take place. This means that every component of the instruction is governed by the learning outcomes, which have been determined after a thorough analysis of the learners' needs. This will lead into looking into some stages of ADDIE model which will guide this study. These are; Analyse, Design, Develop and Evaluate (ADDIE)

ADDIE model is one of the most common models used in the instructional design field a guide to producing an effective design. This model is an approach that helps instructional designers, any content's developer, or even teachers to create an efficient, effective teaching design by applying the processes of the ADDIE model on any instructional product.

- Analyse: Analysis of the learner, analysis of instructional goals, analysis of instructional goals, Developing instructional analysis.
- Design: This phase will put the following into consideration: An assessment's design, Select a form of the course. The second part of the form of your course is to choose a delivery system. Form's course means how you are going, creating instructional strategy.
- Development: This stage will be in two phases: Create factual sample for the instruction design, Develop the materials of the course, run through the conduction of the design.
- Implementation: This deals with the delivery of the instruction, for effective and efficient delivery of instruction.
- Evaluation: This study will be using Kirkpatrick Evaluation Model.

Theoretical framework

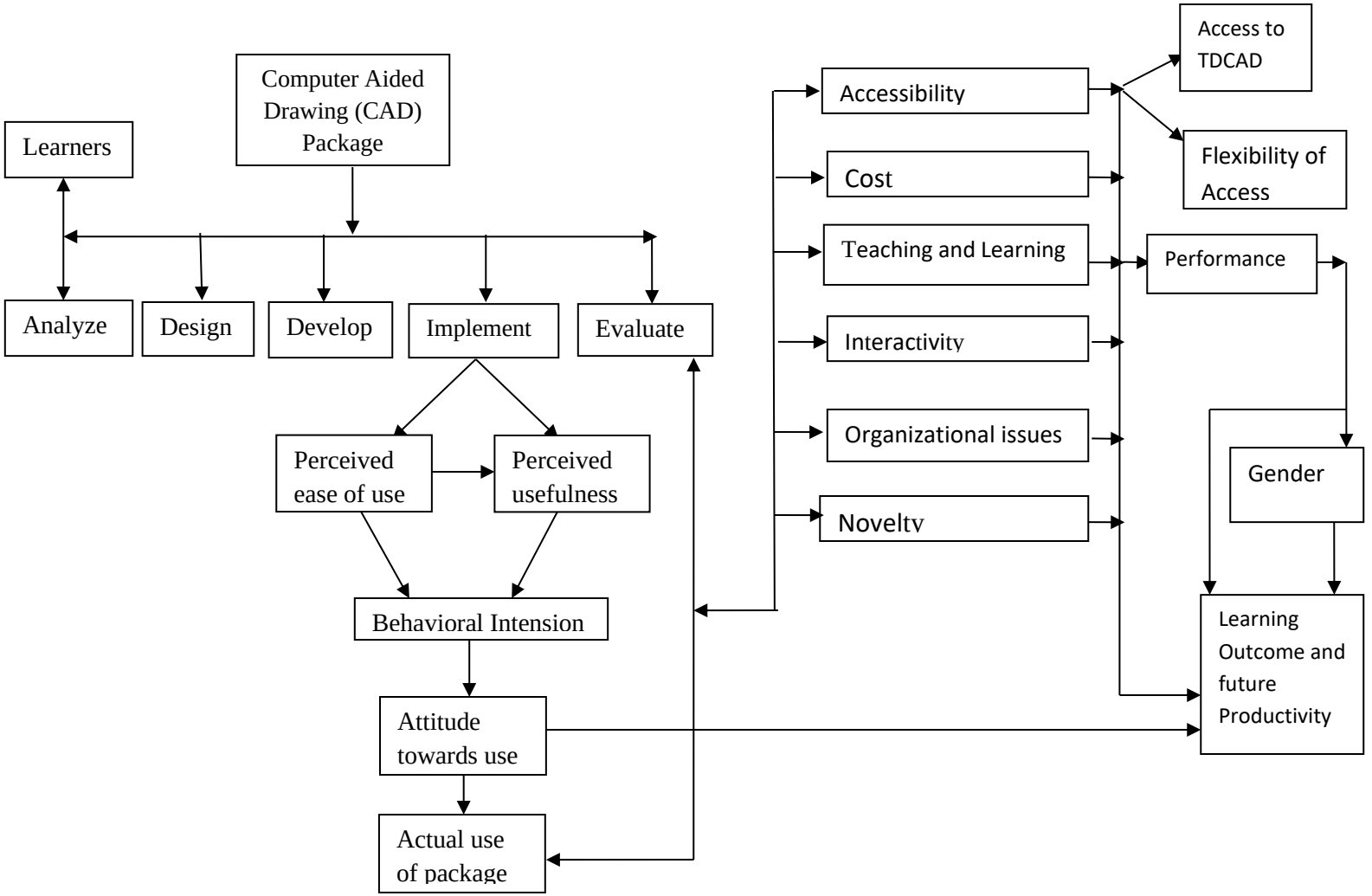
Constructivism

The theoretical framework used in the study is the constructivism theory of leaning, which is a philosophy based on the premise that knowledge is constructed by leaner, through his or her interaction with the environment and combining other learning strategies to ensure learners' satisfaction Abiwo, 2015. Doolittle and Camp (1999) as cited in Usoro, 2010 succinctly asserted that constructivism is a technique where scientific knowledge are constructed and reconstructed by the learner based on his or her prior knowledge. Constructivists view learning as an active process where learners could learn to discover principles, concepts and facts for themselves, constructivism was defined as; a philosophical position which regards knowledge as the outcome of experience mediated by learner's prior knowledge Falode, 2014. Fundamentally, constructivism says that people construct their own understanding and knowledge of the world through experiencing things and reflecting on those experiences Giesen, (2005).

According to Wikipedia free online encyclopedia, prominent constructivists who contributed to this theory of learning are John Dewey (1859–1952), Maria Montessori (1870–1952), Wladysław Strzeminski (1893–1952), Lev Vygotsky (1896-1934), Jean Piaget (1896-1980), George Kelly (1905–1967), Heinz von Foerster (1911–2002), Herbert A. Simon (1916–2001), Ernst von Glasersfeld (1917–2010), Paul Watzlawick (1921–2007), Edgar Morin (1921-), Humberto Maturana (1928-), Laszlo Garai (1935-) and David A. Kolb (1939–) citrd in Falode. 2014. It is based on this theory that the conceptual framework is built.

Conceptual Design

In order to establish the rationale of placing development of a TDCAD package and blended learning models at the core of this study, models that serve as guide for the study is critical. The study will be employing the combination of three models. The first is an instructional system design using the ADDIE model which will be a guide to how this study will be carried out. The other two models will be embedded in the first. These are; Kirkpatrick's four-level-evaluation model this will guide the study at the evaluation stage, the effectiveness of the TDCAD package and the blended learning models while the last will be the Technology Acceptance Model (TAM) that will guide the study on students' perception of the interventions to be used. These models will help the researcher to state the step by step procedure in carrying out the research work.


Learners
Computer Aided Drawing (CAD) Package
Analyze
Design
Develop
Implement
Evaluate
Perceived ease of use
Perceived usefulness
Behavioral Intension
Attitude towards use
Actual use of package
Accessibility
Cost
Teaching and Learning
Interactivity
Organizational issues
Noveltv
Access to TDCAD
Flexibility of Access
Performance
Gender
Learning Outcome and future Productivity

Research Design

This study will be carried out using design-based research of non-equivalent pre-test post-test quasi-experimental design and will use ADDIE (Analyze, Design, Develop, Implement and Evaluate) Model as a major guide. The technology acceptance model (TAM) will be used at the implementation stage, while the evaluation of the strengths and weaknesses of learning technologies will be based on Bates (1995) "ACTIONS" model. The investigation will use researcher's adapted questionnaires to elicit needed information from Technical Drawing teachers and students; using technology acceptance model (TAM) (perceived usefulness, perceived ease of use, behavioral intention, attitude to use and actual usage). Also, information will be gathered from instructional design experts and computer experts using questionnaire which will be used to evaluate package in terms of accessibility, cost implications, teaching and learning, interactivity, organizational issues, novelty and speed following Bates (1995) "ACTIONS" model.

Furthermore, to determine the effectiveness (teaching and learning) of the package on secondary school Technical Drawing (TD) students' achievement in TD, a quasi-experimental procedure (pretest, posttest, non-randomized, experimental and control groups) will be used with two levels of independent primary variable. The independent variables will be the My Technical Drawing Computer Aided Drawing (MYTDCAD) Package while the dependent variable will be the post-test performance of the students.

Technical Drawing Achievement Test (TDAT) will be administered on both the Control and Experimental groups as pretest and posttest. The Experimental Group will be subjected to a treatment using My Technical Drawing Computer Aided Drawing (MYTDCAD) while the Control Group will be taught using the Conventional Strategies (CS). The design layout is as shown in Table 4.

Technical Drawing and (ii) achievement in Technical Drawing and moderator variables of gender at two (2) levels (male and female) and ability Level (high, low average and low). The research design is symbolically represented as follows:

Groups	Pretest	Treatment	Post test
Experimental Group	O_1	MYTDCAD (X_1)	O_2
Control Group	O_3	CS (X_2)	O_4

The schematic representation of this research layout is as shown below:

O_1 X_1 O_2

O_3 X_2 O_4

Where,

O_1 represents the Pre-test Scores of the Experimental Group,

O_2 represents the Post-test Scores of the Experimental Group,

O_3 represents the Pre-test Scores of the Control Group,

O_4 represents the Post-test Scores of the Control Group,

X_1 represents the Treatment (MYTDCAD Package) for the Exp. Group,

X2 represents the Conventional Strategies (CS) for the Control Group.

Sample and Sampling Techniques

Simple random sampling method will be used to select two education districts which are districts III (Falomo, Ikoyi, Lagos) and districts IV (Sabo-Yaba, Lagos) out of the six education districts in Lagos State. Using purposive sampling technique, two senior secondary schools from education district III and four senior secondary school from education district IV will be selected for this study. This will be based on the following criteria: Intact classes consisting of minimum of 25 students each will be used, evidence of having presented Technical Drawing students for WASCE and NECO exams for at least three years consistently, availability of at least a graduate Technical Drawing teacher, availability of a fairly equipped Technical Drawing studio, availability of computer facilities, Government and private ownership of co-educational status. The teachers of TD in each of these schools will also be used as respondents.

Senior Secondary School II (SS II) students are considered appropriate for this study because they are assumed to have studied Technical Drawing for at least one year, this caters for lack of understanding of basic terms in TD and are not under pressure preparing for any external examination. The sampled schools will be randomly assigned into two groups–two experimental groups and one control group.

Validity and Reliability

The instruments were given to experts of various fields related to this study for validation. Cronbach's alpha was used to measure the internal consistency of the instrument

Conclusion

In conclusion, the development of a CAD package that can be used as a learning tool in the Nigerian secondary Schools is expedient for the following reasons:

- The integration of Computer aided Design (CAD) into the technical drawing classes will add novelty to the teaching and learning process.
- The adoption of the CAD package into curriculum would provide opportunity for students and Teachers to have frequent hands on practice
- The integration of Computer aided Design (CAD) into the technical drawing classes will prepare students for what awaits them in the higher institution of learning
- Using CAD package has the benefit of more efficient time management and reduces stress for students and teachers.
- It will provide rest for the teacher who would be able to work on-line at home or attend to the students from private offices or other convenient locations.
- Using CAD package will promote quality and technology driven classroom experiences and environment.
- There are existing CAD packages that could have been adapted into the learning process of technical drawing, but these packages were design to suit the curriculum of the learners of such environment as the developed countries. Of which most of the learners already had background knowledge in use of computer for graphics and drafting and their teacher have gone far ahead of the learners in use of such technologies. The simplicity and user friendliness of these existing CAD packages is missing for learners and teachers of developing countries like Nigeria and some other West African countries.
- Currently in Nigeria, the use of manual form of construction is in complete operation for both teachers and student. More so, most of the technical drawing teachers are not technology savvy.

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EFFECTS OF BLENDED LEARNING ON PRE-SERVICE TEACHERS' ACHIEVEMENT IN ENGLISH LANGUAGE, KATSINA STATE

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Abstract:

The purpose of this study is to analyze the effects of blended learning on pre-service teachers' achievement in English Language. The sample consists of 240 level II pre-service teachers in school of Arts and Social Sciences of Isa Kaita College of Education Dutsinma, Katsina State. Quasi experimental research design was adopted using the pre-test, post-test non-equivalent type for this study. A researcher made objective test questions titled "English Language Achievement Test (ELAT)" was used for data collection. It had reliability coefficient of 0.88 determined using Cronbach's alpha. The control group was taught English Language using the traditional method while the experimental group was taught using blended learning method (traditional and e-learning). To answer the research questions, the data generated was analysed using mean and standard deviation, while ANCOVA was used to test hypotheses at 0.05 level of significance. The result of the study revealed that blended learning is an effective method of teaching English language among pre-service teachers. Based on the result it was recommended that blended e-learning method should be adopted in teaching English education for pre-service teachers.

Keywords: blended learning, English language, pre-service teachers, achievement

Introduction

Significant advancement in technology has been taking place at an unprecedented pace in recent years. While it is an obvious reality that one cannot detached technology from our lives, attempting to keep education away from it does sound unreasonable. English Language teaching necessitates the incorporation of technology into curriculum given its crucial role to Nigeria education system. English is not only the medium of instruction especially at tertiary level of education but also the language of text-books as it serves as vehicle through which students accesses knowledge in other subject areas (Ezeokoli, 2005). At tertiary level, General English is offered as a compulsory subject in both the science and vocational departments. Unfortunately, academic achievement in English Language is abysmally low.

Studies affirmed that method of teaching this subject as the major cause of failure. English Language teachers at all levels are found to solely defend on the unproductive and boring traditional approach which does not support active learning. Traditional approach to education where students receive direct instruction and then practice specific skills is behaviouristic in nature (Berns & Erikson, 2001) kowawole (2002) had blamed the used of traditional teaching strategy for lack of good grasp of basic concepts in English Language. Traditional teaching strategy according to Williams (1990) is just a hit and miss affair. Meanwhile, English Language cannot be well understood if students are not taught with effective teaching strategy. For the teaching of English Language to yield good result and to achieving the desired goals, it has been contemporary issue in education. The situation is blamed on ineffective traditional teaching strategy used by English Language teachers (Ohia & Duff, 1997).

Blended learning has been popular in language learning and teaching environment owning to the fact that this digital era enables both teachers and learners to access online sources easily. It is widely accepted that today's generation is familiar with technology; hence they are categorized as the digital natives. Student's autonomy in language learning environment with computer and internet will no doubt improve their language competency. Godwin-Jones (2011) noted that students' autonomy has the willingness to change and improve learning strategies since language learning also progresses. Students prefer to consult their phones or laptops than to have chunk of papers containing information they look for. With the traditional face-to-face learning environment looking increasingly boring and online learning expensive blended learning is seen as a realistic solution to English Language learning in Nigeria.

Blended learning according to Kholoud (2016) is a process of blending the traditional roles of teachers with the roles of the e-teacher in classes. Thus, it is a learning which integrates traditional and electronic learning. Blended learning is regarded as a new term in relation to the development of the 21st century technology. Grgurovic (2011) argues that blended learning combines face-to-face method and the use of computer in teaching learning process. Bersin (2003) sees blended learning as a strategy which employs technology and the selection of appropriate teaching methods in solving the problems related to class management and the learning directed activities which required accuracy and mastery.

Osguthorpe and Graham (2003) further elaborate blended learning as combining beneficial aspect of face-to-face learning with online learning in a balanced way to get the maximum benefit of both learning environments. Meanwhile, blended learning is without loss of face interaction in learning activities, is to support the teaching-learning process at different time and different places offering some conveniences provided by online learning. Blended learning is a combination of instructional modalities (i.e. onside, self-paced learning and web-based), delivery media (i.e. internet, lectures, power point presentations, text books); instructional methods (face-to-face or technology-based session) and web-based technologies (e.g. Wikis chat rooms, blogs text books, online courses). In what way(s) the combination is done depends on such criteria as learning goals, course content, teacher experiences and teaching style, learner characteristics etc. (Dziuban, Hartman & Moskal, 2005).

A number of researches have been conducted to explore the impact of blended learning on improving student learning and more specifically English Language learning. The fundamental contribution of blended learning approached to education appears to be stimulating collaborative learning (Bruffee, 1993). Barnum and Paarmann (2002), emphasis the integration of online learning into face-to-face interaction in order for reinforcing learner autonomy, promoting learners to produce outputs, and stimulating collaboration amongst learners in order to help each other learn. Moreover, blended learning encourages self-learning and group learning; it enables student to access information and answer questions regardless of time and place and the previous learning of the student (AL-Zaubi & Bani-Doumi, 2012).

Tareg et al (2014) stated that technology enabled instructional method is aimed at improving quality of education and student academic performance. In cooperating collaborative learning through online learning and face-to-face instruction having dominated teaching for long occupies a significant place in language teaching. Arina (2017) found that blended learning is suitable to implement in courses related to language skills, particularly grammar, with student achieving more in English Language with high motivation. Similarly, Gulten (2016) established that blended learning strategy as an effective instructional method that promotes learner autonomy and flexibility thereby reducing students' anxiety towards language learning and decreasing their phobia towards the use of computer.

Statement of the Problem

English Language being the medium of instruction at all level of education has always been taught through the traditional face-to-face method at various levels including tertiary institutions. This has no doubt amounts to poor academic achievement and motivation in the subject area. There is an urgent need for new methods of teaching English Language especially at collage of education since pre-service teachers will be the next generation teachers at primary and secondary school levels. However, this study was carried out to determine the impact of blended learning on pre-service teachers' achievement in English Language at collages of education in Katsina state.

Purpose of the Study

This study was meant to determine the impact of blended learning method on students' achievement in English Language. Specifically, the study will determine whether:

1. Pre-service teachers taught English Language using blended learning will have better achievement than those taught using traditional method.
2. There will be differences between gender and blended learning method in terms of achievement.

Research Questions

1. What is the difference between the mean achievement score of pre-service teachers taught English Language using blended learning and traditional method?
2. What is the different between the mean achievement score of male and female pre-service teachers taught English Language using blended learning method?

Hypotheses

The following null hypotheses were formulated to guide the study

HO_1 - There is no significant differences between the mean achievement score of pre-service teachers taught English Language using blended learning and their counterparts taught using traditional method.

HO_2 - There is no difference between gender and blended learning.

Methodology

Quasi experimental research design adopting the pre-test post-test nonequivalent control group design was used to investigate the effects of blended learning on pre-service teachers 'achievement in English Language.

Design	Pre-test	post-test
Experimental	X_1	X_2
Control	X_3	X_4

Where, X_1 and X_3 = Pre-test Treatment- no treatment, X_2 and X_4 = Post-test,

The population of the study consists of all year one pre-service teachers in school of art and social sciences Isah Kaita Collage of Education Dutsin-ma, Katsina State. The sample of the study consists of two hundred and forty (240) in two class group A and B of (ENG 112) Courses. The two groups were randomly assigned to control and experimental group. The control group (GROUP A) consists of 130 pre-service teachers while the experimental group (GROUP B) consists of one hundred and ten (110) participants. The control group had 92 males and38 females. Experimental groups consist of 75 males and 35 female participants. The instrument for data collection was a researcher male questionnaire tagged English Language achievement test (ELAT), The instrument was subjected to face and content validity by three lectures in English Department and one from Measurement and Evaluation. The instrument was pilot tested and the responses were analysed using Cronbach Alpha which gave a reliability coefficient of 0.88 the data generated was analysed using simple frequency and standard deviation to answer the research questions whole the hypothesis were tested using ANCOVA at 0.05 level of significance.

Results

1. *What is the difference between the mean achievement scores of pre-service teachers taught English Language using blended learning and traditional method?"*

Table 1:
Summary of achievements

Variable	Group	N	Mean x	SD	Mean x	SD	Mean Gain	Diff
Method	Expt	110	30.52	7.22	60.55	7.51	30.03	25.83
	Control	130	30.22	7.21	34.42	7.44	4.20	
Gender	Male	75	31.96	7.48	60.66	7.56	28.70	
	Female	35	30.62	7.50	58.88	6.77	28.26	0.44

When Table 1 is analysed, mean gain of pre-service teachers in the experimental group is 30.03 while the control group had mean gain of 4.20; this shows that there is a mean difference of 25.83 in favour of the experimental group.

"what is the difference between the mean achievement scores of male and female pre-service teachers taught English Language using blended learning?"

According to Table 1 male pre-service teachers in experimental group recorded a mean gain of 28.70 slightly higher than their female counterparts with 28.26 mean gain; a difference of 0.44 mean gains was found.

HO_1 There is no significant difference between the mean achievement scores of pre-service teachers taught English Language using blended learning and those using traditional method.

Table 2:
Summary of ANCOVA Analysis

Source	Type in sum squares	df	Mean Square	F	Sig
Corrected model	50083.263	4	12501.221	220.00	.000
Intercept	40120.224	1	40120.224	712.228	.000
Covariate	62.786	1	62.786	1.067	.224
Method	43225.722	1	43225.722	732.712	.000
Gender	36.114	1	36.114	.663	.301
Method and Gender	1.112	1	1.112	.018	.882
Error	14411.560	255	53.324		
Total	623331.000	268			
Corrected Total	62004.686	259			

As seen in Table 2; the calculated f value (732.72) for method is

HO_2 There is no significant difference between gender and blended learning method of learning English Language.

Table 2, indicate that f calculated value (1.112) for method and gender interaction is less than the table value (3.06) and P> 0.05 from the result therefore, the null hypothesis is retained at 0.05 level of significance.

Discussion

According to the research results, blended learning method is on effective method of teaching English Language to pre-service teachers. Pre-service teachers taught English Language using blended learning had greater mean achievement scores than their counterpart taught using traditional method. Further statistical analysis revealed that significant difference exists between two group taught using blended learning method. However, the result could be credited to the nature of blended learning environment which gave them autonomy to learn, interact, collaborate and access information at their own pace. This is in agreement with that of Arina (2017), Gulten and Kholoud (2016) and Ferriman (2013) which establish that student in blended learning environment had better achievement than those in the traditional face-to-face setting.

Male and female pre-service teachers had almost the same mean achievement level. Further statistical analysis revealed no significant statistical different between gender and blended learning method. This shows that the nature of the method applied did not allow gender discrimination and did affect male and female equally. The result is in agreement with the finding of Bertea (2009), Gulten (2016) and Lee, Yeh, kung and Hsu (2011) which indicate no significant difference in the achievement of male and female student in a blended learning environment. The finding also contradicts that of Adas and Abu Shamis (2011) whose findings establish significant difference between male and female students exposed to blended learning.

Conclusion

The result from this study affirmed that blended learning is an effective method of teaching English at College of education and a good method in mixed gender class. If blended learning is maintained, English Language teachers will be properly trained to do their jobs at primary and secondary school level of education.

Recommendations

The following recommendation were drowned from the study

1. Blended learning method should be applied in teaching English Language at collage of education.
2. Lecturers teaching English Language should be exposed to various modes of blended learning strategy for effective instructional delivery
3. Government should embrace and support the use of blended learning in colleges of education to enhance pre-service teachers' performance.
4. Adequate ICT facilities should be made available to enable lecturers use them in teaching.

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EFFECTIVENESS OF MOBILE-BASED AUGMENTED REALITY INSTRUCTIONAL TECHNOLOGY ON GEOGRAPHY STUDENTS PERFORMANCE IN STATE OF OSUN, NIGERIA

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Abstract

Until the emergence of newer technological innovations, the most common instructional method has been the one-to-all direct communication between teachers and students, which is usually confined to the cubicle of the classroom. This instructional process design has evolved over time to produce scholars that Nigeria has pride in. However, contemporary educators believe that the 18th century way of educating is broken and in this digital age, more appropriate instructional strategies and technologies such as mobile computing technologies (MCT) have the capability to significantly transform, and create a breakthrough that will help students learn better especially in subjects that have been identified to be characterised with abstractive contents. The excessive abstractive contents that are inherent in geography as a secondary school subject is believed to have been a contributing factor to why students' performance in the subject is always unappealing. In light of this, this study premised its purpose on conducting an action research of an experimental design to examine the effectiveness of MCT such as mobile-based augmented reality instructional technology (MBARIT) on geography students' performance in state of Osun, Nigeria. Specifically, the study examined the effect of MBARIT on geography students' performance; investigated students' reaction to MBARIT in learning geography; and examined gender biasness in the performance of students when taught geography with MBARIT. A mixed method analytical approach was employed, while the sample size contained 18 high school geography learners. The findings of the study revealed that geography learners performed excellently when taught with MBARIT; students' reaction towards MBARIT was positive; and MBARIT was not gender bias. The study therefore concluded that understanding the abstractive contents in geography can be enhanced when MCT such as MBARIT is integrated into the subject. The study recommended that in order to achieve better performance in geography, MCT such as MBARIT should be employed.

Keywords: Mobile-Based Augmented Reality; Geography; Performance; Reaction; Gender

Introduction

The role of technology especially Information and Communication Technology (ICT) in teaching and learning has become one of the most important and widely discussed issues in contemporary education policy. ICT introduction into instructional learning situations was never an accident. Melhuish and Falloon (2010) canvassed that education has a well-established history of taking devices not originally intended for educational purposes, and attempting to appropriate them for educational gain. Therefore, its introduction was a calculated attempt at making learners learn more in less time, anywhere, anytime without reducing quality (Tijani, 2009).

The potency of ICT in teaching-learning situations require no argument as several empirical studies have established its potency beyond reasonable doubt. Among many ICT-research modes conducted were: flipped classroom, web quest, gamification, and a host of others, have shown that ICT is a veritable tool, when appropriately used in bringing about improved learning performance across different subject areas (Ibode, 2004; Tijani, 2009; Adeyemo, 2010; Shapley, Sheehan, Maloney, & Caranikas-Walker, 2011; Adedokun-Shittu, Mohammed, & Abdu, 2017; & Makinde & Yusuf, 2017). In addition, learning using technology is believed to complement the traditional forms of teaching and learning (Yasak, Yamhari, & Esa, 2010).

With the established potency of ICT in classroom, teachers do not only have to spend a good deal of personal time working with computers, but also should have a high level of innovation and confidence to use the new technologies that are embedded in contemporary

education. The use of technology in teaching goes beyond just using any technological tool available to teach, but it requires teachers and students to go extra length in ensuring learning takes place. Teachers and students alike are often overwhelmed by the benefits of technologies in teaching such that they decide to use them without understanding the rudiments of integrating technology to classroom instruction (Adedokun-Shittu, Olasehinde-Williams, Obielodan, & Salawu, 2017). Hence, a successful integration of technology in teaching and learning does not only heavily depends on the views and willingness of teachers and students involved but having the appropriate technological tool to improve teaching and learning.

Until the emergence of newer technological innovations, the instructional process has always been approached mostly through the direct communication which occurs between students and teachers usually taking place in the classroom. Although, the teaching methods still work successfully, however, most education institutions are interested in introducing more productive methods for improving the learning experience and increasing the level of understanding of the students. In providing a connection to this, newer technological innovations in computing technologies has provided the potential for improving them (Liarokapis & Anderson, 2010).

Regarding newer computing technologies, manufacturers and experts in ICT have been innovative. Experts have developed different classroom applications software to enhance teaching and learning. The interest generated by classroom technology has reduced truancy, absenteeism, and non-interest in lessons by learners significantly (Angwin, 2013; & Norwich, Dudley, & Ylonen, 2014). In a research conducted by Teo and Neo (2007) for example, the respondents reported that it was boring to just hear the lecturer talking in front of them. The students believed that the integration of technologies would help them in their learning process. Therefore, educators have begun to seek classroom technologies that have the potential to help students learn actively and to improve their understanding especially in subjects that are abstract in contents such as Geography (Nor, Noor, & Noraffandy, 2015).

Geography as a subject is aimed at giving a coherent and comprehensive image of our world on a scientific basis, and appreciation of information (Ford, 2007). Research by Osman, Haji-Iksan, and Halim (2007) found that students are less interested in studying Geography because of their perception that it is a boring subject involving too many abstract concepts. Geography is a subject designed to acquaint learners' knowledge of the features of the earth's crust (internal and external), the spatial spread of the physical and human features, the interactions that exist between man and these spatial features, the changes that occur over space are key concepts to be studied in Geography (WASSCE, 2017). Geography provides a rich and varied context for the use of new technologies to enhance both learning in the subject and to reinforce existing ICT skills (OFSTED, 2004).

Scientific and geographical concepts in Geography can be categorized as theoretical and descriptive concepts. Example of descriptive concepts that can be found in Geography include map work. Theoretical concepts represent the concepts that cannot be seen with the eye such as the earth-sun relationship, earth rotation and revolution, and structure of earth. Students commonly find abstract subjects like Geography to be abstract, requiring a depth of understanding and visualization skills (Gilbert, 2004; & Nor et al., 2015). When students have difficulties in understanding the concept well, it leads to misconceptions. Misconception among students has to be considered because it can interfere with the students' learning of scientific principles and concepts.

In the light of this, Geography as a bridging subject that equips the learner with knowledge and skills that are of great educational value even for other subjects, it requires ICT use to strengthen it (K.I.E., 2006). Research has demonstrated the beneficial use of technology as a means of visualizing abstract concepts. Krower (2006) argued that the advancement in ICT in teaching abstract subjects like Geography could be a crucial step in enhancing performance. Technologies such as visualization technologies have exciting potential for facilitating understanding and preventing misconceptions in the scientific domain (Hay, Marlino, & Hosehuh, 2000, & Nor et al., 2015).

Kozhevnikov and Thornton (2006) found that it is possible to improve students' visualization skills by presenting a variety of abstract visual images and allowing the students to manipulate and explore the images. Dede and Salman (1996), Nor et al (2015), and Shittu (2017) suggest that students can improve their mastery of abstract concepts with virtual

environments that have been designed for learning. There is a wide range of available technologies that can be used for the visualization of abstract concepts. Examples of visualization technologies that have been examined in previous research include animation, virtual environments, simulation, and a host of others.

These technologies can be used to address the problem of misconception and help students understand better. Earlier studies among others was the study of Wu, Krajnick, and Soloway (2001) which developed an animation to help students understand the abstract concepts in Chemistry. According to them, this type of technology allows students to visualize the interactions among molecules and to understand the related chemical concepts. Visualization technologies provide a means for making visible phenomena that are too small, large, fast or slow to see with the unaided eye (Cook, 2006). The use of visualization technologies such as these in education is becoming more advanced and more sophisticated. Nowadays, one of the technologies that show great potential in education especially in visualizing abstract concepts is Augmented Reality (AR).

In technical terms, AR is an amalgamation of computer graphics, vision and multimedia, which enhance the user's perception of the real world through the addition of virtual information (Azuma, et al., 2001). Augmented Reality Systems can also be defined as the technology that allow real and virtual objects to co-exist in the same space and can be interacted with in real-time (Azuma, 1997). The process of combining virtual data with real world data can provide users with access to rich and meaningful multimedia content that is contextually relevant and can be easily and immediately acted upon (Billing Hurst, Kato, & Poupyrev, 2001). This claim is supported by the Horizon Reports from 2004 to 2010, which describe AR as a technology that brings the computer world to the human world (Madden, 2011). Unlike Virtual Reality (VR), which completely immerses the user's senses in a synthetic environment, AR permits the user to perceive the real world through a virtual overlay. Virtual objects used in AR Systems may include text, still images, video clips, sounds, 3-dimensional models and animations. Ideally, these virtual objects will be perceived as co-existing within a real-world environment.

Johnson, Levine, Smith, and Stone (2010) stated that AR has strong potential to provide both powerful contextual, on-site learning experiences and serendipitous exploration and discovery of the connected nature of information in the real world. In addition to that, now that the technologies that make augmented reality possible are much more powerful than ever before and compact enough to deliver AR experiences to not only corporate settings but also academic venues through personal computers and mobile devices, several educational approaches with AR technology are more feasible. Also, wireless mobile devices, such as smart phones, tablet PCs, and other electronic innovations, are increasingly ushering this technology, AR, into the mobile space where the AR applications offer a great deal of promise, especially in learning and training (Lee, 2013).

Several researchers have identified AR as having immense potential to enhance learning and teaching. These include; Shelton & Hedley, 2002; Kaufmann & Schmalstieg, 2003; Dede, 2009; Dunleavy, Dede, & Mitchell, 2009; Burton, et al., 2011; Billinghurst & Duenser, 2012; Lee, 2013; Nor et al., 2015; McNair & Green, 2016; and Kerawalla, Luckin, Selje, & Woolard, 2017. Most of the research conducted on AR to date shows that students are excited and interested to learn using this technology and the response from students shows positive feedback about their experience of the combination of the virtual and real environments.

A new way to improve the learning of three-dimensional shapes instead of the traditional method in which teachers use wooden objects is AR. According to Cerqueira and Kirner (2012), there are several advantages of using AR techniques for educational purposes. For example, AR can minimize the misconceptions that arise due to the inability of students to visualize concepts such as earth-sun relationship, earth rotation, and a host of others, because AR allows detailed visualization and object animation. AR also has the advantage of allowing macro or micro visualization of objects and concepts that cannot be seen with the naked eye.

Understanding some concepts in Geography depends on understanding the spatial structure of the astronomical and celestial matters. There are many concepts in Geography that are abstract, requiring a depth of understanding and visualization skills. When students have difficulties in understanding the concept well, it leads to conceptual misunderstandings and

factual misconceptions. With the help of AR, users can manipulate the virtual 3D objects in the computer in a simple and more intuitive way. As a result, AR has the potential to improve the understanding of the spatial structure of these astronomical and celestial objects.

Many researchers in particular have documented poor academic performance of students in Geography (Umar , Guga, & El-Yakub, 2015). This has also been corroborated by high failure in public examinations in the country such as the West African Examination Council (WAEC) and National Examination Council (NECO). The need to improve students' performance in Geography has been a thing of concern to all stakeholders. This formed the foundation of this action research.

Gender has been identified as one of the factors influencing students' performance at secondary school level (Umar et al., 2015). Reports from various academic sources have indicated that Geography as a course of study is gender sensitive (Gender Geography, 2012; Filgona, 2016; & Filgona & Sababa, 2017). This is the reason why gender issue has received the attentions of many researchers across disciplines and at different levels of education. Gender disparity in performance in Geography prevails in schools where this subject is offered (WAEC Chief Examiner's Report, 2008, 2009 in Essien, 2012). Therefore, the need for Geography teachers to seek for more effective instructional methods that are both performance-enhancing and gender-friendly is imperative.

In order for the educational system to address the sophisticated twenty-first century skills and knowledge needed by the digital natives, there is need for a paradigm shift in pedagogy. Hence, this study seeks to examine the effectiveness of mobile-based augmented reality instructional technology (MBARIT) on Geography students' performance in State of Osun, Nigeria.

Purpose of the Study

Stemming from the identified problems acknowledged in the reviewed literature. This study premised its purpose on examining the effectiveness of MBARIT on Geography students' performance in State of Osun, Nigeria. Specifically, the study:

1. examined the effect of MBARIT on Geography students' performance;
2. investigated students' reaction to MBARIT in learning geography; and
3. examined gender biasness in the performance of students when taught Geography with MBARIT.

Research Questions

The following research questions were answered in this study:

1. What is the effect of MBARIT on Geography students' performance?
2. How do students react to MBARIT in learning geography?
3. Does gender biasness exist in the performance of students taught Geography with MBARIT?

Research Hypothesis

The following hypotheses was tested in this study:

H_{01}: There is no significant difference in the performance of male and female geography students when taught with MBARIT

Methodology

This study adopted an action research design of an experimental type. The population included the entire Geography students in State of Osun, while the sample size included a purposively selected 18 high school Geography learners. The research instruments consist of an adopted Mobile-Based Augmented Reality Application (AR Space) and a validated researcher-developed questionnaire tagged "MBARIT Reactional Questionnaire" with a reliability value of 0.84. A mixed method analytical approach was employed to answer the research questions and test the stated hypothesis at 0.05 level of significance.

Results

Table 1:
Distribution of Geography Learners According to Gender

Gender	Frequency	Percentage
Male	7	38.9
Female	11	61.1
Total	**18**	**100**

Larger percentage of the respondents were female (61.1%), compare to 38.9% of male respondents in the study.

Research Question One: What is the effect of MBARIT on Geography students' performance?

Table 2:
Geography Students' Performance after Using MBARIT

	Performance Test		
Score Range	**Frequency**	**Percentage**	**Performance Level**
0 – 39	0	0.0	Fail
40 – 49	0	0.0	Poor
50 – 59	1	5.5	Good
60 – 69	4	22.2	Very Good
70 – 100	13	72.3	Excellent
Total	**1419**	**18**	**74.7**

The benchmark of ranges 0-39, 40-44, 45-49, 50-59, 60-69, and 70-100 to represent fail, poor, good, very good, and excellent respectively was employed. In the performance test conducted, 13 Geography learners performed excellently, 4 performed very good, and only 1 was performed averagely. Summarily, the result of the analysis revealed that students perform excellently when taught Geography using MBARIT. Therefore, MBARIT has a positive effect on Geography students' performance.

Research Question Two: How do students react to MBARIT in learning geography?

Table 3:
Mean of Geography Learners' Reaction to MBARIT in Learning Geography

S/N	Items	Mean
1.	With the combination of visual impression in the instructional process, I tend to develop more interest in the classroom.	3.33
2.	I find the content of these lessons interesting and every expectation I have for these lessons have been exceeded.	3.20
3.	It was not a waste of time to show me actual astronomical and celestial objects with MBARIT.	3.20
4.	Using MBARIT presentation for the lesson helped me to have a better learning experience.	3.13
5.	Seeing the astronomical and celestial objects in my environment offer a reality of experience which stimulates self-activity on my part as a student.	3.13
	Grand Mean	**3.21**

Source: Field Survey, (2019) *Mean >2.5 = Agreed, Mean< 2.5 = Disagreed

In determining the how geography students reacted to learning geography with MBARIT, mean was employed to analyse the collected data and a benchmark of 2.5 of a 4-point Likert scale was adopted. Majorly, students claimed that they liked MBARIT because: it helps them to develop more interest in the classroom due to the combination of visual impression in MBARIT; the contents were interesting; actual abstract contents presentation in reality; improve better learning experience; and stimulation of self-activity. Cumulatively, the grand mean of 3.21 indicated that geography students reacted positively to MBARIT.

Hypothesis Testing

H_{o1}: There is no significant difference in the performance of male and female geography students when taught with MBARIT.

Table 4:
t-test Analysis of the Gender Biasness in Students' Performance when taught Geography with MBARIT

Gender	N	X	SD	df	*t*	Sig. (2 -tailed)	Remark
Female	7	74.14	15.07				
				16	-.502	.002	**Rejected**
Male	11	81.82	6.51				
Total	**18**						

The analysis revealed that there was a significant difference between the performance of male and female geography students when taught with MBARIT. This is reflected in the findings of the hypothesis tested; df (16) t = -.502, $p < 0.05$. Thus, the hypothesis which states that "there is no significant difference between the performance of male and female geography students when taught with MBARIT" was rejected.

Discussion and Conclusion

The outcome of this study indicates that MBARIT has a great potential in geography learning especially when used in teaching geographic concepts like physical geography where abstract concepts are mostly inherent. It practically improves students' performance and students liked MBARIT significantly. This outcome corroborated the empirical fact that researchers such as Johnson et al., (2010) and Lee (2013) had established about augmented reality in the business and educational industry. However, the gender disparity that was established in WAEC Chief Examiner's Report, (2008, & 2009) and Essien, (2012) as regards geography performance is not favoured in the case of MBARIT. This study established that gender biasness is not a concern when MBARIT is employed in learning geography.

Conclusively, visualising abstraction has been a captivating phenomenon for learners over the years. With the use of visualisation technologies such as microscope, telescope, x-rays, virtual reality, augmented reality, and a host of others, visualising and conceptualising abstract concepts are made easier. These visualisation technologies could be harnessed in the learning of subjects and their contents, especially the ones that are characterised with abstraction. Positively, the outcome of this study has established the prospective of integrating MBARIT into geography learning specifically and AR into classroom instruction generally. This study therefore recommended that in order to achieve better performance in geography, MCT such as MBARIT should be employed.

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POSTGRADUATE STUDENTS' MODE OF STUDY AND THEIR UTILIZATION OF MOBILE TECHNOLOGIES FOR LEARNING IN SOUTH-WEST, NIGERIA

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Abstract

This study investigated postgraduate students' mode of study and their utilization of mobile technologies in South-west, Nigeria. The study adopted a survey design. The study targeted postgraduate students of eleven universities across South-west, Nigeria based on accessibility. A total of 658 postgraduate students were sampled using Research Advisors (2006) model. Researchers-designed questionnaire was used for data collection and the instrument was validated by the researchers. Mean was used to answer the research questions postured, while Analysis of Variance (ANOVA) was used to test the hypothesis. A coefficient of reliability of 0.87 was obtained in the instrument through Cronbach alpha using split-half method of pilot test. The results of the study established that postgraduate students utilize mobile technologies for learning and research. The results further established that PhD postgraduate students utilize mobile technologies for learning and research more than other postgraduate students' counterparts. The results of hypothesis testing indicated that there was no significant difference among postgraduate student' utilization of mobile technologies for learning and research purposes based on mode of study with the p-value 0.792 which is greater than 0.05 alpha value. It was however recommended among others that more orientation should be organized for all postgraduate students in other to bridge the gap in the differences between postgraduate students in their utilization of mobile technologies for learning.

Keywords: ICT, Mobile Technologies, Adoption, Postgraduate Diploma, Postgraduate Students.

Introduction

The resultant effect of education should cater for the needs of individual citizens and society at large because education is important for the development of any society. The importance of education to mankind cannot be underestimated, most especially in this global village dispensation of science and technological breakthroughs where learning can be implemented within and outside the classroom context. Education was defined by Iloanusi and Osuagwu (2009) as a major tool for national socio-economic growth and development. This implies that no societies' socio-economic grows nor develops without embracing education and much emphasis on the learning concern.

This relevance of education to the societal development led to the policies framed by the Federal Republic of Nigeria (FRN, 2013)via the National Policy on Education, who stressed the importance of education as an investment for economic, social, and political developments; an aggregate tool of empowerment for the poor and the socially marginalized groups; an effective means of developing the full capacities and potentials of human resources, as well as the development of competent work force through the acquisition of practical life skills relevant to the world of work as a veritable means of developing sound intelligent learning societies, fit and relevant to the 21st century.

Education is the illumination to every man's path. In every organization, including the educational system, information is always generated and stored in a particular medium before it is transmitted. While the process of generation and storage of this information is Information Technology, the process of its transmission to the intended audience or recipients is communication technology. Oludotun (2005) stated that ICT is a generic term referring to technologies for collecting, storing, editing, and passing on information in various forms. Communication is the process of transferring Information from one person to another as well as from the sender to the receiver with encoding and decoding means.

In a rapidly changing world, technology is essential for an individual to easily access and apply information. Technology has impact on the educational system. The new innovation of devices which are enhanced via technology are becoming more attracting, as it arrests and arouse users' attention. Integrating these technologies into educational system will increase students' academic performance by arousing and arresting their attention. Thus, any institutions who refuse to metamorphose with the trend of technology into learning may become less relevant in human capital growth and development in its economy. ICT is an umbrella term which entails any communication device or application (Nana, 2012). The adoption of ICT in education is capable of empowering learners by transforming teaching and learning process from teacher-dominated/centered to learner-centered where teachers serve as facilitators of students learning' pace. This transformation via ICT will result in increased learning, and also create opportunity for learners to develop their creativity, problem solving abilities, information reasoning skills and other higher-order thinking skills (Trucano, 2005). ICT can also be regarded as gadgets through which information could be sought and accessed.

Mobile Technologies refers to all forms of technologies that can be used to make work easier and delivered in short time. Jarvenpaa and Lang (2005) defined mobile technologies as handheld information technology and artifacts that encompass hardware devices, software interface and applications and communication network services. Therefore, mobile technologies could be regarded as the combined integration of hardware (PDAs, like palm pilot or handspring, mobile phones, and video game players), software (the applications that run on the device which include phone books, calendar programs and others) with its operating system and networking (networks are the infrastructure that supports the transfer of information) (Bola, 2015). Learning with mobile technologies is the exploration of handheld devices with wireless and mobile networks to facilitate, support, enhance and extend the band width of teaching and learning.

Postgraduate students need to be competent in utilizing ICT tools in their learning system. This will boost their academic, research and other learning skills. ICT is drastically altering the ways things are done in nearly every field of human activity (Adeyanju, 2012). Postgraduate education in Nigeria comprises studying for academic and professional degrees, certificates, diplomas or other qualifications for which first degree is required. In Nigeria, the postgraduate programme is operated in the university under the control of the postgraduate school (Auriol, 2014). Postgraduate students are expected to embrace the use of mobile technologies in their learning and research as this will enhance and increase their learning rates and research activities.

Postgraduate mode of study refers to the approach and basis at which postgraduate students run their postgraduate programme. In Nigeria, the programme mode of study at postgraduate levels includes Full Time mode of study, Part time mode of Study and Distance Learning Mode of study. While the Full-Time mode of study and Part time mode of Study is majorly being run by the conventional universities, the Distance Learning Mode of study is majorly run by the National Open Universities and their respective centers. The use of electronic media for classroom instruction has its influence on the improvementof the standard of teaching in the classroom by making concept been taught more concrete.

Statement of the Problem

The new innovation of devices which are enhanced via technology are becoming more attracting, as it arrests and arouse students' attention. Therefore, the limitation in the use of these technologies might jeopardize our learning system. The utilization of ICT tools in teaching and learning has become imperative at all levels of education. This is because teaching cannot be adequately effective without the use of ICT tools in schools in this 21st century (Adebisi, 2013). The mobile technologies should not only be used for social chat alone but it should be adopted into the teaching and learning process. Ogunduyile (2013) noted that some tertiary institutions have the electronic facilities but not maximizing its utilization. The use of mobile technologies in Nigeria is still lagging behind compared to other developed nations in the globe. Most students use the mobile technologies for social self-chat but not for learning.

Purpose of Study

The purpose of the study is to investigate the effectiveness of difference and utilization of mobile technologies by postgraduate students in South West Nigeria.

The objectives are to:

1. Determine the effect of utilizing mobile technologies by postgraduate students in South-West, Nigeria.
2. Examine the different utilization of mobile technologies by postgraduate students in South-West, Nigeria.

Research Questions

This study answered the following questions:

1. How do postgraduate students utilize mobile technologies in South-West, Nigeria?
2. What is the difference in the utilization of mobile technologies by postgraduate students in South-West, Nigeria based on their mode of study?

Research Hypothesis

One hypothesis was tested in this study:

Ho_1: There is no significant difference in the utilization of mobile technologies by postgraduate students in South-West, Nigeria based on their mode of study.

Methodology

This study was a descriptive research of the survey type. The population for this study comprised all postgraduate students in South-west, Nigeria. Postgraduate students were sampled across 11 universities in South-west, Nigeria. Stratified random sampling technique was used across the eleven universities in South-west, Nigeria. Six hundred and fifty-eight (658) postgraduate students were sampled using Research Advisors (2006) model of sample size. The instrument used for data collection was researchers-designed questionnaire with sections A and B for demographic data of the respondents and their utilization of Mobile technologies for learning respectively. Four Likert scale of Strongly agree, Agree, Disagree and Strongly agree was used as the response mode.

The questionnaire was vetted by the researchers and three other experts in the department of Educational technology and department of Computer science for face and content validity, and it was pilot-tested at the University of Ilorin through split-half method. The coefficient of reliability of 0.82 was obtained through Cronbach alpha. The questionnaire was personally administered by the researchers following all ethical issues on questionnaire administration. Mean was used to answer the research questions, while the hypothesis was tested using Analysis of Variance (ANOVA) at 0.05 level of significance.

Results and Discussion

Research Question 1:

How do postgraduate students utilize mobile technologies in South-West, Nigeria?

Table 1:

Postgraduate Students Utilization of Mobile Technologies

S/N	Items	Mean
1.	Mobile Technologies can be used to search and store information regarding lesson to be learnt	3.23
2.	Mobile Technologies allow easy access to information for research	3.55
3.	Mobile Technologies influence quick and better presentations.	2.65
4.	The use of mobile technologies allows receiving of lectures anywhere and anytime.	2.87

5.	The influence of mobile technologies results in competitive advantage compared other devices	2.90
6.	The use of mobile technologies leads to increased classroom product quality.	2.56
7.	Use of mobile technologies gain significant skills and advantages in the learning process	2.59
8.	Mobile technologies allow for greater collaboration and promote group work	2.43
9.	With mobile technologies, students' progress and reports can be easily tracked	3.12
10.	Unlimited source of information is possible with mobile technologies	3.01
11.	Mobile Technologies allow for Global communication	3.34
12.	Assessing students' performance can be done instantly with mobile technologies	2.34
13.	Course curriculum can reflect real world data and real-time information with Mobile Technologies	2.01
14.	Geographically isolated or economically disadvantaged students can benefit from access to online software or resources for learning with Mobile Technologies	3.22
15.	Using mobile technologies in learning makes learning addictive	2.88
	Grand Mean	**2.85**

Table 1, presents the result on how postgraduate students utilize mobile technologies. The results indicated that mobile technologies can be used to search and store information regarding lesson to be learnt and mobile technologies allow easy access to information. Mobile Technologies influence quick and better presentations and the use of mobile technologies allows receiving of lectures anywhere and anytime. Furthermore, the results established that the influence of mobile technologies results in competitive advantage compared other devices. The use of mobile technologies leads to increased classroom product quality and also the use of mobile technologies gains significant skills and advantages in the learning process. Mobile technologies allow for greater collaboration and promote group work.

With mobile technologies, students' progress and reports can be easily tracked and postgraduate students can source for unlimited information with mobile technologies. Postgraduate students believe that mobile technologies allow for Global communication. Assessing students' performance can be done instantly with mobile technologies. Postgraduate students agreed that course curriculum can reflect real world data and real-time information with Mobile Technologies. Geographically isolated or economically disadvantaged students can benefit from access to online software or resources for learning with Mobile Technologies. Using mobile technologies in learning makes learning addictive. The grand mean score on postgraduate students' utilization of mobile technologies was 2.85. Using a bench mark of 2.50 for 4-likert scale, since the grand mean score of 2.85 was greater than the benchmark, it can thus be deduced that postgraduate students utilize mobile technologies for their learning.

Research Question 2:
What is the difference in the Utilization of Mobile Technologies by Postgraduate Students based on their mode of study?
Table 2:
Difference in the Utilization of Mobile Technologies by Postgraduates Students

Mode of Study	N	Mean	Remarks	Mean Deviation
Full-Time	315	3.51	Utilized	0.00
Part-Time	115	3.46	Utilized	0.05
Distance Learning	228	3.56	Utilized	0.04
Total	658			

Table 2, presents the difference in the utilization of mobile technologies by postgraduate students based on mode of study. The table indicates that of the 658 postgraduate students that participated in this study, 315 distance learning Postgraduate students mostly utilized mobile technologies with a mean score of 3.56, 315 fulltime Postgraduate students utilized mobile technologies more with a mean score of 3.51, while 115 Postgraduate part- time students had a mean score of 3.46. The difference in the mean gain of postgraduate students in their utilization of mobile technologies was very low. This indicated that postgraduate distance learning' students utilized mobile technologies more than their full- time and part -time counterparts in South-west, Nigeria.

Hypothesis One

There is no significant difference in the utilization of mobile technologies among postgraduate students in South-West, Nigeria based on their Mode of Study.

Table 3:

Significant Difference in The Utilization of Mobile Technologies Among Postgraduate Students Based on their Mode of Study

Source	Type III Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	.657[a]	2	.219	.350	.792
Intercept	70.448	1	70.448	112.672	.000
Mode of Study	.657	2	.219	.350	.792
Error	2.501	655	.625		
Total	73.607	658			
Corrected Total	3.158	657			

a. R Squared = .208 (Adjusted R Squared = -.386)

Table 3, shows the results on the significant difference in the utilization of mobile technologies among postgraduate students based on their mode of study. It indicated that F (2, 658) = 0.35, p>0.05, which means no Significant difference existed in the utilization of mobile technologies among postgraduate students based on their Mode of Study. Hence, the null hypothesis which stated that there is no Significant difference in the utilization of mobile technologies among postgraduate students based on their Mode of Study is hereby accepted. However, the marginal means on the differences in utilization are represented graphically in Figure 1.

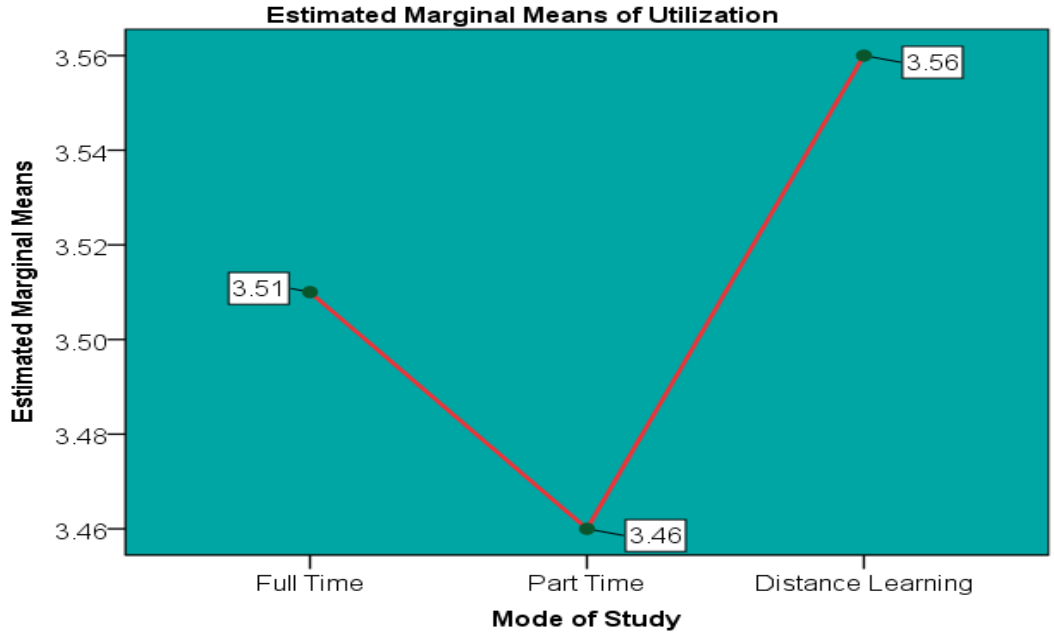

Figure 1: Estimated Marginal Means on Utilization of Mobile Technologies

Figure 1, presents graphically the estimated marginal means on the utilization of mobile technologies among postgraduate students in South-West, Nigeria based on their Mode of Study. It revealed that distance learning postgraduate students utilize mobile technologies the most, next full time and part time postgraduate students respectively but the differences are negligible.

Conclusions

The study concluded that postgraduate students utilize mobile technologies for their learning. The effective utilization of the mobile technologies by postgraduate students could be of immense benefit towards their learning within and outside the classroom settings and also facilitate their research knowledge and skills. There were differences in the utilization of mobile technologies by postgraduate students based on their Mode of Study. The findings indicated that distance learning postgraduate students utilized mobile technologies more than their counterparts in South-west, Nigeria. However, the findings further established that there were not significant differences in the utilization of mobile technologies by postgraduates based on Mode of Study in South-west, Nigeria. This implies that differences existed in the utilization of mobile technologies by postgraduate students based on Mode of Study but the differences were not significant.

Recommendations

Based on the conclusions made, the following recommendations were made:

1. Postgraduate students should be encouraged to continue utilizing mobile technologies in their studies for both learning and research.
2. More orientation should be organized for full time and part time postgraduate students on the usefulness of mobile technologies in learning. This will enable to bridge the gap in the differences between postgraduate students in their utilization of mobile technologies for learning based on Mode of Study.
3. A workshop could also be organized for all postgraduate students in order to maintain their level of utilizing mobile technologies for learning and research without gap.

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EFFECTIVENESS OF SKYPE INSTRUCTION ON MATHEMATICS STUDENTS' ACHIEVEMENT AND RETENTION IN COLLEGES OF EDUCATION, IN NIGER STATE NIGERIA

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Abstract
This study investigated the Effectiveness of Skype instruction on mathematics students' achievement and retention in colleges of education, in Niger State Nigeria. The study adopted Quashi experimental research, pre-test post-test nonrandomized quashi experimental research. The target population for the study was all the NCE two mathematics students in Niger state Nigeria. Intact class of NCE II mathematics students were used for the study. 174 students (128 male and 46 female) were used from two purposively selected colleges of education, in North-Central Nigeria. The research was guided by two research questions and two null hypotheses and tested at 0.05 level of significant. The researchers delivered mathematics instruction through Skype medium on concepts of Co-ordinate Geometry (MAT 212), which was used as treatment material for experimental group. A pilot study was carried to obtain reliability coefficient of the research instrument using test-retest method, PPMC was used to obtain reliability coefficient of 0.73. Thirty (30) multiple choice item were administered to both experimental and control groups as pretest, also posttest and retention test after the treatment. Mean and standard deviation were used to answer the research questions while analysis of variance (ANOVA) was used to test the research hypotheses. The findings of the study revealed that there was significant difference in the achievements and retention of mathematics student taught using mathematics Skype Instruction and those taught using lecture method. The study recommends that mathematics lecturers should be encouraged to use Skype as a medium of instructional delivery in teaching and learning of mathematics.
Keyword: Mathematics Skype instruction, Coordinate Geometry, Achievement and Retention

Introduction

Educational technology and mobile learning have been restored to help teachers and educators by using the new technology in education. Technology is designed to promote meaningful teaching and learning, providing educators and students. This technology is to promote the fundamental learning principles essential for academic achievement. It also provides educators with professional development, curriculum, contests and other resources. Mathematics in all facets of lives has made the subject the centre of every developmental agenda (Owolabi & Adeniyi, 2017). The knowledge of it is needed to carry out day to day activities. Mathematics as a subject that is made compulsory as a general course in Nigeria Certificate in Education (NCE) level regardless the specializations of any students. It is a course that all students must pass before meeting up graduation requirement of NCE. However, the performance of students in mathematics department towards coordinate geometry have continue to attract attention because of inconsistency and inability to improve in that aspect of mathematics in recent times among NCE students.

Skype is a free and easy way for lecturers to open up classroom and lead their students, connect with other lecturers, and expand their knowledge in amazing ways (Ramaraj, 2015). Instructors and parents can also benefit from Skype in the classroom. Skype is a software program using voice over IP technology. IP stands for internet protocol. Cross platform, multi-lingual, and

free to both download and use, Skype software permits users to make high-quality audio and video phone calls over the internet, send instant messages, and do video conferencing online. It is one of the best voices-over internet services online and was created in 2003 by Niklas and Janus but later on was owned by Microsoft particularly in the year 2011, putting it at the top ranks with face-book and twitter. Instructors may download and use Skype at school. The slogan of Skype is the whole world can talk for free.

Davis (2006) postulated that educators have been using Skype in their classroom for several years with a high level of success and convenience. Smethurst, (2009) cited that an Australian educator has used Skype for inter-school debates with the absence of the face to face interaction. Skype provides many free services, including voice and video calls among persons from different geographical location. Thus, the use of Skype is very important for developing countries education system and can be used for the following; lives lectures, guest lectures, videoconferencing, tutoring, student's presentation, assessments (oral examination), announcement and virtual field trips

Skype for education provides opportunities for interactive exchange and collaboration between students living on other sides of town or the other side of the planet. These synchronous, real-time discussion using free software like Skype can tangibly expand the walls of the traditional classroom and engage students to write, share, and communicate with an authentic audience. Educators interested in helping motivate students to develop both traditional as well as twenty-first century literacy skills in the classroom and use audio and video conferencing technologies like Skype to literally plug their students into collaborative exchanges with global partners.
Guest lecturers can come to your classroom via Skype. Instructors can have authors and other guest speakers who do not have the ability to travel to a classroom speak over Skype to share their ideas. Instructors often invite guest speakers to lecture or inform their students about a particular topic, relying on the speakers' schedule to make it happen. Using Skype in the classroom allows guest lecturers/speakers to talk with students from anywhere in the world at any time, eliminating the need for the speaker to physically be in the classroom. Students can ask the speaker questions in real time using Skype. Students can also receive answer from the speaker in real time (Smethurst, 2009).

Aicha (2014) who investigated the impact of using WhatsApp mobile learning activities on the achievement and attitudes of online students using mobile devices at the university. The results of the experimentation show that there are significant differences, at 0.05 alpha level, in the achievements of the experimental group compared with the control group. Kim and Gilman (2008) examined the use of multimedia components such as visual text, spoken text, and graphics in a Web-based self-instruction program to increase learners' English vocabulary learning. The results lead one to conclude that an effective way to improve learning of English vocabulary is to offer text and graphics that illustrate what the vocabulary means.

Jimoh., Alabi., Falode and Olayiwola (2018) investigates effects of three modes of mobile instructional package on mathematics students' achievement and retention. The study revealed that there is significant difference in the mean achievement and retention of mathematics students taught mathematics mobile instructional package (video + only, audio + text and text + only) compare to those taught using lecture method. Achor., Otor and Umoru. (2013) carried out the study on the effects of computer-based instruction (CBI) on students' retention in biology in secondary schools. The result showed that significant difference exists in the retention of students taught using CBI and those taught using conventional method.

Purpose of the Study

The aim of this research is to investigate effectiveness of mathematics Skype instruction on mathematics students' achievement and retention in colleges of education, in Niger State Nigeria. The specific objectives are to:

1. Determine the effect of mathematics Skype instruction and Lecture Method on students' achievement in mathematics.

2. Determine the effect of mathematics Skype instruction and Lecture Method on students' retention in mathematics.

Research Questions

The following research questions were raised to guide the study:

1. What are the mean achievement scores of students taught Mathematics with mathematics Skype instruction and Lecture Method?
2. What are the mean retention scores of students taught Mathematics with mathematics Skype instruction and Lecture Method?

Research Hypotheses

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

H_{01} There is no significant difference in the mean achievement scores of students taught Mathematics with Skype instruction and Lecture method.

H_{02} There is no significant difference in the mean retention scores of students taught Mathematics Skype instruction and Lecture method

Methodology

The study adopted pre-test post-test non-randomized quashi experimental research. The population of the study comprises all NCE mathematics students in Niger state Nigeria and target population were NCE II mathematics student. Intact class of 174 students (male =128, female=46) were used for the study from two purposively selected colleges of education in Niger state Nigeria, the schools were purposively selected because Niger state has only two colleges of education. The Instruments for the study are Co-ordinate Geometry Achievement Test (CGAT) and treatment material is Mathematics Skype Instruction (MSI).

The CGAT comprises of 30 multiple choice objective questions and Mathematics Skype Instruction comprised of Co-ordinate Geometry lesson delivered by instructor on Skype medium. The Co-ordinate Geometry Achievement Test (CGAT) and Mathematics Skype Instruction (MSI) were validated by four experts in mathematics education, education technology, cyber security experts and computer scientist in both university and college of education, because the research was carried out in colleges of education. Experimental group were given Pretest before the treatment and after treatment posttest and retention test were administered on them. Experimental group was exposed to the use of Mathematics Skype Instruction (MSI) while Control group was exposed to Lecture Method (LM).

The retention test was administered on the groups after two weeks of posttest. Mean and standard deviation were used to analyze the research questions while ANOVA was used analyzed hypotheses. Conclusion it was established that there was no significant difference in the achievement and retention of NCE II mathematics student taught using mathematics Skype instruction and those taught using lecture method.

Results

Research Question one: What are the mean achievement scores of students taught Mathematics with mathematics Skype instruction and Lecture Method?

Table 4.1:

Mean and Standard Deviation of Pretest and Posttest Scores of Experimental and Control Group

Group	N	Pretest		Posttest		Mean Gain
		$\bar{X}$	SD	$\bar{X}$	SD	
EXP GROUP	103	24.86	8.07	74.47	12.72	49.61
CTR GROUP	71	24.73	8.44	48.40	9.81	23.67

Table 1 shows the mean and standard deviation of the mean 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 $\bar{X}$ =24.86, SD = 8.07 and $\bar{X}$ = 74.47, SD = 12.72 respectively. This gives a mean gain of 49.61 in favour of the posttest. On

the other hand, the mean and standard deviation of the pretest and posttest of the control group are $\bar{X}$ = 24.73, SD = 8.44 and $\bar{X}$ = 48.40, SD = 9.81 respectively and gives a mean gain of 23.67 in favour of the posttest. The result also revealed that experimental group and control group had mean gain of 42.11 and 27.78 respectively, and with the experimental group having the highest mean gain of 42.11.

Research Question Two: What are the mean retention scores of students taught Mathematics with mathematics Skype instruction and Lecture Method?

Table 2:

Mean and Standard Deviation of Posttest and Retention Scores of Experimental and Control Group

Group	N	Posttest		Retention		Mean Gain
		$\bar{X}$	SD	$\bar{X}$	SD	
EXP GROUP	103	74.47	12.72	76.22	10.48	1.75
CTR GROUP	71	48.40	9.81	49.63	12.14	1.23

Table 2 shows the mean and standard deviation of the mean achievement scores of experimental group and control group in posttest and retention test. The result revealed that mean and standard deviation scores of the posttest and retention test experimental group are $\bar{X}$ = 74.47, SD = 12.72 and $\bar{X}$ = 76.22, SD = 10.48 respectively. This gives a mean gain of 1.75 in favour of the retention test. On the other hand, the mean and standard deviation of the posttest and retention test of the control group are $\bar{X}$ = 48.40, SD = 9.81 and $\bar{X}$ = 49.63, SD = 12.14 respectively and gives a mean gain of 1.23 in favour of the retention test. The result also revealed that experimental group and control group had mean gain of 1.75 and 1.23 respectively, and with the experimental group having the highest mean gain of 1.75.

Hypothesis One: There is no significant difference in the mean achievement scores of students taught mathematics with Skype instruction and Lecture method.

Table 3:

Summary of analysis of variance (ANOVA) comparison of the posttest mean achievement scores of the experimental and control group taught Mathematics using (MSI and CTR).

GROUP	Sum of Square	Df Square	Mean	F	Sig
Between Groups	28559.15	1	28559.15	211.16	0.00
Within Groups	23261.90	172	135.24		
Total	51821.05	173			

Table 3 shows the results of the analysis of variance on achievement of students who taught Mathematics using Mathematics Skype Instruction and lecture method. As shown in (Table 3) revealed F (1, 172) = 211.16 p=0.00. With P< 0.05, the null hypothesis (**H_{O1}**) was rejected. Therefore, students taught Mathematics using Mathematics Skype Instruction compared to those taught using Lecture. The mean standard deviation for each of the groups are (MSI) $\bar{X}$ =74.47, SD= 12.72 and CTS $\bar{X}$ =48.40, SD =9.81 with this finding, the student who use Mathematics Skype Instruction have the highest mean.

Hypothesis Two: There is no significant difference in the mean retention scores of students taught Mathematics Skype instruction and Lecture method.

Table 3:

Summary of analysis of variance (ANOVA) comparison of the posttest mean retention scores of the experimental and control group taught Mathematics using (MSI and CTR).

GROUP	Sum of Square	Df Square	Mean	F	Sig
Between Groups	29711.72	1	29711.72	237.19	0.00
Within Groups	21544.89	172	125.26		
Total	51256.61	173			

Table 4 shows the results of the analysis of variance on retention of students who taught Mathematics using Mathematics Skype Instruction and lecture method. As shown in (Table 4) revealed F (1, 172) = 237.19 p=0.00. With P< 0.05, the null hypothesis ($\mathbf{H_{O2}}$) was rejected. Therefore, students taught Mathematics using Mathematics Skype Instruction compared to those taught using Lecture. The mean standard deviation for each of the groups are (MSI) $\overline{X}$ =76.22, SD= 10.48 and CTS $\overline{X}$ =49.63, SD = 12.14 with this finding, the student who use Mathematics Skype Instruction have the highest mean.

Discussion

There was significant difference in the mean achievement scores of students taught Mathematics with mathematics Skype instruction medium and Lecture method. This is in support of findings of Aicha (2014) who investigated the impact of using WhatsApp mobile learning activities on the achievement and attitudes of online students using mobile devices at the university. The results of the experimentation show that there are significant differences, at 0.05 alpha level, in the achievements of the experimental group compared with the control group. Also, in agreement with the work of Kim and Gilman (2008) who examined the use of multimedia components such as visual text, spoken text, and graphics in a Web-based self-instruction program to increase learners' English vocabulary learning. The results lead one to conclude that an effective way to improve learning of English vocabulary is to offer text and graphics that illustrate what the vocabulary means.

There was significant difference in the mean retention scores of students taught Mathematics using mathematics Skype instruction medium and Lecture method. This is concurred with the findings of Jimoh, Alabi, Falode and Olayiwola (2018) who carried out investigation on the effects of three modes of mobile instructional package on mathematics students' achievement and retention. The study revealed that there is significant difference in the mean achievement and retention of mathematics students taught mathematics mobile instructional package (video + only, audio + text and text + only) compare to those taught using lecture method. Also support findings of Achor., Otor and Umoru (2013) who carried out the study on the effects of computer-based instruction (CBI) on students' retention in biology in secondary schools. The result showed that significant difference exists in the retention of students taught using CBI and those taught using conventional method.

Conclusion

1. Mathematics Skype instruction was effective for teaching of mathematics.
2. Mathematics Skype instruction can improve students' achievements in mathematics more than lecture method.

Recommendations

1. Skype instruction should be used by mathematics lecturers as instructional medium.
2. Mathematics lecturers should be trained on the use of Skype in teaching and learning of mathematics.

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WHEN THE FOUNDATION IS DESTROYED, WHAT CAN THE TEACHER DO?

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Abstract
This paper discusses teachers' responsibility at ensuring that students learn values that they might have missed during child developmental age. The learning process for a child starts from the family which is an essential agent of socialization. However, children growth and development in the 21st century have been left in the hands of the teachers at school, television, social media and children playgroup. The teachers in school would have to put all resources and processes together to ensure well-rounded individuals are churned out of school into the society. M-learning and Flipped classrooms were discussed as approaches teachers could utilize to work with students at ensuring learning takes place.

Keywords: Childhood Education, Socialization Process, Parent Involvement, Students attitude, Flipped classroom, M-learning.

Introduction

There is a popular question of the Bible, that when the foundation is destroyed, what can the righteous do? (Psalm 11:3). This question can be likened to the dilemma that teachers in post-primary school face when they come in contact with students that should be taught. The students have had a learning experience that is somewhat different from the type that the teacher wants to present to them. For instance, children who have been taught from home to watch television and play games on mobile phones may have a hard time adapting to reading books in school.

Learning to think and understand is a crucial skill in education that is core part of literacy process. Children develop their thinking capacity from experiences gathered from home during the early childhood days. Garcia and Ríos (2014) identified several forms of family participation that contribute to the improvement of school performance and ability for a child to socialize well in schools. Likewise, children learn to participate in decision-making processes, and build certain forms of intelligence when properly taught from home before entering school.

Learning is a major influencer of children development and it depends on how well a child is nurtured. Because individuals are not born knowing how to behave in society, there is need to learn many of the behaviors from the environment while growing up. For most children, this learning starts with the family at home. Academic success at an early age carries core values, attitudes, and habits into other areas of life (Fairmount, 2019). Not only are children more driven to succeed, but they also experience an increase in courage and commitment. The families and the involvement of teachers at an early age result in more capable students who actively seek to overcome challenges and succeed over the course of their lives.

Learning comes in many forms. Sometimes children learn by telling them something directly. However, the most common way children learn is by observation of everyday life. A child's learning and socialization are most influenced by their family since the family is the child's primary social group (all4kids.org, 2019). As the primary agents of childhood socialization, parents and guardians in a home play a critical role in guiding children into their roles and responsibilities deemed appropriate in a society. They continue to teach gender role behaviour either consciously or unconsciously, throughout childhood. Families also teach

children values the children will hold throughout life. The children frequently adopt their parents' attitudes not only about work but also about the importance of education, patriotism and religion (Masten & Monn, 2015).

What went wrong?

The importance of parental involvement in the education of children is extensively documented. Everard, Morris and Wilson (2004) state that problems concerning behaviour and school related outcomes are easier dealt with if parents and teachers work together and there is a positive correlation between parental attitudes and their children's academic performance. In primary school science it was observed that children learn more at home if their parents explain things to them as they go along (Mafa & Makuba, 2013).

Despite the identified numerous importance of childcare and family education in the early development of a child's cognitive and social abilities, the key players which are the parents are usually not available to play the necessary role as they need to work to pay bills. Parents are assumed to respond more to financial incentives at workplace as this would enable them to settle bills and so, they are likely to find themselves distracted from important issues of the social well-being of the children. Waldfogel (2017) reported that less than one third of the children receives the needed family training from parents while the rests are left to be attended to by nannies, day-care centers, grannies or the television.

Older Students put in a negative attitude to learning as they believe that education is not fascinating like other professions like music industry, film industry, sports and so on. Students thus channel their interest into those things they think can propel their fame and wealth in short time. This could be responsible for the attitude of students towards learning which has been proven to be negative in some cases. Some parents encourage their children to nurture this attitude towards learning by creating a belief in the children minds that all there is to life is to make money.

Also, technological advancements have taken its toll on how parents raise their children. Children are left in front of screens (Mobile phones, television or computers) to learn while they suffer neglect from parents and siblings that are engrossed in their separate screens. The presence of so many entertaining and interactive activities on the internet that can be accessed on mobile phone and tablets competes with the attention parents should give their children that would aid in proper development of the cognitive and social abilities of the child. Likewise, children could learn the addiction to screen from their parents and this would be a hard-nut case for the teachers especially those who have not mastered the art of integrating emerging technologies into classroom environment.

What teachers could do to Remedy the lost values in Children

Research on child–computer interaction has sought to provide children with technology-mediated activities where communication and collaboration are not impeded (Hourcade 2015). The challenge for researchers is to move away from personal computing, a paradigm that a user sees by device, with little or no interaction with others. In recent years, researchers like Sherry Turkle (2017) have sounded the alarm about how personal devices reduce face-to-face interactions (with family and other important daily interactions), due to the distracting effect caused by mobile phones and tablets in children and adults. The proliferation of mobile devices and their use by children of all ages has opened the debate in families and school environments. In this sense, educators, having overcome the conception of technology as a danger to their development, agree with the scientific community that a responsible,

educational, creative, and supervised use of mobile devices can be highly beneficial for the playful opportunities that offer and their potential for the cognitive, social, and emotional development of young children

Intricacy can take place when students at any level of education need to digest information of their reading from books, lecture session or academic discussion without the use of complement application. Screen media in forms of videos, games, blogs and social networks are increasingly common in children's life. It is therefore essential to understand the impact of specific technologies such as smart phones, tablets or e-books for literacy and the best ways to include these technologies in children's routine at home, in childcare or in the classroom. This therefore makes the use of technological software and hardware empirical and inevitable to boost learning. Facilitating learning via the use of technologies are the upright mission of educational technology. Education in the 21st century has become dynamic and as such learning is not restricted to any certain time and place. The use of different and various means for information and communication technology has become empirical for students in learning. As the world has emerged into an information age, the utilization of technology in various educational settings to boost learning is inevitable (Bonk, & Graham, 2006). Therefore, it is expected that parents, teachers and school administrators show great efforts in passing information to students by using effective technology-based methods. These efforts will increase the performance of students and make them more skilled.

As a good-looking car might not function without fuel in the engine, so also learning might not be fully achieved without learning materials and media. Internet literate or computer literate students can quickly obtain easy access to any information they need to boost learning. The ubiquity of learning technologies and internet has ensured that children have access to a wide range of learning contents either at home or at school. In other words, with the use of information technologies, learning could be made continuous. Teaching and learning in various educational classrooms around the world are progressively utilizing technology to keep the children active both at school and at home (El-Abbouri, Hildebrandt, & Puckett, 2014). Garrison and Vaughan, (2008) established that the use of blended learning has to a great degree yielded boundless strides of achievement especially in keeping track of children learning activities and value formation.

Knowledge and information are essentials for people to respond to the opportunities and challenges of social, economic and technological changes. What role can the teacher play in curbing these educational challenges of students. If the foundation of a building is destroyed, the architect can still come to the scene, recommend and proffer possible solutions to the problems on ground. It might be that the building be demolished in other to start afresh or structure some pillars to support the weak foundations. In the same vein, with all the educational challenges in educational system which makes it seem impossible for some students' learning problems to be insignificant, is there any role the teacher could play.

Parents and teachers need to utilize students' environment and what they are versed with to create learning instructions. For instance, M-learning also known as mobile learning is a key area widely accepted by young learners because of its independent and ubiquitous nature. This form of instruction is driven in large part by the need to deliver different kinds of training to more students in more places in line with the existing training budgets, resources and equipment available. In most countries of the world, students of high school or secondary age already have smart phones or PC-tablets that schools and educational institutions can leverage on to facilitate m-learning among the students. Likewise, many school starters through their

parents have access to smart devices that could house learning applications to be used for mobile learning purposes.

Development of several learning apps and websites such as Sesame Street First Steps, Jump Start Preschool Programs, Adventure Workshop, Reader Rabbit and a host of others that could be accessed on mobile devices has made M-learning fun and active for learners. For instance: "The Tag Reading System" by LeapFrog is an optical pen that can read to children aloud from specially designed story books; BeeBots are a programmable robot for preschool children that teaches pre-math skills such as sequencing, estimation, problem-solving, graphing skills and number awareness; Leapsters is a game that teaches school readiness and eye-to-hand coordination that would be needed in school. Teachers and parents could utilize these applications to arrest and maintain the attention and interest of students away from the distractions available on the internet and television. When not properly guided, some students use these electronic devices or information and communication technological tools for other activities aside learning. Students use of smart devices for social connections and movies is a major challenge to the implementation of m-learning.

Flipped classroom or flipped learning is another path that parents and teachers can utilize to work together at ensuring that students learn. With the use of flipped classroom, students might be required to watch educational videos while at home ensuring that quality screen time for the student is achieved. Flipping a classroom allow students to learn new material at their own pace: they can pause the video to take notes and process information; they can rewind and review the video if there is something they do not understand (Educause, 2012; Bergmann & Sams, 2012). The flipped or inverted classroom is a form of blended learning in which events that have traditionally taken place inside the classroom now take place outside the classroom and vice versa. In this model, learning is divided into two parts – interactive group learning activities inside the classroom, and direct computer-based or video based individual instruction outside the classroom (Bishop & Verleger, 2013).

Brame (2013) opined that the flipped classroom as having four key elements: provide an opportunity for students to gain first exposure to course material prior to class, whether through lecture videos or screencasts; give students an incentive for students to prepare for the day's activities by requiring them to complete a specific task before they come to class; develop a mechanism to assess student understanding; use in-class activities that focus on higher level learning objectives. These can be accomplished via automated quizzes, discussion board posts, or assignments to be reviewed in class. Pre-class tasks can help the instructor tailor class content to match student need. Self-grading quizzes can provide students with self-knowledge as to where they need help. In-class activities can be structured so as to provide students with feedback both from their peers and the instructor. Class time should be used to promote deeper learning and to increase the skill with which students can apply and synthesize the knowledge they gained when preparing for class.

Education empowers communities and citizens to fully participate in development and prosperity. Such development which communities experience via education empowerment influences and propel their prosperity. But this can only be effective if barriers against the successful delivery of such information are being encountered (Onojah 2016). Students might not be performing up to task due to factors emanating from the difficulties which hinders or slowdown their rate of learning. Therefore, there is a need to device a means to hinder the barriers which is expected to destabilize students' learning. One of such could be appropriate adoption of instructional technology which is the theory and practice of design, development,

utilization, management, and evaluation of processes and resources for learning. The role of instructional technology in teaching is of great importance because of the use of information and communication technologies. Various applications to enhance distance education, the Internet, teachers, and students themselves, aid learning if properly integrated into the teaching and learning process.

Stosic and Serbia (2015) stated that with the application of instructional technology, students can independently progress in mastering teaching materials, to choose the pace of work, to repeat the material that is not sufficiently clear, that after tests performed immediately get results and track their progress. This would cater for all learners' academic progress regardless of their individual differences. Students are expected to level up with their counterparts in their local environment and their counterparts from other countries in their academic performances. It is therefore imperative to employ techniques and technology which can aid students to overcome the negative effect of this recession on their academic performances.

Everybody can learn, but not with the same style, the same time nor the same pace. The pedagogical model of instructional technology encourages students to learn in an interactive and collaborative environment, and at their own pace and in their own time. The instructor or teacher as the case be, leads the process of teaching and learning with instructional technology but it does not mean that the instructor is responsible for students learning. But the teacher can facilitate learning through various means, techniques and methods through an ethical means and practice and also improve performance via such practices. Teachers can assist students learn to manage their expectations and feelings of isolation by embracing technologies that can help in curbing educational challenges.

Children's interest in learning can be enhanced when teachers and parents have these in mind about learning (Zosh, Hirsh- Pasek, Gollinkof & Morris 2019):

i. Learning occurs when the learner is active rather than passive - Active learning occurs when the learners mind and hands are engaged on the instructional activity presented. Mobile learning encourages more active engagement than other forms of media, such as television or traditional books, given the interaction children have with the tablet screen. Learning occurs when the learner has to mentally manipulate ideas, see similarities and differences between new concepts and existing knowledge, and incorporate this new information into a more comprehensive understanding
ii. Learning occurs when the content is meaningful - Children can learn anything – from the names of animals to the characteristics that make mammals different from reptiles. However, when selecting or creating educational instructions, it is crucial that children do not just learn that the sphere on the screen is a sphere but that the football they play with resembles a sphere too. Learning must occur in contexts that connect meaningfully to children's lives.
iii. Learning is maximized with social interaction - While one of the attractive features of M-learning and Flipped Classroom is that children, from an early age, can carry out assignments independently, research repeatedly shows that social interaction supports learning. Teachers should find a way to incorporate collaborative assignments that would require learners to work together with peers and colleagues at achieving a common goal.

iv. Guided exploration towards a learning goal is best - In guided instruction, the child is given an active and primary role but a more knowledgeable partner or adult guides and supports the child's learning. This method may help children establish a particularly prepared, flexible and active mindset that promotes active, engaged, meaningful, and socially interactive learning.

Conclusion and Recommendations

In order for teachers to capture learners' attention from the so many distractions on television, social media and internet, there is need to package instructions in such a way that would make learners active and engaged rather than passive during the learning process. Hence, it is recommended that the teachers should utilize approaches like m-learning and flipped classroom to teach students in order for them to be actively engaged and involved both in school and at home.

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DEVELOPMENT AND EVALUATION OF MOBILE LEARNING-APP ON SELECTED BASIC TECHNOLOGY CONCEPTS IN ILORIN METROLIS

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Abstract

The Integration of mobile technologies into instruction have a great potential to stimulate learning, engage students and improve classroom and outdoor teaching. In spite of the enormous benefits of mobile devices for instruction, mobile devices have not yet been deployed for learning in Nigeria secondary school, thus the objective of this study was to develop and evaluate mobile learning-App on selected Basic Technology Concepts in Ilorin Metropolis. This study is a research design and development of Model type. Five (5) Educational Technology experts, five (5) Basic Technology experts and three (3) computer science expert were randomly selected for the study. Basic technology Learning-App, Educational Technology expert rating guide, basic technology expert rating guide computer science expert rating guide were employed. Mean rating and standard deviation were used to answer the research questions. The results of the findings indicated that ;(i) Educational technology experts rate the developed basic technology mobile learning-App as suitable for instruction with mean value 3.42> 2.5 (ii) Basic technology experts rate the developed basic technology mobile learning-App suitable for instruction with mean value 3.43 > 2.5 among others. The study concluded that the developed basic technology learning App is suitable for teaching and learning basic technology. The implication of this findings is that, the learning App will create an effective teaching and learning experience of basic technology in upper basic secondary school. It was therefore recommended that; secondary school teachers should be trained on how to develop learning Apps irrespective of their area of specialization.

Key words: Mobile Technology, ICT, Gender

Introduction

The field of education has been affected by Information and Communication Technologies which have undoubtedly affected teaching, learning and research (Yusuf, 2005). Therefore, a better education system will also allow Nigerian youth to take advantage of economic opportunities and also become active players in their own economy and reduce the rate of unemployment in the country (World Bank, 2010). Learning societies constantly change, giving room for dynamics in its educational system. Having recognized the role self-employment can play in the high rate of unemployment, Nigeria is making serious efforts to establish and systematically improve the teaching of technical and vocational education and training (FRN, 2014), Basic technology as a subject is very important for the scientific and technological advancement of any nation as its usefulness cuts across all fields of human endeavor (Onasanya, Fakomogbon, Shehu & Soetan, 2010. Uwaifo (2011), asserted that the aim of the basic technology is to develop in children the aptitude for things that are technical and not necessarily making them technicians.

Instructional resources give room for acquisition of skills, knowledge and development of self- confidence and self-actualization. (Ali, Haolader & Muhammad, 2013) referred to instructional resources as objects or devices, which help the teacher to make a lesson much clearer to the learner. The integration of instructional media in education to facilitate teaching and learning is one that brings about effective impartation of knowledge on the students. Instructional resources are the different teaching resources which a classroom teacher employs to facilitate teaching for the achievement of the stated objective.

Abdul-Raheem (2016) defined instructional resources as essential and significant tools needed for teaching and learning of school subjects to promote teachers' efficiency and improve students' performance. Instructional resources are those resources and equipment that support

the instructional program to allow varying achievement levels, free choice, reading interest and teaching-learning styles. They are those resources and equipment used by the teacher during teaching and to improve student's knowledge, ability and skills to monitor their assimilation of information and to contribute to their overall development and upbringing (Onasanya, 2011). The use of new technologies in the classroom is indispensable for providing opportunities for learners to learn new ideas, skills and to operate in this digital era.

Traditional educational setting seems not to be suitable for preparing learners to function well and become productive in the current working society. In this 21st century proliferation of digital technology, any organization that does not integrate new technologies in institutions cannot seriously claim to prepare students for life in the 21st century (Ali, Haolader & Muhammad, 2013). The use of as an instructional resource speed up the rate of change in this domain. ICTs by their very nature are tools that encourage and support independent learning. ICTs greatly facilitate the acquisition and absorption of knowledge, offering developing countries unprecedented opportunities to enhance educational systems. The use of ICT is making major differences in the learning of students and teaching approaches. ICT provides opportunities for students to communicate with one another through e-mail, mailing lists, chat rooms, and so on. It also provides quicker and easier access to more extensive and current information, and it can be used to do complex mathematical and statistical calculations.

Angel (2008), affirmed that the world is gradually being saturated with information. Information and Communication Technology as tools within the school environment include use for school administration and management, teaching and learning of ICT related skills for enhancing the presentation of classroom work, teaching/learning intellectual, thinking and problem solving skills, stimulating creativity and imagination, for research by teachers and students and as communication tool by teachers and students (Derbyshire, 2003; cited by Abdul-Salam, 2016).

(Kirschner & Woperies, 2003) agreed that the potentials of ICT to facilitate students' learning, improve teaching and enhance institutional administration. The knowledge of ICT has brought forward a well-structured knowledge with a pace of learning, this is not only use various teaching and learning resources in the pursuit of learning but also requires the students to construct their own knowledge, learn more independently and in that process acquired the habit of individualize learning which could upgrade the teaching and learning resources which include the use of computer, compact Disk, Digital Video Disk (DVDs), internet and other media. The use of ICT as a tool for enhancing students' learning, teacher's instruction and as a catalyst for improving access to quality education in formal and non-formal settings has become a necessity. (Yusuf, 2005) observed that the field of education has been affected by the penetrating influence of information and communication technology. The author stressed that, ICT has impacted on the quality and quantity of teaching, learning, and research in traditional and distance education institutions.

More so, mobile technology is one of the current ICTs versatile tools for teaching and learning process (Hartnell & heym, 2008). This is for the fact that teaching and learning process is shifting from traditional method to technology integrated learning. The effective integration of mobile technology into educational settings has poses a challenge to instructors and school administrators (Mcconatha, Praul, & Lynch, 2008). The innovations that mobile technology has brought into teaching and learning process have made a great change. Studies maintain that a mobile technology has the power to change the ways students learn and teachers teach and it is also suggested that mobile technology can transform the teaching-learning process (Narayanansamy & Ismail, 2011; Sarrab, Elgamel, & Aldabbas, 2012). This implies that mobile technology is a catalyst for transforming; transforming the process of exchanging information, teaching methods, learning styles, scientific research, and in accessing information.

Mobile technology is of more relevance to education due to the advancement of technologies equipped in majority of the mobile phones which makes the devices become more capable of supporting the learning and teaching activities (Hujainah, Dahlan, & Al-hami, 2016). Mobile learning (m-learning) is a learning tool which can be run on mobile devices. It is considered to be an enhancement to the electronic learning (e-learning). M-learning overcomes several limitations of e-learning especially in teams of mobility. It provides more independent way of learning whereby learners can use the application to do learning activities at any time

and place. However, as with other learning and teaching applications to be developed for mobile learning must also be developed based on certain learning theories and guidelines in order to be effective as well as usable (Khadage & Latteman, 2013). It is true that mobile phones are mainly used for completely communication purposes, but fortunately some people have begun to regard them as a core pedagogical activity in higher educational institutions, (El-Hussein & Cronje 2010).

Most students have started overcoming their difficulties regarding the place and time of lectures via the effective exploitation of their mobile phones or what has been so called "Mobile Learning". Teachers, look for possible innovative ways of providing their students with the teaching materials and activities through their mobile phones. Nowadays, Mobile Learning has been widely accepted by learners. In other words, learning via mobile devices is widely accepted by the learner community because of its application as well as its philosophy and standards, (Lan, Huang, 2012 & Little, 2012).

Khanghah and Halili, (2015) posited that mobile learning applications help students to learn by themselves without restriction of time, place and target audience age which are the students. Using mobile learning applications to learn encourages students to learn on their own and retain greater interest. Mobile learning application assists in delivering contents that attract learners' attentions and help to understand learning content. Mobile learning-app has become pervasive, as many higher institutions of learning have initiated a number of mobile learning initiatives to support their conventional method of learning (Shiyadeh, Rad, & Jooybari, 2013). This infers that mobile learning-app have been developed and adopted globally due to its effectiveness in teaching and learning process.

Mobile learning is emerging as one of the solutions to the challenges faced by education. With a variety of tools and resources always available, mobile learning provide increased options for the personalization of learning-mobile learning in classrooms often has students working interdependently, in groups, or individually to solve problems, to work on projects, to meet individual needs, and to allow students learn at convenient place and times (Ally, 2009).

Statement of the Problem

The integration of instructional media such as mobile application into teaching and learning has improved both the students and teachers in the educational sector. The advent of mobile technologies has created opportunities for delivery of learning via devices such as PDAs, mobile phones, laptops, and PC tablets (laptops designed with a handwriting interface). Collectively, this type of delivery is called m-learning. (Akpan, Usoro & Akpa, 2010), suggested that pupils are supposed to acquire skills in basic technology to makes them fit into the society as on completion of the learning activity students cannot carry out simple daily maintenance on technological appliances.

Many students and teachers use their device for non-academic activities like financial transaction and chatting, downloading app that does not have relevance to education. Lack of educational application such as basic technology application for teaching and learning basic technology in upper basic secondary school undermines the use of mobile technology for teaching and learning. To this end, opportunities presented through mobile technology are rapidly expanding and the focus on how it can be incorporated to support learning is increasing everyday (Botha, Cronje, & Ford, 2007), this study brings about the need to develop mobile-learning app for teaching and learning basic technology. Hence this study will develop and validate basic technology Learning-App for upper basic secondary school students in Ilorin metropolis.

Purpose of Study

The purpose of the study was set to:

1. Examine the processes involved in the development of basic technology learning app for teaching and learning basic technology.
2. Examine the ratings of educational technology experts on the developed learning App in teaching and learning basic technology.

3. Determine the ratings basic technology experts on the developed learning-App in teaching and learning basic technology.
4. Examine the ratings of computer science experts on the developed learning-App in teaching and learning basic technology.

Research Questions

The study provided answers to the following research questions.

1. What are the processes involved in the development of basic technology learning app for teaching and learning basic technology?
2. What are the ratings of educational technology experts on the developed learning-App in teaching and learning basic technology?
3. What are the ratings of basic technology experts on the developed learning-App in teaching and learning basic technology?
4. What are the ratings of computer science experts on the developed learning-App in teaching and learning basic technology?

Methodology

This study is a Research design and development of Model type. The research deals with the development and validation of the existing or newly constructed development model process or techniques. The population of this study were all basic technology, educational technology and computer science experts in Ilorin metropolis. 5 (five) basic technology teachers, 5 (five) Educational Technology experts and 3 (three) computer science experts were randomly selected for the study from selected secondary school and University of Ilorin.
Basic technology Learning-App (TECH-APP), Educational Technology Expert Rating Guide, Basic Technology Expert Rating Guide and Computer Science Expert Rating Guide were the instrument used for data collection and they were validated by Educational Technology Expert, Basic Technology Expert and Computer Science Expert for scrutiny and expertise assessment in order to ensure content and construct validity. Their comments, suggestions and corrections were used to produce a final draft of the instrument. The collected data were analyzed using weighted mean, percentage and frequency descriptive and inferential statistics with the aid of statistical package for social science (SPSS) version 20.0.

Results

Research Question One:

What are the processes involved in the development of basic technology learning app for teaching and learning basic technology?
The basic technology mobile learning App was design and developed based on the ADDIE model. The ADDIE Model is a fundamental and simplified instructional system design model. Most of the instructional design models are based on this generic ADDIE Model (Kruse, 2011). The model consists of five different but interrelated phases: analysis, design, development, implementation and evaluation phase. The details of the five phases were elaborated further in the development phases below.

Analysis phase

It was decided that the instructional platform design was to be a mobile learning App on basic technology and the topics to be design are woodwork machines and metal work machines.

Design stage

The design phase involves the process of transferring the ideas and concepts into something that is tangible and visual. Thus, the basic technology learning App was developed based on the three aspects of learning App design which are interactional, informational and representation. The details of each aspect were as follows:
Interaction Design: involves the process of designing the software using MOBIRISE App inventor and using WEB TO APK BUILDER software to convert the software into an application. Also determining how the users gain control of the software.
Informational Stage: deciding on how the information is to be presented to the users.

Table 1: Course content of Basic Technology Learning App

Week	Contents	Objectives
1	Wood work machines	(i)Define wood work (ii)Identify the various types of woodwork machines. (iii)State the uses of machines. (iv)Carry out simple operations (cutting and boring) with the machines.
2	Metal work machines	(i)Define metal works. (ii)Identify the various types of metalwork machines (iii)State the uses of the machines. (iv)Explain simple machine operations (cutting, drilling, grinding, milling etc.) (v)State basic care and maintenance techniques of metalwork machines.

Representation Design: planning the layout of the learning App with regards to three elements: color, scheme, font and graphic. At this stage, the entire framework and architecture of the basic technology learning App is constructed and designed.

Development Phase

This third phase of development of the basic technology learning App involves the actual process of writing and preparing the teaching materials for the learning App. The main includes target audience which is upper basic secondary school II and the instructional content. The instructional content includes woodwork machines as sub menu and metal work machine. Wood work has section such as instructional objectives, introduction, types and uses of woodwork machines, summary and essay questions and metal work machines also has section such as instructional objectives, introduction, types and uses of metal work machines, summary and essay questions.

Implementation Phase

Implementation phase involves the process of making the basic technology learning App available to experts for validation. The basic technology learning App was validated by different types of experts which includes computer science experts, basic technology experts and educational technology experts.

Evaluation Phase

To determine the validity of the instructional learning App, responses were obtained via questionnaire conducted on the various experts. For the basic technology learning App the validation was done by three different types of experts which includes three computer science experts, five basic technology experts and five educational technology experts. The questionnaire was specifically designed to obtain feedback on the various experts in the various field.

Research Questions 2: What are the ratings of educational technology experts on the developed learning-App in teaching and learning basic technology?

Table *2*: Educational technology experts rating of the developed basic technology mobile learning-App for upper basic secondary school.

Items	Mean
1. The use of text follows the principles readability	3.40
2. The numbers of color in each screen is not more than six	3.80
3. The design uses proper fonts in terms of style and size	3.60
4. The TECH APP is structured in a clear and understandable manner.	3.20
5. The presentation of information can captivate learner's attention	3.00
6. A high contrast between graphics and background is retained.	3.00
7. The presentation of information can stimulate recall	3.40
8. The package allows learner to work on their own pace	4.00
9. The introduction of TECH APP facilitates learning by doing	3.60
10. The TECH APP is structured to allow learner to move around freely in different units	3.20
Grand Mean	**3.42**

From the data gather from table 2, a grand mean of 3.42 is obtained. Since the grand mean was greater than the bench mark which is 2.5, this shows that basic technology learning App is suitable for instruction.

Research Questions 3: What are the ratings of basic technology experts on the developed learning-App in teaching and learning basic technology?

Table *3*:
Basic technology experts rating of the developed basic technology mobile learning-App for upper basic secondary school.

Items	Mean
1. The content TECH APP is sufficient to achieve the stated objectives for the selected topics in basic technology.	3.20
2. The content in TECH APP is in line with the basic technology curriculum.	3.80
3. The sub-topics have been sequentially and coherently arranged.	3.40
4. The language used in the TECH-APP is simple and easy for both teachers and students.	4.00
5. The diagrams in TECH APP are clear enough.	4.00
6. The TECH APP help make learning effective and efficient.	4.00
7. The content in TECH APP can facilitate easy achievement of expected behavioral outcome.	3.60
8. The evaluation questions for each lesson are relevant for the attainment of the lesson objectives.	3.60
9. The content of TECH APP is in line with the target audience.	3.40
10. The assignments are relevant to the topics treated.	3.80
Grand Mean	**3.43**

From the data gather from table 3, a grand mean of 3.43 was obtained. Since the grand mean was greater than the bench mark 2.5, this shows that basic technology learning App is suitable for instruction.

Research Questions 4: What are the ratings of computer science experts on the developed learning-App in teaching and learning basic technology?

Table *4*:
Computer science experts rating of the developed basic technology mobile learning-App for upper basic secondary school.

Items	Mean
The structure of the package permits learner to advance, review, see examples, repeat units, or escape to explore another unit	3.00
The TECH APP has ease of navigation	3.20

FAVICON for returning to the main menu	3.00
Key for access previous unit	3.20
The presentation of information can stimulate recall	3.40
The TECH APP screen is designed in a clear and understandable manner.	3.00
The quality of the text, images, and graphics is good	3.40
The content can be update and/ or modified with new knowledge that will appear soon after the development of package	3.40
The package can be used in different platform	3.00
The package provides opportunity for interaction at least over three or four screen frames	3.60
Grand Mean	**3.22**

From the data gather from table 4, a grand mean of 3.22 was obtained. Since the grand mean is greater than the bench mark 2.5, the basic technology mobile learning App was suitable for instruction.

Discussion

This study developed and validated basic technology learning App for upper basic secondary school students in Ilorin metropolis. Result of the findings from this study based the processes involved in the development of basic technology learning app for teaching and learning basic technology. This involves the use mobile App developing software known as mobirise to create the basic technology learning App for upper basic secondary school in Ilorin metropolis. ADDIE model was used to design and develop the learning App. This study agrees with Reiser and Dempsey (2007), which states that ADDIE model is the most basic and applicable, generic and systematic instructional systems design mode for development of instructional material.

It was revealed in the study that educational technology experts rated the basic technology learning App as suitable for the purpose it is intended for. The grand mean obtained revealed that the basic technology learning App have been developed to be in line with educational technology principle of design and can be utilized for teaching and learning , if integrated appropriately as Naimie, Siraj, Ahmed, Abuzaid, and Shagholi, (2010) asserted that the integration of technology into instruction creates new opportunities for learning activities which increases students' engagement of different learning styles.

The grand mean obtained revealed that the basic technology learning App content is suitable for the target audience and can achieve the objective of basic technology in Nigerian curriculum as stated by (Fakomogbon et al., 2012), that the objectives of teaching Basic Technology subject in Nigerian junior secondary school schools are to, provide pre-vocational orientation for further training in technology, providing basic technology literacy for everyday living which is the second objective and lastly to stimulate creativity.

Research Question three sought to know the ratings of computer science experts on the developed Learning-App in teaching and learning basic technology. The grand mean obtained revealed that the basic technology learning App have been well structured and suitable for the purpose it is intended for as Khanghah & Halili (2015) posited that mobile learning applications encourage individualistic learning without restriction of time, place and the age of the target audience. Using mobile learning applications to learn encourages students to learn on their own and retain greater interest. In addition, learners' performance will be enhanced as long as there is some interaction between learners and the mobile applications (Hamdan & Ben, 2012).

Conclusion

The result obtained from data gathered and analyzed in this study indicated that the developed basic technology learning App for upper basic secondary school in Ilorin metropolis is suitable for teaching and learning basic technology in upper basic secondary school if well deployed into instructional process.

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COLLEGES OF EDUCATION LECTURERS' ATTITUDE AND INTENTION TOWARDS USING SOCIAL MEDIA IN INSTRUCTION IN SOUTH-WEST, NIGERIA

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Abstract
Great improvement brought by Social media into the teaching learning process cannot be overemphasized. However, especially among the developing nations, not many countries have adopted its use, hence, this study on colleges of education lecturers' attitude and intention toward using social media in instruction in South-West, Nigeria. The research design was descriptive cross-sectional survey method with sample drawn from ten Federal and State colleges of education in South-West, Nigeria. 1069 lecturers responded to the adapted questionnaire used to gather data. Mean score was used to answer the two research questions formulated. Findings showed that attitude (x = 3.16) and intention (x = 3.14) to use social media in instruction was positive with maximum possible mean being 4. The implication is that Social media will be highly welcomed if integrated in Nigerian colleges of education for instructional purposes. It was therefore recommended among others that colleges of education lecturers should acquire higher skills and develop their proficiency in the utilization of Social media tools.
Keywords: Social media, Attitude, Intention.

Introduction

In the design and provision of qualitative education the quest for interactivity has become a necessary goal. Interaction is central to the expectations of teachers and learners in education, and to that extent, it is the primary objective of the educational process (Omoniyi, 2005). This interactivity has paved way for the integration of information and communication technology into the teaching and learning process. Now the rate of imparting knowledge is very fast and education has become easier. Orunmoluyi (2012) opined that with ICT, studies have been made easy in a way that it can be carried out in groups or in clusters.

The influence of ICT has permeated every aspect of human life and endeavour (Olagunju, 2010). The teaching and learning process have been dramatically altered by the convergence of a variety of technological, instructional and pedagogical developments in recent times (Marina, 2001; Smith, 2002). The coming of technologies has in immense measure, challenged the traditional way of teaching and learning (Kwache, 2007). ICT is an interdisciplinary science primarily concerned with the collection, classification, manipulation, storage, retrieval and dissemination of information. This development has its origin in the common stock of human knowledge (Badmus, 2013). The advent of ICT, especially in its modern form, has brought about effective and efficient information generation, utilization and dissemination, storage and retrieval.

Ifinedo (2005) explained that the impact of ICT in education in Africa is still very low compared with developed world. A good number of researchers have carried out investigations to substantiate why Africa and other developing countries are still backward technologically in this computer age. However, African countries have come to realize that they have to move with the trend of technology globally for the varieties of advantages it offers. Ifinedo (2005) carried out a research to determine the readiness of some African countries which are Botswana, Cote d'Ivoire, Egypt, Ghana, Kenya, Mauritius, Nigeria, South Africa and Tunisia. The result of the research on the readiness of Africa revealed that Africa is right below the ladder in the global networked economy. In recent times, some African countries are making efforts to be technologically alive. Nigeria launching her first communication satellite on July 7, 2011 is a tremendous effort towards the right direction.

As reported by Orunmoluyi (2012), Nigeria has come to recognize the importance of ICT, and so Nigerian National Policy for Information Technology (IT) was formulated in the

year 2001, which states the National Information Technology vision, mission and policy. The vision is to make Nigeria ICT capable country in Africa and a key player in the information society by the year 2005; using ICT as the key engine for sustainable development and global competitiveness; the mission is to use ICT for education, creation of wealth, poverty eradication, job creation and global competitiveness while in policy, the government recognizes IT as a strategic imperative for national development and taking cognizance of its immense benefits, government has resolved to provide considerable national resources, both financial and otherwise for the realization of the National IT vision statement (Njoku, 2006).

Generally, ICT has been described as an umbrella term that includes any communication device or application (encompassing radio, television, cellular phones, computer network, hardware and software, satellite systems and so on). It is a phrase used to describe a range of technologies for gathering, storing, retrieving, processing, analyzing and transmitting information (Adenegan, 2009). ICT has found its way into different networks of life such as social (facebook, skype, twitter, Hi-5, games, etc.), academic/research, communication and commercial networks. ICT is a new development with tremendous impact and potentials on tertiary education in particular and education in general.

The term "social media" has become inherently connected to the popular YouTube, Flickr, and Facebook websites. Describing media as social implies that it exists in a social space and/or user interact in some way through the media. Grover and Stewart (2010) defined social media as the arena where users can engage in the creation and development of content and gather online to share knowledge, information and opinions using web-based applications and tools. According to Kaplan and Haelein (2010) defined social media as a group of 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.

social media as technologies that facilitate social interaction, make possible collaboration and enable deliberation across stakeholders (Bryer & Zavatarro, 2011). These technologies include blogs, wikis, media (audio, photo, video, text) sharing tools, networking platforms (including Facebook) and virtual words. They (social media) are range of applications that augment group interaction and shared spaces for collaboration, social connections and aggregates information exchanges in a web-based environment. Different media like Facebook, MySpace, Twitter and many others are a new development that can be used to improve learner performance.

Attitude is the controller of actual behaviour of an individual, consciously or unconsciously (Yusuf, 1998). According to Littlejohn (2002), attitude is an accumulation of information about an object, person, situation or experience… a disposition to act in a positive or negative way toward some object. According to this theorist, attitudes toward any object play an extremely important role in influencing subsequent behaviours towards it.

Positive attitude on the part of the lecturers is very important if social media are to be effectively integrated into the school curriculum. Adetimirin (2008) studied factors affecting the use of technology in higher education. Among the factors that affect the successful use in the classroom are lecturers' attitudes and disbelief in the use of technology. Studies on lecturer's attitude to computer confirmed that lecturers have positive attitude, yet computers were not being used for instructional purpose (Olumorin, 2008). The National Policy on Education (FRN, 2004) emphasised the need to use ICT at all levels of education. Lecturers at the colleges of education should therefore not develop negative attitude to implementation of ICT in general and social media in particular. This is because good ICT-related behaviour among the lecturers would replicate good ICT behaviour on their students (the pre-service or in-service teachers) and consequently, the students that would be taught later in life by these neophyte teachers (Adeyanju, 2012).

However, no matter how positive the attitude may be, if the lecturers do not intend to use social media in teaching, all other efforts will continue to prove abortive. Intention refers to having something in mind as a plan or purpose. It means planning to do something. It is a matter of willingness from the heart. Adeyanju (2012) reported the observation of Young (1998) that although there are more computers and other information technologies in tertiary institutions nowadays, the use of these technologies has in a large number of cases, not enhanced either individual or institutional level of productivity. The reasons adduced for this

include inadequate training in new skills, and / or unwillingness by lecturers themselves to learn new skills.

Statement of the Problem

One of the tenets of education throughout the world is the introduction and integration of ICT in education (Jhuree,2005). Social media and networking technologies have significant potential to recreate the learning environment between student and teacher. Learning can be experienced as a uniquely social enterprise; course content can be co-created by a community of learners, where the instructor is a learner along with students. The role of instructor might then transform to become as much facilitator as subject matter expert (Fountain, 2001). According to Crook et al, (2008), Social media tools also provide learners with new opportunities to become independent in their study and research.

However, in Nigerian higher institutions today, not much has been done with social media in the education arena especially in employing them as tools for instruction (Folorunso, Vincent, Adekoya & Ogunde, 2011). Onasanya, Yahya, Akingbemisilu and Ayelaagbe (2013) looked into online social networking and the academic achievement of university students in some selected Nigerian universities. Ayannuga, Olukumoro and Ayannuga (2012) researched on social media as a tool for deploying instruction materials among Nigerian undergraduates. It was reported that generally, students found the technology easy to use and enjoyed getting familiar with emerging technologies while completing their coursework.

For social media to be relevant in education, it is essential for teachers to focus on the pedagogy behind the use (Kember, 2008). Moreover, colleges of education lecturers also occupy important position in transmitting technology culture in instructional delivery to future generations of teachers who will be found in the classroom. Therefore, if social media tools will be relevant within the education context, the lecturers' attitudes and intention towards its usage in teaching should be investigated. This is the gap that the researcher wants to fill to add to knowledge.

Purpose of Study

The purpose of the study is set to:

1. Examine the attitude of COE lecturers towards using social media in instruction.
2. Determine the intentions of COE lecturers in using social media in instruction.

Research Questions

This study attempted to answer the following questions:

1. What attitude do COE lecturers have towards using social media in instruction?
2. Do COE lecturers have the intention of using social media in instruction?

Scope of the Study

This study covered Ten State and Federal Government owned colleges of education in the South-West geo-political zone of Nigeria. This comprises Oyo, Ogun, Ondo, Osun, Lagos and Ekiti States. Lecturers were sampled from all the schools in each of the colleges of education. In all, 1069 lecturers responded to the instrument and the data collected was finally processed. The dependent variables of concern were the lecturers' attitude and intention towards using Social media. The colleges include Emmanuel Alayande College of Education (EACOED), Oyo; Federal College of Education (FCE) (Special), Oyo; Federal College of Education (FCE), Osiele, Abeokuta; Michael Otedola College of Primary Education (MOCPED), Epe, Lagos; Adeniran Ogunsanya College of Education (AOCOED), Ijanikin, Lagos; Federal College of education (FCE) (Technical), Akoka, Lagos; Adeyemi College of Education (Adeyemi COE), Ondo; College of Education (COE), Ilesa; Osun State College of Education (OSSCE), Ila and College of Education (COE), Ikere-Ekiti.

Methodology

This study was a descriptive research type utilizing cross-sectional survey method. The dependent variables of the study are attitude and intention of the lecturers to use social media in instruction. The targeted population for the study consists of all the lecturers in Colleges of Education in the South-Western States of Nigeria. Federal government and state-owned

colleges of education were used for the study because these are institutions making use of permanent lecturers that can be easily contacted. Many of the lecturers teaching in the private-owned colleges of education are from government-owned colleges of education and universities employed on part-time basis. So, they could not be respondents because they may not be readily available to give adequate information needed for the research and also to avoid duplication of responses. Ten Federal and State colleges of education in the six states of the South-West of Nigeria were contacted. One hundred and fifty lecturers were randomly selected from each of the ten Federal and State colleges of education for the study. In all, the research instrument was distributed to a sample of 1,500 out of which 1069 adequately responded and was analyzed in the study.

Research Instrument

The instrument for this study was a questionnaire titled CELAISSSN adapted online from the previous studies of Lin, Chuan-chuan and Lu (2000), Moon, Ji-won and Kim (2001) as adapted by Chang (2004), and Yusuf, Mejabi, Fakomogbon, Gambari, Azuquo and Oyeniran (2013). Based upon these previous studies, items were selected based upon their relevance to attitudes toward using and intention to use social media in teaching. The questionnaire implemented ten items for each of the variables. The instrument was given to computer science lecturers and educational technologists that are ICT literate in colleges of education to determine the relevance and suitability of the instruments for the study. The essence of giving out the instrument for validation was to make necessary modifications based on their comments and suggestions. The reliability of the instrument was also determined section by section based on the two major variables. For lecturers' attitude and lecturers' intention towards the use of social media in teaching, the value was 0.89 and 0.93 respectively.

Procedure for Data Collection

The researcher personally administered the copies of the questionnaire to the lecturers in all the ten sampled institutions with the help of research assistants. Two research assistants were recruited in each of the ten institutions to assist with questionnaire administration. The questionnaires were given to the lecturers and research assistants helped to collect the completed questionnaire.

Data Analysis Techniques

The analysis and interpretation of data obtained through the questionnaire was done using descriptive and inferential statistics. The frequencies were converted to means and percentages to answer the research questions. Section II was 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 Attitude, Strongly Agree was 401 (37.4%), Agree was 501 (46.9%), Disagree was 115 (10.8%) while Strongly Disagree was 52 (4.9%). For Intention, strongly agree was 380 (35.5%), Agree was 517 (48.4%), Disagree was 124 (11.6%) and Strongly Disagree was 48 (4.5%).

Research Question 1: What attitude do COE lecturers have towards using Social media in instruction?

Table 1.

Attitude of Respondents towards using Social Media in Instruction.

S/N	Attitude towards using Social Media	Mean ($\bar{X}$)
1.	Social media are for young boys and girls.	3.12
2.	The use of social media will hinder my professional development.	3.20
3.	Social media are not relevant to my discipline.	3.18
4.	I think positively about using social media.	3.06
5.	I will never take a job that will force me to use ICT tools.	3.29
6.	Social media are not meant for teaching and learning but only for social engagements.	3.22
7.	I wish that computer and ICT were not as important as they are	3.27
8.	Using the social media has been a pleasant experience.	2.99

9.	Social media will make lecturers to become lazy.	3.16
10.	The use of social media in teaching will make many students to fail.	3.14
	Grand mean ($\overline{X}$)	3.16

Table 1 reveals that item 5 which sought to find out whether the respondents will never take a job that will force them to use ICT tools has the highest mean score of 3.29, meaning that the use of social media will never be a problem in taking any job. This was followed by the mean score of 3.27 which revealed that the respondents do not care that computer and ICT were as important as they were.

The respondents were also of the opinion that social media are not only for social engagements but are also meant for teaching and learning and that the use of social media will not hinder their professional development with mean score of 3.22 and 3.20 respectively. Other responses followed the same pattern. The lowest mean score was 2.99 whereby the respondents were of the opinion that social media has been a pleasant experience.

On the whole, the grand mean score on attitude towards the use of social media in instruction was 3.16. Using a benchmark of 2.0, it could be inferred that the respondents generally had a positive attitude towards the use of social media in instruction.

Research Question 2: Do COE lecturers have the intention of using Social media in instruction?

Table 2.
Intention of Respondents in using Social media in Instruction.

S/N	Intention to use Social Media	Mean ($\overline{X}$)
1.	I wish I never have anything to do with social media	3.31
2.	I plan on using the social media on a regular basis in the future.	3.00
3.	It will take me time before I can think of using social media in Teaching.	3.03
4.	I will rather leave teaching job than to use social media in teaching.	3.41
5.	Atrocities that students perform on social media will never make me to use it in teaching.	3.18
6.	It's too late for me to begin to use social media in teaching.	3.30
7.	I will always prefer to stand in the class teaching.	2.64
8.	I can never be convinced to use social media in teaching.	3.20
9.	I hesitate to use social media for fear of making errors difficult to correct.	3.10
10.	The fear of students that know more of computer applications than me will never make me use social media.	3.23
	Grand mean ($\overline{X}$)	3.14

Table 2 reveals clearly that item 4 has the highest mean value of 3.14, meaning that the use social media in teaching can never make the respondents to leave teaching job. This was noted to be followed by mean score of 3.31 against the statement that they wish they never had anything do with social media. The respondents also believed that it was not too late for them to begin to use social media in teaching, this having a mean score of 3.30.

Furthermore, it was revealed that the fear of students who know more of computer than the respondents was not a criterium for them never to use social media in teaching with a mean score of 3.23. This was closely followed by a mean score of 3.20 against the statement that they can never be convinced to use social media in teaching. However, item 7 which revealed that some of the respondents still prefer to stand in the class teaching had a mean score of 2.64.

On the general note, the grand mean score for the intention of the respondents to use social media in teaching was 3.14. Using 2.0 as the bench mark, it could be deduced that the respondents generally have the intention of using social media in teaching.

Discussion

Research question 1 sought to find out whether the attitude of COE lecturers towards using social media in instruction will be positive or otherwise. The result of the mean value showed that the responses of the respondents were on the positive side. In support of this finding, Adetimirin (2008) studied factors affecting the use of technology in higher institutions. He reported that among the factors that affect the successful use in the classroom are lecturers' attitude and disbelief in the use technology. Yusuf (1998) also explained that attitude is important because of the fact that it is the controller of actual behaviour of an individual, consciously or unconsciously. Conversely, Olumorin (2008) revealed that studies on lecturers' attitude to computer confirmed that lecturers have positive attitude, yet computers were not being used for instructional purpose.

From the findings, it could be deduced that integrating social media into teaching in the colleges of education will be a welcomed idea. Efforts to make it work should therefore be made by all stakeholders at the college of education level.

The intention of COE lecturers to use social media in instruction was examined by research question 2. Such intention includes planning on using the social media on a regular basis. The result of the mean score established that COE lecturers had positive intention to use social media in instruction. This finding aligned with that of Olumorin (2008) that the successful integration of ICT into higher education depends not only on awareness and availability but also on the extent to which instructors are willing to use it and are able to use it. Adeyanju (2012) also reported the observation of Young (1998) that although there are more computers and other Information Technologies in tertiary institutions, the use of these technologies had in a large number of cases enhanced either individual or institutional level of productivity because of inadequate training in new skills, and/or unwillingness by lecturers themselves to learn new skills.

By implication, COE lecturers are willing and ready to use social media in teaching. Encouragement and enabling environment should therefore be created so that this dream can see the light of the day.

Conclusion

This research explored the lecturers' attitude and intention towards social media in South-West Nigeria. The findings in the research established that COE lecturers had a positive attitude towards using social media in teaching. Also, the intention of COE lecturers to use social media in instruction was found to be positive.

Recommendations

Based on the findings and conclusions of this study, the following recommendations were made:

1. Colleges of education lecturers should acquire higher skills and develop their proficiency in the utilization of social media tools;
2. colleges of education lecturers should improve their skills by making use of social media for instructional purpose and shift their foci from using it for fun and entertainment;
3. lecturers should embrace student-centered learning approach in the teaching and learning process so that an instructional strategy approach like social media will be known to various stakeholders in education.

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EVALUATION OF MOBILE LEARNING DIGITAL GAME FOR TEACHING NUMERACY TO ADULT LEARNERS IN LAGOS STATE

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Abstract
Numeracy is the ability of learners to recognize and understand the role of mathematics in many contexts. It involves choosing the mathematics to use, applying mathematical skills and evaluating their use to solve problems in the world around us. The study evaluated mobile learning digital game for teaching numeracy to adult learners in Lagos State, Nigeria. The research design used for this study was a quasi-experimental pre-test post-test control group research design. There are two groups with one group given treatment and the other group serving as the control group. A sample size of 9 adult learners was selected for the study. Simple random sampling technique was used to select one adult literacy centre in Yaba Local Council Development Area and another adult literacy center in Kosofe Local Government Area. The following research instruments were used to gather relevant data for the study. These are Mobile Learning Digital Game Package (MLDGP), Adult Learning Attitude Questionnaire (ALAQ) and Numeracy Achievement Test (NAT). The inferential statistics used was t-test and Analysis of Covariance (ANCOVA) at 0.05 level of significance. The learning of numeracy with gamification among adult learners has significant effect on the achievement when compared with their counterpart that was not taught with gamification. Based on the findings from the study, the following conclusions were made there is a significant difference between numeracy achievement scores of learners taught with gamification than those taught without gamification. The study recommended among others that in order to enhance qualitative and effective teaching and learning of numeracy among adult learners, mobile learning digital games should be incorporated by curriculum developers into the adult education curriculum.
Keywords: Digital game, Mobile Learning, Numeracy, Adult learners.

Introduction

Mathematics plays an important role in the daily activities of individuals and across various human professions. Trading and market activities involve the use of numbers; cooking a good meal involves measurement as the cook must use the correct proportion of ingredients. In the same vein, trading activities deal with buying and selling which involve the use of the basic operations: addition, subtraction, multiplication and division. As a result, numbers are used in the transactional activities in the work and market places.

O'Donoghue (2002) perceived the term numeracy as any one of a number of things including basic computational arithmetic, essential mathematics, social mathematics, survival skills for everyday life, quantitative literacy, mathematical literacy and an aspect of mathematical power. Numeracy is the ability of learners to recognize and understand the role of mathematics in many contexts. It involves choosing the mathematics to use, applying mathematical skills and evaluating their use to solve problems in the world around us. Alberta Education (2015) defines numeracy as the ability, confidence and willingness to engage with quantitative and spatial information to make informed decisions in all aspects of daily living. A numerate individual has the confidence and awareness to know when and how to apply quantitative and spatial understandings at home, at school, at work or in the community. In some cases, these individuals are adult learners.

An adult learner is a matured individual who is 25 years and above and involved in various forms of learning. The principles of andragogy follow directly from an understanding of the characteristics of adults as learners and can be recognized when we understand the characteristics of adults and see the way those characteristics influence how adults learn best (citation needed).

The teaching and learning process of numeracy to adult learners in Nigeria has mostly been done through the conventional methods of teaching which to a large extent does not cater for the various domains of learning. Activities involved in these methods are mainly teacher-centred not student-centred (Ogunbode, 2015). In other words, it involves only the cognitive domain of learning leaving out the affective and psychomotor domains. LSB practitioner training (2014) states that teachers who follow the principles of andragogy when choosing materials for training and designing program delivery find that their learners progress more quickly, and are more successful in reaching their goals.

The Canadian Literacy and Learning Network (2013) outlines the 7 key principles of adult learning which distinguish adult learners from children and youth. They are:

a. Adults cannot be made to learn; they will only learn when they are internally motivated to do so.
b. Adults will only learn what they feel they need to learn (practically).
c. Adults learn by doing.
d. Adult learning is problem-based and these problems must be realistic. Adult learners like finding solutions to problems.
e. Adult learning is affected by the experience each adult brings.
f. Adults learn best informally. Adults learn what they feel they need to know whereas children learn from a curriculum.
g. Adults want guidance.

Based on these principles, andragogy, which also encourages the use of technology such as mobile devices can help meet the present needs of adult learners and make them learn in a ubiquitous environment. These can be achieved with the use of educational games commonly called gamification.

Educational games are designed with the explicit goal of helping learners learn about important subject-matter content, strategies, and cognitive or social skills. Instead of learning by just reading a textbook or listening to a lecture, the learner plays a game that requires engaging curriculum contents and provide learning opportunities as part of the game context. Educational games have potential because the learning of contents with perceived difficulties become an enjoyable and engaging experience for the learner. Intellectual hard work is transformed into play.

Educational games involve students in competition or achievement in relationship to a goal; the game teaches and it is fun (McKeachie, 2002). Many games are simulation with the goal of modelling real-life problems or crisis situations. One advantage of games and simulations is they encourage participants to confront their own attitudes and values (SIilberman & Auerbach, 1998) through involvement in making decisions, solving problems, and reacting to results of their decisions (McKeachie, 2002). Educational games should increase enjoyment, topic interest, and what Csikszentmihaly (1990) calls the flow experience (such intense concentration that time and fatigue disappear). Engagement in the game should facilitate learning by increasing time on task, motivation, and self-regulated activities, as long as the focus is on the instructional curriculum rather than game components that distract from the knowledge and skills to be learned.

One important characteristic of rich gaming environments is that they allow for embedding assessment into the learning context. Shute (2009) has referred to this as “stealth assessment” because no performance is marked specifically as testing; rather, all action is simply part of the flow of a game. Games can also be used with adult learners to warm them up after a long day at the office or carrying out their household duties, in short, games are often welcomed by adult learners as they want to relax a little and make the transition from the outside to the numeracy classroom. It should be noted that some basic factors affect the use of gamification to teach adult learner.

Factors that can affect the use of gamification in teaching adult numeracy are the age, gender and socio-economic factors of the adult learner. The age of the adult is a key factor in the use of gamification given that some of them see the use of smart phones as being childish or as a waste of money, considering the fact that they have little or nothing to do with engagements beyond calling and text messaging. Some adults may see it as unnecessary since they can still reach family and friends and make transactions with their business partners through calls. This can make gamification unrealizable since a few adult learners own smart phones.

The socio-economic status is also very important since the use of digital phones depends on the income of the adult learner. In this century, adults are seen as digital immigrants. Digital immigrants are characterized as individuals born before 1980 who knew an analogue-only world and still rely on analogue forms of interaction (Canadian Journal of University Continuing Education, 2013). For digital immigrants, the communication changes happening via the introduction of digital technologies are supposedly learned and relearned, instead of easily becoming second nature (Palfrey and Gasser, 2008). They want to chat with friends and family on social media platforms so has to keep up with their social status. The adult learner finds himself to be a digital immigrant as they are forced into using digital technologies.

Purpose of Study

The purpose of the study was to:

1. Determine the effect of gamification on adult learner's achievement in numeracy.
2. Examine the influence of gamification on leaner's attitude towards numeracy.
3. Examine the influence of gender on the achievement of adult learners taught with mobile learning digital game.
4. Investigate the gender influence on the attitude of adult learners taught with mobile digital game.

Research Questions

1. What is the effect of gamification on adult learners' achievement in numeracy?
2. Does gamification have any influence on learners' attitude toward numeracy?
3. What is the influence of gender on the achievement of adult learners taught with mobile learning digital game?
4. What is the influence of gender on the attitude of adult learners taught with mobile learning digital game?

Research Hypothesis

1. Gamification does not have significant effect on learners' achievement in numeracy.
2. There is no significant effect of gamification on learners' attitude towards numeracy.
3. Gender has no influence on the achievement of adult learners taught with mobile learning digital game.
4. Gender has no influence on the attitude of adult learners taught with mobile learning digital game.

Methodology

Research Design

The research design used for this study was a quasi-experimental pre-test post-test control group research design. There are two groups with one group given treatment and the other group serving as the control group. The treatment group was subjected to the mobile learning digital game package and the control group was exposed to the conventional teaching method with prepared numeracy content.

Population of the Study

The population of this study comprises of the adult learners in all adult literacy centres in Lagos State of Nigeria.

Participants

A sample size of 9 adult learners was selected for the study. Simple random sampling technique was used to select one adult literacy centre in Yaba Local Council Development Area and another adult literacy centre in Kosofe Local Government Area. Thereafter, simple random

sampling was used to select an intact adult literacy class in each of the adult literacy centres earlier selected. The intact class selected was randomly assigned to treatment and control group. The two intact classes had a total of nine students.

Table 1
Distribution of adult learners across selected adult literacy centres.

Selected LCDA	*Selected Schools*	*Respondents*		*Total*
		Male	*Female*	
Yaba LCDA	Centre A	1	3	4
Kosof LGA	Centre B	2	3	5
Total		3	6	9

Figures from Table 1 show that male and female adult learners were 3 and 6 respectively. These made up the total sample size of 9 participants.

Research Instruments

The following research instruments were used to gather relevant data for the study. These are:

- Mobile Learning Digital Game Package (MLDGP)
- Adult Learning Attitude Questionnaire (ALAQ)
- Numeracy Achievement Test (NAT)

Mobile Learning Digital Game Package (MLDGP)

The Mobile Learning Digital Game Package is an application adopted by the researcher as an intervention to assess the impact of gamification on adult learners' achievement in numeracy. It is an application for adult learners to play with before the post test. The game will train the adult learners on two different topics on numeracy. The game package includes two games to cover the topics considered in the study. The first game, "Brain Workout" covers arithmetic. It has five levels each with 200 tasks; it is a puzzle-like game where the player is expected to fix the correct number or symbol. The player can start from a level that is suitable for his or her level. The second game is a place value game. It has three options; to learn, to practice and to play games. The game and practice involves task and they both have three levels: easy, medium and hard.

Adult Learners' Attitude Questionnaire (ALAQ): The questionnaire comprises of two sections. Section A is on demographic data of respondents. Section B contains items on the attitude of adult learners towards the use of mobile learning digital game package. It was rated based on 7-point Likert scale from 'Not at all' to 'Always' the instrument is shown in appendix IV.

Numeracy Achievement Test (NAT): The Numeracy Achievement Test (NAT) was made up of 10 items divided into three sections. The first section is a multiple-choice question containing 5 items with 3 options (one is key and two are distracters). The second section is a "fill in the gap" question with 5 items. This test instrument was designed to determine the effectiveness of the developed mobile learning digital games package. The items in the NAT were drawn in line with the content of the digital game package which was used to measure the performance of adult learners in both pre-test and post-test. The content validity was ensured by using a Test Blue Print.

Table 2:
Test Blue Print for a 10-item Numeracy Achievement Test

Topic	***Weight (%)***	***Knowledge (44%)***	***Comprehension (20%)***	***Application (36%)***	***Total***
Arithmetic	55	2	1	2	5
Numeration	45	2	1	2	5
Total	100	4	2	4	10

Method of Data Collection

The mobile learning digital game package was tested on the adult learners at the two centers. The experiment lasted for 2 weeks the exercise include orientation for the adult education teachers and adult learners; lessons for the two groups; administration of the numeracy achievement pre-test; teaching with the use of the mobile learning digital game package (only for the experimental group) and finally the administration of the numeracy achievement post-test.

Data Analysis

Descriptive and inferential statistical tools were used. Mean and Standard Deviation were computed for all the groups where applicable. The inferential statistics used was t-test and Analysis of Covariance (ANCOVA) at 0.05 level of significance.

Results

Descriptive Analyses of Demographic Data

This section described students' variables based on gender, age and class

Table 3: Gender of Participants

Gender	Frequency	Percent
Male	3	33
Female	6	67
Total	9	100

Concerning gender, from the above table, the percentage of the respondents was 33% male and 67% female. This means that female participants were more than their male counterpart.

Table 4.

Distribution of Respondents by Age

Age Range	Frequency	Percent
18-30	1	11
31-40	2	22
41-50	4	45
51-above	2	22
Total	9	100

Table 4 shows that the age range of participants between 18-30 was 11% while participants between 31-40 were 22%. Besides, participants between ages 41-50 and 51-above was 45% and 22% respectively.

Research Hypothesis 1: Gamification does not have significant effect on learners' achievement in numeracy.

Descriptive and inferential statistics were used to respond to hypothesis one. Table 3 contained descriptive analysis of the researcher's observation using mean, standard deviation and mean difference. The analysis of covariance was used to test the hypothesis and the result was presented in Table 5.

Table 5:

Descriptive Analysis of the effect of Gamification on Learners' Achievement

Experimental Group	N	Pre-test		Post-test		Mean Difference
		Mean	Std. Dev.	Mean	Std. Dev.	
Treatment	4	0.75	0.96	9.00	0.82	8.25
Control	5	0.60	0.55	1.60	0.55	1.00
Total	9	0.68	0.71	4.89	3.95	4.63

Table 5 shows that the pre-test achievement scores of the participants were 0.75 and 0.60 for the treatment and control groups respectively. However, at post-test, the mean value of the treatment group rose to 9.00, while the control group rose to 1.60. The mean difference shows that the treatment group gained 8.25 as against the 1.00 gain by the participants in the control group. In order to determine the significant difference in the mean values, an Analysis of Covariance (ANCOVA) was used to analyze the data and the result of the analysis was presented in Table 6.

Table 6:

ANCOVA analysis for Numeracy Achievement

Source	Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	122.914[a]	2	61.457	186.735	.000
Intercept	106.414	1	106.414	323.335	.000
Covariate	1.225	1	1.225	3.723	.102
Group	117.470	1	117.470	356.927	.000
Error	1.975	6	.329		
Total	340.000	9			
Corrected Total	124.889	8			

Figures from Table 6 shows that an F calculated value of 356.927 was gotten as a result of the effect of gamification on achievement in numeracy among adult learners. The calculated value was found to be greater than the critical value of 0.000 given 1 and 6 degrees of freedom. This led to rejecting the null hypothesis. It was concluded that learning numeracy with gamification among adult learners has significant effect on the achievement of adult learners when compared with their counterpart that was not taught with gamification.

Research Question 2: There is no significant effect of gamification on learners' attitude to numeracy.

Descriptive and inferential statistics were used to respond to hypothesis two. Table 5 contained descriptive analysis of the researcher's observation using mean, standard deviation and mean difference. The analysis of covariance was used to test the hypothesis and the result was presented in Table 7.

Table 7

Descriptive Analysis of the effect of Gamification on Learners' Attitude

Experimental Group	N	Pre-test		Post-test		Mean Difference
		Mean	Std. Dev.	Mean	Std. Dev.	
Treatment	4	28.25	2.22	42.00	6.06	13.75
Control	5	27.00	3.54	29.60	4.04	2.60
Total	9	27.55	2.92	35.11	8.04	8.18

Table 7 shows that the pretest attitude scores of the participants were 28.25 and 27.00 for treatment and control group respectively. However, at posttest, the mean value of the treatment group rose to 42.00, while the control group rose to 29.60. The mean difference shows that the treatment group gained 13.75 as against the 2.60 gain by the participants in the control group. In order to determine the significant difference in the attitude mean values, an Analysis of Covariance (ANCOVA) was used to analyse the data and the result of the analysis was presented in Table 8.

Table 8:
ANCOVA analysis for Attitude towards Numeracy

Source	Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	353.797[a]	2	176.898	6.508	.031
Intercept	47.823	1	47.823	1.759	.233
Covariate	12.108	1	12.108	.445	.529
Group	296.641	1	296.641	10.913	.016
Error	163.092	6	27.182		
Total	11612.000	9			
Corrected Total	516.889	8			

Observation from Table 8 shows that an F calculated value of 10.913 was gotten as a result of the effect of gamification on the attitude of learners. The calculated value was found to be greater than the critical value of 0.000 given 1 and 6 degrees of freedom. This led to rejecting the null hypothesis. It was concluded that there was significant difference in the attitude of learners taught with gamification towards numeracy than their counterpart that were taught with the conventional method.

Hypothesis Three: Gamification does not have significant effect on male and female learners' achievement in numeracy.
Descriptive and inferential statistics were used to respond to hypothesis three. Table 7 contained descriptive analysis of the researcher's observation using mean, standard deviation and mean difference. The analysis of covariance was used to test the hypothesis and the result was presented in Table 9.

Table 9:
Descriptive Analysis of Learners' Achievement and Gender

Experimental Group	Gender	N	Pretest		Posttest		Mean Difference
			Mean	Std. Deviation	Mean	Std. Deviation	
Treatment	Male	1	0.00		9.00		9.00
Group	Female	3	1.00	1.00	9.00	1.00	8.00
	Total	4	0.75	0.96	9.00	0.82	8.25
Control	Male	2	0.50	0.71	1.50	0.71	1.00
Group	Female	3	0.67	0.58	1.67	0.58	1.00
	Total	5	0.60	0.55	1.60	0.55	1.00
Total	Male	3	0.33	0.58	4.00	4.36	3.67
	Female	6	0.83	0.75	5.33	4.08	4.50
	Total	9	0.67	0.71	4.89	3.95	4.22

Table 9 shows that, the achievement mean score at pretest was 0.00 and 0.50 for male in treatment and control group respectively. Also, the female participants had 1.00 for treatment group and 0.67 for control group.
At posttest, the male participants' achievement mean score rose to 9.00 for the treatment group while the control group rose to 1.50. Similarly, for the female participants, their achievement mean score rose to 9.00 while in the control group, the mean score rose to 1.67.
The mean difference treatment group among the male participants was 9.00 while the female participants 8.00. These values were above the total for male and female which was 3.67 and 4.50 respectively. In order to determine if the achievement mean differences were significant, an analysis of covariance was conducted and the result presented in Table 10.

Table 10:
Inferential Analysis of Achievement for Experimental Groups and Gender

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	123.205	4	30.801	73.153	.001
Intercept	106.181	1	106.181	252.180	.000
Covariate	1.482	1	1.482	3.521	.134
Experimental Group	102.703	1	102.703	243.919	.000
Gender	.154	1	.154	.365	.578
Experimental Group * Gender	.228	1	.228	.540	.503
Error	1.684	4	.421		
Total	340.000	9			
Corrected Total	124.889	8			

Table 10 shows that an F calculated value of 0.540 was derived as the effect of gamification among the experimental and control group due to gender. These calculated value (Fcal = 0.540; $p > 0.05$) was found to the less than the critical value of 0.000 given degrees of freedom 1 and 4 at 0.05 level of significance. Consequently, the null hypothesis was retained and it was concluded that the use of gamification has not led to significant difference between male and female achievement in numeracy.

Hypothesis Four: Male and female participants' attitude to numeracy does not significantly differ as a result of using gamification.

Descriptive and inferential statistics were used to respond to hypothesis four. Table 9 contained descriptive analysis of the researcher's observation using mean, standard deviation and mean difference. The analysis of covariance was used to test the hypothesis and the result was presented in Table 10.

Table 11:
Descriptive Analysis of Gamification on Learners' Attitude and Gender

Experimental Group	Gender	N	Pre-test		Posttest		Mean Difference
			Mean	Std. Dev.	Mean	Std. Dev.	
Treatment Group	Male	1	29.00		46.00		17.00
	Female	3	28.00	2.65	40.67	6.66	12.67
	Total	4	28.25	2.22	42.00	6.06	13.75
Control Group	Male	2	26.50	2.12	28.00	2.83	1.50
	Female	3	27.33	4.73	30.67	4.93	3.33
	Total	5	27.00	3.54	29.60	4.04	2.60
Total	Male	3	27.33	2.08	34.00	10.58	6.67
	Female	6	27.67	3.44	35.67	7.58	8.00
	Total	9	27.56	2.92	35.11	8.04	7.56

Table 11 shows that, the attitude mean score at pre-test was 29.00 and 26.50 for male in treatment and control group respectively. Also, the female participants had 28.00 for treatment group and 27.33 for control group.

At post-test, the male participants' attitude mean score rose to 46.00 for the treatment group while the control group rose to 28.00. Similarly, for the female participants, their attitude mean score rose to 40.67 while in the control group, the mean score rose to 30.67.

The mean difference treatment group among the male participants was 17.00 while the female participants 16.67. These values were above the total for male and female which was 6.67 and 8.00 respectively. In order to determine if the mean differences in attitude were significant, an analysis of covariance was conducted and the result presented in Table 10.

Table 12:
Inferential Analysis of Attitude for Experimental Groups and Gender

Source	Sum of Squares	df	Mean Square	F	Sig.
Corrected Model	378.760[a]	4	94.690	2.742	.176
Intercept	59.209	1	59.209	1.715	.261
Covariate	7.205	1	7.205	.209	.672
Experimental Group	311.881	1	311.881	9.032	.040
Gender	3.144	1	3.144	.091	.778
Experimental Group * Gender	24.540	1	24.540	.711	.447
Error	138.128	4	34.532		
Total	11612.000	9			
Corrected Total	516.889	8			

Table 12 shows that the analysis for gender attitude to numeracy as a result of using gamification was 0.711. This was found to be insignificant since it ($p > 0.05$) was less than the critical value of 0.000 given degrees of freedom 1 and 4 at 0.05 level of significance. Thus, the null hypothesis was retained. It was concluded that male and female attitude to numeracy do not differ as a result of using gamification.

Discussion

The observation from the first hypothesis was that gamification impacted on the achievement in numeracy than their counterpart that was not taught with gamification. The finding from this study varied from the observation of Sayan (2015) who studied the effect of computer games on the achievement of basic mathematical skills among grade 5 elementary school students. The researcher found out no significant difference between the group that learned basic mathematical skills with the aid of math computer games and the other group that learned basic mathematical skills alone without playing computer game. In addition, Stoyanova, Tuparova and Samardzhiev (2017) in their study of the impact of motivation, gamification and learning style on students' interest in mathematics observed that the use of gamification stimulates learners' interest and promote active learning. In addition, Yildirin (2017) observed that gamification-based teaching practices have a positive impact upon students' achievement.

The finding from hypothesis shows that the use of gamification was impactful on adult learners' attitude to numeracy. Hamari and Koivisto (2013) during an empirical study of social motivations to use gamification observed that social factors are strong predictors for attitudes towards gamification, and, further, continued use intentions and intentions to recommend the related service. In the same vein, Yildirin (2017) reported that gamification-based teaching practices have a positive impact upon learners' attitudes toward lessons. However, Semmar (2006) emphasized the importance of self-efficacy, self-regulation, motivation, and their "synergistic" effect on adults' academic achievement. Besides, Ndlovu and Moyo (2013) reported other affective factors that could influence adult learners' performance in Nkulumane-Emganwini Area of Zimbabwe. Learning style, age and self-concept were also found to affect performance while marital status and income were found not significantly affecting performance.

Observation on hypothesis three shows that the use of gamification as a method of instruction has not led to significant difference between male and female achievement in numeracy. This finding aligns with the report of Chung and Chang (2017) during their study of the effect of gender on motivation and student's achievement in digital game-based learning. The researchers observed that the usability of the digital game in this study receives positive response from learners regardless of gender. Similarly, Okechukwu, Maduagwuna and Ugama (2014) observed no significant interaction between gender and instructional method on student's achievement in quadratic expression.

The result of hypotheses four shows that male and female participants' attitude do not significantly differ as a result of using gamification as a method of instruction. The finding aligns with Martí-Parreño, Seguí-Mas and Seguí-Mas (2016) who observed no differences in use of gamification by age, gender or type of institution (public or private). However, the result negates the observation of Koivisto and Hamari (2014) during their study of demographic differences in perceived benefits from gamification. The researchers observed that female enjoy greater benefits from the use of gamification.

Conclusion

Based on the findings from the study, the following conclusions were made;

1. There is a significant difference between numeracy achievement scores of learners taught with gamification than those taught without gamification.
2. There is a significant difference in attitude of learners taught with gamification and those taught without gamification.
3. There is no significant difference between males taught with gamification and females taught with gamification.
4. Male and female participants' attitude to numeracy does not significantly differ as a result of using gamification.

Recommendations

Based on the findings of this study, the following are recommended;

1. In order to enhance qualitative and effective teaching and learning of numeracy among adult learners, mobile learning digital games should be incorporated by curriculum developers into the adult education curriculum
2. The use of the mobile learning digital games for teaching numeracy to adult education should be encouraged in the adult literacy centres as it enhances effective learning.
3. Since gender is not a determinant of adult learners' achievement and attitude when taught through mobile learning digital games. Therefore, facilitators should put in more effort on equal distribution of attention to both male and female adult learners.
4. Stakeholders should endeavour to provide adult learning centres with well-equipped learning resources and facilities that can be used with the mobile learning digital game to improve learning.
5. Adult educators (facilitators) should learn how to develop or adopt mobile learning digital games for various contents in the adult education.

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IMPACT OF INTERACTIVE SIMULATIONS ON SECONDARY SCHOOL CHEMISTRY STUDENTS' LEARNING OUTCOMES IN ABUJA MUNICIPAL AREA COUNCIL

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Abstract

This study investigated the "Impact of Interactive Simulations on Secondary School Chemistry Students' Achievement and Interest in Abuja Municipal Area Council". The sample of the study comprised Two hundred and sixty-four (264; M= 168, F=96) students selected from four co-educational senior secondary schools in Abuja Municipal Area Council. There were one experimental group and a control group. One treatment instrument namely, PhET interactive simulations instructional package was adopted to examine its impact on students' achievement and interest. The research design was a quasi-experimental, pretest posttest control design. The experimental group was taught using PhET interactive simulations package and the control group was taught using lecture method. The Chemistry Achievement Test (CAT) of 20 items was validated by experts for data collection. The reliability of the items instrument was ascertained using Cronbach Alpha formula and a coefficient of 0.826 was obtained. Four (4) hypotheses were formulated and tested at 0.05 alpha levels. The data were analyzed using mean, Standard Deviation and ANCOVA Statistic. The findings of the study revealed that students in experimental group achieved significantly better than their counterpart in the control group. There was statistically no significant difference in the achievement of Male and Female students of experimental group. The mean difference of strongly agreed and agreed for the PhET interactive simulations out measured the other Likert scale. In addition, there was no significant difference in the mean interest score of male and female students in the group.

Keywords: Achievement, Interest, Learning outcomes, Open Educational Resources (OERs), Open source, PhET, Simulations

Introduction

With rapid development in Information and Communication Technology (ICT), the use of technology in learning environment has become a commonplace. ICT addresses visual and auditory senses, it is used in science teaching in many forms such as micro-computer-based laboratories, micro-words, interactive video discs, multimedia, hypermedia and simulations (Koyunlu & Dokme, 2011). Technology is one of the most prevalent tools complementary to innovative instructional models and it has also become one of the most important components in many aspects of our lives. Due to the prevalence of technology in our society, many educators strive to make its integration into education a reality. There are many technology-based learning environments for schools that teach science. Examples include Interactive Physics, a computer-based Newtonian micro-world (Design Simulation Technologies, 2005-2013), PhET simulations (PhET Interactive Simulations, 2013), interactive simulation programs for physics, chemistry, biology, earth science, and mathematics concepts (Wieman, Adams, Loeblein, & Perkins, 2015).

Simulation is a programme that creates animated, interactive, game – like environments, which focus on connecting real – life phenomena to the underlying science. Within this process, it makes the visual and conceptual models of experts and scientist simple, so that they can be undrestood by learners (Adams, Reid, LeMaster, McKagan, Prrkins, Dubson & Wieman, 2010). There are published simulations available for purchase but many teachers prefer to create

their own to suit their purpose, just as PhET interactive simulations (PhET Interactive Simulations, 2013). A well-designed simulation simplifies a real-world system while heightening awareness of the complexity of that system. Students can participate in the simplified system and learn how the real system operates without spending the days, weeks, or years it would take to undergo this experience in the real world (Design Simulation Technologies, 2005-2013).

However, PhET interactive simulations are open educational resources (designed and tested at the University of Colorado at Boulder), which have developed a suite of realistic, open source simulations that cover many main topics of pure science subjects both at the secondary and University levels. These simulations are designed and tested to provides fun, interactive, research-based simulations of physical phenomena in a learning environment (Adams, *el al.* 2010). They can be freely used, shared, or redistributed under the license and animate what is invisible to the eye through the use of graphics and intuitive controls such as click-and-drag manipulation, sliders and radio buttons. As the user manipulates these interactive tools, responses are immediately animated thus effectively illustrating cause-and-effect relationships as well as multiple linked representations (motion of the objects, graphs, number readouts, and other.) (Yeo, 2009).

Chemistry is the branch of science that deals with the study of the structure and composition of matter. Chemistry has often been described as the central science, this is because effective study of chemistry lays a solid foundation for the scientific and technological development of an early learner in the sciences (Omoifo, 2012). It does not just start and end in the classroom or school as often perceived, phenomena in chemistry are practiced in day to day lives in and outside the school, even on social media. Some of the chemistry practices are the process of heating (cooking/warming) of food, the process of washing clothes with soap or detergents, addition of limestone when cooking beans, unripe plantain and many others, the process of putting stainless steel spoon into meat while boiling, the process of separation of kerosene or petrol from water, the process of preparation of pap from grounded maize(corn), the process of spraying insecticides in the house to kill insects, the act of melting ice block into liquid water for the purpose of drinking, preparation of African fufu through cassava, the burning of materials in the presence of air(oxygen), the process of rusting of clean nail when it has been exposed to air and water (chemical change) and so many others, just to mention but a few. This goes to show that many principles in chemistry are applied in day to day activities (Forrester, 2012). The weakness associated with the performance of candidates in chemistry were attributed to lack of relevant textbooks, lack of instructional resources and equipment, inappropriate instructional strategies and methods and inadequate supply of laboratory materials. Again, prominent among the prevalent problems in the school system are interest and gender, according to (2014), interest is a decisive factor in the learning process.
Interest is a persisting tendency to pay attention and enjoy some activities. It is viewed as emotionally oriented behavioural trait which determines students' enthusiasm in tackling educational programmes or other activities (Olayemi, 2014). Galton (2005) stressed interest as that attraction which forces or compels a student to respond to a particular stimulus. To some others, it is a phenomenon that emerges from an individual's interaction with the environment (Agboola & Oloyede, 2007). An interest represented a specific and distinguished relationship between a person and an object. Thus, such object can be concrete, topical, subject-matter or abstract ideas that is a certain part of the cognitively represented environment. One important role of the instructor is to order and structure the learning environment and use of motivational techniques to secure and sustain the attention and interest of the learner (Kalu, 2010). Therefore, interest is an effective behaviour that can be aroused and sustained in teaching and learning through appropriate teaching strategy, students' interest and achievement in any learning activity is sustained by the active involvement of the learner in all aspects of the learning process. Ogbu (2010) emphasized that unless the instructor stimulates students' interest in learning students' achievement will be minimal.

However, it is important to determine whether male and female students show equal interest with the use of PhET interactive simulations method in the teaching of chemistry. As noted,

(Post Primary Schools Management Board, 2014), gender is the physical and behavioural difference that distinguishes individual organisms according to their functions in the reproductive process. Boys and girls as groups are interested in different aspects of science, with girls being equally or less interested than boys in some topics in chemistry and Physics (Sjoberg, 2014). It is also suggested that the main reasons for these inconsistencies is related to the type of measure used by the researchers, the nature of the content and of the chemistry curriculum, the instructional techniques often used in the chemistry classrooms, and the students' grade level (Cheung, 2012). Against this background, therefore, the researcher tends to investigate the impacts of PhET interactive simulations on learning outcomes of chemistry students in secondary schools.

Statement of the Research Problem

As important as the Chemistry is and in spite of its day to day applications, students 'performance in external examination WAEC and NECO revealed poor performance of students. This is evidenced in WAEC/NECO results from 2013 to 2015. The steady decline in students' performance in chemistry and its related subjects has remained a source of worry to the students, parents, teachers, government and even Non – Governmental Organizations in Nigeria. In addressing this issue, the instructional strategies among other factors have been reported to be a crucial parameter. Researchers (Udo & Eshiet, 2013; LongJohn 2009; Igboegwu 2010) have traced these problems of failure in chemistry to these number of factors; inappropriate instructional strategies and methods and lack of students' interest. Poor and ineffective instructional strategies have been reported by the above-named researchers as the major factor responsible for the consistent poor achievement of students in Chemistry.

Purpose of Study

The purpose of the study was to:

1. Examine the difference in the mean achievement scores of students taught Chemistry using PhET interactive simulations and students taught chemistry with lecture method.
2. Examine the difference in the mean achievement scores of male and female students taught chemistry using PhET interactive simulations.
3. Determine the difference in the mean interest score of students taught chemistry by PhET interactive simulations and those taught chemistry with lecture method.
4. Determine the difference in the mean score of male and female students taught Chemistry using PhET interactive simulations.

Research Questions

The following research questions were formulated to guide the study:

1) What is the difference in the mean achievement scores of students taught chemistry using PhET interactive simulations and students taught chemistry with lecture method?

2) Is there any difference in the mean achievement scores of male and female students taught Chemistry using PhET interactive simulations?

3) What is the difference in the mean interest scores of students taught chemistry by PhET interactive simulations and those taught chemistry with lecture methods?

4) What is the difference in the mean interest scores of male and female students taught Chemistry using PhET interactive simulations?

Research Hypotheses

The following null hypotheses were formulated and tested at 0.05 level of significance in order to answer the above research questions

Ho_1: There is no significant difference in achievements scores of students taught chemistry using PhET interactive simulations and lecture methods

Ho_2: There is no significant difference in the mean achievement scores of male and female students taught chemistry using PhET interactive simulations

Ho_3: There is no significant difference in the mean interest scores of students taught chemistry using PhET interactive simulations and lecture method

Ho_4: There is no significant difference in the mean interest scores of male and female students taught chemistry using **PhET** interactive simulations**.**

Methodology

The research design that was adopted is a quasi – experimental pre-test, posttest, control group design. The design entails the use of non-randomized sample where the researcher cannot randomly sample and assign subjects hence intact classes was used. The sample for this research was 264 SSII science students (Experimental group = 144, 53 male and 91 females while control group = 120, 43 male and 77 female). The study was conducted in four (4) co-educational schools in AMAC, FCT, Abuja. These schools are Government Secondary School wuse zone3, Government Secondary School TundunWada zone4, Model Secondary School, Maitama and Government Secondary School Gwarinpa, FCT, Abuja. Based on the nature of this research, a series of sampling techniques were adopted. Firstly, a purposive random sampling technique was adopted to obtain four schools in AMAC. These schools were purposively sampled based on equivalence (ICT centres, facilities and regular power supply), school type (public school) and candidates' enrolment (enrolling students for WASSCE Chemistry Examination for minimum of ten years). Secondly, the selected four equivalent co-educational schools were divided into two groups; experimental group and the control group through balloting. Two schools were assigned each into experimental group, that is two for PhET interactive simulations while the remaining two for conventional lecture method. However, PhET interactive simulations was assigned to experimental group and conventional lecture method was equally assigned to control group. Finally, the intact classes were used throughout the research.

The research instrument that was used for this study was a 20- item Chemistry Achievement Test (CAT). The CAT consisted of twenty objective (20) objective items developed on the concepts that was taught with four options letters A – D with only one correct answer included and it was used to obtain data on students' gender and achievement and the same was used for pilot study to determine the reliability of the instrument while Chemistry interest inventory test (CIIT) developed by the researcher, comprised of twenty (20) statements based on five(5) – point Likert scale in which Strongly Agreed(SA) was awarded 5 points, agreed (A) 4 points, undecided (U) was 3 points, disagreed (D) was awarded 2 points and finally, Strongly Disagreed (SD) was 1 point. A mean of 3.00 was taken as acceptable mean for agreement. The CAT questions with the accompanying answers and CIIT were validated by the experts in the subject area. A reliability test was carried out for the instrument using Cronbach Alpha formula and a coefficient of 0.826 was obtained and considered very adequate for research study.

The CAT instrument was administered to the students at first contact with them during the first week of the study as pretest and at the end of three weeks intensive teaching of intact classes by means of dual period of eighty (80) minutes per day in each school. Both the CAT and CIIT were administered to the students in the two instructional strategy groups in all the sampled schools. The CAT questions were collated, marked, scored and later converted to percentage while CIIT were also collated and analyzed accordingly.

The data obtained were analyzed statistically using inferential and descriptive statistics (Mean and Standard deviation). Analysis of covariance (ANCOVA) statistics using Statistical Package for Social Sciences (SPSS) version 23.0 and the significance of the statistical analyses was ascertained at 0.05 alpha level of significance to test the research hypotheses.

Results

The results of this study are presented in this section

Hypothesis One

There is no significant difference in achievement scores of students taught chemistry using PhET interactive simulations and lecture methods.

This hypothesis was tested using descriptive statistics (mean and standard deviation) and analysis of covariance (ANCOVA). The mean and standard deviation of the posttest mean achievement scores of experimental and the control groups were uses as covariance analysis. The result of the analysis is as shown in Table below.

Table1:
Mean and Standard Deviation of the Posttest Mean Achievement scores of Experimental and the Control Groups

Group	N	Mean(x)	Standard Deviation
Control	**120**	**30.71**	**10.722**
Experimental	**144**	**37.22**	**12.327**
Total	**264**	**34.26**	**11.930**

From the Table 1, it was observed that experimental group benefited from the treatment more than the group counterparts. This is because the students in the experimental group have a higher mean score of 37.22 with standard deviation of 12.327 while control group has a mean score with standard deviation of 10.722

Table2:
ANCOVA Comparison of the Posttest Mean Achievement Scores of Experimental Group and the Control Group

Source	Sum of Square	df	Mean Square	F Sig	Partial Eta Squared
Corrected Model	3373.041[a]	2	1686.521	12.925.000	0.90
Intercept	25240.842	1	25240.842	193.431 .000	.426
Pre	595.756	1	595.756	4.566.034	.017
Group	3175.588	1	3175.588	24.336 .000	.085
Error	34057.925	261	130.490		
Total	347325,00	264			
Corrected Total	37430.966	263			

a. R squared=0,90 (Adjusted R squared=0.83) Significant at 0.05 level

The analysis in Table indicated that an F- value of 24.336 and a P-value of 0.000 (F (1,261) =24.336, P<0.05). The outcome of treatment was significant at P<0.05 and hypothesis one (Ho_1) was rejected. This shows that a statistically mean variation exists among the two groups (PhET interactive simulations and Control group).

Hypothesis Two
There is no significant difference in the mean achievement scores of male and female students taught chemistry using PhET interactive simulations.
To find out whether any significant difference existed in the posttest of male and female students taught using PhET interactive simulations, descriptive statistics (mean and standard deviation)

Table 3:
Mean and Standard Deviation of the Posttest Mean Achievement Scores of Male and Female Students Taught Chemistry Using PhET interactive simulations

Groups	N	Pretest Mean	Pretest Std.	Posttest Mean	Posttest Std.	Mean Gain Score	Difference in Std.
Male	53	25.40	8.969	37.45	9.335	12.05	0.366
Female	91	29.12	9.591	37.09	11.500	7.97	1.909

From Table 4, it was observed that both male and female students benefited from the treatment. The male students, however, has higher mean score of 37.45 with standard deviation of 9.335 while the female students have a mean gain score of 37.07 with standard deviation of 11.500.

Hypothesis Three
There is no significant difference in the mean interest scores of students taught chemistry using PhET interactive simulations and lecture method.
This hypothesis was tested using descriptive statistics (mean and standard deviation)

Table 5:
Mean, median, Standard deviation and percentage of the Posttest Mean Interest scores of Experimental and the Control Groups

	Items	Std. D.	Mean	Median
1.	Chemistry is an abstract subject.	1.475	3.1	3.00
2.	Learning chemistry with PhET interactive simulations are better than the lecture method.	1.568	4.20	4.50
3.	I had no problem to understand what to do in chemistry.	1.121	3.67	4.00
4.	The PhET interactive simulation was meaningful.	0.825	4.44	5.00
5.	I am interested more in carrying out experiments of some chemistry concepts using PhET simulations.	0.989	4.32	5.00
6.	I was very engaged in trying to understand the underlying chemistry in the PhET interactive simulations.	0.959	4.01	4.00
7.	I am interested in studying chemistry using PhET interactive simulations.	0.913	4.25	4.00
8.	The chemistry discussion/ activities were very interesting.	1.142	4.03	4.00
9.	I would like to attend chemistry classes in higher institution using PhET interactive simulations.	1.117	4.17	5.00
10.	Chemistry becomes more fun and interesting with PhET simulations than the lecture method.	1.192	4.10	5.00
11.	The simulations gave new knowledge in the pH scale (acid - base) and chemical reactions.	0.854	4.37	5.00
12.	I felt that the chemistry that was treated in the simulation has become more comprehensible.	1.031	4.03	4.00
13.	The chemistry textbook does not help me understand some chemistry concepts.	1.449	2.75	3.00
14.	The simulation helped me to connect real life phenomena with underlying chemistry concepts.	0.953	4.03	4.00
15.	I enjoy learning about chemistry with simulations outside the school.	1.066	3.93	4.00
16.	I prefer learning chemistry with PhET interactive simulations than the lecture method.	1.137	3.94	4.00

17. I believe that Chemistry will be useful for my everyday life.		0.758	4.56	5.00
18. I think chemistry Offers a wide range of cares.	0.8134.53			5.00
19. Chemistry made me get to better understanding of Some of the things we do at home.	0.856	4.33		5.00
20. I think females perform better than the males in Chemistry.		1.614	3.63	4.00
GRAND TOTAL		1.092	4.02	

From Table 5: the mean scores of items relevant to the PhET interactive simulations are relatively high, above the mean score of 3.00 of the five (5) Likert scale of the research. For instance, the mean scores of item 2, item 4, item 5, item 6, item 7 and item 10 are 4.20, 4.44, 4.32,4.01, 4.25 and 4.10.

Hypothesis4

There is no significant difference in the mean interest scores of male and female students taught chemistry using PhET interactive simulations**.**

To find out whether any significance existed in the posttest mean scores of male and female students taught Chemistry using PhET interactive simulation, descriptive statistics (mean and standard deviation) were shown below

Table 6:

mean and standard deviation of the posttest mean interest scores of male and female students taught Chemistry using PhET interactive simulations strategy

Variable	Gender	No. in samples(N)	Grand Mean(x)	Grand SD.
	MALE	53	3.7455	1.0763
Experimental				
	FEMALE	91	3.9130	1.10005

From Table 6: it was observed that the mean and standard deviation of both male and female students benefited from the treatment as follows: Experimental Group (Male: X =3.7455, SD=1.0763, Female: X= 3.9130, SD= 1.10005). The difference between the mean of male and female in experimental group is 0.1675. The mean difference of the mean interest scores shows that there is no significant difference in the mean interest scores of male and female students taught Chemistry using PhET interactive simulations.

Discussion

The results of the data analysed showed that experimental group taught Chemistry with PhET interactive simulations achieved better than those taught by means of conventional lecture method. The results further stressed that the variation in the mean achievement of the experimental group and the control was statistically significant and considerable. This outcome is in line with earlier findings of Onwukwe, (2010) who testify that the effects of play simulation and teaching with analogy on achievement among Chemistry students, revealed that simulations in learning, have significant effects on achievement of students in Chemistry. The findings were also in agreement with the findings of Joel (2017) who established that students achieved satisfactory academic achievement after exposure to virtual learning through PhET interactive simulation.

The findings on the computer simulation as interactive by Kotoka and kriek (2014) stressed that simulation allows users to interact with it and minimizes abstractness of hazardous Chemistry concept to the students. Students in experimental group were able to visualize, explore and formula scientific explanations in Chemistry that were otherwise impossible to observe and manipulate by students in control group. This implies that computer simulation improvs students' achievement when compared with lecture method.

The findings on the students' interest in Chemistry by means of interactive simulations achieved substantial different in the mean interest scores of students taught Chemistry by the use of PhET interactive simulations and those taught with conventional method. This discovery is in accord with the discovery of Ugur, Abdullahi, Kutalmis and Omer (2017) who concluded that there is an increase in interest of students in the experimental group who were exposed to computer simulations within the 5E teaching model, which is due to the active participation of students in the experimental group in the teaching learning process, the hands-on activities which simplified learning, simulation which made abstract concepts visual and understandable, and the increase in students' interest in using computers in recent years.

The findings on the gender pertaining mean interest scores of students taught Chemistry with PhET interactive simulations pointed out that there was no considerable variation in the mean interest. Also, the finding indicates that gender did not influence students' interest in Chemistry significantly. These findings were in agreement with the findings of Ezeudo and Okeke (2013).

Conclusion

This study revealed that the achievement of Chemistry students in AMAC, FCT- Abuja is independent of gender as significant difference in mean achievement scores between male and female was not found and likewise, the mean interest scores. It was also observed that when PhET interactive simulation package is used, there is significant achievement scores of students in Chemistry than the lecture method. In addition, the use of PhET interactive simulations sustain students' interest and achievement in any learning activity. It is concluded that PhET interactive simulation is gender sensitive which means that male and female students achieved equally with it.

Recommendation

Based on the major findings of this study, the following recommendations are proffered:

1. Chemistry teachers should be trained to use PhET interactive simulations in making their lessons interesting, interactive as well as making the students to achieved better.
2. Government and stake holders in education should provide in-service training to chemistry teachers on how to use PhET interactive simulations in teaching.
3. The government should utilize the service of various bodies like the Science Teachers Association of Nigeria (STAN), Nigeria Union of Teachers (NUT), Chemical Society of Nigeria (CSN) and others to organize seminars, workshop and conferences to inform and train chemistry teachers and other science teachers on the use of PhET interactive simulation in teaching and learning
4. Students should be encouraged to participate in PhET interactive simulation activities because the method provide cooperative and collaborative skills which improve their understanding of chemistry concepts.
5. PhET interactive simulations can be used in other subjects such as Biology, Physics, Health science and Mathematics to test its effectiveness in other subjects.

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DESIGN, DEVELOPMENT, AND VALIDATION OF COMPUTER SIMULATION AND TUTORIAL MODE OF INSTRUCTION FOR EFFECTIVE TEACHING OF BIOLOGY AT SENIOR SECONDARY SCHOOL

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Abstract

Students encountered in today's classroom are digital natives being prepared for live in the next few decades. Unfortunately, most teachers are "digital immigrants" making the use of technology in classroom difficult. The purpose of this study was to design, develop, and validate computer simulation and tutorial mode of instruction for effective teaching of biology in senior secondary school. Mixed research method was adopted. The qualitative method used design-based research approach. For the quantitative, a quasi-experimental design of pre-test, post-test, non-equivalent control group was used. To determine the effectiveness of the developed package, a sample of 302 SS2 biology students was purposively selected. The package was validated by ten educational technology experts, ten computer experts, and fifteen experienced biology teachers and trial tested on 100 SS2 biology students. Eight instruments: COSIM, COTUM, TTM, BAT, ETEVI, COMPEVI, BIOTEVI, and BIOSVI were used to collect relevant data. While BAT yielded reliability coefficient of r – 0.89, the Cronbach's alpha internal consistency of the validation instruments were: ETEVI (0.76), COMPEVI (0.96), BIOTEVI (0.83), and BIOSVI (0.73). Mean and standard deviation were used for research questions. Analysis of Covariance (ANCOVA) was used to test hypotheses at significance level of 0.05. Experts agreed that the package was suitable for studying biology; mean achievement scores and retention rate of students taught using the package was higher than those taught using traditional teaching method. This implies that schools should in addition to academic skills; inculcate basic ICT skills into their students to enhance performance, and increase their flexibility, job mobility, and self-reliance.

Key words: Simulation, Tutorial, Instructional package, and Design-based Research.

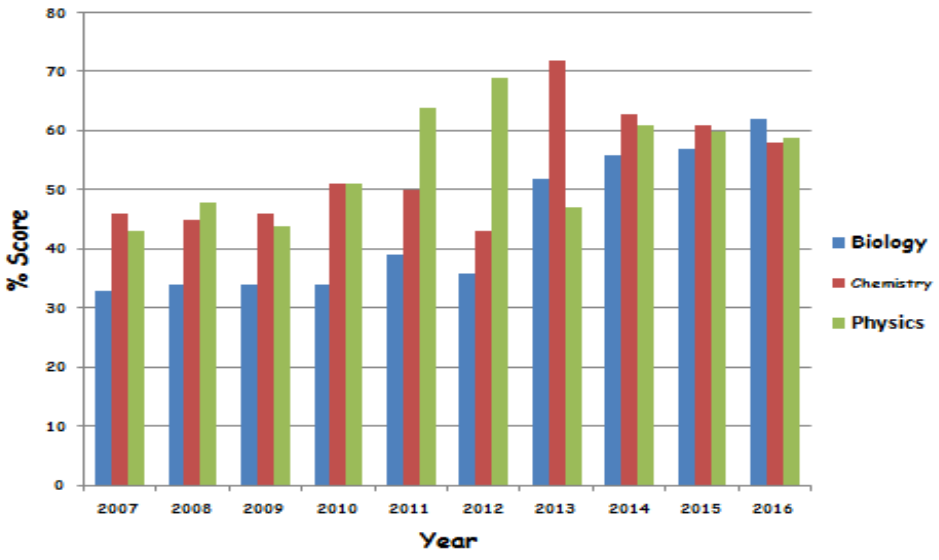
Introduction

As a result of the changes in the structure of the society occasioned by science and technology, the educational system has been influenced. Most students receive information through computer and other information technology (IT) facilities even outside the school environment. Asogwa, Muhammed, Asogwa, & Ofoegbu (2016) asserted that the integration of computers for instructional purposes is already common, widespread, and accepted. They allow students to learn depending on their own ability; the speed, pace, and time they need, such that smart ones learn faster and take less time while average ones learn more slowly and take more time. The computer presents tasks to the students, detects their errors, and offers suggestions for help. This point is further elaborated by the "cognitive theory of multimedia learning". It states that learning can be more successful if both channels of human working memory (visual and verbal/acoustic) are used for information processing at the same time. In other words, students learn more deeply from words and pictures than from words alone (Mayer, 2001). Using computer for instruction can take the form of computer-based instruction (CBI), Computer Enhanced Learning (CEL), Computer Assisted Instruction (CAI) among others. However, Osemmwinyen, 2009; and Yusuf & Afolabi, (2010) opined that CAI is one of the most effective instructional strategies. It takes many formats: tutorial, drill and practice, games, simulation, problem solving, and demonstration (Çepni, Taş & Köse, 2004, and Yusuf & Afolabi, 2010). However, simulation and tutorial are the most effective (Adebayo, 2011).

Simulation means mimicry, making working replicas or representations of real life or hypothetical situations (Krulik, 2010). It is an effective method of teaching sciences (Olele, 2008). The reality brought by its characteristic features of movement and color cannot be over emphasized. Students taught using simulated package had improved learning outcomes Ramatu, Oluwole**,** & Ahmed (2015); Adebayo, & Oladele (2016); Umoke & Nwafor (2014); and Elangovan, & Ismail (2014). It increased their understanding (Varma & Linn, 2012) and reduced misconceptions (Meir, Perry, Stal, Maruca, & Klopfer, 2005). Same as simulation in enhancing learning is the use of computer tutorial. It presents concepts in small stages, each stage requiring student's active participation through frequent evaluation, and reinforcement. It brings about motivation which enhances participation and academic achievement.

For some years now, the academic achievement of students in biology has been of major concern to educators, policy makers, and other stake holders. The curriculum content is intended to provide a modern biology course that will meet the needs of the learner and the society in general. It prepares students for higher courses in medicine and surgery, nursing, bio-chemistry, micro-biology, physiology, botany, anatomy, pharmacy, etc at higher level (JAMB, 2013). Despite its importance, students' performance in standardized examinations is comparatively low. Statistics of students' performance in the major sciences (physics, chemistry, and biology) between 2007 and 2016 (figure 1) shows that biology enjoyed highest number of student enrolment but recorded the least percentage of credit passes. This has been linked to the ineffective teaching methods adopted by teachers (Yearwood, 2005), and (Yusuf, 2009). The traditional teaching method still in vogue does not only lack proper engagement and interactive styles, but failed to incorporate technology in the instructional delivery. To meet the need of school leavers and make them fit for global competitiveness, improved teaching method is now a necessity. Application of ICT in form of instructional package can introduce the needed radical change. It can help to reduce identified challenges of biology instruction, promote active learning, and provide opportunities for students to construct and understand difficult concepts through repeated demonstration in student-controlled environment. Therefore, designing and developing suitable instructional package for individualization of instruction is of paramount importance.

Figure 1:
Bar chart showing students' performance in SSCE in the major science subjects between 2007 and 2016.



To design and develop an instructional package requires an appropriate instructional system design (ISD) model. It spells out the present state and needs of students, define the end goal of instruction, and create an "intervention" to close any existing gap. ADDIE instructional model is the most commonly used (Shibley, Amaral, Shank, & Shibley, 2011). It is an acronym for Analysis, Design, Development, Implementation, and Evaluation. Literature reviewed indicated overloaded biology lessons; heterogeneous students; lack of suitable instructional

software and use of traditional teaching method. These may have led to recycling of wrong ideas, misconceptions, rote learning, and poor retention of learnt concepts.

Retention according to Ramatu, Oluwole, & Ahmed (2015) is the ability to reproduce the learnt concept when the need arises. Use of appropriate instructional method can aid retention. Scholars posited that computer simulation and tutorial modes are capable of enhancing retention (Elangovan, & Ismail (2014); Ramatu, Oluwole**,** & Ahmed (2015); Suleman, Hussain, Ud Din, & Iqbal (2017); and Vinita, & Banswal (2015). Supporting this view, Ezeh (2009) noted that students retain 30% of what they read in textbooks, 40% of teachers' lectures but 80-90% of concepts learnt through computer application. Though there are many commercially developed CAI packages, most of them do not satisfy local content. They are not in line with the curriculum and may not adequately address the objectives and scope of instruction set by individual teachers. Hence the need to design, develop, validate and determine the effectiveness of COSIM and COTUM on students' achievement, and retention of learned concepts in biology.

Purpose of Study

The specific objectives are to:

1) Examine the different processes involved in developing COSIM and COTUM for learning some concepts in biology.
2) Examine the expert's rate of developing instructional package for learning biology.
3) Examine the difference between the comparative mean achievement scores of students taught biology with the package and traditional teaching method.
4) Examine the difference between the comparative mean retention scores of students taught biology with the package and traditional teaching method.

Research Questions

The following research questions were raised to guide the conduct of this study:

1. What are the processes involved in developing COSIM and COTUM for learning some concepts in biology?
2. How do experts rate the developed instructional package for learning of biology?
3. What are the comparative mean achievement scores of students taught biology with the package and traditional teaching method?
4. What are the comparative mean retention scores of students taught biology with the package and traditional teaching method?

Research Hypothesis.

The following hypothesis has been formulated at 0.05 level of significance to guide this study.

Ho_1: There will be no significant main effect of treatment on the academic achievement of students in biology.

Ho_2: There will be no significant difference between the mean retention scores of students in the experimental group and the control group.

Scope of the Study.

The study was restricted to SS2 biology students of some Senior Secondary Schools in Lagos State. It focused on some biology topics: mode of nutrition in living organisms; human circulatory system; and chromosomes: basis of heredity.

Methodology

Research Design

Mixed research method (qualitative and quantitative) was adapted for this study. The qualitative method adopted design-based research (DBR) approach which incorporated experts' suggestions on how to enhance the adoption of the developed package for instruction in Nigerian secondary schools. For the quantitative method, a quasi-experimental design of pre-test and post-test, non-equivalent control group design was utilized. Intact classes were used.

Sample and Sampling Technique

A sample of 302 SS2 biology students (172 males and 130 females) was selected using multi-stage sampling. Firstly, random sampling technique was used to determine two educational districts out of the six districts in Lagos State. Six pieces of papers each bearing the name of a district were folded and reshuffled. Two out of the six with the inscription "yes" were selected. Secondly, purposive sampling technique was employed to select the three schools that participated in the study from the two sampled districts. Only the streams/arms of SS 2 classes that offered biology participated in the study.

Research Instruments

Eight research instruments: three of them were treatment instrument used to engage the students in the teaching strategies, while the remaining five were measurement scale used to collect relevant data. They include;

1. **Instructional package for computer simulation mode (COSIM):** a self-instructional package used by students in the experimental group one to study some selected concepts in biology.
2. **Instructional package for computer tutorial mode (COTUM** used for experimental group two.
3. **Operational guide for traditional teaching method (TTM):** lesson plan for control group.
4. **Biology Achievement Test (BAT):** multiple choice items adapted from WAEC and Nwana (1980).
5. **Educational Technology Experts' Validation of Instrument (ETEVI):** adapted from Koledafe (2011).
6. **Computer Experts' Validation of Instrument (COMPEVI):** adapted from Falode, (2014), it contains items that sought the opinion of computer experts on the suitability of the package**.**
7. **Biology Teachers' Validation of Instrument (BIOTEVI):** used to evaluate the appropriateness of the instructional package for the learning of the selected biological concepts.
8. **Biology Students Validation of Instrument (BIOSVI):** reflected on students' preferences toward the use of the package compared to traditional methods of learning.

Validity of the Instruments

The developed package was validated by 10 educational technology experts, 10 computer experts, and 15 experienced biology teachers. Based on their suggestions, a modified package was developed and trial-tested on 100 SS2 biology students purposively selected from two secondary schools within the area of study. This was to further determine the usability and objectivity of the package. BAT was subjected to face and content validity by 2 science educators and 3 biology teachers.

Reliability of the instruments

Kuder -Richardson (K– R 21) applied on BAT yielded a reliability coefficient of r – 0.89. Cronbach's alpha used to determine the internal consistency of the validation instruments yielded reliability coefficient as follows: ETEVI (0.76), COMPEVI (0.96), BIOTEVI (0.83), and BIOSVI (0.73).

Method of Data Analysis

Detailed information on the processes of designing and development of the package was provided in research questions one. Two was answered with mean, while three and four were answered using mean and standard deviations. Hypotheses were tested with Analysis of Covariance (ANCOVA) at a significance level of 0.05. This statistical instrument was considered most appropriate for the study due to its ability to remove differences in the initial status of the experimental and control groups that often results when intact classes are used (Uzoagulu, 2011).

Results

Research Question 1:
What are the processes involved in developing COSIM and COTUM for learning some concepts in biology?

Creation of a successful learning experience that can engender transfer of knowledge requires an appropriate instructional design before the actual development. As stipulated by ADDIE model, the design stage involved two phases – analysis (process of defining what to be learned) and design (process of specifying how it is to be learned).

A. Analysis: at this stage, the biology content, the learners, the present methods, and media of instruction were analyzed. From literature reviewed, biology lessons were overloaded; suitable instructional software was not used; students in the class were heterogeneous; they hardly received immediate feedback to their responses in tests and examinations. The traditional teaching method still in vogue may have led to recycling of wrong ideas, misconceptions, cramming and regurgitation resulting in students' poor academic achievement.
B. Design: is concerned with specifying of learning objectives and forming learning "blue-print" for instructional materials, assessment instruments, content, media, and methods. The content and instructional objectives of the package were derived from the National Curriculum for Senior Secondary School (Federal Ministry of Education as derived from the National Policy on Education, 1977, 1981, 1999, & 2007). More so, each of the three modules covered by the package had specified behavioural objectives indicating what the students should be able to do after going through the content of each module. Following the principle of multimedia learning, the script for the development stage was written. Other materials: validation instruments, evaluation instruments, storyboard, and media were formulated. The decision on how to deliver the content of the instructional package to the selected sample was also taken.

At the development stage, three phases were involved:

C. Development: Script was type written in Microsoft words and developed using PowerPoint presentation. The storyboard (visual plan) of the package was developed before sending it to a computer animator for programming. For the narration, the researcher read the content of each slide, recorded the voice and synchronized it with the respective slide using the "insert" command of the authoring tool. The package comprised of three modules each containing between 27 - 50 slides covering:

i. home page,
ii. title page (for each module),
iii. learning objectives,
iv. how to study the module,
v. content (broken down into units per module), and
vi. end of unit test (for each unit).

It was programmed using Articulate Storyline 360, and published on html platform. This gave rise to Computer Simulation Mode (COSIM) and Computer Tutorial Mode (COTUM) burned into CD-ROMs and given to experts for validation. Instructional guideline, evaluation instruments, validation instruments, and a cost analysis table were also developed at this stage.
B. Implementation: The researcher approached the Tutor general/Permanent secretary of the participating districts to seek permission to use their schools for this study. The CD-ROMs were installed into the computers in the computer laboratory of schools designated as experimental group. As a self-instructional package, the students were guided to study the content on their own.
C. Evaluation: Each unit in the module had an "end of unit test" to ensure mastery of the unit before proceeding to the next one. At the end of the learning process the students were evaluated to ascertain their learning outcomes.

Research Question 2:

How do experts rate the developed instructional package for learning biology?

i. **Educational Technology Experts' Validation of Instrument (ETEVI):** adapted from Koledafe (2011) was administered on ten educational technology experts to determine the quality of the developed instructional package and seek their opinion on how to improve on the package. They suggested the inclusion of hyperlinks to improve the navigation and interactivity of the package as well as providing room for students to practicalize building of the DNA model. Table 1 shows their mean rating of the package out of a maximum mean score of 5

Table 1:

Mean Rating Scale of the package by Educational Technology Experts.

S/N	A. Typology	Mean Rating
1	The appearance of characters on the screen	4.5
2	Sequence of information on the screen	4.3
3	Consistency of the position of information on the screen	4.5
4	Brevity of the slide content	3.8
	Grand Mean	**4.3**
	B. legibility	
5	Use of readable font size	4.5
6	Consistency in the use of upper and lower cases	4.5
7	Clarity of figures, tables, and animations	4.6
8	Conventional assignment of colour codes	4.1
9	Audibility of the narration	4.0
	Grand Mean	**4.3**
	C. Navigation	
10	The package allows learners to move around freely in different units	4.2
11	Learner controls slide change and time of learning	4.5
12	The package encourages easy movement to and from the home page to the modules.	4.1
	Grand Mean	**4.3**
	D. Interface	
13	The package has attractive homepage	3.9
14	The package has appropriate slide layout	4.4
15	The package has well organized interface	3.9
	Grand mean	**4.1**
	E. Functionality	
16	The package encourages immediate knowledge of result	4.6
17	The concepts and vocabularies are relevant to the learner's ability	4.8
18	The package information depth and scope are in line with stated modular objectives	4.8
19	The interactivity of the package corresponds to the maturity of the students	3.9
20	The package inspires students to apply what they have learnt rather than memorize it.	4.6
	Grand Mean	**4.5**
	F. Packaging	
21	The package can be uploaded to server for larger learners in real time	4.4
22	The instructions on how to use the modules are clear and self-explanatory	4.6
23	The package can be used with personal digital assistants (PDAs)	4.5

	Grand Mean	**4.5**
	G. Durability	
24	The content can be updated and/or modified with new knowledge that will appear soon after the development of the package	4.4
25	The package allows storage (save) in CD-ROM, cloud computing and other external storage devices	4.4
	Grand Mean	**4.4**

This rating is a confirmation of the suitability of the instructional package for learning biology.
ii. Computer Experts' Validation of Instrument (COMPEVI): a twelve-item questionnaire adapted from Falode, (2014) was administered on ten computer experts selected from the sampled schools to determine the appropriateness of the package with reference to flexibility, novelty, and speed. They opined that the package should either be downloadable or burned into CD-ROM instead of flash drive to avoid possibility of virus distribution.

Table 2:
Mean Rating Scale of the Package by Computer Experts.

S/No	Item	Mean Rating
	Flexibility	
1	The developed instructional package can run on different operating system platforms	3.3
2	The package has features that can allow online accessibility	3.3
3	The package has features that can make it accessible on mobile devices	3.7
	Grand Mean	**3.4**
	Novelty	
4	The application of instructional package is a new idea in my school	3.9
5	The biology instructional package is new to biology students in my school	3.8
6	The biology instructional package is new to biology teachers in my school	3.7
7	This instructional package is new to ICT staff in my school	3.6
8	The Software used to develop this package is not already known to my school computer programmers	3.7
9	ICT staff in my school are competent and skilled to develop and modify the package	3.5
	Grand Mean	**3.7**
	Speed	
10	Playing the animation video in the instructional package does not take time to complete	3.7
11	Transiting from one slide to another in the package does not take time to achieve	3.9
12	Installation and setup of the instructional package on computer systems does not take time to complete	3.5
	Grand Mean	**3.7**

By this rating, the experts confirmed the appropriateness of the package for studying of biology.

iii. Biology Teachers' Validation of Instrument (BIOTEVI): a questionnaire, BIOTEVI adapted from Olumorin, Orunmoluyi, Fakomogbon, & Yusuf, (n.d.) was administered on fifteen biology teachers, most of them WAEC team leaders, to determine the suitability of the package for studying the selected concepts. In their suggestion on how to improve the package for its adoption, they noted that an adjustable audio button should be introduced to control

distraction when many students are making use of the package at the same time and in the same location. They added that the substrate of the mushroom should be shown for clarity. Above all, they agreed that the package could help the students to have a clearer view of what they learnt. Table 3 shows the mean rating of the package by these experts out of a maximum mean score of 5.

Table 3:

Mean Rating Scale of the package by Biology teachers.

S/no	Item	Mean rating
1	The content of the package adequately covers the selected biological concepts for senior secondary school biology syllabus	**4.7**
2	The various sub-topics are sequentially arranged to allow for transitional learning.	**4.6**
3	The language/terminologies used are adequate enough for the students to understand.	**3.8**
4	The content of each module relates directly to the objectives of senior secondary biology.	**4.7**
5	The "end of unit tests" is relevant to the content of the respective units.	**4.2**
6	The feedback of the "end of unit tests" are accurate	**4.1**
7	The pictures and tables are reasonably clear and self-explanatory.	**3.6**
8	The animations, to a large extent, projects and explains what they are intended to explain.	**4.7**
9	The narration is clear and satisfies local bias.	**4.1**
10	The package is well designed and self-instructional.	**4.3**
	Grand Mean	**4.3**

This confirms that the package was very suitable for learning of biology.

iv. Biology Students' Validation of Instrument (BIOSVI): a questionnaire, BIOSVI adapted from Gambari, & Yusuf, (2014) was used to ascertain the opinion of the students in terms of the content, navigation, interactivity, feedback, and screen design of the package. It also reflected on their preferences toward the use of the package compared to traditional methods of learning. Table 4 shows their mean rating of the package out of a maximum mean score of 4.

Table 4:

Mean Rating Scale of the package by Biology students.

S/No	Item	Mean Rating
	Content of the package	
1	The content of the package has been well organized (arranged in order)	4.0
2	The diagrams/illustrations in the package are very clear to me.	3.3
3	It was easy to understand the lesson because information was presented from simple to more difficult one.	3.3
	Grand Mean	**3.5**
	Navigation of the package	
4	From the main menu, I can click to move to any of the three modules.	3.4
5	The PREVIOUS key enables me to revisit the previous section(s) of the lesson.	3.6
6	The NEXT key directs me to go to the next section of the lesson.	3.5
7	The OPTION keys allow me to select the correct option.	3.4
	Grand Mean	**3.5**
	Interactivity of the package	
8	It is not difficult to operate the package with computer keys and icons.	3.3

9	This package permits me to repeat any section, pause and continue an animation view.	3.0
10	Frequent display of "end of unit questions" does not interrupt the learning process.	3.3
11	This package enables me to apply what I have learnt rather than memorize it.	3.4
	Grand Mean	**3.3**
	Feedback from the package	
12	This package displays the word "correct" when I select correct option for a question.	3.6
13	This package displays the word "incorrect" when I select wrong option for a question.	3.6
14	This package allows me to proceed to the next unit only if I have exhausted the end of unit questions.	3.5
	Grand Mean	**3.6**
	Screen design of the package	
15	The use of proper lettering (fonts) in terms of style and size make the information legible.	3.2
16	The colours used for the various presentations are very attractive.	3.2
17	The animations (moving picture) in the package assist in understanding the lessons better.	3.3
	Grand Mean	**3.2**
	Students' preferences toward the use of the package compared to traditional methods of learning	
18	Studying biology with an interactive package is more preferable than using text books.	3.3
19	The activities provided in this package are more effective compared to normal classroom instruction.	3.2
20	I will suggest to my friends to use computer package in studying biology instead of textbooks.	3.3
21	I prefer to study biology with an interactive package with my teacher acting only as a facilitator.	3.3
	Grand Mean	**3.3**

Students preferred using the package when compared to the traditional method of teaching.

Research Question 3:

What the comparative mean achievement scores of students taught biology with the package and traditional teaching method?

Table 5:

Achievement of students taught with the developed instructional package and those taught using the Traditional Teaching Method.

Groups	N	Pretest $\overline{X}$	SD	Posttest $\overline{X}$	SD	Mean Gain
COSIM	102	16.8	7.8	31.1	6.5	14.3
COTUM	100	16.5	5.9	25.0	6.3	8.5
TTM	100	16.7	5.0	18.3	8.4	1.6

From table 5, students exposed to COSIM achieved more followed by those exposed to COTUM.

Ho_1: There will be no significant main effect of treatment on the academic achievement of students in biology.

Table 6:
Summary of analysis of covariance (ANCOVA) for test of significance of treatments on students' achievement in biology.

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	8323.231[a]	6	1387.205	27.405	.000
Intercept	23841.297	1	23841.297	471.003	.000
Pretest	107.172	1	107.172	2.117	.147
Treatment	8147.470	2	4073.735	80.480	.000
Error	14932.359	295	50.618		
Total	209812.000	302			
Corrected Total	23255.589	301			

Significant difference existed between the achievement of students taught biology using the package and those taught with traditional teaching method ($F = 80.48$; $P < 0.05$).

Table 7:
Scheffe's Post Hoc Test for the Comparative Effect of Treatment on Students' Achievement in Biology.

(I) Treatment	(J) Treatment	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
COSIM	COTUM	6.0188*	1.00311	.000	3.5510	8.4867
	TTM	12.7188*	1.00311	.000	10.2510	15.1867
COTUM	COSIM	-6.0188*	1.00311	.000	-8.4867	-3.5510
	TTM	6.7000*	1.00806	.000	4.2200	9.1800
TTM	COSIM	-12.7188*	1.00311	.000	-15.1867	-10.2510
	COTUM	-6.7000*	1.00806	.000	-9.1800	-4.2200

*. The mean difference is significant at the 0.05 level.

Scheffe's Post Hoc test revealed that the significant difference was created by COSIM followed by COTUM.

Research Question 8:
What are the comparative mean retention scores of students taught biology with the package and traditional teaching method?

Table 8:
Retention Level of Students Taught with Instructional Package and those Taught Using the Traditional Teaching Method.

Groups	N	Posttest $\overline{X}$	SD	Retention $\overline{X}$	SD	Mean Difference
COSIM	102	31.1	6.5	23.7	11.1	7.4
COTUM	100	25.0	6.3	20.3	9.1	5.0
TTM	100	18.3	8.3	09.0	9.0	9.2

Experimental groups one and two retained learned concepts better than those in the control group.

Ho_2: There will be no significant difference between the mean retention scores of students in the experimental group and the control group.

Table 9:
Summary of Analysis of Covariance (ANCOVA) for Test of Significance of Student Retention Scores.

Source	Type III Sum of Squares	Df	Mean Square	F	Sig.
Corrected Model	11790.087[a]	3	3930.029	41.013	.000
Intercept	7832.258	1	7832.258	81.735	.000
Posttest	18.836	1	18.836	.197	.658
Treatment	8369.298	2	4184.649	43.670	.000
Error	28555.780	298	95.825		
Total	135548.000	302			
Corrected Total	40345.868	301			

Since the associated probability value of .000 was less than 0.05, the null hypothesis was rejected.

Table 10:
Scheffe's Post Hoc Test for the Comparative Effect of Treatment on Students' Retention in Biology.

(I) Treatment	(J) Treatment	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval Lower Bound	Upper Bound
COSIM	COTUM	3.3659	1.37572	.052	-.0185	6.7502
	TTM	14.6059*	1.37572	.000	11.2215	17.9902
COTUM	COSIM	-3.3659	1.37572	.052	-6.7502	.0185
	TTM	11.2400*	1.38251	.000	7.8389	14.6411
TTM	COSIM	-14.6059*	1.37572	.000	-17.9902	-11.2215
	COTUM	-11.2400*	1.38251	.000	-14.6411	-7.8389

The significant difference was created by COSIM followed by COTUM.

Summary of Major Findings
The findings of this study based on the purpose of the study are summarized as follows:

1. In this study, computer simulation and tutorial package was designed and developed using ADDIE model.
2. From the experts rating, the package is appropriate and very suitable for studying biology.
3. The study found that the mean achievement score of students taught using COSIM was the highest followed by COTUM and then TTM.

4. The study found that students taught biology using the developed instructional package retained more of the learned concepts than those taught using the traditional teaching method.

Discussion

The ADDIE instructional design model adapted for this study has been considered by other researchers to be the most commonly used (Shibley, Amaral, Shank, & Shibley, 2011). Bolaji (2016) carried out a study on evaluation of a ubiquitous collaborative mobile learning model for teaching mole concept in chemistry in Nigerian secondary schools. In the study, the content derived from the National Curriculum had the instructional package designed using this model. However, Olumorin, Orunmoluyi, Fakomogbon, & Yusuf (n.d.) had a different approach. Though they believed that most of the current instructional design models were spin-offs or variations of the ADDIE model, yet in their study on the assessment of a physics computer-assisted instructional package for teaching selected topics in secondary schools in Nigeria they used Dick and Carey ISD model. In the same vein, Anunobi, Gambari, Alabi, & Abdullahi (2017) carried out a study on the development and validation of web-based courseware for junior secondary school basic technology students in Nigeria. They adopted Dick and Carey instructional system design model.

From literature reviewed, a number of packages have been developed using different authoring tools. In their study on the effects of computer assisted instruction on secondary school students' performance in biology, Yusuf, & Afolabi, (2010) developed a package using Dream weaver and flash written in Hypertext Markup Language (html) with illustrations converted to Graphic Interchange Format (GIF). In the same vein, when Gambari, & Yusuf (2014) conducted a study on development and validation of computer instructional package on physics for secondary schools in Nigeria, they developed a package using Macromedia Dreamweaver 8 in addition to Microsoft Word, Macromedia Fireworks 8, and Macromedia Flash 8. AlSultan, Lim, MatJafri, & Abdullah (2006) developed CAI package on remote sensing processing using Macromedia Flash. In other research works, (Gambari, Ezenwa, & Anyanwu, 2014; Yusuf, Gambari, & Olumorin, 2012) Macromedia Dreamweaver 8, micro-media flash, fireworks 8, flash and MS office software were used. From the above reports, it can be deduced that much emphasis have been laid on the afore-mentioned authoring tools. The researcher therefore deemed it fit to explore other options such as Adobe Captivate, Active presenter, Articulate Storyline, Camtasia, Letora, etc. Articulate Storyline 360 was adopted for the development of the instructional package for this study. The output offers the learners the chances of evaluating learned concepts using computer-based test (CBT). It provides immediate feedback and an opportunity for the user to review answered questions. The package developed using this authoring tool can be published on html platform, web-page, CD-ROM, Android phone, learning management system (LMS), etc to beat the restriction of time and distance and enhance durability.

The developed package was rated very high by experts thus confirming its suitability and appropriateness for learning of the subject. This finding is supported by Asogwa, Muhammed, Asogwa, & Ofoegbu (2016). They posited that the integration of computers into the classrooms in Nigerian secondary schools is already common, widespread, and accepted for instructional purposes. Apart from motivation, literature shows that instructional package has the potential of arousing student's interest, stimulating positive attitude, promoting retention ability and improving their achievements (Yusuf & Afolabi, 2010). It increases students' attention and curiosity (Kocakaya & Gonen 2010). More so, simulation exposure reduces misconceptions about learned biology concepts (Meir, Perry, Stal, Maruca, & Klopfer, 2005). Tekbiyik, & Akdeniz, (2010) added that since science has many theoretical and abstract concepts which are difficult to understand easily, students need some visual media and hands-on materials in order to learn better. This is why Adekunle (2008) in Okobia (2011) noted that when the students are given the chance to learn through more senses than one, they learn faster and easier.

Students exposed to the package achieved more than those exposed to TTM. This is a confirmation of the principle of the cognitive theory of multi-media learning. The theory stated among other things that students learn better from words and pictures than from words alone;

from animation and narration together than only from animation or narration or on-screen text. The finding is also supported by Olafare (2011) who reported in his study that computer instructional package enhanced performance of students in cultural and creative art. The result is in line with the findings of Gambari, Ezenwa, & Anyanwu (2014). They examined the effects of two modes of computer-assisted instructional package (animation with text and animation with narration) on the achievement of students taught solid geometry. Comparing their post test scores, they found a significant difference in favour of animation with narration. The findings of this study negate the report of Anyanwu (2003). In his study on the effectiveness of instructional materials in teaching of Social Studies in some selected post primary school in Owerri educational zone, he asserted that learners are not acquainted with computer assisted instructional package and by consequence, may not contribute to improved performance.

The package improved the retentive capacity of the students after the treatment. This is a confirmation of the finding of Ramatu, Oluwole**,** & Ahmed (2015). Likewise, in their study on the effects of computer assisted instructional package on junior secondary school student's achievement and retention in geometry in Minna Niger state, Safo, Ezenwa, & Wushishi, (2013) found that students taught with simulation instructional package had higher retention scores than those taught using traditional teaching method. It was similar to that of Suleman, Hussain, Ud Din, & Iqbal (2017) and Ezeh (2009). They posited that students retained higher percentage of concepts learnt through computer application than the ones learnt through textbooks, and teachers' lectures.

Conclusion

Most teachers in today's classrooms are "digital immigrants", as such they find it difficult to use technology for instructional delivery. In this era of globalization and digitization, ICT competence has become a necessity. This implies that schools should in addition to academic skills; inculcate basic ICT skills into their students. Since experts rated the Package designed and developed for the purpose of this study very high, it implies that the package is suitable and appropriate for learning of the subject. It was found to meet up with the required standards of instructional design and development process. The self-instructional format, visualization and interactivity features made it very attractive and interesting. It will not only enhance the academic performance of the students, but increase their flexibility, job mobility and self-reliance.

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ASSESSMENT OF COLLEGES OF EDUCATION STUDENTS' BEHAVIOURAL INTENTION TOWARDS WHATSAPP UTILIZATION FOR LEARNING BIOLOGY IN NIGER STATE

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Abstract

The study assessed Colleges of Education Students Behavioural Intention towards WhatsApp utilization for learning Biology in Niger State. The study adopted descriptive survey research design. The population of the study was 1,259 NCE 11 Biology students who were in 2018/2019 academic session in the colleges of education in Niger State. Four hundred and twenty-five students constitute the sample size for the study using Krejcie and Morgan sample size. Cronbach Alpha correlation was used to determine a reliability coefficient values of 0.86 and 0.73. The instrument was administered on all the respondents and retrieved after four weeks. Mean and Standard Deviation were used to answer the research questions. While Analysis of Variance (ANOVA) was used to test null hypothesis. A decision rule was set in which a mean score of 3.0 and above was considered agreed while a mean score below 3.0 was considered disagreed. From the result of the study, hypotheses one was rejected and hypothesis two was not rejected. Findings revealed that students perceived the usefulness of WhatsApp platform for learning Biology with a mean score of 3.08, students perceived the ease of use of WhatsApp platform for learning Biology with a mean score of 3.24. However, based on these findings, it was recommended among others that, the management should ensure that, there should be a strong, free and reliable internet services in colleges of education in order to enable the students access social media platform for learning.

Key Words: ICT, Social Media, WhatsApp, TAM, Biology, Perceived Usefulness, Perceived Ease of Use

Introduction

The widespread development of Information and Communication Technology (ICT) makes its utilization very imperative. Many researches have now been directed towards the uses of ICT. This have contributed significantly to the changes in the teaching and learning that have taken place in the e-learning. The over-emphasis on the use of ICT evolves a new paradigm for education known as e-leaning (Saleh & Steve, 2014). Consequently, polytechnics, colleges of education, universities and even secondary schools in Nigeria have metamorphosed their teaching strategies in order to adopt technologies that would enable them achieve their goals, most importantly as enshrined in the National Policy in Education (FRN, 2004). E-learning is commonly defined as the international use of ICT in teaching and learning (Brady & Smith, 2010). Learning could be done through the use of ICT and recently other platforms have been adequately utilized to convey information, ideas, knowledge through the use of social media platform.

Social Media have become a versatile communication tools which have been found to be enhancing teaching and learning by cooperative or collaborative learning (Bryer & Zavatarro, 2013). Social media are potent tools that facilitate the sharing and collaborating activities among students, between students and teachers. There are several social networking sites and social media platforms currently in use by students, these includes: Facebook, Twitter, Instagram, Snap chat, Pinterest etc. One of the popular method of sharing ideas, facts and

knowledge among students is the use of WhatsApp tool in learning (Lockyer & Patterson, 2008).

WhatsApp is considered as an educational tool based on the fact that it possesses several beneficial features which enables peer feedback, goodness of fit with social context, and an instrument of interaction (Levent, 2007). Research records showed that WhatsApp users are children with the age bracket of 18 and 25 years old, and they are adults at the tertiary level of education, (Naveen & Sudhansh, 2017). Based on this premise it can be deduced that WhatsApp could be a real veritable tool for providing active participation and collaborative learning among college of education students. However, several models have been put forward to address user's responses to the use of new technology for learning such as the technology acceptance model (TAM).

Technology Acceptance Model (TAM) was developed by (Davis, 1989). It has been one of the most popular research models to produce use and acceptance of information systems and technology by individual users (Hossain & de Silver, 2012). The TAM model has two major factors which are; perceived usefulness and perceived ease of use which are relevant in the behavior of using the computers. Davis, (1989) viewed perceived usefulness as the prospective user's subjective probability that using a specific application system will enhance his or her job or life performance. Similarly, perceive ease of use can also be defined to mean the degree or magnitude to which the individual user expects the identified system to be free of effort. The two factors mentioned, perceived useful and ease of use are two most potent determinants of actual system use. The individual attitude to use is related to the user's evaluation of the need of employing a particular information system application based on his behavioral intention.

Intention of use of journal media system is the key factor in developing technology utilization models (Davis *et al.*, 1989, Venkatesh *et al.*, 2003). The theory of reasoned action (TRA) believes that intention to use a system is the function of attitude toward a person's behavior and subjective norms which were later extended to include perceived control and hence the theory of planned behavior (Venkatesh, *et al.*, 2008). Perceived enjoyment was considered as a vital user post – adoption belief that translates to increased levels of user satisfaction and continuance intention (Pelling & White, 2009). Researchers have discovered that individuals who enjoy a web system view their interactions with the system more positive and form a high degree of behavioral intention to use that system. However, most tertiary institutions of learning such as Polytechnics, Monotechnics and Universities are beginning to appreciate the importance of social media platforms in teaching and learning. The colleges of education are not left out in the bid to utilize social media platforms for teaching and learning.

Colleges of Education are tertiary institutions of learning. The colleges of education were introduced/established to produce National Certificate to qualify Grade 11 teachers with in depth knowledge to handle pupils adequately at primary and post primary levels of institutions in Nigeria. The need for this led to the establishment of Federal colleges of education and similarly by the states. The objectives for setting up this level of education were clearly spelt out in the National Policy on Tertiary Education (FRN, 2004). However, the National Policy on Teacher Education focused majorly on the; production of highly motivated, conscientious and efficient classroom teachers for all levels of educational system, encourage further the spirit of enquiry and creativity in teachers, help teachers to fit into social life of the community and the society at large and enhance their commitment to national goal amongst others thus transforming teachers from the pedagogical or analogue style of teaching characterized by teachers centeredness method of learning popularly known as conventional method of teaching.

The paradigm shifts from the conventional method characterized by the teacher's occupation of the teaching became necessary with the advent of so many social media platforms. More expectations have been placed on the role that technology might exert to harness effective and

efficient learning most importantly at the higher level of education. The agitation remains that there exist a disconnect between authorities' ambition for interactive learning through a wide range of technologies and the realities of the practices (Roblyer, *et al.*, 2010). Dunn (2012) noted that learning must be done using adequate technology. To Laird and Kuh (2005) active learning and deep interaction between students and their teachers requires an extended degree of technologies engagement in the teaching of biology specifically.

Biology is one of the core courses offered at both post primary and tertiary levels. At the colleges of education level, the concepts of biology are abstract in nature. Biology as a course of study in colleges of education is not being offered singly but in conjunction with other courses such as: Biology/Geography, Biology/Agricultural science, Biology/Economics, Biology/Mathematics, Biology/Physics and Biology/Chemistry amongst others. The course is offered right from 100 level to 300 level. The tutors of Biology must be holders of first degree in Biology Education, master's degree and PhD degree are an added qualification. The subject is divided into two major branches at NCE level such as Animal Biology and Plant Biology. The former deals with the study of animals (Zoology) while the later deals with the study of plants (Botany). Both the branches of Biology mentioned above involves some abstract aspects of the topics such as; Genetics, evolution and hybridization amongst others which can adequately be learnt through ICT. Information technologies have fine-tuned our live today, presently, Nigerian tertiary students and teachers have massive use of smart phones, iPad and other computer model device which can be used to learn Biology through various social media platform. The role of emerging social medial platform may offer new opportunities to enhance teaching and learning of biology. Social connection affects so many aspects of the live of the Nigerian child, based on this they can be applied to education and learning would no longer be a surprise (King & Sen, 2013). Most of the tertiary institution students use smart phones and other mobile devices which are equipped for social media applications like Facebook, twitter, Wikipedia, YouTube, WhatsApp and Instagram amongst others, these platforms are characterized by the facts of enabling social interaction, content sharing, and collective intelligence. Therefore, WhatsApp application can be adequately utilized to enhance the teaching and learning of biology in college of education in Niger State.

Yeboah (2014) also carried out research on the impact of WhatsApp messenger usage on students' performance in tertiary institutions in Ghana. The researcher adopted survey research design and 50 students from five (5) tertiary institutions were interviewed as the sample for the study and 250 questionnaires were administered to the students from same institutions. The researcher did not mention any statistical tool used for statistical analysis for the study. The study unveiled that WhatsApp takes much of students' time.

Chokri (2015) investigated the effectiveness of WhatsApp Mobile Learning Activity Guided by Activity Theory on students' Knowledge Management (KM). The researcher adopted an experimental approach-based comparison between 34 students of an experimental group and 34 students of a control group. The learning process of the experimental group was based on continuity between 2 hours of in-class learning and 1 hour of learning activities that were mediated by WhatsApp instant messaging each week. The control groups' experience was 100% in-class with no app mediation, t-test was used to compare the mass of the control and experimental groups in the test and the students' attitudes at 0.05 Alpha level. The result revealed that there was a significant difference between the experimental group and the control group, therefore WhatsApp is a good tool for learning when it is used in a blended course strategy.

Bhatt and Arshad (2016) carried out research work on the impact of WhatsApp on youth of Agra India. This study was conducted upon 100 respondents and an interview schedule was used as tool of data collection. The study revealed that WhatsApp is a medium of making communication easier and faster thereby enhancing effective flow of information, idea sharing and connecting people easier. It was also found that WhatsApp has a profound negative impact on youth and adversely affects their education, behaviour and routine lives. Ehibudu and Sira (2017), the study investigated the influence of WhatsApp and Facebook social media usage on academic performance of secondary school students in Port Harcourt. Correlational analysis design was used. A sample of 300 senior secondary school students were used. The instrument used for data collection was English achievement Test (EAT). The result from the study revealed that there was a significant relationship with students' academic performance in Port-Harcourt L.G.A.

Akpan and Ezine (2017). Studied the effectiveness of WhatsApp as a collaborative tool for learning among undergraduate students in the University of Oyo. Quasi-experimental design was adopted. The sample of participants was 60. The instrument for data collation was achievement test. Mean, standard deviation, t-test and z-test was used to analyze the data. The result established that students taught with WhatsApp did better in retention of concepts taught than the control group. However, the result also showed that there was no significant difference between male and female students who used WhatsApp application.

Sonia and Alka (2017) carried out research on effectiveness of e-learning through WhatsApp as a teaching learning Tool. Two group of students were taught the same topics by two different T-L-activities (WhatsApp and didactic lectures). Assessment of knowledge was done by giving pre and posttest questionnaire of 20 marks for each topic. The posttest result revealed that the learners with WhatsApp as a learning tool score marks ranging from 5-20 marks while those taught with didactic lecture scored in the range of 3-17.5 marks and have an average of 11.6 and 11.9 scores respectively. The two tailed t-value between the two groups is 0.635 which is not satisfactory. It was revealed that there was no significant difference between the knowledge gained from WhatsApp or didactic lectures, advantages out pars the disadvantages.

Naveen and Sudhansh (2017) carried out a survey analysis on the usage and impact of WhatsApp messenger in the region of Northern Indian. An internet-based survey with open source Lime survey software was used to obtain responses. 460 responses were received in which only 136 responses were considered for analysis, and the result shows that there is a significant impact of WhatsApp on it users.

Previous studies were on the need of TAM to measure the use of social media for collaborative learning, using TAM in understanding academics Behavioral intention to use learning management system, effectiveness of WhatsApp as a collaborative tool for learning among undergraduate students, effects of social media on course achievement and behavior, amongst others. Colleges of education students may possess skills of using social media for different purposes, but it is a well- known fact that many of them has been using the platform for fun, entertainments, social interactions chatting, and watching of audio/visuals due to a great deal of interest cultivated for such. Therefore, the utilization of WhatsApp platform for learning Biology is the gap that the researcher intends to fill.

Statement of the Problem

The high enrolment of students offering Biology as a core course/subject at secondary school level have resulted in the dramatic increase in the number of students enrolling into tertiary institutions of learning which include colleges of education (Ibrahim, 2016). This increase in the population of secondary school leavers gaining admission into the Colleges of Education has led to geometric increase in admission of students to read Biology with combination of

other subjects. The large class sizes have led to the corresponding poor performance of students in the final National Board for Colleges of Education (NBCE) as reported by (Ibrahim, 2016). However, many factors have been envisaged by several researchers as the cause of the dismissal poor performance of students in the subject such as; inadequate instructional materials, large class sizes, laziness on the part of the lecturers and students, the didactic method of teaching characterized by teacher centeredness, lack of use of Information and Communication Technologies (ICT), phobia of the use of ICT, misuse of ICT by students for social interaction amongst others.

Several strategies have also been used to salvage these problems such as; Building of ICT Center's in colleges of education, use of Power Points, Digital Versatile Disc (DVD), Video Compact Disc (VCD), Computer Assisted Instruction (CAI), Programmed Instruction, e-learning, conferencing, Audacity Programmed, Codel amongst others. But the poor performances of students in Biology in colleges of education have persisted. Hence, the search for more interactive strategies between the teacher, learner and the materials to be learnt becomes imperative.

Thus, the interactive platform considered by this study that might solve the problem may be the use of WhatsApp. Therefore, the study intends to assess the Technology Acceptance Model in examining colleges of education student's behavioral intention to use WhatsApp for learning Biology in Niger State.

Purpose of Study

The main purpose of the study is to examine how students perceive usefulness of WhatsApp for learning Biology in Colleges of education and students perceive the ease of use of WhatsApp platform for learning Biology in colleges of education. The Specifically the Study is set to:

1) Examine how the students perceive the usefulness of WhatsApp for learning Biology in Colleges of education.
2) Examine how the students perceive the ease of use of WhatsApp platform for learning Biology in colleges of education.

Research Questions

The following questions were raised to guide the study.

1) How do students perceive usefulness of WhatsApp for learning Biology in Colleges of education?
2) How do students perceive the ease of use of WhatsApp platform for learning Biology in colleges of education?

Research Hypotheses

The following null research hypotheses were formulated and will be tested at 0.5 level of significance.

HO_1: There is no significant difference in students' perceived usefulness of WhatsApp platform based on school.

HO_2: There is no significant difference in the students' perceived ease of use of WhatsApp among Colleges of Education Students in leaning Biology.

Methodology

The study adopted descriptive survey research design. A descriptive survey research design was utilized based on the fact that it involves the systematic collection of data from a group of

respondents (Sambo, 2005). This type of survey entails the collection of information for the purpose of describing and interpreting the prevailing conditions, practices, attitudes, beliefs, usage, intention, and usefulness in an ongoing process of learning. In relation to this study the descriptive survey design will enable the researcher to determine and assess the technology acceptance model as it relates to the use of social media (WhatsApp) for learning Biology at tertiary level of education by obtaining data from respondents on perceived usefulness, perceived ease of use, behavioural intention and attitude towards the use of WhatsApp platforms for learning Biology. The independent variable of the study is TAM, while the dependent variable were perceived usefulness and perceived ease of use.

There are three (3) Colleges of Education in Niger. The researcher used random sampling technique in sampling two (2) Colleges of Education. The Colleges of Education are Colleges of Education A and College of Education B. Convenience Sampling technique was employed in the selection of NCE II Biology students. The convenience sampling has been found to be used in many studies investigating Technology Acceptance Model (Krejcie & Morgan, 1970). It was considered appropriate because it ensures better response in a short period of time and ensure that the respondents are equally represented in the sample. The researcher used Krejcie and Morgan (1970) in determining the sample size from the sample frame. According to Asuzu (2015), sample is a portion of a study population of interest selected in such a way that it is a complete representative of the study population and so, inference data obtained from the sample will be as true as if the entire population has been studied. Hence using Krejcie and Morgan's table, 425 NCE II Biology students was used as the sample of the study.

The research instrument that was used in this study is a researcher – designed questionnaire tagged Questionnaire on Assessment of Technology Acceptance Model in Examining College of Education Students' Behavioural Intention towards WhatsApp Utilization for learning Biology. A questionnaire allows for the collection of large number of data in a short period of time as well as getting the required information from the respondents freely and voluntarily. This is also based on the fact that questionnaire can be used to measure what information an individual possesses, like and dislike, interest, attitude and beliefs of an individual or group of individuals by asking them what they think about some issues (Sambo, 2008).

The instrument contains three (3) sections harmonized in one questionnaire, that is sections A – C. Section A requires the respondent's demographic information which includes: course of study, department, school or faculty. Section B contains six (6) items purposely meant to collect information on perceived Usefulness of WhatsApp for learning Biology (QPUWLB). Section C contains seven (7) items designed to collect information on perceived Ease of Use of WhatsApp for learning Biology (QPEUWLB). All the sections are based on five (5) points Likert rating scales of SD (Strongly Disagree) – 1 point, D (Disagree) – 2 points, N (Neutral) – 3 points, A (Agree) – 4 points and SA (Strongly Agree) – 5 points.

Results

Data obtained were analyzed using descriptive statistics of Mean and Standard Deviation and Analysis of Variance (ANOVA). The results are presented based on the research questions and hypotheses.

Research Question One: How do students Perceived Usefulness (PU) of WhatsApp platform for learning Biology?

The descriptive statistics of Mean and Standard Deviation was used to answer this research question and the summary of the results is presented in table 1.

Table 1:

Mean and Standard Deviation of Students' Response on the Perceived Usefulness of WhatsApp Platform for Learning Biology

S/N	Item	N	Mean($\bar{x}$)	Std. Dev.	Decision
1	Using WhatsApp in my learning process would enable me to accomplish learning tasks more quickly.	425	3.16	1.36	Agreed
2	Using WhatsApp would improve my learning achievement.	425	3.33	1.36	Agreed
3	Using WhatsApp in my academic studies would increase my achievement.	425	3.12	1.34	Agreed
4	Using WhatsApp would enhance my effectiveness in learning Biology.	425	2.81	1.34	Disagreed
5	Using WhatsApp would make it easier for my studies.	425	2.85	1.37	Disagreed
6	I would find WhatsApp useful in my studies.	425	3.18	1.32	Agreed
	Grand Mean		**3.08**		**Agreed**

Decision mean: 3.00

Table 1 shows the Mean and Standard Deviation of students' response on their Perceived Usefulness of WhatsApp for learning Biology. The table revealed the computed Mean score of 3.16 with Standard Deviation of 1.36 for item one, Mean score of 3.33 with Standard Deviation of 1.29 for item two, Mean score of 3.12 with Standard Deviation of 1.34 for item three, Mean score of 2.81 with Standard Deviation of 1.34 for item four, Mean score of 2.85 with Standard Deviation of 1.37 for item five, and Mean score of 3.18 with Standard Deviation of 1.32 for item six. The table revealed further that, the grand Mean score of the six items was 3.08 which is greater than the decision mean score of 3.00. This implies that majority of the respondents agreed and perceived the usefulness of WhatsApp platform for learning Biology.

Research Question Two: How do students Perceive the Ease of Use (PEU) of WhatsApp platform for learning Biology?

The descriptive statistics of Mean and Standard Deviation was used to answer this research question and the summary of the results is presented in table 2.

Table 2:

Mean and Standard Deviation of Students' Response on Perceived Ease of Use of WhatsApp Platform for Learning Biology

S/N	Item	N	Mean($\bar{x}$)	Std. Dev.	Decision
1	I feel that using WhatsApp would be easy for me.	425	3.24	1.29	Agreed
2	I feel that my interaction with WhatsApp would be clear and understanding.	425	3.23	1.28	Agreed
3	I feel that it will be easy to become skilful at using WhatsApp.	425	3.14	1.29	Agreed
4	I would find WhatsApp to be flexible to interact with.	425	3.55	1.13	Agreed
5	Learning to manipulate WhatsApp platform would be easy for me.	425	3.03	1.27	Agreed
6	I feel that my ability to determine WhatsApp ease of use is limited by lack of experience.	425	3.27	1.30	Agreed

7	I feel that my ability to determine WhatsApp ease of use is limited to lack of experience.	425	3.20	1.30	Agreed
	Grand Mean		**3.24**		**Agreed**

Decision Mean: 3.00

Table 2 shows the Mean and Standard Deviation of students' response on their Perceived Ease of Use of WhatsApp platform for learning Biology. The table revealed the computed Mean score of 3.24 with standard Deviation of 1.29 for item one, mean score of 3.23 with Standard Deviation of 1.28 for item two, Mean score of 3.14 with Standard Deviation of 1.29 for item three, Mean score of 3.55 with Standard Deviation of 1.13 for item four, Mean score of 3.03 with Standard Deviation of 1.27 for item five, Mean score of 3.27 with Standard Deviation of 1.30 for item six and Mean score of 3.20 with Standard Deviation of 1.30 for item seven. The table further revealed that; the grand Mean score was 3.24 which is greater than the decision mean score of 3.00. This implies that, the majority of the students agreed and perceived the ease of use of WhatsApp platform for learning Biology.

Testing of Null Hypotheses

Hypothesis one: There is no significant difference in students' Perceived Usefulness (PU) of WhatsApp platform for learning Biology based on school.

Analysis of Variance (ANOVA) was used to test the Null Hypothesis and the summary of the results is presented in table 3

Table 3:

ANOVA Result of Students' Responses on PU of WhatsApp Platform for Learning Biology Based on School

Group	Sum of Square	df	Mean Square	F	p-value
Between Group	389.023	1	389.023		
Within Group	16412.333	423	38.800	10.026	0.002*
Total	16801.355	424			

* = significant at 0.05 level

Table 3 shows the ANOVA results of students' responses on PU of WhatsApp platform for learning Biology. The table revealed that there was statistical significant difference in students' PU of WhatsApp platform based on school with F (1,423) = 10.026, p-value = 0.002 at P < 0.05. On this basis, hypothesis one was rejected.

Hypothesis Two: There is no significant difference in students PEU of WhatsApp platform for learning Biology based on school. Analysis of Variance (ANOVA) was used to test the Null Hypothesis and the summary of the results is presented in table 4.

Table 4:

ANOVA Result of Students' Responses on PEU of WhatsApp Platform for Learning Based on School

Group	Sum of Square	df	Mean Square	F	p-value
Between Group	6.460	1	6.460	0.192	0.661^{ns}
Within Group	14219.696	423	33.616		
Total	14226.155	424			

ns = not significant at 0.05 level

Table 4 shows the ANOVA results of students' responses on PEU WhatsApp platform for learning Biology based on school, and the table revealed that there was no statistical significant difference in students' PEU of WhatsApp platform for learning Biology based on school with F (1, 423) = 0.192, p-value = 0.661 at P > 0.05. On this basis, hypothesis two was not rejected.

Discussion

The result of the analyses related to hypothesis one revealed that there is significant difference in the students' Perceived Usefulness of WhatsApp platform for learning Biology. This finding is in line with that of Yeboah (2014) who carried out a study on the impact of WhatsApp messenger usage on students' performance in tertiary institutions in Ghana, and discovered that WhatsApp takes much of the students' study time. The finding is also with that of Ehibudu and Sira (2017) who found out that there was a significant relationship with students' academic performance.

This finding contradicts the finding of Bhatt and Arshad (2016) who found out that WhatsApp is a medium of making communication easier and faster, thereby enhancing effective flow of information, idea sharing and connecting people easier, and was found that WhatsApp has a profound negative impact on youth and adversely affects their education, behaviour and routine lives.

The result of the analyses related to hypothesis two revealed that there is no significant difference in the Perceived Ease of Use of WhatsApp platform for learning Biology. This finding supports the result of Sonia and Alka (2017) who reported that there was no significant difference between the knowledge gained from WhatsApp or didactic lectures and that the advantages out pass the disadvantages. The findings is also in agreement with that of Akpan and Ezine (2017) who found out that there was no significant difference between the students who used WhatsApp application.

This finding contradicts the finding of Naveen and Sudhansh (2017) who revealed that there is a significant impact of WhatsApp on its users. Similarly, this finding contradicts the result of Chokri (2015) who found out that WhatsApp is a good tool for learning when it is used in a blended course strategy and that there was significant difference between the experimental group and the control group.

Conclusion

This study was on assessment of Technology Acceptance Model in Examining Colleges of Education Students Behavioural Intention towards WhatsApp Utilization for Learning Biology in Niger State. It was concluded that the Colleges of Education students perceived the usefulness of WhatsApp platform for learning Biology and also perceived the ease of use of WhatsApp platform for learning Biology. It was also revealed that there was significant difference in the students' perceived usefulness of WhatsApp for learning Biology, there was no significant difference in the students perceived ease of use of WhatsApp platform for learning Biology.

Recommendations

Based on the findings of this study, it is recommended that regular orientation should be given to the students on how to and when to use social media particularly WhatsApp platform that is related to education in order to enhance their academic performance. In addition, there should be a strong, free and reliable internet services in colleges of education in order to enable the students to access WhatsApp platform for learning. Also, lecturers should ensure that they incorporate the use of WhatsApp platform in teaching and learning process so as to avoid the negative influence of the platform on students.

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ASSESSMENT OF THE GREEN PRACTICES ADOPTED IN PUBLIC BUILDINGS IN NIGERIA- A CASE STUDY OF THREE STAR HOTELS IN ABUJA

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Abstract

The study investigated the green practices adopted in public buildings in Nigeria, with particular reference to three-star hotels in Abuja. The population of the study was 114 (89 facility managers and 25 registered builders). Two research questions were raised and two hypothesis tested at .05 level of significance guided the study. The instrument for data collection was a 35-items Green Practices in Public Buildings Questionnaire (GPPBQ) developed by the

researcher. The questionnaire was validated by three building technology experts in the Department of Industrial and Technology Education, Federal University of Technology Minna, Niger State. A pilot test of the instrument was carried out in Lafia, Nasarawa State. The Cronbach alpha coefficient Method was used to determine the internal consistency of the instrument and 0.92 was obtained as the overall reliability coefficient of the instrument. Data collected was analyzed and Mean and Standard Deviation were used to answer the research questions while Z-test analysis was used to test the hypothesis at .05 level of significance. Findings revealed that some green practices were adopted by three-star hotels in Abuja while others were not adopted. Based on these findings therefore, it was recommended among others that governments at all levels should subsidize the cost of green building materials. This is because some green building materials are expensive and this could hinder their adoption in building construction.

Index Terms: Green Practices, Hotels, Climate Change, Green Buildings and Sustainable Development.

Introduction

Green practices or green building practices has been defined by Yudelson (2014) as a comprehensive term for those strategies that are aimed achieving energy efficiency, water efficiency, material efficiency and a healthy indoor environmental quality in buildings. Similarly, Nnenanya (2013) defines green practices as those measures that are aimed at creating structures which are environmentally responsible and resource efficient throughout their lifecycle from the design stage to construction, use, renovation and demolition. Kumar (2013) further defined green practices as goals and mechanisms that are developed to reduce waste and conserve energy in buildings. Green practices can be integrated into buildings at any stage, from design and construction, to renovation and deconstruction. However, the most significant benefits can be obtained if the design and construction team take an integrated approach from the earliest stages of a building project (U.S. Environmental Protection Agency, 2016). Akinwade, (2012) classified green practices in buildings under two main dimensions, namely:

1. Energy efficiency
2. Water efficiency

Energy efficiency means reducing the amount of energy required to provide quality services in buildings. It is mainly achieved through electrical energy conservation, passive solar design and the use of renewable energy. Because buildings are the dominant energy consumers in cities, a lot of energy can be saved if we make our buildings energy efficient. This is because numerous studies have shown that energy generation is the single biggest source of greenhouse gas emissions and since buildings are the biggest consumers of this energy, it therefore means that a significant reduction in greenhouse gas emissions can be achieved if buildings are designed and built to consume less energy.

Water efficiency simply means reducing water wastage in buildings through the use of water efficient devices and techniques. Ensuring water efficiency in buildings has become very important not just because of climate change, but also because of increasing World population which has put a lot demand for the limited fresh water that is available. Using water saving techniques not only saves money but also results in less diversion of water from our rivers and lakes which helps to keep the environment healthy. It can also reduce water treatment costs and the amount of energy used to treat, heat and pump water. This results in lower greenhouse gas emissions due to lower energy demand in buildings, be they private or public buildings.

Public buildings such as hotels, office buildings, commercial buildings, hospitals and health facilities, libraries, sport buildings, religious buildings, public transit buildings and educational buildings are responsible for more than half of the energy consumption by buildings worldwide (Idoro,2011). This is not just because such buildings are typically larger, but also because of the number of people that use such buildings on a daily basis. By definition, public buildings are regarded as buildings without obstructions. In other words, buildings that people are free to come in and out of as they like.

Green practices have gained popularity in developed nations as a result of the realization that greenhouse gas emissions (GHG) remain the primary factors driving global warming and climate change, and buildings play a central part in causing GHG emissions (Cheng, 2014). The United Nations Environment Programme (UNEP, 2014) also reported that, globally, buildings account for up to 40% of total energy consumption and 30% of GHG emissions. Similarly, the IEA (2016) singled out the building sector as being responsible for more than 40 percent of the world's total primary energy consumption and for 24 percent of global Carbon dioxide (CO2) emissions. CO2 is one of the greenhouse gases which go high up in the atmosphere and trap heat, causing the greenhouse effect and consequently, global warming and climate change.

As a result of the menace of climate change which affects both developed and developing countries like Nigeria, the countries of the world met in Brazil in the year 2010 to find a way out. This meeting resulted in the adoption of the green initiative, intended to save the planet from human destruction. One of the cardinal principles of the green initiative is sustainable development for all. To achieve this, adopting green practices in the building sector has become imperative. This is because according to Yudelson (2014), the adoption of green practices in buildings helps to lower GHG emissions which in turn helps to mitigate the effects of global warming and climate change. Bello (2015), stated that combating climate change in the 21st century has become highly imperative because humanity's window to prevent dangerous global warming is rapidly narrowing as humanity's carbon budget – the total amount of carbon dioxide that can be emitted for a likely chance of limiting global temperature rise – diminishes every year. In the same vein, the Inter-Governmental Panel on Climate Change (IPCC) stated, in its Fifth Assessment Report (2014), that the world will warm by between 3.7°C to 4.8°C by 2100 if humanity continues to pursue this "business as usual" pathway it is currently on. This level of warming according to the IPCC (2014) would be disastrous for the human civilization. What this therefore means is that all nations of the world must come together and contribute their quota in the fight against climate change.

It is for the reason stated above that the Global Alliance for Buildings and Construction (GABC, 2017), stated that the year 2015 was a pivotal year as far as humanity's efforts to combat climate change was concerned, with the adoption of the 2030 agenda for sustainable development and the Paris agreement at the Conference of Parties (COP21). Now, in order for countries to successfully implement these agendas and reach their goals, it is crucial that important changes are made in the building sector. The Paris agreement sets milestones for decarbonizing our society. It aims at "holding the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels". The Paris agreement also recognizes that "climate change represents an urgent and potentially irreversible threat to human societies and the planet and thus requires the widest possible cooperation by all countries, and their participation in an effective and appropriate international response, with a view to accelerating the reduction of global greenhouse gas emissions".

Currently, the issue of greenhouse gases emissions has become a general concern in Nigeria, due to the increasingly devastating effects of climate change on the environment. One of the largest sources of these greenhouse gas emissions in Nigeria according Kolade (2014) is the numerous generator sets used by Nigerians. For example, according to the Manufacturers Association of Nigeria (MAN, 2015) report, Nigerians spend about 1.56 trillion Naira yearly to power their generating sets with either petrol or diesel due to the inadequate power supply in the country. Furthermore, the Federal Government of Nigeria (FGN, 2018), at the 24th monthly power sector stakeholders meeting in Abuja stated that Nigeria loses about 24 billion Naira monthly due to the importation of diesel alone. The government further indicated that 300 million litres of diesel is being used by Nigerians to power generators every month. The government however, insisted that high power consuming homes, offices and industries must generate their own source of power in order to enjoy reliable power supply. Also, MAN (2015), stated that an estimated 80 million Nigerians own power generator sets for their electricity supply.

There is no doubt that the powering of all these generator sets definitely increases the release of greenhouse gases into the atmosphere and further worsens the effects of climate change not just in Nigeria, but all over the World. One of such effects of climate change according to

Omole (2013) is rising sea levels occasioned by melting polar ice, which threatens to submerge coastal cities like Lagos and Port Harcourt in the future if nothing is done to mitigate this. Other effects of climate change in Nigeria according to Tasiu (2018) include the spread of water borne diseases and malaria as a result of increased flooding, the rapid shrinking of the Lake Chad in the north-east of Nigeria which threatens the livelihood of millions of Nigerians and increasing desertification in Northern Nigeria which many experts believe is the primary cause of the perennial Farmers-Herders clashes in the country. One of the best ways we can mitigate these effects of climate change not just here in Nigeria but all over the World, is by ensuring sustainability in the building Sector (Tunji, 2018). The only way to ensure sustainability in the building sector according to GABC (2017), is through the adoption of green practices in buildings, be they private or public buildings.

Due to increase in urban population and attendant residential pressures, energy consumption is projected to rise in buildings especially in fast growing cities like Abuja (allafrica.com 2010). With an annual growth of at least 35%, Abuja, in 2015 maintains the record of the fastest growing city on the African continent and one of the fastest growing in the world (Tasiu, 2018). Between the years 2000 and 2010, Abuja grew by 139.7%, giving it a record as the fastest growing city in the world (Euromonitor, 2010). In contrast, London took 100 years to grow from 1 million to 8 million inhabitants. According to the United Nations (UN, 2014), more than half of the world's population (54%) is already living in urban settlements. Looking at the percentage of land set aside as green open spaces in the Abuja master plan is enough indication that the original designers wanted Abuja to lead in the green city index. Unfortunately, Abuja is not among the only four cities in Africa (Johannesburg, Cape Town, Nairobi, and Cairo) ranked among the top 100 green cities in the World (Sustainable Cities Index, 2016).

The issue of greenhouse gas emissions has caused the greatest challenge facing mankind today, which is climate change (UN, 2018). Due to Africa's location in the tropics which is always hot, many experts believe that countries like Nigeria stand to bear the greatest brunt of climate change. This fact is already dawning on us due to the rapid advance of the Sahara Desert in northern Nigeria and rising ocean levels in southern Nigeria. It therefore means that every single sector of our national life must contribute their quota in the fight against climate change. One of the sectors with the greatest greenhouse gas emissions mitigation potential in Nigeria is the hospitality sector of which, hotels are the dominant players. This is due to the nature of the hotel business which sees them open 24 hours a day and 365 days a year. As a result of this, they end up consuming a lot of resources, particularly energy and water. What this therefore means is that their potential for waste generation is very high and is thus a source for concern. This research is therefore aimed at assessing the green practices adopted by three-star hotels in Abuja to improve efficiency in their day to day operations.

Theoretical Framework

Unified Theory of Acceptance and use of Technology: This is a technology acceptance theory formulated by Venkatesh, (2003). Though the theory was formulated to determine the factors responsible for user acceptance of Information Technology, it can also be used to determine the factors responsible for user's acceptance of any new product or innovation (Venkatesh, (2003). The theory holds that there are four key constructs:

1. performance expectancy
2. effort expectancy
3. social influence
4. facilitating conditions

Performance expectancy according to the theory refers to an individual's perception that using a new system will enhance job performance. Factors affecting performance expectancy include: systems effectiveness, systems improvement of work and systems improvement of productivity.

Effort expectancy; according to the theory refers to an individual's perception that using a new system will be free of effort. Factors affecting effort expectancy include: Easiness of accessing the system, smoothness of interacting with the system and systems overall presentation or outline.

Social influence; according to the theory refers to an individual's perception of the degree to which other people approve or disapprove of the target behavior. At this phase, consumer demand for example, can influence decision making. It therefore means that if a client or building contractor feels that adopting green practices in building construction will not be approved by the society, they may likely not adopt a green design in the construction of a building.

Finally, facilitating conditions according to the theory refers to an individual's perception of the factors that impede or facilitate the behavior. Such factors could include government policy, cost of the target behaviour and technological barriers. Since the Unified Theory of Acceptance and use of Technology deals with user behavior and attitudes towards a new system or technology and green technology concepts are relatively new in Nigeria (Smart, 2012), the theory is hereby adopted for this research.

Purpose of Study

Specifically, the study is set to:

1. Investigate the green practices adopted by three-star hotels in Abuja to improve energy efficiency.
2. Investigate the green practices adopted by three-star hotels in Abuja to improve water efficiency

Research Questions

The following research questions guided the study:

1. What are the green practices adopted by three-star hotels in Abuja to improve energy efficiency?
2. What are the green practices adopted by three-star hotels in Abuja to improve water efficiency?

Research Hypotheses

The following null hypotheses, tested at 0.05 level of significance were further used to guide the study:

H01. There is no significant difference between the mean ratings of facility managers and registered builders on the green practices adopted by three-star hotels in Abuja to improve energy efficiency.

H02. There is no significant difference between the mean ratings of facility managers and registered builders on the green practices adopted by three-star hotels in Abuja to improve water efficiency.

Methodology

A descriptive survey design was adopted for the study. A descriptive survey design according to Ali (2006), is a descriptive study which uses sample of an investigation to document, describe and explain what is in existent or non-existent on the present status of phenomena being investigated. Ali (2006), further stated that in a descriptive survey study, views and facts are collected through questionnaire, analyzed and used for answering research questions. The design is considered appropriate as the present study seeks to determine the greening practices in building construction technology in Nigeria. The study was carried out in Abuja, the capital city of Nigeria, located within the Federal Capital Territory (FCT). Abuja was chosen as the area for the study because of the large presence of various hotels in the City. According to the NTDC (2018), there are 183 hotels in Abuja. These comprises of 2 five-star hotels, 24 four-star hotels, 93 three -tar hotels, 45 two-star hotels and 19 one-star hotels. The population of the study consisted of 93 facility managers of three-star hotels and 34 registered builders all based in Abuja.

Data was collected using a 35 items questionnaire developed by the researcher and known as Green Practices in Three-Star Hotels Questionnaire (GPTSHQ). The GPTSHQ is made up of

two parts. Part one contains the introduction and the respondent's personal data while, part two contains the questionnaire and is divided into two sections: A and B. Section A contains research question one which focuses on the green practices adopted by three-star hotels in Abuja to improve energy efficiency and contains 18 items. Section B contains research question two which focuses on the green practices adopted by three-star hotels in Abuja to improve water efficiency and contains 17 items. Sections (A and B) were structured using four-point rating scales of Strongly Agree (SA), Agree (A), Disagree (D), and Strongly Disagree (SD). These ratings weighted 4, 3, 2 and 1, beginning from the highest to the lowest respectively.

The instrument was content validated by three experts of building technology education from the department of Industrial and Technology Education, Federal University of Technology Minna, and their comments and suggestions were considered in preparing the final draft of the instrument. The instrument was trial tested in Lafia, Nasarawa State, and data was collected to determine the reliability of the instrument using the split-half method. The Cronbach alpha coefficient was used to determine the internal consistency of the instrument and 0.92 was obtained as the overall reliability coefficient of the instrument. The instrument was later administered to the respondents by the researcher and a 96% return rate was recorded from the facility managers, while an 74% return rate was recorded from the registered builders. This response rate is adequate in both cases because Sani (2015) suggested that a response rate of about 30% was adequate for construction industry studies. Thus, the final population for the study consisted of 89 facility managers and 25 registered builders.

Mean and standard deviation were used to answer the research questions. Mean scores above 2.50 and above were considered Agreed; while mean scores 0f 2.49 and below were considered Disagreed by the respondents, in accordance with the research questions. Furthermore, Z-test was used to test the hypotheses. Decision was made by comparing the Z-calculated value with that of Z-critical at .05 significance level. Hypothesis was rejected if Z-cal is found to be greater than Z-critical; otherwise it is accepted.

Results

Research Question 1

What are the green practices adopted by three-star hotels in Abuja to improve energy efficiency?

Table 1:
Mean Responses of Guest Services Staff and Administrative Staff on the Green Practices Adopted by Three-Star Hotels to Improve Energy Efficiency

N_{FM} = 89, N_{RB} = 25

S/N	Green practices adopted by three-star hotels in Abuja to improve energy efficiency	$\bar{X}$FM	SDFM	$\bar{X}$RB	SDRB	Remark
1	Planting of trees around hotel premises to provide shade.	3.30	0.51	3.46	0.45	Agreed
2	Installation of solar panels for renewable energy generation	3.17	0.37	3.08	0.28	Agreed
3	Use of solar water heating to reduce energy consumption	1.98	0.37	1.92	0.70	Disagreed
4	Use of low energy electrical appliances like compact fluorescent bulbs	3.26	0.44	3.20	0.41	Agreed
5	Use of solar powered electrical appliances	2.94	0.39	2.92	0.40	Agreed
6	Provision of windows for increased day lighting in rooms	3.47	0.49	3.48	0.51	Agreed
7	Provision of windows to enhance natural ventilation in rooms	3.44	0.51	3.92	0.31	Agreed
8	Use of shading devices such as curtains and drapes	3.06	0.24	3.16	0.37	Agreed
9	Provision of swimming pool for evaporative cooling	2.71	0.57	2.76	0.44	Agreed
10	Installation of electric meters to monitor electricity consumption	3.04	0.17	3.02	0.28	Agreed
11	Installation of smart occupancy sensors to reduce electricity consumption	3.09	0.28	3.16	0.36	Agreed
12	Generation of biogas from kitchen wastes for cooking	3.02	0.22	3.08	0.28	Agreed
13	Insulation of walls to prevent heat loss or gain.	2.84	0.37	2.86	0.20	Agreed
14	Unplugging of electrical appliances not in use.	3.09	0.28	3.20	0.41	Agreed
15	Sleep mode and power saver features are activated on computers and other equipment to save energy.	3.03	0.17	3.16	0.86	Agreed
16	Installation of living or green roofs to provide insulation and cooling	2.02	0.22	2.04	0.46	Disagreed
17	Use of wind turbines for electricity generation	1.26	0.40	3.18	0.34	Disagreed
18	Use of inverters for electricity generation	3.06	0.24	3.18	0.34	Agreed
19	Grand Total	2.88	0.35	2.94	0.42	

Key: N_{FM}, $\bar{X}_{FM}$, SD_{FM} = number, mean and standard deviation of facility managers, N_{RB}, $\bar{X}_{RB}$, SD_{RB} = number, mean and standard deviation of registered builders.

Table 1 shows the analysis of responses of the respondents on the green practices adopted by three star hotels in Abuja to improve energy efficiency. The results reveal that items 1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 13, 15, 16, 17, and 18 have their mean values above the cut-off point of 2.5, indicating that 15 green practices which improve energy efficiency have been adopted by three

star hotels in Abuja. Items 3, 12 and 14 have their mean values below 2.5, indicating that they were not adopted by three star hotels in Abuja to improve energy efficiency. Furthermore, the table also shows that the standard deviations (SD) of the items are within the ranges of 0.17 to 0.86, indicating that the responses of the respondents were not too far from each other on the green practices adopted by three-star hotels in Abuja to improve energy efficiency. This further strengthens the mean.

Research Question 2
What are the green practices adopted by three-star hotels in Abuja to improve water efficiency?

Table 2:
Mean Responses of Guest Services Staff and Administrative Staff on the Green Practices Adopted by Three Star Hotels to Improve Water Efficiency

N_{GSS} = 89, N_{AS} = 25

S/N	Green practices adopted by three-star hotels in Abuja to improve water efficiency	$\bar{X}$FM	SDFM	$\bar{X}$RB	SDRB	REMARK
1	Harvesting/storage of rainwater	3.04	0.22	3.12	0.36	Agreed
2	Use of ultra-low flow toilets and urinals	2.52	0.60	2.56	0.41	Agreed
3	Use of water-efficient dishwashers and washing machines at full loads	3.13	0.40	3.24	0.46	Agreed
4	Use of low-flow shower heads instead of bathtubs	2.82	0.49	2.88	0.35	Agreed
5	Use of flow restrictors on water taps	1.92	0.39	1.96	0.28	Disagreed
6	Re-use of waste water for flushing and irrigation	2.85	0.42	2.88	0.33	Agreed
7	Prompt repair of leaking pipes and taps	3.03	0.17	3.08	0.28	Agreed
8	Use of watering cans instead of water sprinklers	2.90	0.20	2.84	0.59	Agreed
9	Use of touch free or electronic taps	1.78	0.69	1.84	0.46	Disagreed
10	Use of waterless toilets	1.78	0.42	1.88	0.37	Disagreed
11	Use of pool covers to cover swimming pools when they are not in use	1.24	0.42	1.20	0.41	Disagreed
12	Washing of fruits and vegetables in a bowl rather than under a running tap	1.78	0.67	1.92	0.35	Disagreed
13	Shutting off of appliances which use water such as dish washers and washing machines when they are not in use to save both energy and water	3.02	0.21	3.04	0.20	Agreed
14	Installation of smart water sensors to detect leaks in pipes	1.59	0.30	1.52	0.35	Disagreed
15	Recovery of condensates from air conditioners.	1.87	0.35	1.84	0.37	Disagreed
16	Installation of water pressure regulators to reduce risk of rupturing water lines.	1.79	0.56	1.88	0.33	Disagreed
17	Installation of water meter to monitor water consumption	3.12	0.32	3.08	0.22	Agreed
	Grand Total	**2.36**	**0.40**	**2.40**	**0.36**	

Table 2 shows the analysis of responses of the respondents on the green practices adopted by three-star hotels in Abuja to improve water efficiency. The results reveal that items 1, 2, 3, 4, 5, 7, 8, 9 and 14 had their mean values above the cut-off point of 2.5, indicating that 9 green practices which improve water efficiency have been adopted by three-star hotels in Abuja. Items 6, 10, 11, 12, 13, 15, 16 and 17 had their mean values below 2.5, indicating that they were not adopted by three-star hotels in Abuja to improve water efficiency. Furthermore, the table also shows that the standard deviations (SD) of the items are within the ranges of 0.17 to 0.69 indicating that the responses of the respondents were not too far from each other on the green practices adopted by three-star hotels in Abuja to improve water efficiency.

Hypothesis 1

There is no significant difference between the mean ratings of facility managers and registered builders on the green practices adopted by three-star hotels in Abuja to improve energy efficiency.

Table 3:

Z-test Analysis on the Green Practices Adopted by Three Star Hotels to Improve Energy Efficiency

Subjects	$\bar{X}$	SD	N	df	Z-cal	Z-critical	Decision
FM	2.88	0.35	89.00	112	0.67	1.98	Accepted
RB	2.94	0.42	25.00				

Level of significance= 0.05

Key: FM= Facility Managers, RB= Registered Builders, $\bar{X}$= Mean, SD= Standard Deviation and df = Degree of Freedom.

The result shown in table 3 reveals that the Z-cal value of 0.67 is less than the Z-critical value of 1.98 at 0.05 level of significance and 112.00 degree of freedom. The null-hypothesis is therefore accepted. Hence, there is no significant difference between the mean ratings of facility managers and registered builders on the green practices adopted by three-star hotels in Abuja to improve energy efficiency.

Hypothesis 2

There is no significant difference between the mean ratings of facility managers and registered builders on the green practices adopted by three-star hotels in Abuja to improve water efficiency.

Table 4:

Z-test Analysis on the Green Practices Adopted by Three Star Hotels to Improve Water Efficiency

Subjects	$\bar{X}$	SD	N	df	Z-cal	Z-critical	Decision
FM	2.50	0.43	89	112	1.18	1.98	Accepted
RB	2.40	0.36	25				

Level of significance= 0.05

Key: FM= Facility Managers, RB= Registered Builders, $\bar{X}$= Mean, SD= Standard Deviation and df = Degree of Freedom.

Results emerging from table 4 reveals that the Z-cal value of 1.18 is less than the Z-critical value of 1.98 at 0.05 significance level and 112.00 degree of freedom. Thus, the null hypothesis is accepted. This means that significant difference does not exist between the mean responses of facility managers and registered builders on the green practices adopted by three-star hotels in Abuja to improve water efficiency.

Discussion of Findings

The findings from table 1 reveal that 15 green practices which improve energy efficiency have been adopted by three-star hotels in Abuja while 3 were not adopted. Some of the green practices that were adopted to improve energy efficiency include; orientation of hotels in north-south direction for increased day lighting, installation of solar panels for renewable energy generation, and use of low energy electrical appliances like compact fluorescent bulbs. The green practices that were not adopted include; use of solar water heating to reduce energy consumption, installation of wind turbines for electricity generation and installation of living or green roofs to provide insulation and cooling. In the same vein, Table 3 revealed that there is no significant difference in the mean responses of facility managers and registered builders on the green practices adopted by three-star hotels in Abuja to improve energy efficiency. This implies that both facility managers and registered builders do not differ in their opinions on the green practices adopted by three-star hotels in Abuja to improve energy efficiency.

Generally, the findings in table 1 are in harmony with the unified theory of acceptance and use of technology formulated by Venkatesh (2003). Therefore, simply put in line with the findings in table 1, green practices such as use of solar water heating to reduce energy consumption, installation of wind turbines for electricity generation and installation of living or green roofs to provide insulation and cooling would probably have been adopted by the three star hotels in Abuja if not for some factors that hinder their adoption. The low mean scores of items 3, 12 and 14 as shown in table 1 means that there is perceived difficulty to adopt these green practices by hotels in Abuja. This factor is similar to the effort expectancy and facilitating conditions factors of the unified theory for the acceptance and use of technology.

The results emanating from table 2 reveal that out of 17 green practices which improve water efficiency, 9 have been adopted by three-star hotels in Abuja while 8 have not been adopted. Some of those adopted by the three-star hotels include; installation of water meter to monitor water consumption, harvesting/storage of rainwater, use of ultra-low flow toilets and urinals and use of water-efficient dishwashers and washing machines at full loads. The green practices that were not adopted include; use of flow restrictors on water taps, use of touch free or electronic taps and use of waterless toilets. Furthermore, Table 4 revealed that there is no significant difference in the mean responses of facility managers and registered builders on the green practices adopted by three-star hotels in Abuja to improve water efficiency. This implies that both facility managers and registered builders do not differ in their opinions on the green practices adopted by three-star hotels in Abuja to improve water efficiency.

Generally, the findings in table 2 are in harmony with the unified theory for the acceptance and use of technology. The high mean scores of items 1, 2, 4 and 8 can be attributed to the perception of hoteliers that their adoption will result in the improvement of work performance as well as improvement in productivity. These factors are similar to the performance expectancy factor of the unified theory for the acceptance and use of technology. Similarly, the low mean scores of items 6, 10, 11, 12, 15, 16 and 17 could be attributed to lack of awareness and perceived difficulty in carrying out such green practices due to either cost or technological barriers. These factors are similar to the effort expectancy and facilitating conditions factors of the unified theory for the acceptance and use of technology.

Conclusion and Recommendations

The aim of this study was to investigate the green practices adopted by public buildings in Nigeria, with particular reference to three-star hotels in Abuja. The choice of this study area was based on the challenges faced by researchers on identifying the types of green practices adopted by hotels in Abuja. Hence, this study has filled the gap in that area.

The findings of this study revealed that 15 green practices which improve energy efficiency have been adopted by three-star hotels in Abuja. Similarly, 9 green practices which improve water efficiency have also been adopted by three-star hotels in Abuja.

Over the past decade, the hospitality industry has grown to become the single largest business sector world-wide, currently employing in excess of 200 million people. In some parts of the world, tourism indeed is the most important source of income. While providing a significant boost to many local and national economies, the hotel industry has been shown to pose a significant threat to the environment in which it is developed. Among other resources, the hotel industry consumes substantial amounts of energy for providing comfort and services to its

guests. The effects on the environment include pollution of water resources, the soil, air, noise and excessive use of locally available/ imported materials. Green practices should therefore be embraced by hotels in Nigeria not only because of humanity and environmental concerns but also because of its capability to increase financial profit and long-term competiveness of hotels. It is therefore recommended based on these findings that:

1. The federal government of Nigeria should establish a green building council which will be responsible for setting the guidelines for the construction of green buildings. Such a council will also be responsible for classifying green buildings depending on their extent of adoption of green practices in their design. The establishment of a green building council in Nigeria will enable Her to join the only two countries in Africa with green building councils (South Africa and Egypt).
2. Governments at all levels should subsidize the cost of green building materials. This is because some green building materials are expensive and this could hinder their adoption in building construction.
3. Governments at all levels should also create more awareness about the importance of adopting green practices in buildings. This will enable green buildings to grow in popularity here in Nigeria and will result in a healthier and more sustainable environment.

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EVALUATION AND ASSESSMENT IN ISLAMIC STUDIES EDUCATION USING INFORMATION COMMUNICATION TECHNOLOGY IN NIGERIAN SCHOOLS

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Abstract
This paper discusses on the evaluation and assessment in Islamic studies education using Information Communication Technology in Nigerian schools. Other issues discussed in the paper include the concept of evaluation in relation to education, assessment, measurement and testing in relation to evaluation, evaluation and assessment processes in Islamic studies education, functions of evaluation, evaluation and assessment in Islamic studies education using ICT, challenges of evaluation and assessment using ICT. The paper concluded that using ICT in evaluating and assessing Islamic studies education will support the National Policy on Education which stated that government shall take necessary measure among other things to ensure that teaching shall be practical, activity-based, experiential and Information Technology (IT) supported, and also to meet the demands of the Islamic studies curriculum in Nigeria which aimed at helping the students become ideal Muslims and to inculcate in them the habit of critical thinking and to suit the contemporary needs of Muslim children in a changing and developing Nigeria of 21st century. Recommendations were offered at the end of the paper.

Key words: Evaluation, Assessment, ICT and Islamic studies.

Introduction

Information and communication technologies (ICT) have become one of the fundamental building blocks of modern society. It is evident that many countries now regard the mastering of the basic skills and concepts of ICT as an inevitable part of education. Various new models of education are evolving in response to the new opportunities that are becoming available by integrating ICT into the teaching and learning environment. The effective integration of the applications ICT however, depends to a large extent on teacher's familiarity and ability with the ICT learning tools. Therefore, Islamic studies teachers need to know exactly how ICT is used as a teaching and learning tool and as a means for evaluation and assessment, for their own purposes and to help students to use them. Islamic studies teachers should note the need to meet the global challenges of instructional delivery using Information Communication Technology (ICT), online resources and web application packages because they are very helpful in improving teacher's performances and resourcefulness (NERDC, 2012). Islamic studies teachers who are not on the highway i.e, online, may not get much done as well as the learners. It is expected that the teachers of Islamic studies should use internet services to acquire internet teaching and learning resources for the betterment of the teaching learning processes. Dellit (n.d) opined that there is growing evidence that ICT application in the business of education can accelerate and improve learning on a number of fronts, from basic skills (Mann 1999; BECTA 2000); problem solving (Oliver and Omari 1999; Williams 1999), information management (Peabody 1996), work habits (Adnanes 1998), motivation (US Congress 1995; Allen 2000; Combs 2000; Diggs, 1997; Sherry, 2001), establishing life-long learning habits (Schollie 2001) and concepts development (Yelland 1998).

The adoption of Computer Based Test (CBT) for entrance examination into tertiary schools organized by the Joint Admission and Matriculation Board, a Nigerian examination body with a core mandate to conduct Matriculation Examination for entry into all Universities, Polytechnics and Colleges of Education in Nigeria is great measure in ensuring the use of ICT in evaluation and assessment of various subjects in our schools, of which Islamic studies is

inclusive. Islamic studies teachers can evaluate and assess their teaching and learning processes by obtaining feedback through emails, Facebook, Twitter, and Short Message Service (SMS) from their students (NERDC, 2012). Dole, Bloom & Kowalske (2015) as cited in Danzaria & Kangiwa (2018) argued that, unless a new pedagogy (that encompassed Information Communication Technology) materializes, students will become increasingly bored and unmotivated and consequently, teachers will become even more stressed. These new pedagogies will require changes in the relationships between teachers and students, in teaching and learning strategies, and in how learning is assessed. This paper examined evaluation and assessment in Islamic studies education using Information Communication Technology in Nigerian schools.

The Concept of Evaluation in Relation to Education

There are so many definitions of evaluation. Grace (2010) defined evaluation as the process of establishing the extent to which the objectives of a programe have been achieved. Thus, evaluation is a judgmental process, aimed at decision making. Doll (1992) as cited in Grace (2010) also defined evaluation as a broad and continuous effort to inquire into the effects of utilizing educational content and process to meet clearly defined goals. As to Okam (1998), evaluation is qualitative in nature and is used as a collective term for those appraisal methods that do not depend on measurement. It includes both qualitative and quantitative descriptions of pupil's behavior plus value judgment concerning the desirability of that behavior.

Banks (1977) as cited in Okam (1998) regards evaluation as a technical aspect of instruction and its purpose is to develop as much precise and objective information about the instructional process as possible in order to (a) assess the effectiveness of instruction, (b) determine the accomplishment of instructional goals, (c) provide feedback to the teacher about the instructional process, and (d) provide information on which important decisions about pupils progress, curriculum changes, and instructional goals can be made.

Assessment, Measurement and Testing in relation to Evaluation

Assessment and measurement are very often used interchangeably with evaluation. According to Grace (2010), assessment, measurement, testing and evaluation are closely related. Assessment is that process which will show whether there has been a change in student's behavior. The change revealed through assessment can be given a value by quantifying procedures that can be referred to as educational measurement. Measurement is the means of determining the degree of achievement of a particular objective or competency. It therefore refers to the determination of the actual educational outcomes and comparing these with intended outcomes as expressed in the objectives of a programme. Measurement gives a quantitative value to the change in student's behaviour. Testing, on the other hand is the use of instruments for measuring achievement. Measurement and testing are ways and tools of collecting information for assessment and evaluation. Evaluation in the above context is the process of giving value judgement based on the information gathered through measurement and testing.

Okam (1998) stated that in the strictest sense of the word, evaluation is not synonymous with either assessment or measurement in the area of curriculum evaluation. 'Assessment' and 'Measurement' constitute part of the evaluation process; 'evaluation' is not necessarily 'measurement' or 'assessment'. In a simpler language 'assessment' seeks to answer the question as to whether change has occurred in the learner as a result of teaching-learning situation and in which direction, while 'measurement' seeks to allocate scores in terms of numbers to the performance of a pupil, say 30%, 59%, 80% etc. Thus, measurements are quantitative descriptions of achievements in terms of test scores. Evaluation is a qualitative description of a pupil's behavior. Therefore, evaluation is a much more comprehensive and inclusive term than either 'assessment' or 'measurement'.

Evaluation and Assessment Processes in Islamic Studies Education

Islamic studies education is concerned with acquisition and development of knowledge, skills, attitudes and values intrinsic in the Islamic studies curriculum, and therefore, has to cope with

the relevant application of a wide range of evaluation procedures to ensure the achievement of instructional objectives. According to NERDC (2012) an Islamic studies teacher should undertake assessment at regular intervals of students' progress in order to help improve the students' performance, and the assessment should involve the three domains of learning i.e cognitive, psychomotor, and affective in order to expose learners to new knowledge, skills, values and attitude. The knowledge, skills, values and attitudes acquired according to Kartowagiran and Maddini (2015) are what is going to be useful in the life of an individual student or as part of his society, and they involve the application of the learning outcome in both the classroom and outside. The outcome may be in relation to faith (rooting of belief), deeds (internalization of faiths), and worship (application of faiths and deeds) that will guide the students in the religious practices of their daily life. Some of the processes involved in evaluating and assessing the Islamic studies education include:

a. Determination of instructional objectives which according to Okam (1998) is considered as the determination of what to be evaluated. This always has priority in the evaluation processes, it implies that no evaluation device should be selected until the purposes of the evaluation have been carefully defined.
b. Selection of evaluation technique in the Islamic studies education in terms of the purposes to be served. Technique which is most suitable or appropriate for evaluating the aspect of pupil's behavior should be selected for use, i.e in terms of accuracy and convenience of the technique. As to Okam (1998), no single evaluation technique is adequate for appraising pupil's progress towards all of the important outcomes of instruction, because most evaluation techniques are rather limited in scope, but can be use in terms of accuracy and convenience.

Kartowagiran and Maddini (2015) identified some components within which evaluation and assessment can be done under Islamic studies teaching which they consider as (i) evaluating the result component in three sub-components - cognitive, affective, and psychomotor. The cognitive evaluation is done by analyzing and synthesizing the results of the daily quizzes, mid-semester test, and end-semester test. The affective evaluation is done by observing the students' discipline, diligence, honesty, and politeness in and out of the classroom. The psychomotor evaluation is done by analyzing and grading student's progress reports, port-folios, and assignments. (ii) Evaluating the impact component of the instructional processes covering the internalization and implementation of religious values in the forms of belief in embracing the religion (faith), taking positions in life matters (attitude), and doing actions in daily life (behavior).

Functions of Evaluation

In education generally evaluation and Assessment performs certain functions. According to (NTI/NCE/DLS,2000) evaluation and assessment performs the following functions.

1. **Instructional functions:** These relate to those ways in which evaluation helps to improve the quality of activities in the classroom such as: Encouraging good study habit among students; increasing motivation of the students through feedback; provision of entry behavior (previous knowledge) of the students; determining the extent of objectives attained; feedback on areas of students strength and weaknesses and; feedback on areas of teachers strength and weaknesses;
2. **Administrative functions:** These relate to those ways in which evaluation helps the school administration in taking decision which affect the whole school such as: Classification of students in terms of their abilities and interest e.g Science, Technical, Art; Placement of students into Grades suited for their characteristics; Selection of persons and curriculum materials and; Awarding certificate to individuals.
3. **Guidance Functions:** These relate to those ways in which evaluation helps in guiding the learner in making decision which include: Vocational guidance; Diagnosis of students' learning difficulties to ensure his proper educational development; Helping students to solve social and personal problems.
4. **Research Functions:** These relate to the ways in which evaluation helps in determining the effectiveness or otherwise of methods and materials employed in a programme such as: Determining the effectiveness of instructional methods; Determining the effectiveness of instructional materials; Determining the effectiveness

of a new curriculum; Determining the learner's characteristics and factors influencing learning.

Information Communication Technology (ICT) in Education

ICT is an acronym that stands for Information Communication Technologies. It includes all technologies for the manipulation and communication of information that is concerned with the storage, retrieval, manipulation, and transmission or receipt of digital data. Computers are some of the gadgets of ICT and are accepted by more teachers than other technologies and are widely supported by administrators, parents, politicians, and the public in general, they increase equity of access, and reduce the time needed to accomplish a given set of objectives (Reeves, 1998) as cited in Gill (2017). According to Reeves (1998) as cited in Gill (2017) computer-based cognitive tools such as databases, spreadsheets, communication software, etc., have been intellectually developed to function as intellectual partners in promoting critical thinking and higher order learning. ICT roles in education cannot be overemphasized because they provide the learner with fast and searchable access to vast amounts of information. It also supports a wide range of broader educational objectives including independent learning, collaboration with others and communication skills (Hunt, 2004) as cited in Gill (2017). Idowu and Esere (2013) expatiated that ICT-driven education is electronic mode of knowledge sharing and transmission, which may not necessarily involve physical contact between teacher and student.

Technology can provide a set of ways to assess children understanding and learning and allows for continuous evaluation of the classroom lessons, Minstrell and Hunt (2004) as cited in concept to classroom (n.d). Dawes (2001) as cited in Ghavifekr, Kunjappan, Ramasamy & Anthony (2017) stated that new technologies (ICT) have the potential to upkeep education across the curriculum and deliver opportunities for efficient student-teacher communication in ways not possible before. According to Jenkins (1999) as cited in Gill (2017) ICT changes teaching and learning through its potential as a source of knowledge, a medium to transmit content, a means of interaction and dialogue, these technologies provide flexibility to learners which are denied by the traditional process and method.

According to Danzaria and Kangiwa (2018), in Nigeria many programmes were introduced with the aim of improving digital learning, i.e the use of Information Communication Technology in the country at schools and colleges across the nation. Such programmes include: (a) Digital Awareness Project (DAP), which is a special intervention programme in Nigeria to address the digital information knowledge gap in the country, especially among the teeming youth. The strategy of this programme is to expose schools and colleges to Information Communication Technology (ICT) (b) School Knowledge Centers (SKC): The Universal Service Provision Fund (USPF) designed the (SKC) project to promote the demand and adoption of ICT in public schools in Nigeria in order to create 21st century skills. Teachers and students are trained on how to use ICT for teaching and learning with the objectives of increasing ICT literacy among teachers and students and facilitate ICT application in teaching and learning (c) Schools Connect Nigeria and (d) School Access Programme (SAP).

Evaluation and Assessment in Islamic Studies Education Using ICT

The National Policy on Education (2013) stated that in order to fully realize the goals of education in Nigeria and gain from its contribution to the national economy, government shall take necessary measure among other things to ensure that teaching become practical, activity-based, experiential and Information Technology (IT) supported. Islamic studies curriculum in Nigeria is designed in such a way that students will get basic Islamic education that will help them to become ideal Muslims who will be useful in their community and to play their role in sustainable national development and to inculcate in them the habit of critical thinking. The curriculum is designed to suit the contemporary needs of Muslim children in a changing and developing Nigeria of 21st century. Therefore, modern teaching resources and approaches should be used in Islamic studies to facilitate the effective implementation of the curriculum, such as software, web sites, electronics and television-based resources (NERDC, 2012). These modern teaching resources required the application of Information Communication Technology (ICT) tools in the evaluation and assessment processes that should be conducted in line with the stated instructional objectives. The ICT tools comprises of computers – desktop and laptop, video devices, digital camera, digital photocopy machine, digital audio and video devices, DVD

player, multimedia projector etc. Using these tools in Islamic studies will save teachers' and student's time and are friendly. That is why Lin (2018), opined that the use of educational technologies (ICT) for student assessments and evaluation saves time, makes the learning process more comprehensive and friendly, offer fast feedback, among others.
The adoption of Computer Based Test (CBT) for entrance examination into tertiary schools organized by the Joint Admission and Matriculation Board, a Nigerian examination body with a mandate to conduct Matriculation Examination for entry into all Universities, Polytechnics and Colleges of Education in Nigeria is a great measure in ensuring the use of ICT in evaluation and assessment of various subjects in our schools, of which Islamic studies is inclusive.

Challenges of using ICT in Evaluation and Assessment

Using ICT in education generally posed some challenges in teaching learning processes including evaluation and assessment especially to developing World. As to Rotherham and Willingham (2009), the first challenge is the cost involved in using ICT. A truly rich assessment system would go beyond multiple-choice testing and include measures that encourage greater creativity, show how students arrived at answers, and even allow for collaboration. Such measures, however, cost more money than policymakers have traditionally been willing to commit to assessment. The second challenge is the delivery challenges. Delivering these assessments in a few settings is very hard, because most of these assessments will be technology-based, and most schools' ICT systems will require a substantial upgrade, where available while in some schools they need to be installed or provided. As to Idowu and Esere (2013) the challenges include (a) resistance to change from traditional pedagogical methods to more innovative, technology-based teaching and learning methods, by both students and academics (b) inadequate ICT infrastructure including Computer hardware and software and bandwidth/access (c) Lack of qualified ICT personnel (d) the cost of the equipment (e) the political will on the part of government (f) lack of necessary infrastructural facilities.

Conclusion

The paper is on evaluation and assessment in Islamic studies education using Information Communication Technology in Nigerian schools. It discusses the concept of evaluation, assessment, measurement and testing, processes of evaluation and assessment in Islamic studies education, functions of evaluation, evaluation and assessment of Islamic studies education using ICT and challenges of evaluation and assessment using ICT. It is hoped that using Information Communication Technology (ICT) in the evaluation and assessment of Islamic studies education will support the implementation of the National Policy on Education in ensuring that teaching has become practical, activity-based, experiential and Information Technology (IT) supported, and also to meet the demands of the Islamic studies curriculum in Nigeria which aimed at helping the students become ideal Muslims and to inculcate in them the habit of critical thinking and to suit the contemporary needs of Muslim children in a changing and developing Nigeria of 21st century.

Recommendations

Based on what is discussed above, the following recommendations were offered:

a. Islamic studies teachers should support the government initiatives on the method of teaching that is practical, activity-based, experiential and Information Technology (IT) supported;
b. ICT resources should be made available by the government to various schools across the nation to ensure its availability and usage;
c. Islamic studies teachers should be given more training through workshops and seminars on the application of ICT in Assessment and evaluation by either the government or non-governmental organizations.

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SOCIAL MEDIA AND LEARNING IN BIOLOGY: STUDENTS' PERSPECTIVE

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Abstract

The main purpose of this study was to explore students' perspective on the use of social media as a tool in enhancing learning of biology concepts. A descriptive survey strategy was used for this study. Two hundred Senior Secondary School II science students randomly selected from ten senior secondary schools in Shomolu Local Government Area of Lagos State were sampled in this study. A self-designed questionnaire (r = 0.75) was used for data collection. Data collected were analyzed using descriptive statistics. Result of the study revealed that students have access to social networking sites such as, YouTube on a regular basis. The findings also revealed that students use social media for both non-academic and academic activities such as online discussion which help in learning biology concepts better. However, it was revealed that teachers are not involved in the use of social media in teaching biology concepts. Also, students do not have personal phones to access the social media facilities. Based on the findings, it is therefore recommended that biology teachers should include the utilization of social media in teaching biology concepts, and the school authority should also allow the use of phones which can access social media by biology students.

Keywords: Social media, Biology, students, teachers, perspective

Introduction

One of the observable features of development in the present 21st century, is the rate of technological development. The world is moving from analog to digital technology on a faster train of development. Almost everything, most especially communication, information are being done technologically. Generations today are experiencing a new wave of interpersonal communication with the advent and continuous development of technology. Currently with the rise in technology, communication has shifted away from the traditional modes of interpersonal communication which have long been based on face-to-face models of interaction, to a more technological approach of establishing and maintaining relationships. According to Oluwatoyinbo, (2011), the structured technology is now mediating how communication occurs between people and has demonstrated that interaction online is significantly different from physical interaction in a collection of ways.

A most significant part of technology is Information and Communication (ICT). In our society today, the most interesting aspect of ICT that communicates, connect and build social relationships among people who share common interest and/or activities is social media. Social media are computer – mediated technologies that facilitate the creation and sharing of all forms of information, ideas, career interests and other forms of expression via virtual communities and networks. Social media are able to create highly interactive platforms through which individuals, communities and organizations can share, co-create, discuss and modify user generated or pre-made content posted online. Boyd & Ellison (2007) and Kaplan & Haenlein (2011) describe social media as a group of internet-based application that builds on the technological foundation and allows the creation and exchange of users – generated content. Abdulkadir (2016) describes social media as online technology platforms that helps to connect people together far and near.

Social media gives opportunities to have access to all types of information in the palm of our hands through different devices such as cell phones, iPad and other hand held devices. Most social networks allow users to maintain profiles of themselves and list of friends and relatives. These networks encourage people to share their personal experience with others through music, videos and other media. Examples of social media include Facebook, Twitter, Instagram, 2go,

WhatsApp, Blogs, etc. Gonzales, (2019) explains that the use of social media helps to have access to basic information as quick as possible and it has a wider and faster means of communication.

Biology is a subject which contains information on knowledge of living things, including their physical and chemical structures, functions, development and evolution. Information in biology also includes knowledge on various interactions between living organisms and environment. Therefore, it contains knowledge which makes an individual to be conversant with oneself as a living being and the environment where one lives. Biology has different subdivisions such as zoology, which is knowledge about animals, botany – knowledge about plants, morphology – knowledge of structure of organisms, physiology – functioning of structures of organism, micro-organisms – knowledge about minute organism, etc. Acquisition of these, will make an individual to apply such to everyday life on matters of personal and community health and agriculture (FGN, 2013). This is one of the reasons why biology is taught as a science subject in secondary school where students will be well informed with this important information about themselves and the natural.

As quick as social media is in getting access to information, wider and faster in circulating such information, studies have showed that it has negative influence on students' learning. Abdulkadir, (2016), Ahn, (2011), found that the use of social media has negative impact on secondary school students' academic performance. In the like, Junco, (2012) also submits that the use of social media has negative impact on overall performance of students. In tertiary institutions, Kirschner & Karpinski (2010) reported negative relationship between use of social media and students' academic performance. Those who use social media were found to have lower average grade point. Apeanti & Danso (2014), Amofah-Serwah & Dadzie (2015) have also show that interacting with social media has negative influence on tertiary students' academic performance. In Nwanbueze & Aduba (2014) study, the findings showed that the use social media by secondary school students have negative influence on their overall attitude, social life, academic, emotions and health – wise. This may be the reason for ban of use or interacting with social media by secondary school students.

Since most studies on social media and students have focused on the effects of social media on academic performance of students generally. The few available influence of use of social media on biology have also concentrated on academic achievement of students. The researcher feel it is necessary to conduct the study on perceptions of biology students on interaction with social media and learning.

Statement of the Problem

The use of social media to contact families, friends, classmates, etc. have become popular in the society. It has been the fastest technological way to access and communicate information in the recent time. However, studies have recorded its negative impact on students' learning and consequently the academic achievement as well as other attributes such as attitudes, emotions, etc. This may be the reason for the restriction and total ban of the use of social media network among secondary school students. The students irrespective of their class level or subject combination are not allowed to interact with social media especially while in school. But, studies on student's perspective on their essence of social media usage is very limited, especially narrow down to biology as a subject. Therefore, this study is out to find out secondary school biology students' perception on the use of social media especially with learning of biology, a subject which is relevant to their everyday life on matters of personal, community, health and agriculture.

Purpose of the Study

This study specifically sought to:

1. Determine whether biology students participate in social media and the most frequently used.
2. Determine the frequency of participation of biology students in social media.
3. Identify what biology students use social network sites for.

Research Questions

The following research questions were set for the study.

1. Which social media are biology students exposed to?
2. To what extent do biology students access social media?
3. What are perceived uses of social media by biology students?

Methodology

The study employed descriptive survey design. All Senior Secondary School Two (SSS II) biology students in public secondary schools in Shomolu Local Government Area for 2018/19 session made up the population of the study. Ten senior secondary schools and twenty SSS II biology students from each school were randomly selected for the study. In all, a total of two hundred students made up the sample. The instrument was divided into three sections – Section A contains personal data of the respondents, Section B is made up of extent of participation in social media network and Section C composed of perceived reasons of access or participation on social media by biology students. The responses from section B was composed of five items using a four-point Likert type scale for answering while Section C is made up of ten items. The instrument, Biology Students' Learning and Social Media Questionnaire (BSSML) was validated by experts, with reliability (r) = 0.75 using Cronbach was used to collect data for the study. The instrument was administered to the selected sample by the researcher together with two research assistant and retrieved back immediately to avoid loss any of copy of the instrument. The data collected were analyzed using descriptive statistics.

Results

The results are presented according to the research questions:

Research Question One: Which social media are biology students exposed to?

Table 1:

Frequency of social media accessed by biology students.

Social Media	Frequency	Percentage (%)
Twitter	103	51.5
Facebook	171	85.5
Instagram	119	59.5
YouTube	137	68.5
2go	65	32.5
Google+	11	5.5
Snapchat	43	21.5
Pinterest	56	28
WhatsApp	107	53.5

Table 1 above showed the responses of biology students on the various social media they accessed and exposed themselves to. The table revealed that 103 (51.5%) of the students indicated that access twitter, 171(85.5%) responded the students access Facebook, 119(59.9%) said they are exposed to Instagram, 137(68.5%) are exposed to YouTube, 65(32.5%) students visit 2go, Google+ is reported to be visited by 11(5.5%), biology students who visit Snapchat are 43(21.5%), students exposed to Pinterest are 56(28%) while 107(53.5%) students are exposed to WhatsApp. This table has showed that biology students are exposed to various social

media and a student is exposed to more than one social media. The data in the Table 1 is further represented in figure 1 below.

Figure 1: Chat showing rate of access of social media by biology students.

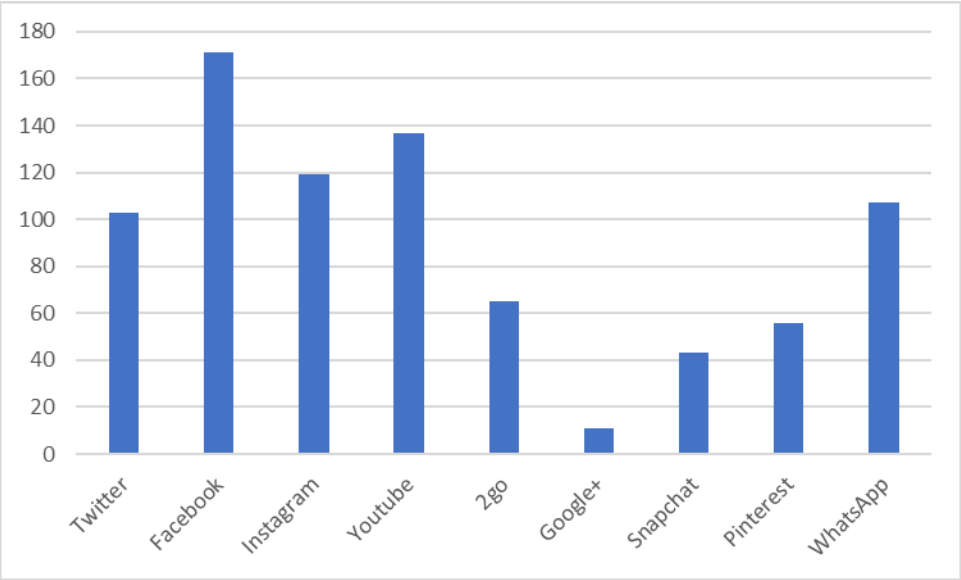


Figure 1 above showed Facebook as the social media which biology students are most exposed to. This is followed by YouTube, Instagram, WhatsApp, Twitter, 2go, Pinterest, Snapchat and google+ respectively.

Research Question Two: To what extent do biology students access social media?

Table 2:
Biology Students Access Social Media

S/N	Statement	SA	A	D	SD	$\bar{X}$	Std Dev
1	Biology students participate on social media at home.	81	101	2	16	3.38	.62
2	Social media are access by biology students during break and free periods while in school	101	93	-	6	3.42	.52
3	Biology students access social media immediately after school hours	86	105	4	5	3.35	.59
4	Biology students access social media at any desirable time though always in possession of mobile phone.	120	77	2	1	3.58	.56
5	Biology students participate on social media during study hour.	78	99	16	7	3.31	.57

From Table 2 above, the analysis of data collected and presented examines the time biology students accessed social media. The five items in the table which indicated times biology students access social media were accepted because they have mean scores which are above

2.5 which is the benchmark for making decision. This implies that they access social media at home, during free periods in school, after school hours, study time and any other time they desire to do so. To show the extent of the students' participation on social media daily, Table 3 is presented.

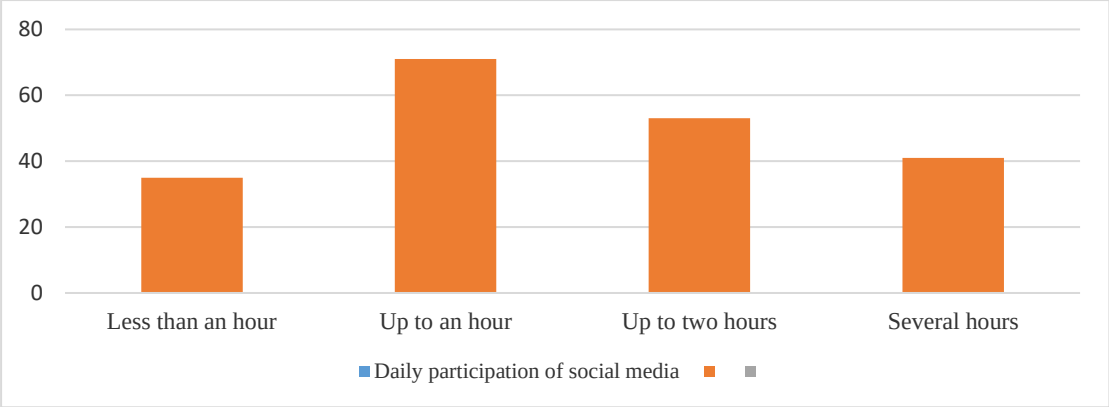
Table 3:

Daily participation of biology students on social media

Variable	Frequency	Percentage (%)
Less than an hour	35	17.5
Up to an hour	71	35.5
Up to two hours	53	26.5
Several hours	41	20.5
Total	200	100

Table 3 showed the extent to which biology students participate on social media on daily basis. 35(17.5%) students spend less than an hour, 71(35.5%) spend up to an hour, 53(26.5%) spend up to two hours while 41(20.5%) spend several hours on social media daily. This is further represented graphically in figure 2.

Figure 2: Chat showing the extent of participation of biology students on social media



Research Question Three: What are perceived uses of social media by biology students?

Table 4:

Social media usage by biology students

S/N		SA	A	D	SD	$\bar{X}$	Std Dev
1	Biology students use social media to chat friends, relatives, classmates, etc.	86	112	-	2	3.43	.55
2	Social media are used to download home videos and music by biology students	100	93	2	5	3.46	.60
3	Biology students use social media to get updated information and news.	79	114	2	5	3.35	.58
4	Social media are used for gisting only among biology students	55	136	5	4	3.20	.59

5	Biology students use social media to play games and watch football match.	83	111	1	5	3.38	.56
6	Social media are used for online discussions of biology concepts by students.	72	123	2	3	3.32	.56
7	Students visit social media to download on biology concepts.	84	107	2	7	3.36	.60
8	Students clarify difficult biology concepts by reading them on social media.	80	109	10	1	3.34	.59
9	Biology students use social media to do assignments in biology.	100	93	2	5	3.46	.60
10.	Social media are used to study and take notes on biology concepts.	90	106	3	2	3.42	.59

Table 4 above presented analysis of data collected on perceived usage of social media by biology students. Ten items in this section were on various activities of social media usage by biology students. Five of the items were on non-academic activities, while the other five items were on academic activities on biology. Each of the ten items have mean score greater than 2.5. Therefore, the ten items were accepted as they were above the benchmark of 2.5, and were interpreted to be the most glaring purposes of which biology students access and participate in social media. The implication is that biology students use social media to chat their love ones, download home videos and music, get latest information, play games and watch football. The students also use social media to participate in online discussion on biology concepts, download video clips on concepts in biology, clarify concepts which appear difficult, do assignments in biology as well as taking notes during their study hours.

Discussion

The findings of this study revealed that biology students access different types of social media with Facebook being the most visited, followed by YouTube, Instagram, Whatsapp, Twitter respectively. Google plus was the least visited. This finding of Facebook as the most visited social media is consistent with previous studies such as Kirschner & Karpinski (2010), Seba & Tarang (2013), Ogbaeja & Nwafor (2017), Katcha, et al (2018), etc. The reason for the popularity of Facebook among the students may be because it is cheaper and its ability to use it to chat with multiple friends at the same time. However, twitter was the least visited social media network sites that biology students are exposed to according Katcha, et al (2018) while Abdulkadrir (2016) found WhatsApp as the least used social media.

This is the era of technology. Social networking site is one of the aspect of technology which connects people together without restriction of time and location. It is an aspect of technology which individual participates freely, hence students can participate on all these social media without restriction. The study revealed that biology students use reasonable portion of their daily time to participate on social media (i.e those who spend up to an hour -71 (35.5%)), and those who use up to two hours – 53 (26,5%) daily). This is in line with Abdulkadir (2016) finding that students used considerable portion of their daily life interacting through social media.

The findings of this study also revealed that biology students use social media for various purposes. These include chatting with friends, downloading music and home videos, updates on information and news, gisting, playing games and ball, online discussions, downloading video on biology concepts, clarification on difficult biology concepts, doing assignments and taking notes while reading biology online. These is in line with previous studies of Katcha et al (2018), who submitted that students use social media to chat friends, etc, download home videos and for online discussion. Mingle & Adams, Ogbaeja & Nwafor (2017) also found that

students participate on social media for updates on news and any other information while Abdulkadir (2016) submitted that students used social media for assignments and taking notes. It would be observed from this study that students use social media for both non- academic and academic purposes. This supports the findings of Waleed & Mohd (2014) and Katcha et al (2018) that apart from being a communication tool and chatting platform, students also used social media for education purpose. This is against the submission of Nwanbueze & Aduba (2014) that social media has no positive influence on students, but rather have overall negative influence.

Mingle & Adams (2015) is of the opinion that the time spent on social network sites by students is the same time that is normally being used for extracurricular activities. Therefore, it implies that participating on social network sites do not take away their productive time. No significant relationship was found between times spent on social media and with students' academic performance. In view of this and other findings from this study, it is good biology students are allowed the use of social media in schools with proper monitoring instead of being ban in schools.

Conclusion

In spite of the general views of negative effects of social media on students' academic pursuit due to free ways entrance to the social network sites, and consequently on their academic performance and attitudes as revealed by studies, the findings of this study shows that biology students also access social media for information on their learning of biology. Since it is evident from this study that biology students access various social network sites for different purposes, secondary schools can create possibilities and opportunities of making a responsible use of social media. This could be through creation of platforms for online discussion of biology concepts with biology teachers. There is need for biology teachers and schools at large to stay abreast of the technology to infuse social media into teaching and learning of biology since we are in the technology era and students use social media everyday.

Recommendation

Based on the findings of this study, here are recommendations:

1. The use of social media by teachers for teaching and learning of biology concepts should be introduced and encouraged by the school authority.
2. The use of social media by biology students should be allowed in schools but with guiding rules and principles by the school.
3. Secondary school management should also consult appropriate Information Communication and Technology (ICT) bodies and authorities to assist in creation of social media for learning with appropriate legal backing.

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PERCEIVED USEFULNESS AND PERCEIVED EASE OF USE OF LEARNING MANAGEMENT SYSTEM AMONG DISTANCE LEARNERS' IN SOUTH-WEST, NIGERIA

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Abstract
Learning Management System (LMS) is a common platform where students and teachers can interact digitally most especially in Open and Distance Learning (ODL) institutions. However, it has been discovered over time that most of the distance learners with poor study habits lag behind in its utilisation. The purpose of this study was to investigate Perceived Usefulness and Perceived Ease of Use of Learning Management System among Distance Learners' in South-West, Nigeria. Emphasis was on gender and field of study using an adapted Technology Acceptance Model (TAM) of Davis (1993). This study employed a descriptive research method. Data were collected through the administration of validated researcher-adapted questionnaire. Descriptive statistics of mean and standard deviation were used to answer all research questions. Inferential statistics of t-test and ANOVA were used to test the hypotheses at 0.05 level of significance. The research findings indicated that there were significant differences between male and female distance learners in their: perceived usefulness of LMS (p=0.00); perceived ease of use of LMS (p=0.004); in favour of males; there was no significant difference among Sciences, Arts and Social Science distance learners on their perceived usefulness and perceived ease of use of LMS.
Keywords: perceived ease of use, learning management, perceived usefulness, distant learners.

Introduction

The development of Information and Communication Technology (ICT) infrastructures in Nigeria which has motivate learners in every educational institution to make use of the internet for learning. ICT has improved and is still improving the educational standard of the nation. ICT has changed the way the tutors teaches and how student learn (Oliver, 2002). Some tutors have dynamically shifted the mode of teaching from face-to-face mode to an entirely online mode by designing courses and curricula that are offered online completely. The institution of ICT in distance education has helped to improve distance learning systems bridging the geographical distance between tutors and students (Asabere, 2012; Oliver, 2002; Ogunlade & Joshua, 2015; Tinio, 2002). Distance Education (DE) as it implies is a form of education that use electronic mediated device to facilitate learning where learners and instructors are located differently (Gulati, 2008 & Selvam, 2012).

One significant innovative technology to expand teaching and learning mostly in Distance Education is e-learning. E-learning involves the delivery of information through the internet (Santy & Smith, 2007). It involves learning with the aid of ICT-technology but not yet a full substitute for traditional method of learning (Behera, 2013). In this 21st century, e-learning has experienced monumental growth as some institutions have separate online campus in addition to the existing face-to-face campus. E-learning includes the use of software, internet, CD-ROM, online learning or any other electronic or interactive media to disseminate information (Nagarajan & Wiselin, 2010). All students and tutors could add and contribute to the learning activities from any geographical location, and a variety of educational opportunities can be constantly shared and retrieved. Through e-learning, both lecturers and students benefit from streamline learning process using Open Source Learning Management System (LMS) because of its low cost of application with many features and attainment (Ololube, 2014; Syamsuddin & Alimin, 2014).

LMS is known in literature by several names, including course management system, virtual learning environments and e-learning courseware (Moore, Dickson-Deane, Galyen, 2011). The LMS helps students and lecturers by facilitating alternative way to learn,

communicate and save time as well as making e-learning content easier to be accessed, (Munasinghe & Wojewardana, 2017). LMS is defined as an online digital environment that allows information to be shared between tutor and students and providing access to content and administrative features for specific courses within an integrated environment (White & Larusson, 2010). LMS is also a comprehensive system that streamlines an organization's needs for both its clients and its employees (Obadara, 2014). Obadara also opined that organizations using LMS have a central place to store course material online for access by specified users. LMS usage serves as a medium to stimulate pedagogical process by blending traditional learning practice and online learning environments (Alghamdi & Bayaga, 2016).

LMS allow learning institutions to offer a larger number of courses online whether full or blended, by providing institutions with a digital space for numerous purpose which include documentation, tracking and online training. (Schmidt, 2002; Research & Markets, 2018). Clarke-Okah (2009) explained that LMS has two principal characteristics which are course management and organizing/managing students. Course management enables the administration and transfer of knowledge. In organizing and managing students, it facilitates student admissions, registration, payment of fees and other relevant administrative requirements.

LMS uses variety of tools and functions such as course management tools, online group chat and discussion, homework collections and grading, documentation, course evaluation tracking, and reporting of course or classroom events between various people that participate. Moodle is an example of such LMSs. MOODLE, that is Modular Object-Oriented Dynamic Learning Environment was established at Curtin University in Western Australia by Martin Dougiamas (Kennedy, 2005; Smart & Cappel, 2006; Singh, Mangalaraj, & Ta-neja, 2010). Moodle comprises features which can be understood from the six classified main factors, they are: Course and Curriculum Design, Administrator Tools and Instructor Tools (Momani, 2010). However, it is obvious that the expectation of distance learners towards the use of LMS has now increased anxieties for such concern in certain parts of the country for example, in South-west, Nigeria.

Research Hypotheses

H_{O1}: There is no significant difference between male and female distance learners on their perceived usefulness of LMS.

H_{O2}: There is no significant difference between male and female distance learners on their perceived ease of use of LMS.

H_{O3}: There is no significant difference among Sciences, Arts and Social Science distance learners on their perceived usefulness of LMS.

H_{O4}: There is no significant difference among Sciences, Arts and Social Science distance learners on their perceived ease of use of LMS.

Review of the Related Literature

Perception is the process through which people interpret an impression to yield a meaningful understanding of the things around them (Lindsay & Norman, 1977), or it is the way people think about something and the idea of what it is like and the capacity to comprehend the accurate nature of a subject as its affects our situation (Adeyemo, 2011). Falade (2013) sees perception as cognitive process in which information processing is used to transfer information from the world into the brain and mind where it is further processed and related to other information). Perception allows an individual to act within his/her environment through; touching, sighting, tasting, smelling and hearing. Perception follows four stages which are: stimulation, registration, organization, and interpretation as noted by Lindsay and Norman (1977).

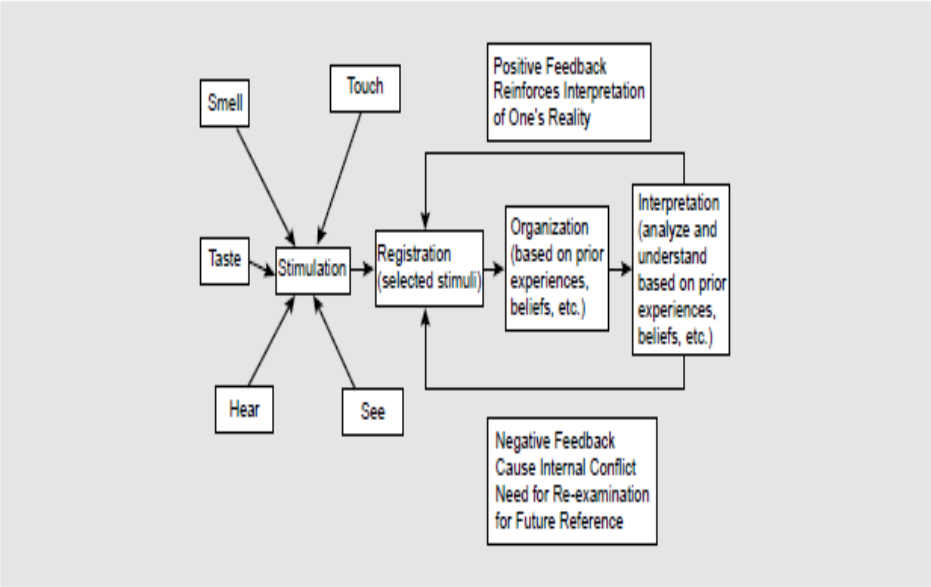

Figure 1: Perception Processing System

Sources: Lindsay and Norman (1977)

There are basically four theories of perception, which are; naive realism which is a straight forward view as man directly perceive the world as it is using his sense organs, the second one is representative realism suggesting that perception is not the passive process that the naïve realist suggests, rather, man is actively involved in perception (his experiences). The third which is idealists, and the fourth theory, which is the most recent is referred to as phenomenalism (Theory of knowledge, 2013). Venkatesh and Davis (1996); Pin and Hsin-Hui (2005) grouped perception into perceived usefulness and perceived ease of use. When perceptions towards technology and information systems is negative, it can reduce usage, and lower end user satisfaction.

Researches on Learning management system has a great contribution to the fields of education which has contributes to an understanding of information behaviors leading to effective learning. To measure the efficiency and effectiveness of using LMS, users' perception is reckoned as an essential parameter of success and failure. The acceptance of LMS is based on the perception of it users and when users have a negative perception it can result to low usage leading to destroying many organizational investments in information technology (Karahanna, Staub, & Chervany, 1999; Venkatesh & Davis, 2000). It was suggested that connecting perception with actual use is not easy as opined by Hanson and Robson (2004) in a study in which they examined the use of two commercial LMS (WebCT and Blackboard). In their finding it was evident that the students reported that these systems improved their learning.

In a research carried out by Tharindu (2008), result indicated that no significant relationship between the perception students had about the LMS and it actual use. Almarashdeh, Sahari, Zin, and Alsmadi. (2010) indicates that the ability of LMS to allow student and instructors to accomplish his learning task, enhance effectiveness in learning and increase learning efficiency is more significant than easy to access information, easy to use and clear interaction of the LMS. The study also confirms that the reception of the LMS is vital in determining whether the system is working and used by students and instructors in Malaysian universities. Trayek and Hassan (2013) also examined the perceptions of students at the Defence University on the use of the LMS. Result showed that users had a positive attitude towards the use of the LMS. Nevertheless, that there are some technical issues that must be addressed to certify that the LMS can function excellently.

Juha-Matti and Niklas (2014) concluded that students' perception of the LMS is affected by many factors related to social influences, perceived easiness to use and perceived usefulness. In addition, factors such as the actual system and content qualities are also important

to whether students' embrace a system or not. It is clear from the results that the perceptions reflect issues that are both technical and social in nature, which in many ways supports previous research on user adoption of technology. Suorsa and Eskilsson (2014) examined how Learning Management Systems are perceived by students in upper secondary school in which ten students were interviewed to detect issues influencing scholar discernments on LMS. Based on the study results it was concluded that the most important finding is that, the students' perceptions of a learning management system is mainly influenced by how the system correlates with their educational needs and expectations. Thus, if it has the 'right' functionality students are likely to accept the system. Conversely, if the system does not provide the needed functions, the users will turn to using other systems instead. This means that IT-professionals within education need to make sure that the functionality of an LMS corresponds with the students' needs.

Sisay (2018) examined university student perception and utilisation of technology for learning at Haramaya University in Ethiopia. It was discovered that students have confident insight towards technology utilisation for learning from the study. Olivia (2009), also conducted a research in relation to gender, finding indicate that male uses the internet than their female counterpart in the use of ICT which indicate a gender barrier. In respect to student perception on LMS based on field of study, Omotunde (2015) opined that pre-service teachers in Chemistry department have a very good perception of the use of LMS while, History department have a relatively little/skimpy insight on the use of LMS. This implies that students' field of study may influence or affect their perception on use ICT facilitated technologies such as LMS. However, majority of the empirical studies above has established that the LMS is a useful innovation, fostering interactive teaching and learning more than residential students.

Success of any technology integration into instructional process depends highly on users' acceptance of the system rather than the system itself. The Technology Acceptance Model (TAM) of Davis (1993) was adapted for this study. A model that extends the previous models is presented for this study in figure 2, this model provides the framework for the research design and data analysis.

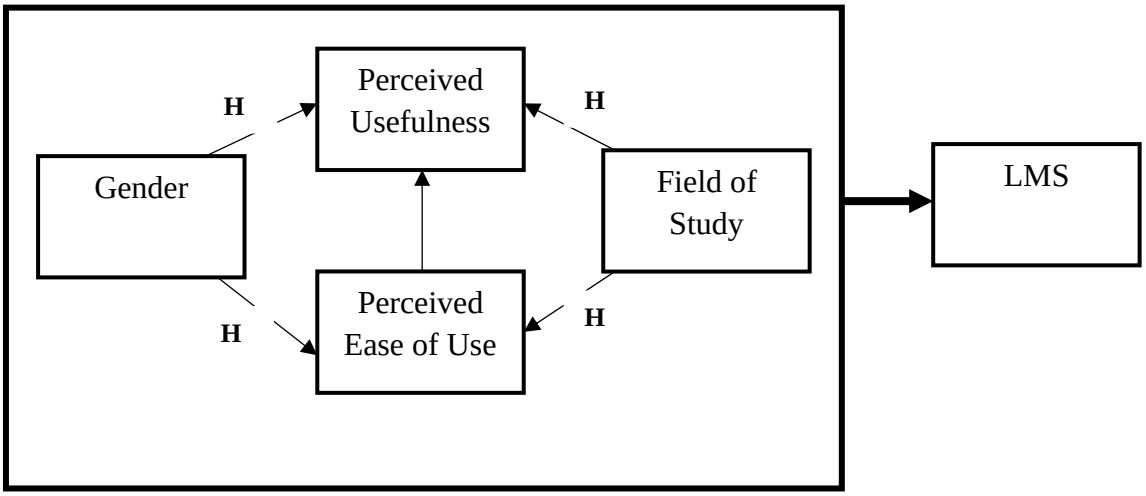

Figure 2: The Hypothesized Model on Perceived Usefulness and Perceived Ease of Use of Learning Management System among Distance Learners'

Research Design and Methodology

The study adopted descriptive research of survey method. Descriptive research of survey method was chosen for the study because it enables the researcher to gather a large amount of information from the respondents.

Sampling

The participants in this study were 697 Distance Learners of National Open University of Nigeria (NOUN) in South-west Nigeria. Learners from each of the study centres (Akure, Osogbo, Ado-Ekiti, Abeokuta, Ikeja and Ibadan) were Purposively sampled.

Methods of data collection

Questionnaire is the survey instrument used in this research. The research instrument was divided into two sections. The first section consists of demographic information. The second section consist of 20 questions; 10 questions on perceived usefulness of LMS and 10 questions on perceived ease of use of LMS. The questionnaire items were adopted from the following prior studies (Lonn, Teasley & Krumm, 2009; Govender, Dhurup & Mudaly, 2014). The participants were asked to indicate their perception on a likert scales (4-1) with response ranging from "strongly agree" to "strongly disagree".

Data analysis and interpretation

The analysis and interpretation of data obtained were done using descriptive and inferential statistics. Frequencies, mean, standard deviation and bar chart were used to analyze the research questions. Hypotheses 1 and 2 were tested using independent *t*-test while hypotheses 3 and 4 were tested using ANOVA. All hypotheses were tested at 0.05 level of significance.

Results and Discussion

Table 1:
Percentage Distribution of Respondents by Gender

Gender	No of Respondents	Percentage
Male	299	42.9
Female	398	57.1
Total	697	100.0

Demographic status of respondents by gender was presented in table 1. It showed that respondents of male gender were 299 with 42.9% while 398 (57.1%) were female. Figure 3 present bar chart of respondent by gender.

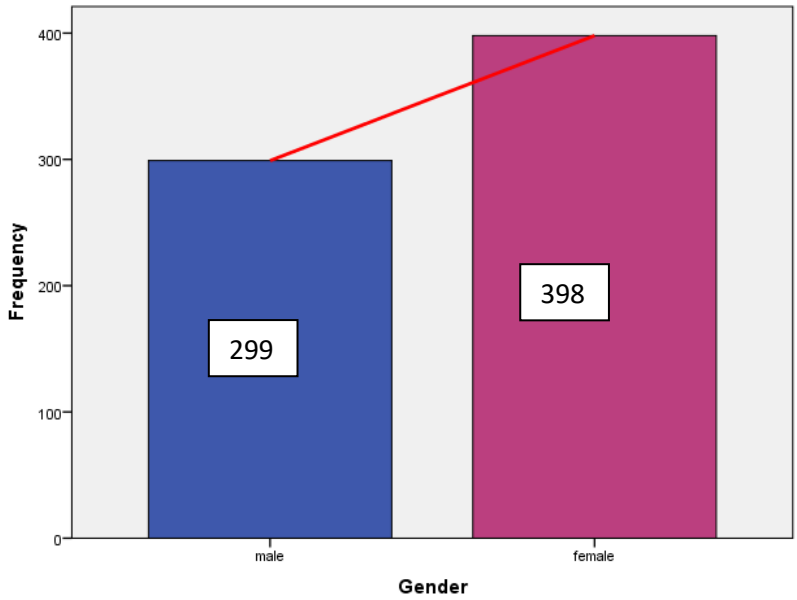

Figure 3: Bar Chart of Respondents' Gender

Figure 3 present bar chart of respondents by gender. The bar showed that female has the higher bar more than their male respondents. Thus, the field of study of respondents need to be reviewed. This was analyzed in table 2.

Table 2:
Percentage Distribution of respondents by Field of Study

Field of study	No of Respondents	Percentage
Science	284	40.7
Arts	149	21.4
Social Science	264	37.9
Total	697	100.0

Table 2 represents the demographic status of respondents by their field of study. It was revealed from table 2 that majority of the respondents in Sciences were 284 (40.7%) Arts were 149 (21.4%) while Social Sciences were 264 (37.9%). A chart better presents the illustration of respondents based on their field of study as shown in figure 4.

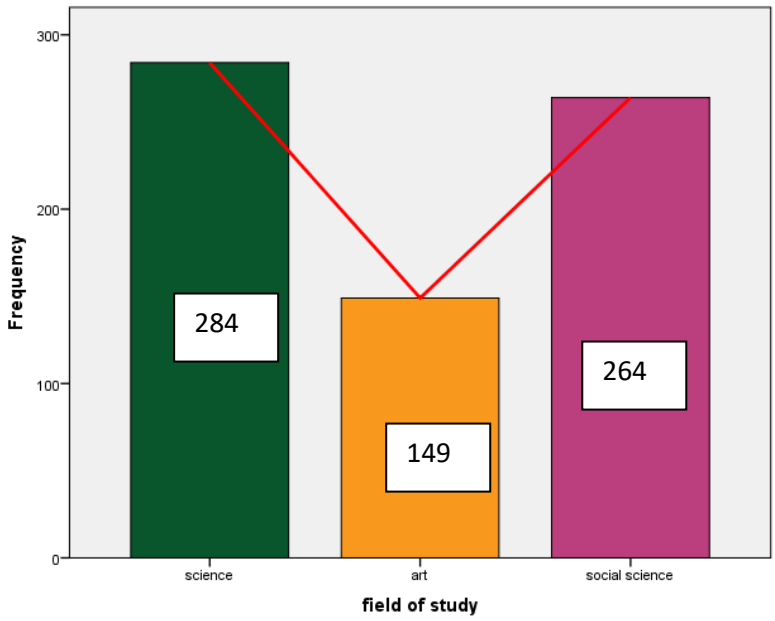

Figure 4: Demographic Status of Respondents by their Field of Study

Figure 4 present bar chart of respondents by their field of study. The bar showed that science respondents had the highest bar than both arts and social science respondents.

Results

This part presents the result of the analyses on perceived usefulness and perceived ease of use of learning management system among distance learners.

Research Question 1: What is the perception of distance learners on the usefulness of LMS? The researcher analyzed the responses from the items on the questionnaire and the results were as shown in Table 3.

Table 3:
Perceived usefulness of LMS

S/ no	Statements	Mean	Std. Dev
1	Using LMS improves my academic achievement	3.26	0.68
2	I find using LMS calendar more useful when finding out about events	3.14	0.67
3	LMS gives me more control over my learning	3.15	0.68
4	LMS helps me learn more efficiently	3.11	0.72
5	LMS system makes my learning more effective	3.11	0.70
6	LMS has a positive effect on my learning	3.10	0.73
7	Through LMS I find it useful to communicate to my teachers and friends.	2.87	0.86
8	The LMS makes learning more meaningful	3.06	0.73
9	I find LMS useful when discussing topic of my studies with my classmates	3.07	0.78
10	LMS is useful when downloading course materials uploaded by my lecturers.	3.20	0.73
	Grand mean	**3.12**	**0.47**

Table 3 revealed that using LMS improved distance leaners' academic achievement was ranked highest having the mean score 3.26 out of maximum of 4. This was followed by LMS gives more control over learning, using LMS calendar was more useful when finding out about events, LMS helps to learn more efficiently, LMS system makes learning more effective and LMS has a positive effect on learning having the mean scores of 3.20, 3.15, 3.14, 3.11, 3.11 and 3.10 respectively. The lowest mean scores were 3.07, 3.06 and 2.87 with the statement that said I find LMS useful when discussing topic of studies with classmates, the LMS makes learning more meaningful and through LMS I find it useful to communicate to with teachers and friends.

However, the grand mean score for perception of distance learners on the usefulness of LMS was found to be 3.12 using 2.0 as the bench-mark. It can then be inferred that distance learners' perceived usefulness of LMS was positive.

Research Question 2: What is the perception of distance learners on the ease of use of LMS? The researcher analyzed the responses from the items on the questionnaire and the results were as shown in Table 4.

Table 4:
Perceived Ease of Use of LMS

S/ No	Statements	Mean	Std. Dev
1	I quickly understand the LMS process	3.13	0.73
2	It is easy for me to become skillful in ICT when using LMS	3.14	0.76
3	LMS is easy to handle problem whenever I encounter them	2.95	0.80
4	My interaction with LMS as a student does not require me to seek for assistance	2.89	0.83
5	Learning through LMS is easy for me	3.05	0.76
6	It is easy to get relevant materials from LMS	3.10	0.74
7	I find it easy to download course materials uploaded by my lecturers when using LMS	3.15	0.73
8	LMS makes it easier for me to comprehend	3.00	0.79
9	The LMS makes it more convenient to communicate with my lectures	2.77	0.87
10	I find easy to take quizzes when using LMS	2.86	0.82
	Grand mean	**3.01**	**0.49**

It could be noted from Table 4 that participants find it easy to download course materials uploaded by lecturers when using LMS was ranked highest having the mean score 3.15 out of maximum of 4. This was followed by it is easy for to become skillful in ICT when using LMS, I quickly understand the LMS process, it is easy to get relevant materials from LMS, learning through LMS is easy and LMS makes it easier to comprehend having the mean scores of 3.14, 3.13, 3.10, 3.05 and 3.00 respectively. The lowest mean scores were 2.95, 2.89, 2.86 and 2.77 with the statement that LMS is easy to handle problem whenever you encounter them, interaction with LMS as a student does not require me to seek for assistance, I find it easy to take quizzes when using LMS and LMS makes it more convenient to communicate with lectures. However, the grand mean score for perception of distance learners on the usefulness of LMS was found to be 3.01 using 2.0 as the average bench-mark. It can then be inferred that distance learners' perceived usefulness of LMS was positive.

Hypotheses Testing

Hypothesis One

H_{O1}: There is no significant difference between male and female distance learners on their perceived usefulness of LMS.

Table 5:

T-test Summary for Significant Difference Between Male and Female Distance Learners Perceived Usefulness of LMS

Gender	No	Mean	Std. Deviation	Df	t	Sig. (2 tailed)	Remarks
Male	299	3.18	.44				
				695	3.68	.00	Sig.
Female	398	3.05	.48				
Total	697						

The significant difference between male and female distance leaners' perceived usefulness of LMS was revealed in table 5. The result showed that t (695) = 3.68, $p<0.05$. the null hypothesis was rejected. This was because the result of the t-value of 3.68 resulting in 0.00 significance value was less than 0.05 alpha value. This implies that the null hypothesis which stated there was no significant difference between male and female distance learners on their perceived usefulness of LMS was rejected. It can therefore be concluded that there was significant difference between male and female distance learners on their perceived usefulness of LMS. The direction of difference is shown in figure

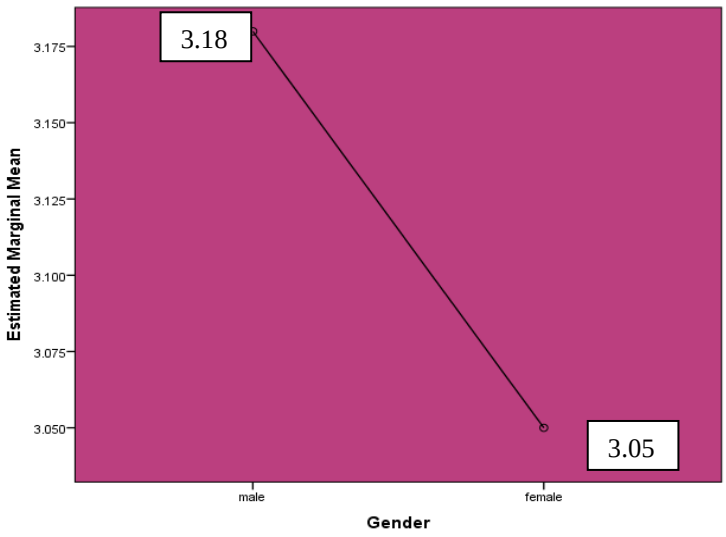

Figure 5: Estimated Marginal Mean on difference between male and female distance learners' perceived usefulness of LMS

Figure 5 present graphically the estimated marginal mean on difference between male and female distance learners' perceived usefulness of LMS. It revealed that the male distance learners had the highest mean score than their female counterparts.

Hypothesis Two

H_{O2}: There is no significant difference between male and female distance learners on their perceived ease of use of LMS.

Table 6:

T-test Summary for Significant Difference Between Male and Female Distance Learners Perceived Ease of Use of LMS

Gender	No	Mean	Std. Deviation	Df	t	Sig. (2 tailed)	Remarks
Male	299	3.07	.47	695	2.89	.004	Sig.
Female	398	2.95	.52				
Total	697						

Table 6 presents the result on significant difference between male and female distance learners on their perceived ease of use of LMS. The result showed that, $t(695) = 2.89$, $p<0.05$. the null hypothesis was rejected. This was because the result of the t-value of 2.89 resulting in 0.004 significance value was less than 0.05 alpha value. This implies that the null hypothesis, there is no significant difference between male and female distance learners on their perceived ease of use of LMS was rejected. It can therefore be concluded that there was significant difference between male and female distance learners on their perceived ease of use of LMS. The direction of difference is shown in figure 6.

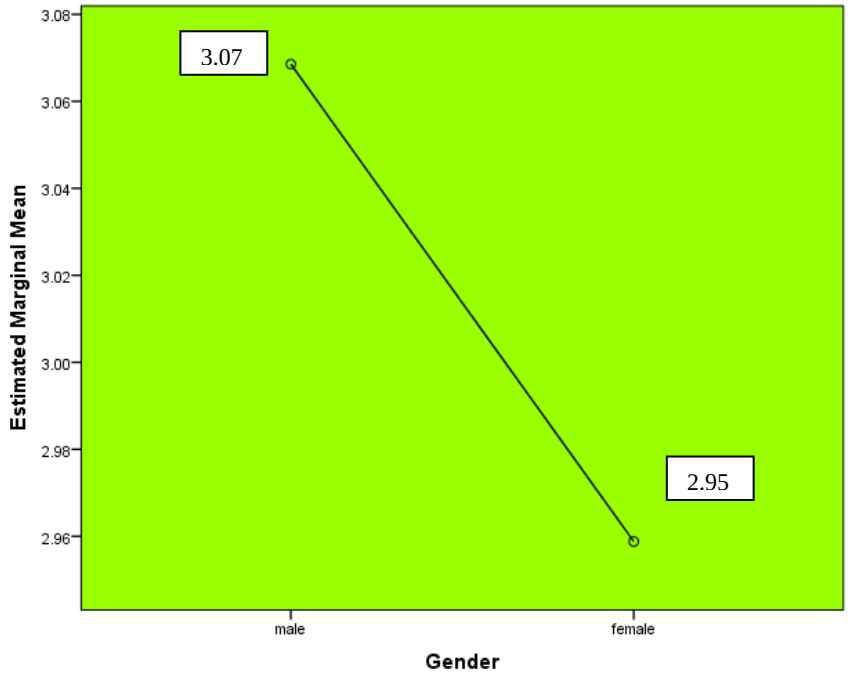

Figure 6: Estimated Marginal Mean on difference between male and female distance learners' perceived ease of use of LMS

Figure 6 present graphically the estimated marginal mean on difference between male and female distance learners' perceived ease of use of LMS. It revealed that the male distance learners had the highest mean score than their female counterpart.

Hypothesis Three

H_{O3}: There is no significant difference among Sciences, Arts and Social Science distance learners on their perceived usefulness of LMS.

Table 7:

ANOVA Summary for Significant Difference among Sciences, Arts and Social Science Distance Learners Perceived Usefulness of LMS.

	Sum of square	Df	Means square	F	Sig.	Remarks
Between groups	.086	2	.043	.198	.821	Not Sig.
Within groups	151.151	694	.218			
Total	151.237	696				

Table 7 revealed that there was no significant difference among Sciences, Arts and Social Sciences distance learners on their perceived usefulness of LMS. F (2, 694) = .198, p = .821. This therefore meant that the null hypothesis was not rejected because the significant value (.821) was greater than the 0.05 alpha level. By implication, the null hypothesis was established, thus, no significant difference existed among Sciences, Arts and Social Science distance learners on their perceived usefulness of LMS.

Hypothesis Four

H_{O4}: There is no significant difference among Sciences, Arts and Social Science distance learners on their perceived ease of use of LMS.

Table 8:

ANOVA Summary for Significant Difference among Sciences, Arts and Social Science Distance Learners Perceived Ease of Use of LMS

	Sum of square	Df	Means square	F	Sig.	Remarks
Between groups	.503	2	.252	1.015	.363	Not Sig.
Within groups	172.123	694	.248			
Total	172.626	696				

Table 8 revealed that there was no significant difference among Sciences, Arts and Social Science distance learners on their perceived ease of use of LMS. F (2, 694) = 1.015, p = .363. This therefore meant that the null hypothesis was not rejected because the significant value (.363) was greater than the 0.05 alpha level.

By implication, the null hypothesis was established thus, no significant difference existed among Sciences, Arts and Social Science distance learners on their perceived ease of use of LMS.

Conclusion

This paper has made an attempt to revealed that the perception of distance learners on the usefulness and ease of use of LMS was positive. The findings indicated that there was a positive response to all the statements for relative advantage. The finding was in support of Sisay (2018) who reported that students had positive perception toward technology assisted. Furthermore, the influence of distance learners' gender on their perceived usefulness and perceived ease of use of LMS was examined. The result of the *t*–test established that there existed significant difference between male and female distance learners on their perceived usefulness and perceived ease of use of LMS. These findings on gender influence agreed with findings of Olivia (2009) who reported that male uses the internet than their female counterpart in the use of ICT which institute a form of digital divide.

Finally, on distance field of study, the result established that there was no significant difference among Sciences, Arts and Social Science distance learners on their perceived usefulness, perceived ease of use, attitude and utilization of LMS for undergraduate

programmes. This showed that students' field of study may affect their ICT facilitated technologies such as LMS. The study concluded that distance learning institutions should create e-learning culture using LMS by providing useful content, easy and free access of internet service to all students for effective learning.

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PROBLEM-BASED BIOLOGY CLASS IN ASSESSING SECONDARY SCHOOL STUDENTS' COGNITIVE DEVELOPMENT IN GOMBE STATE

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Abstract

Problem-Based Learning (PBL) is a student-centered approach for effective teaching and learning. The study investigated the assessment of secondary school students' cognitive development in problem-based Biology class in Gombe State, Nigeria. The research adopted a qualitative method that combines content analysis and observation. A total of 30 students of SSI were purposively used as intact class from the selected school in Gombe State. Content analysis protocol and observation checklist were used as method of data collection. The data obtained was analyzed using direct content analysis and theme-based analysis were used to answer the research question. The findings of the study revealed that problem-based Biology class improved students' cognitive development based on Bloom's taxonomy levels of cognitive development and last stage of Piaget's theory of cognitive development. The study concluded that problem-based Biology class improved students' cognitive development. The implication of the findings of this study is that, using problem-based learning into Biology class will increase students' cognitive development. It was therefore recommended that Biology teachers should develop and train themselves on how to used problem-based learning activities for effective teaching and learning of Biology.

Keywords: Problem-based learning, cognitive development, Biology.

Introduction

Problem-Based Learning (PBL) is a student-centered approach which was originally established in medical education; it is also called inquiry-oriented instructional method. PBL is now prominent in 21st centuries classrooms instruction (Chen, and Doty, 2005). A study conducted by Savery (2006) posits that learners engaged in a team to acquire knowledge with authentic and challenging problems. In addition, learners collaborate to solve authentic problems using resources made available to them. Where teacher act as facilitator, provides support and coaching of various kinds, drives the activities through assessment questions and strategies that learners are expected to engage in to improve their intellectual development (Hmelo-Silver, & Barrows, 2008). In PBL classroom context, learners obtained greater solution that cannot be achieved by individual students.

PBL is a subset of project-based learning where teacher could form a project to be solved by students (John, 2014). Similarly, Kartyas and Gati (2006) noted that PBL is a student-centered method that consists of carefully selected and sequenced authentic problems where teachers act as facilitators or guides, and learners work in a team to overcome difficulties that have to do with critical thinking. PBL improve student's knowledge and cognitive development concurrently while engaging in meaningful problem-solving (Koehler, and Mishra, 2008). PBL develop intrinsic motivation in the students and providing authentic learning experiences which relate to day-to-day problems (Woods, 2015).

Problem-Based Learning provides viable learning community where students learn how to work with different individuals from different background and setting. Technology in the 21st century provides the opportunity to integrate learner support into PBL environments (Andrea, 2007). Problem-based learning addresses the need to promote lifelong learning through the process of inquiry and constructivist learning. PBL is considered a constructivist approach to instruction because it emphasizes collaborative and self-directed learning under prescribed facilitation (Woods, 2013). Similarly, constructivist theory believed that facilitators should create an interactive learning environment for students by modern teaching media that can promote their intellectual development (Goswami, 2015).

Lillard (2010) opined that cognitive development involves changes in the student's thinking, intelligence, recalling, remembering and understanding. Cognitive developmental processes enable a growing child to memorize a concept, imagine how to solve a biological problem, come up with a creative strategy, or string together to form new meaningful knowledge. This shows that knowledge is actively constructed by the students. However, students think and reason in different ways according to their stage of cognitive development. The study further reported that action (physical interaction) with the world is a critical part of knowledge construction. The basis of cognition of students is indeed in sensory-motor learning which is approved by some theories of cognitive development (Eman, Nik, and Hairul, 2013).

Bloom's Taxonomy is a theory of cognitive development which is widely accepted for assessment of students' cognitive development. This theory emphasizes the importance of intellectual and continuous assessment of students' learning. They also emphasize on the importance of problem-based activities as a way of evaluating students' cognitive development rather than multiple-choice, true/false, short answer, and matching formats (Vidakovic, Bevis, and Alexander, 2013). This theory was found to be a useful framework for developing assessment that can involve students in complex cognitive tasks. The emphasis is on task in a certain level of Bloom's taxonomy based on the highest level of cognitive task posed to the student (Vidakovic, Bevis, and Alexander, 2013). Remembering, understanding, applying, analyzing, evaluating and creating were the levels established by Bloom (Alul, 2000). This Bloom's levels were part of the researcher's observation checklist in assessing the students' cognitive development. Another theory for cognitive development is Piaget theory.

Piaget theory is a theory of cognitive development that emphasizes on students' cognitive development and theory believed that cognitive development undergoes four (4) stages: Sensorimotor (0 to 2 years), preoperational (2 to 7 years), concrete operations (7 to 11 years), and formal operations (adolescence) (Ojose, 2008). Therefore, based on this study, the researcher considered only formal operations because the last stage is dealing with adolescence. In this stage, students can think abstractly, formulate hypotheses, use deductive reasoning, and can check solutions. However, the teacher should be giving more concrete instructional tools such as charts, illustrations, graphs, and diagrams, video, that could enhance students' thinking whenever possible by encouraging them to explain how they solve problems and create problem-based that enable students to experience the tasks and dilemmas of professionals in the disciplines or subject area represents (Louisiana, 2011).

Biology is among the three basic science subjects in Nigerian secondary school (Olutola, 2016). The biology curriculum of senior secondary school in Nigeria aims to prepare students to acquire adequate laboratory and field skills in biology, practical aspect, meaningful and relevant knowledge through technology in Biology, the ability to apply scientific knowledge to everyday life in matters of personal, reasonable, functional scientific attitudes, and enhance technology skill in solving problem (Federal Republic of Nigeria, 2013).

Statement of the Problem

Technology has affected lifestyles in so many ways particularly when it comes to the issue of education. Participants in problem-based learning classes showed high improvements in their knowledge, experience, and confidence after participating in their respective professional development enactments (Andrew, Mimi, M-Brooke, Jeffrey, and Heather, 2011). Therefore, this encompasses the ability to exercise critical thinking in order to evaluate, integrate, and make effective use of technology resources in teaching and learning. Most student-centered approaches tend to encourage collaboration among students to improve their

cognitive development and their level of understanding. Remembering, understanding, applying, analyzing, evaluating and creating were the levels established by Bloom. This Bloom's levels were part of the researcher's observation checklist in assessing the students' cognitive development and the last stage of Piaget theory of cognitive development which is formal operations because it deals with adolescence. In this stage students can think abstractly, formulate hypotheses, use deductive reasoning, and can check solutions.

Most learners or students do become receptive that is they easily learn what is concretely seen or touched or they can easily interact within a team or group to solve a particular problem. What is interactive become more permanent in their memories and can easily improve student's cognitive development. Problem-based learning which provides a good basis or avenue for meeting the needs of such categories of students is not emphasized in most Biology classes. It is in the light of the aforementioned that the researcher embarked on this study to assess students' cognitive development in a problem-based Biology class in a secondary school in Gombe State.

Purpose of the Study

The general purpose of this study was to assess secondary school students' cognitive development in a problem-based Biology class in Gombe State, Nigeria. Specifically, the study:

1. Examined how technology-integrated problem-based biology class improves students' cognitive development based on groups (male, female, and mixed group).

Research Question

1. How does technology integrated problem-based biology class improve students' cognitive development?

Methodology

This study adopted a qualitative method. The qualitative method involved a content analysis guide problem-based activity and the observation checklist. Both content analysis and observation of their technology-integrated problem-based activity was used to assess students' cognitive development. The instructional video lesson adopted from smartlearning.com was used to teach the lesson based on the selected contents and shared with participants in a CD to watch before, during and after the class activity. The population of this study was all Senior Secondary School one (SS I) science students in Gombe State. The target population consisted of all SS I science students in Gombe metropolis. All private Senior Secondary Schools were purposively selected because they have more technological facilities. One Secondary School in Gombe with SS I science students were purposively selected. An intact class in the selected school was used for this study.

The data collected through content analysis guide was used to answer research question. It was analyzed using direct content analysis approach. This approach used content analysis protocol to categorize students' problem-solving group activity into six levels of Bloom's taxonomy and forth stage of Piaget theory of cognitive development. Findings from the observation was also analyzed using a theme-based analysis. Items in the Bloom's Taxonomy and forth stage of Piaget theory of cognitive development were used as themes-based analysis, the findings from observation supported the findings of content analysis to answer research question.

Results

The results were presented in the following sequence: content of students were analyzed based on problem-based activity questions and two using direct content analysis and the observation were analyzed using a theme based analysis based on the observations of problem-based activities one and two. The direct content analysis and theme-based analysis answering research question one.

Content Analysis Result

The analysis of this content provided answer to research question "*How does problem-based biology class improve students' cognitive development?*" The students' content was analyzed using direct content analysis based on problem-based activity. The analysis was guided by content analysis protocol that contained themes extracted from Bloom's taxonomy levels of cognitive development and the last stage of Piaget's theory of cognitive development (formal operations). The respondents were divided into male, female and mixed groups respectively and the analysis was based on groups using a marking guide.

Activity Question: *List the food that you ate yesterday. Separate the items into foods that came from animals and those that came from plants. Many foods are combinations of different foods. List the ingredients of each food separately, then indicate which one is from plant or animals. For example, if you had cake for lunch you should list like: flour which is plant (wheat), sugar which is plant (sugar cane or sugar beets), eggs which is from animal (chicken). For every animal that you have listed, list several foods that it eats. For example, if you had milk with your cake, list cow as the producer of the milk, and list grass and corn as food the cow eats. Then represent all the food you ate in a food chain? As in examples, thus:*

Plant (wheat) → *Animal (eggs, chicken)* → *Man*
Grass (producers) → *Cow (milk)* → *Man*

Based on the above question, the content of group A (male) indicated that male group ate bread and cow meat, pepper chicken and tea, jollof rice with eggs and mango juice for breakfast, lunch and dinner respectively. The male group separated all the ingredients as in plants and animals. Group A finally represented what they ate in a food chain. As in;

Plant (wheat, sugarcane) → *Animal (cow)* → *Man*

The content above indicated that the male group understood and remembered what they have learned and they applied and analyzed it in a form of food chain as they summarized their class activity.

Group B (female) ate jallof rice, sandwich, with coconut juice and tea. The female group listed all the ingredients as in plants and animals of what they ate. The ingredients for jallof rice are: *plant (rice, tomatoes, pepper, onion, green beans, palm oil and groundnut oil); animals (meat, eggs which is from chicken)*. Female group also listed the ingredients for sandwich includes: *plant (flour which is from wheat, butter, groundnut oil); animal (fish, eggs)* and the ingredient for coconut juice and tea are: *plants (coconut, sugar, flavor, water, ginger, Lipton, bournvita which is from cocoa) animals (milk which is from cow)*. The female group represented what they eat in the food chains.

The content above indicated that the female group understood, remember, applied and analyzed what they ate in a form of food chain and they performed deductive reasoning of they have learned and finally they summarized their class activity as evaluation and answered the problems.

The content of group C (mixed group) showed that mixed group began with represented what they ate in the food chains and they also indicated the linked between the producers, primary and secondary consumers. The mixed group ate *tea and bread for breakfast, jallof rice for lunch, and swallow food for dinner*. The mixed group listed all the ingredients as in plants and animals respectively, they mentioned *flour, sugar, butter which are all plants and milk which is from cow which is animal* for breakfast. The ingredient for lunch were: *plants (rice, vegetables, tomatoes, pepper); animals (meat, eggs)*; while for dinner were: *maize (gharrintuwo), amarantus, vegetables); animals (fish)*. The food chains of what they ate were:

Plant (Bread) → *Animal (milk which is from cow)* → *Man*
(Producer) (primary consumer) (secondary consumer)

Plant (Rice) → *Animal (meat from cow)* → *Man*

(Producer (primary consumer (secondary consumer)

Plant (Tuwo, amarantus) → *Animal (fish)* → *Man*
(Producer) (primary consumer) (secondary consumer)

It clearly indicated that group A and B understood the problem-based activity better than group C. In addition, both groups applied five levels of Bloom's taxonomy of cognitive development and performed deductive reasoning and finally answered the question (last two levels of last stage of Piaget's theory of cognitive development) as expected (see making/key guide as appendix). This revealed that Bloom's taxonomy levels of cognitive development found to be effective in improving students' cognitive development. The findings showed that the content of group A (male) was better than that of group B (female) and C (mixed group) respectively. Therefore, this revealed that problem-based Biology class improved students' higher thinking using both theories.

The contents were also analyzed by coding yes as 1 and no as 0 in order to explain the students' contents based on the themes extracted from the two theories. The results are presented in a table below:

Table 4:
Content analysis results of problem-based activity question one based on groups

Bloom's Taxonomy Levels	Group 1 male	Group 2 female	Group 3 mixed	**Piaget Stage IV of Cognitive Development (Formal Operation)**	Group 1 male	Group 2 female	Group 3 mixed
Remembering	√	√	√	**Think abstractly**	×	×	×
Understanding	√	√	√	**Formulate hypothesis**	×	×	×
Applying	√	√	√	**Deductive reasoning**	√	√	√
Analysis	√	√	√	**Check solution**	√	√	√
Evaluation	√	√	√				
Creating	×	×	×				

Table 1 indicated that all the groups were able to carried out five levels of Bloom's taxonomy but they were not able to create. Therefore, Bloom's taxonomy levels of cognitive development found to be successful in improving students' cognitive development in a problem-based Biology class. While last stage of Piaget's theory of cognitive development (formal operation) improved students' cognitive development with problem-based Biology class. Similarly, from content of food chain indicated that all the groups were able to brainstorm, recall, comprehend, communicate, translate, construct, utilize and breakdown all information and what they learnt in terms of remembering, understanding, analyzing, applying and evaluating.

However, they could not create, think abstractly and formulate any hypothesis because they were not required to do something new or different with the information and they also had an idea about the concept since they were taught. Both groups did not assume any information as they summarized the content and solve the problems.

Observation Result

The observation was analyzed using theme-based analysis based on the themes on the observations checklist and the activity observed during lesson session. The observations supported content analysis in answering research question. The observation checklist was extracted from Bloom's taxonomy levels of cognitive development which were: remembering, understanding, applying, analyzing, evaluation, interaction, collaboration, brainstorming, discussion, participation, creativity, team spirit, and leadership style; last stage of Piaget's theory of cognitive development (formal operation) the themes extracted were: think abstractly, formulate hypothesis, deductive reasoning, and check solution.

Observation

From the observation of the class activity, students were able to give accurate definition of terms. It was also noted during the class observation that students were able to interact and brainstorm about the activity given. There was active participation of all the group members and they discussed the possible solution to each questions collectively. Students tackled the problem-based learning activity appropriately and they displayed a very good team spirit in working together.

On the other hand, it was difficult for them to explain the relationship between food chain and food web. However, students were not able to analyze their understanding from the lesson. Students did not also show enough creativity during the class activity. A little leadership style was exhibited by the group leaders as they tend not to carry everyone in the group along. During the class activity, they displayed maximum remembrance and understanding of the content behind food chain and food web and they were able to apply their understanding of the concepts to answer the questions in the class activity.

This indicated that students were able to understand, remember, and apply their understanding from the lesson, analyzed, evaluates, interacts, collaborates, and actively participated. The respondents also indicated a team spirit, tackled the problem-based activity, and demonstrated little leadership style. Similarly, the respondents carried out deductive reason and answered the solution as expected. However, they could not create, think abstractly and assume any value or formulate any hypothesis. Therefore, this showed that Bloom's taxonomy levels of cognitive development were powerful tool in assessing students cognitive development and the last stage of Piaget's theory of cognitive development served as a moderate way in improving students' higher thinking skills.

Discussions of the Findings

The study assessed secondary school students' cognitive development in a problem-based Biology class in Gombe State, Nigeria. The findings of study revealed that problem-based Biology class improve students' cognitive development and also the findings of the observation supported that problem-based Biology class is a cogent instructional tool in improving students' cognitive development and learning higher critical level thinking skills. It was found that Bloom's taxonomy levels and last stage of Piaget's theory of cognitive development (formal operation) was effective in students' cognitive development. This finding agreed with that of Eman, Nik, and Hairul (2013) that Bloom taxonomy level of cogntive development and the formal operation (last stage of Piaget's theory of cognitive development) can be a very powertul tool in assissting a student to learn higher-level thinking skills and it is also a framework for ensuring and encourage students' higher-order thinking skills. Similarly, Woods (2015) supported that PBL develop intrinsic motivation in the students and providing authentic learning experiences which relate to day-to-day problems.

Conclusions

Problem-based learning is a student-centered approach that consists of carefully selected and sequenced authentic problems where teachers act as facilitators or guides, and learners work in a team to overcome difficulties that have to do with critical thinking. Problem-based Biology class found to be effective in students learning in secondary schools based on

the Bloom's taxonomy levels of cognitive development and the last stage of Piaget's theory (formal operation) of cognitive development. Bloom Taxonomy emphasizes the importance of intellectual and continuous assessment of students' learning and also emphasized the importance of problem-based activities as a way of evaluating students' cognitive development. Piaget believed students thinking developed as they acted directly on the environment using their senses.

Implications of the Study

The findings have great implications on the students' cognitive development in Gombe State, Nigeria. Since problem-based Biology class improved students' cognitive development. Using Bloom's taxonomy levels of cognitive development and last stage of Piaget's theory of cognitive development will serve as a basis for assessing students' cognitive development. Therefore, for Problem-based learning activities to be fully adopted there is need for proper integrating of technology into Biology class can help improve students' cognitive development. Since it is a student-centered that supports classroom instruction by creating opportunities for students to learn at their own pace.

Recommendations

Based on the findings and conclusions of this study, the following recommendations were made:

1. The teaching of Biology in secondary school should be conducted in a manner that students will effectively understand and learn the concept taught. It should also be practical as the use of problem-based learning Biology class has been playing a greater role in improving students' cognitive development.
2. Biology teachers should employ Bloom's taxonomy levels and the last stage of Piaget theory of cognitive development in assessing students' cognitive development. Since it makes learning real, permanent, interesting, and enhance collaboration, recalling, interaction, comprehension, creativity and promote problem-solving. This will give students opportunity to work in a group/team to collaborate, exchange knowledge and understanding.
3. Biology teachers should develop and train themselves on how to use problem-based learning technique for effective teaching and learning of Biology.

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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 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

Purpose of Study

Specifically, the study is set to:

1) Examine the mean difference in achievement scores of students taught genetics using Gamification Instructional Package and those taught with Lecture Method.
2) Examine the difference in the mean achievement scores of male and female students taught Genetics using Gamification Instructional Package.

Research Questions:

The following research questions were raised to guide the study:

1) What is 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.

$H0_2$: 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 quasi 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 is 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
		$\bar{X}$	SD	$\bar{X}$	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 $\bar{X}$ =33.50, SD = 6.12 and $\bar{X}$ = 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 $\bar{X}$ = 35.70, SD = 5.96 and $\bar{X}$ =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 Two: 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
		$\bar{X}$	SD	$\bar{X}$	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 groups. From the result, it can be seen that mean score of the pretest and

posttest score of the male are $\bar{X}$ =34.38, SD = 6.63 and $\bar{X}$ = 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 $\bar{X}$ = 32.29, SD = 5.26 and $\bar{X}$ = 78.29, SD = 6.58, the mean gain is 46.00 in favour of the female posttest score. Also, 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.

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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MAINTENANCE PRACTICES ADOPTED IN ELECTRICAL DISTRIBUTION NETWORK FOR THE REDUCTION OF ELECTRICAL POWER LOSSES IN NIGER STATE

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Abstract
The study investigated the maintenance practices adopted in electrical distribution network for the reduction of electrical power losses in Niger State. two research questions guided the study while two null hypotheses were formulated and tested at 0.05 level of significance. The study adopted a mixed method research design. The targeted population for the study was 134 respondents. There was no sample since the population was manageable. The instrument for data collection was a 106-items questionnaire and an interview guide developed by the researcher. The questionnaire was validated by three expect. Cronbach alpha reliability method was employed to determine the internal consistency of the instrument and a reliability coefficient of 0.93 was obtained. Data collected was analyzed using SPSS. Mean and Standard deviation were used to answer the research questions while Z-test was used to test the hypotheses at 0.05 level of significance. The findings of the study revealed that 17 preventive maintenance practices were constantly adopted while 19 maintenance practices were occasionally adopted by engineers and technicians/technologist for the reduction of electrical energy losses in Abuja distribution network. The hypothesis tested further revealed that there is no significant difference in the mean responses of engineers and technicians/technologist on the preventive maintenance practices adopted in electrical distribution network for the reduction of electrical energy losses. It was recommended amongst others that, there should be regular training and retraining of staffs of Abuja Electricity Distribution Company AEDC Both Engineers and Technicians/Technologist on maintenance practices to be carried out to reduce losses.

Key Words: Energy, Electrical Energy, Distribution network, Maintenance, Corrective Maintenance

Introduction

Energy plays the most vital role in the economic growth, progress, and development, as well as poverty eradication and security of any nation. Energy is the capacity to do work as measured by the capability of doing work as defined by Thumann and Younger (2008). Energy exists in various forms which are light energy, heat energy, mechanical energy, electrical energy to mention but a few. The most important of this form is electrical energy since it can easily be transmitted from one place to another. Electrical energy is a form of energy resulting from the flow of electric charge. Energy is the ability to do work or apply force to move an object. In the case of electrical energy, the force is electrical attraction or repulsion between charged particles. The movement of charged particles through a wire or other medium is called current or electricity. Electricity is derived from electrical power system which is made up of three stages of Generation, Transmission and Distribution system. But this study focuses on electrical power distribution hence

Electrical power distribution is the final stage in the delivery of electric power; it carries electricity from the distribution system to individual consumers. Distribution substations connect to the transmission system and reduce the transmission voltage to medium voltage ranging between 2kV and 35 kV with the use of transformers. Primary distribution lines carry this medium voltage power to distribution transformers located near the customer's premises. Distribution transformers again reduces the voltage to the utilization voltage used by lighting, industrial equipment or household appliances (*Short, 2014)*. Commercial and residential

customers are connected to the secondary distribution lines through service drops. Customers demanding a much larger amount of power may be connected directly to the primary distribution level or the sub-transmission level. Primary distribution voltages range from 4 kV to 35 kV phase-to-phase (2.4 kV to 20 kV phase-to-neutral) (*Csanyi, 2012).* In Niger state, Abuja Electricity Distribution Company AEDC is responsible for the distribution of electricity. Abuja Electricity Distribution (AEDC) is one of the 11 Electricity Distribution Companies that were successfully privatized and handed over to new investors on 31st October 2013. AEDC franchise area and distribution network currently covers the Federal Capital Territory (FCT), Niger, Kogi and Nasarawa states across an area of 133,000 sq/km. AEDC owns and maintains electrical installations and the distribution network within its franchise area. It is also responsible for the entire meter to cash process (M2C) including but not limited to metering, billing, revenue collection and customer services.

During the delivery of energy to the consumers, a reasonable amount is been lost. Generally, Electric power losses are wasteful energy caused by external factors or internal factors, and energy dissipated in the system (Gupta, 2007). They include losses due to resistance, atmospheric conditions, miscalculations and losses incurred between sources of supply to load centre (or consumers).

Distribution losses occur due to technical and non-technical losses as power flows through the network but technical losses is the focus of this study. Technical losses (TL) are naturally occurring and consist mainly of power dissipated in the system components such as Distribution lines, transformers, power control equipment and measurement systems. Technical power losses are possible to compute and control, provided the power system network consists of known quantities of loads. Some of the reason that could lead to technical losses include: lengthy distribution lines, inadequate size of conductors of distribution lines, too many stage of transformations, and improper load management among others. For these losses to be minimized, maintenance is required.

Maintenance is defined as the combination of all the technical and administrative actions, including supervision, intended to retain an item in, or restore it to a state in which it had been and can perform its required function effectively. It includes inspection, testing, servicing, repair and reclamation. Mohammed and Abbas (2001) classified maintenance into three groups which are preventive, predictive and corrective maintenance. But this work focus on corrective maintenance therefore Corrective Maintenance is defined as any maintenance activity which is required to correct a failure that has occurred or is in the process of occurring (Amelia et al., 2005). According to Moayed and Shell (2009) it is one that occurs after the identification and diagnosis of a problem. It is maintenance identified by a condition monitoring system or due to breakdown. Turki *et al.* (2014) also stated that corrective maintenance are practices where systems are maintained only after failure mostly of a critical nature. Equipment is allowed to run till it fails. The action taken to restore the equipment into use can be servicing, repairing, replacement or overhaul.

Maintenance practices are mostly carried out by engineers and technicians working in Distribution Stations (AEDC) who are trained and possess the competent skills required in the field so as to reduce losses. These groups of persons carry out these practices either on daily or routine bases.

Statement of the Problem

In developed countries, it is not greater than 10%. However, in developing countries like Nigeria, it is still over 20%, (Ramesh, *et al.* 2009). Nigeria is a highly populated Western African country. On a rough evaluation only about 40% of Nigerians are connected to the national energy grid. This percentage of Nigerians who actually have electric power supplied to them still suffer electric power problems around 60% of the time (Aliyu, Ramli & Saleh, 2013). Oyedepo (2011) observed that Niger state and the country at large consistently suffers from energy shortage due to poor maintenance practices adopted by the maintenance personnel of the electrical power distribution stations in the state. Also, Agbata (2000) observed that most modern electrical equipment suffer disrepair (poor repair) in the hands of maintenance personnel. Out of ignorance, minor faults are complicated to cause further damage in the

electrical system. The impact of these is that distribution stations will continue to lose a lot of resources because of poor supply of electrical energy and the existing plants may not operate at their maximum installed capacities towards providing stable electrical power to the consumers in Nigeria. This reduction can effectively be done if appropriate maintenance practices are carried out in distribution network hence the need for this study.

Purpose of Study
Specifically, the study is set to:

1) Examine the corrective maintenance practices adopted in electrical distribution network for the reduction of electrical energy losses.
2) Identify the maintenance strategies that can reduce electrical energy losses in an electrical distribution network.

Research Questions

The following research questions are formulated to guide the study:

1) What are the corrective maintenance practices adopted in electrical distribution network for the reduction of electrical energy losses?
2) What are the maintenance strategies that can reduce electrical energy losses in an electrical distribution network?

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

HO_1 There will be no significant difference in the mean responses of Engineers Technicians/Technologist on the corrective maintenance practices adopted in electrical distribution network for the reduction of electrical energy losses.

HO_2 There will be no significant difference in the mean responses of Engineers Technicians/Technologist on the maintenance strategies that can reduce electrical energy losses in an electrical distribution network

Research Methodology
Mixed method research design was adopted for the study. Mixed methods research according to Johnson, Onwuegbuzie and Turner (2007), is a design in which a researcher or team of researchers combines elements of quantitative and qualitative research approaches (for instance use of quantitative and qualitative viewpoints, data collection, analysis, inference techniques) for the broad purposes of breadth and depth of understanding and corroboration. Quantitative data will be obtained from descriptive survey research design which involves the use of questionnaire to seek information from Technicians/Technologist and Engineers while qualitative data will be obtained from interviews. The study was carried out in AEDC Area Offices in Niger State. The population for the study comprises of 134 subjects: 18 maintenance engineers and 116 maintenance technicians/technologist from the six area offices in Niger State. There was no need for sampling since the population was manageable. Data was collected using a 106-items questionnaire developed by the researcher. Part A was used to seek for personal information about the respondents and Part B (Section A, B, C and D) were used to solicit information to answer research question 1, 2. The questionnaire was validated by three expect, two from the Department of Industrial and Technology Education, Federal University of Technology Minna and one from Abuja Electricity Distribution Company (AEDC).
The instrument was pilot tested in AEDC, Nasarawa State and the reliability coefficient was found to be 0.93. The questionnaire was administered by the researcher with the help of five research assistant. The data obtained from the respondents was organized and analyzed on the basis of the research questions and hypotheses. Mean and standard deviation were used to answer research questions while z-test was used to test for hypotheses at 0.05 level of significance.

Results

Research Question One: What are the corrective maintenance practices adopted in electrical distribution network for the reduction of electrical energy losses?

Table 4.1:
Corrective maintenance practices adopted in electrical distribution network for the reduction of electrical energy losses

S/N	ITEMS	$\bar{X}_A$	SD_A	Remark
	Supply lines			
1	Repair distribution lines and towers	4.64	0.50	CA
2	Replacement of damaged poles	4.68	0.64	CA
3	Replacement of all damaged conductors	4.67	0.68	CA
4	Distribution line stringing.	4.43	0.70	OA
5	Replacement of insulator and hardware	4.54	0.65	CA
	Transformers			
6	Tighten every loosen nuts and other parts of the transformer	4.67	0.60	CA
7	Replacement of bushings	4.64	0.61	CA
8	Replacement of the sealing (gaskets)	4.58	0.65	CA
9	Replacement of transformer accessories	4.60	0.66	CA
10	Maintenance of the cooling system	4.51	0.77	CA
11	Stopping of oil leakage from the transformer	4.56	0.70	CA
12	Replacement of oil	4.53	0.55	CA
	Busbars			
13	Refurbish tools, parts and equipment when damaged	4.52	0.90	CA
14	Replace worn out parts of the busbars	4.53	0.67	CA
15	Repair damaged parts of the busbars	4.42	0.90	OA
	Switch gears/switching apparatus			
16	Correct any faulty, damaged, discolored and worn components using site spares.	4.37	0.81	OA
17	Spot check and correct any loose components or connections	4.49	0.75	OA
18	Replace any faulty battery, fuse, or switch.	4.58	0.63	CA
19	Examine insulators for cracks, chips, breaks, and evidence of flashover.	4.54	0.59	CA
	Surge voltage protection			
20	Replace only with identically rated components.	4.61	0.56	CA
21	Components should be inspected for damage and replaced if necessary.	4.54	0.59	CA
	Grounding (Earthing)			
22	Damaged cable lugs are replaced.	4.58	0.64	CA
23	Check for signs of corrosive damage to contact surfaces on Line clamps/Earth clamps.	4.61	0.67	CA
24	All damaged cable (strand breakage) is replaced.	4.55	0.67	CA
25	Replace all damaged fittings with new ones.	4.53	0.67	CA
	Grand Total of $\bar{X}_A$ and SD_A	**4.56**	**0.76**	**CA**

N_1 = Number of Engineers**,** N_2 = Numbers of technicians/technologist, $\bar{X}_A$ =Average mean of Engineers and Technicians/technologist, SD_A = Average Standard Deviation of Engineers and technicians/technologist, CA = Constantly Adopted, OA = Occasionally Adopted.

Table 4.1 shows the analysis of responses of the respondents on the corrective maintenance practices adopted in electrical distribution network for the reduction of electrical energy losses. The score shows that items 1, 2, 3, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 18, 19, 20, 21, 22, 23, 24 and 25 have their mean values within the range of constantly adopted (4.50 - 5.00). But items 4, 15, 16 and 17 have a mean value within the range of occasionally adopted (3.50 - 4.49). The table also shows that the standard deviations (SD) of all items are within the ranges of 0.55 to 0.90 and are positive which indicates that respondents were not too far from the mean of their responses on the corrective maintenance practices adopted in electrical distribution network for the reduction of electrical energy losses.

An interaction with engineers and technicians/technologists shows that corrective maintenance majorly involves replacement of damaged parts. One of the engineers said: "corrective maintenance is carried out whenever there is a break down and it involves complete replacement. For example, Improving or replacement of the earthing system when it is more than 5Ω, replacement of broken cross arm, replacement of under sized cables, wooden poles, replacement of transformer oil when bad, tightening of transformer part" (Engineer 5 Interview, April 29, 2019).

Research Question 2

What are the maintenance strategies that can reduce electrical energy losses in an electrical distribution network?

Table 4.2:

Mean Responses of Maintenance Engineers and Maintenance Technicians/Technologist on the Maintenance Strategies that can Reduce Electrical Energy Losses in an Electrical Distribution Network N1 = 18, N2 = 116

S/N	ITEMS	$\overline{X}_A$	SD_A	Remark
1	Regular training and retraining of Technical staff	4.54	0.72	SA
2	Ascertaining the quality of Aluminium conductor	4.75	0.44	SA
3	Making fund available in case of casualty	4.66	0.57	SA
4	Regular Staff motivation	4.66	0.57	SA
5	Holding Staff responsible of failures in their part	4.68	0.54	SA
6	Assigning Staff to their area of Specialization	4.76	0.43	SA
7	Installation of alarm system in case of short circuit	4.76	0.45	SA
8	Inculcating team spirit among workers	4.52	0.72	SA
9	Educating energy users on power factor and power factor correction	4.74	0.51	SA
10	Setting up of maintenance practices monitoring team	4.80	0.40	SA
11	Installation of closed circuit television CCTV to check distribution equipment	4.68	0.75	SA
12	Regular evaluation of maintenance practices	4.70	0.46	SA
13	Ensuring adequate load distribution among electrical users	4.77	0.52	SA
14	Setting up a task force for monitoring illegal connections	4.74	0.45	SA
15	Use of proper jointing techniques such as western union splice joint, rattail joint, fixture joint, knotted tap joint and split bolt connector	4.64	0.48	SA
16	Keeping the number of joints to a minimum	4.64	0.49	SA
	Grand Total of $\overline{X}_A$ and SD_A	**4.69**	**0.53**	**SA**

N_1 = Number of Engineers**,** N_2 = Numbers of technicians/technologist**,** $\bar{X}_A$ = Average mean of Engineers and Technicians/technologist, SD_A = Average Standard Deviation of Engineers and technicians/technologist, SA = Strongly Agree

Table 4.2 displays the analysis of responses of respondents on the maintenance strategies that can reduce electrical energy losses in an electrical distribution network. The result shows that all the items have their mean values within the ranges of strongly agree (4.50 - 5.00). The table also reveals that the standard deviations (SD) of all items are within the range of 0.40 to 0.75 and are positive which indicates that respondents were not too far from the mean of their responses on the maintenance strategies that can reduce electrical energy losses in an electrical distribution network.

The interview conducted with the engineers and technicians/technologists displays that for electrical energy losses to be reduced standard materials must always be use to draw lines. One of the engineer said, "For electrical energy losses to be reduced, standard conductors should be used, bad fuse should be replaced, joints in a conductor should be reduced to a minimum, constant evaluation of maintenance practices should be carried out

4.3 Hypothesis One

There will be no significant difference in the mean responses of Engineers, Technicians/Technologist on the corrective maintenance practices adopted in electrical distribution network for the reduction of electrical energy losses.

Table 4.3
Z-test Analysis of Mean Difference between Responses of Maintenance Engineers and Maintenance Technicians/Technologists on the Corrective Maintenance Practices Adopted in Electrical Distribution Network for the Reduction of Electrical Energy LossesN1 = 18, N2 = 116

	Hartley Test for Equal Variance		**z-test for Equality of Means**						
								95% Confidence Interval for Difference	
	F	**Sig.**	**Z**	**Df**	**Sig. (2-tailed)**	**Mean Difference**	**Std. Error Difference**	**Lower**	**Upper**
Equal variances assumed	5.14	0.00	0.21	118	0.83	0.04	0.19	0.41	0.33
Equal variances not assumed			0.12	14.79	0.91	0.04	0.33	0.75	0.67

Table 4.3 shows the z-test analysis of differences in the responses of engineers and technicians/technologist on the corrective maintenance practices adopted in electrical distribution network for the reduction of electrical energy losses. The table discloses that from Hartley test for equality of variance, the significant criterion (sig. 2-tailed) was found to be 0.91 which is greater than the probability value of 0.05 in comparison hence; the null-hypothesis was accepted. Therefore, there is no significant difference in the mean responses of engineers and technicians/technologist on the corrective maintenance practices adopted in electrical distribution network for the reduction of electrical energy losses.

4.4 Hypothesis Two

There will be no significant difference in the mean responses of Engineers Technicians/Technologist on the maintenance strategies that can reduce electrical energy losses in an electrical distribution network

Table 4.4
Z-test Analysis of Mean Difference between Responses of Maintenance Engineers and Maintenance Technicians/Technologists on the Maintenance Strategies that can Reduce Electrical Energy Losses in an Electrical Distribution NetworkN1 = 18, N2 = 116

	Hartley Test for Equal Variance		**z-test for Equality of Means**						
								95% Confidence Interval for Difference	
	F	**Sig.**	**Z**	**Df**	**Sig. (2-tailed)**	**Mean Difference**	**Std. Error Difference**	**Lower**	**Upper**
Equal variances assumed	1.04	0.42	0.14	118	0.89	0.02	0.14	0.27	0.31
Equal variances not assumed			0.14	18.07	0.89	0.02	0.15	0.29	0.33

Table 4.4 shows the z-test analysis of differences in the responses of engineers and technicians/technologist on the maintenance strategies that can reduce electrical energy losses in an electrical distribution network. The table shows that from Hartley test for equality of variance, the significant criterion (sig. 2-tailed) was found to be 0.89 which is greater than the probability value of 0.05 in comparison hence; the null-hypothesis was accepted. Therefore, there is no significant difference in the mean responses of engineers and technicians/technologist on the maintenance strategies that can reduce electrical energy losses in an electrical distribution network.

Discussion

The findings emanate from the study as presented in Table 4.1 revealed that most of the corrective maintenance practices were adopted in electrical distribution network for the reduction of electrical energy losses. The result from Table 4.1 divulges 21 items such as; repair distribution lines and towers, replacement of damaged poles, distribution line stringing, tighten every loosen nuts and other parts of the transformer, maintenance of the cooling system, stopping of oil leakage from the transformer and so on are constantly adopted with mean value falling within (4.50 - 5.00). While other items such as replacing all damage cable (strand breakage) and fitting new ones falls within the range (3.50 - 4.49) and their standard deviation range disclose low level of dispersion. Hence, the respondents were not too far from the mean of their responses on the corrective maintenance practices adopted in electrical distribution network for the reduction of electrical energy losses.
From the interview conduct the responses of the engineers and technicians/technologists shows that corrective maintenance majorly involves replacement of damaged parts. the responses from engineers reveals the various step and measure taken in corrective maintenance practices especially when there are breakdown of transformer. For example, Improving or replacement of the earthing system when it is more than 5Ω, replacement

of under sized cables, wooden poles, replacement of transformer oil when bad, tightening of transformer part.

The outcomes Table 4.3 demonstrations the level of significance of responses of engineers and technicians/technologist on the corrective maintenance practices adopted in electrical distribution network for the reduction of electrical energy losses at the probability value of 0.05. The significance value of 0.91 affirmed that there is no significant difference in the mean responses of engineers and technicians/technologist on the corrective maintenance practices adopted in electrical distribution network for the reduction of electrical energy losses. The result is inconsonance with the finding of (Turki *et al.,* 2014). He lamented that corrective maintenance as a practice where systems are maintained only after failure mostly of a critical nature. Equipment is allowed to run till it fails. The action taken to restore the equipment into use can be servicing, repairing, replacement or overhaul. Otieno (2016) also stated that most of the manufacturing companies do planned corrective maintenance as opposed to unplanned corrective maintenance. It was found that most of the firms had maintenance staff that was readily available to diagnose and correct problems with equipment, also noted that in most cases the corrective action taken included inspection, cleansing, oiling and adjustment.

The results conveyed on Table 4.2 depict the findings on responses of respondents on the maintenance strategies that can reduce electrical energy losses in an electrical distribution network. The outcome shows that all the items listed: regular training and retaining of technical staff, ascertaining the quality of aluminum conductor, making fund available in case of causality, installation of alarm system in case of short circuit, inculcating team spirit among workers, regular evaluation of maintenance and son on are been accepted with their mean values within the ranges of strongly agree (4.50 - 5.00). The standard deviations (SD) of all items are within the range of positive value 0.40 to 0.75which indicates that respondents responses were close on themaintenance strategies that can reduce electrical energy losses in an electrical distribution network.

Conclusion

The need for adequate maintenance for the reduction of electrical energy losses cannot be overemphasize, as it handles the overall functionality and services offered by electrical distribution network. The present study was able to investigate into the various maintenance practices adopted by the electrical distribution network in Niger State. In the outcome of the investigation it was conclude that preventive, predictive and corrective maintenance are practices that are widely adopted by the electrical distribution network especially the corrective maintenance practices.

Recommendations

The following recommendations were made for implementation based on the findings of this study;

1. AEDC should organize seminars and workshops for Engineers and Technicians/Technologist) to improve their maintenances practices in distribution network.
2. Standard equipment should used by AEDC workers during installation and repairs so as to reduces losses in Niger state.
3. Maintenance practices should be constantly carried out on distribution equipment by Engineers and Technicians/Technologist to prolong their lifespan.

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THE DEVELOPMENT AND VALIDATION OF EDUTAINMENT INSTRUCTIONAL PACKAGES FOR TEACHING BIOLOGY AT SENIOR SECONDARY SCHOOL IN NIGERIA

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Abstract

This study was conducted to develop and validate Edutainment Instructional Package on Biology for teaching senior secondary school students in Nigeria. Teaching of science subjects in Nigeria is mostly done using conventional method and which was identified as a major cause of students' poor performance in Biology. Several researches have indicated that Ecology is one of the topics responsible for students' poor Biology performance in Senior Secondary School Certificate Examinations (SSSCE) in Nigeria. Studies have proven the efficacy of Edutainment Instructional Package for improving students' performance in all disciplines, developing one for Nigerian Biology students is inevitable. The first package was developed using HTML, CSS and JavaScript Language while the second package was built with action script 3.0. The package was developed in accordance with ADDIE model. The validation was done in three stages: content validation (biology university lecturers, secondary school biology teachers and examination bodies); expert's validation (computer programmers and biology experts) and field trial validation (one-on-one validation by students). The observations, comments and suggestions during the validation were used to modify the package. At the completion of the package, development and validation was found to produce a very good performance when used for biology instruction.

Keywords: Edutainment Instructional Package; Biology; Computer-Supported Collaborative Learning; Secondary School; Nigeria

Introduction

Science education has been seen as a very important key to the development of any nation in many areas (Kola, 2013). Without science education, science and technology will not be possible; for instance, engineering, medicine, architecture and so on will not be possible if there is no one to teach the students the core subjects needed for these courses. Science education comprises of three main subjects namely biology, chemistry and physics. Biology, the study of life is therefore very important to any growing economy like Nigeria. Many graduates of biology education are self-employed and employers of labour; many owned schools for themselves where people work and earn their living while some are in to fish farming business. This could be the reason why the Federal Government of Nigeria emphasized the teaching of science in the National Policy on Education (FME, 2013) to be solely activity-based and child-centered. This corroborated with the reports of Jibrin, Zayum & Mohammed (2017) that the major challenge in teaching is to create experiences that involve the students and support of his or her own thinking, explanation, evaluation, communication and application of the scientific models needed to make sense of these experiences.

Biology is a branch of science which deals with the study of living things. It serves as a pre-requisite to the study of other lucrative and challenging professions like; medicine, nursing, pharmacology, biochemistry, agriculture among others (Ihejiamaizu & Ochui**,** 2016). The importance of Biology as a secondary school subject can be further illustrated by the fact that any candidate seeking for university admission must obtain a credit pass to study courses like Medicine, Pharmacy, Biochemistry, Microbiology and Biology Education among others must obtain credit pass in Biology.

The objectives of the Biology curriculum is to prepare students to acquire adequate laboratory and field skill in Biology, meaningful and relevant knowledge of Biology, the ability to apply scientific knowledge to everyday life in matters of personal and community health and agriculture and reasonable and functional scientific attitude. In pursuance of the above stated objectives of biology curriculum, the contents and context of the curriculum place emphasis on field studies, guided discovery, laboratory techniques and skills along with conceptual attitude (Federal Ministry of Education, 2009). To achieve these objectives, emphasis should be placed on the teaching and learning process in other to allow students develop their highest potentials (Okoyefi, 2014).

In spite of the importance of biology as a subject, students' performance at senior secondary school level has been poor (WAEC Chief Examiners Report 2008 – 2016; Ezenwosu, and Nworgu, (2013). The poor performance in Biology as a science subject has implications on

university admission, schools not been able to produce adequate number of qualified candidates in science-based courses for university admission. The resultant effect is that the students will not perform well in Biology examination due to lack of using innovative technological tools for teaching and learning. This particular problem will prevent the educational system in Nigeria from producing required number of qualified scientists and technologists. Consequently, students will lack required knowledge and skills that will affect technological development of Nigeria, and this may affect Nigeria's vision to become one of the 20 industrialized nations in the world by year 2020 (Gambari, Akawo, Gana & Eguono, 2014).

Poor performance in science in general and Biology in particular has been majorly attributed to certain factors which include: inadequate, inappropriate and perhaps non-utilization of the available laboratory equipment in teaching and learning biology; nonchalant attitude of students towards certain concepts in the biology curriculum; abstract nature of some biology concepts such as ecology and conventional classrooms/ lecture method being defective. Hence, the need for computer technology that has the potential to foster students' abilities, revolutionize the way they work, think and learn (Chinna and Dada, 2013; Yassanne, 2014). The increase in digital technology such as playing computer games or watching video has become a routine activity of students today. Students prefer to learn in a conducive environment by combining education with entertainment.

Edutainment is a learning process designed to make education and entertainment to be combined harmonically in order to make fun learning (Katsaliaki, Korina & Mustafee, Nakonil, 2014). The nature of this process is to make a fun learning to make students interested in learning. Basically, edutainment supports students to succeed the learning by optimizing their potential. The idea underlying edutainment is to promote learning by merging educational contents and entertainment activities that increase engagement, emotion, and motivation (Nalan Aksakal, 2015). The nature of this process is to make a fun learning to make students interested in learning. Basically, edutainment supports students to succeed the learning by optimizing their potential. Nalan Aksakal, (2015) further opined that the idea underlying edutainment is to promote learning by merging educational contents and entertainment activities that increase engagement, emotion, and motivation (Nalan Aksakal. Edutainment is therefore engaging entertainment and media-based materials to promote learning process.

Rawda (2015) conducted a research to investigate the usage of edutainment (games and animation films) in vocabulary learning for some intermediate students. The result reveal that students in the experimental group generally preferred online learning supplemented with digital educational games and animation films to conventional activity-based lessons. In the same way, Ruby and Joyce (2016) carried out a study on the effect of using Edutainment to Facilitate Mathematical Thinking and Learning. It was found that students performed better using edutainment than those taught with conventional method.

Based on the above literature, this study focused on the development and validation of Edutainment Instructional Package on Biology for teaching senior secondary school students in Nigeria.

Purpose of the Study

The main purpose of this research was to transform the Biology content of the Nigerian secondary school Biology curriculum into edutainment instructional software, and then package it into a computer application, CD-ROM, flash drive which could be used for teaching and learning of biology at that level. To ensure both face and content validity of the instruments, each instrument was subjected to validation by experts. Validation of the package was done to ensure its suitability, and effectiveness in enhancing the teaching and students' learning of biology (ecology) concepts. Specifically, this study sought to find out:

1. If the content of the developed Edutainment Instructional Package (EIP) sufficiently and appropriately covered the chosen areas of biology (ecology) in a sequential manner.
2. Whether the design and development of the EIP conformed to acceptable standards of Biology teachers/experts and educational technology experts/computer programmers.
3. The performance level of students in biology when taught using the EIP.

Methodology

Research Instruments

Development of Edutainment Instructional Package (EIP)

Edutainment Instructional Package (EIP) for senior secondary Biology, a computer-assisted instructional package was developed by the researcher and a programmer in accordance with ADDIE model instructional design (see figure 1). Each of the stages of the ADDIE: Analysis, Design, Development, Implementation and Evaluation were sequentially followed in the development of EIP as follow.

Analysis: This is the need/task analysis stage. At this stage, the researcher having seen the poor performance of students in Biology and having looked at the WAEC chief examiner's report on some of the concepts that students fail most which is ecology for this study decided to seek for a way forward to improve on the students' performance in biology. From the researcher's experience as a teacher, most students prefer to learn in a conducive environment by combining education with entertainment. This made the researcher to propose the development of EIP. The necessity for researcher-made edutainment instructional package was based on the fact that Edutainment Instructional Package was not commonly developed/produced and used for teaching and learning in Nigeria. Even when they are available, they may not be for educational purposes. As a result of this, developing an edutainment instructional package for biology instruction by the researcher to enhance effective teaching of biology becomes necessary.

Design: This is the second stage in the development of EIP. In this stage, the researcher having sought out the scheme of work of biology especially, on ecology began to articulate on the content of the chosen concept so as to design EIP that will enhance effective teaching of the concept (Ecology). A researcher-adapted test instrument used in collecting data for this study, Biology Ecology Achievement Test (BEAT) was designed. BEAT initially consist of 132 multiple choice objective items adopted from past multiple-choice questions from West African Examination Council (WAEC, May/June, 2008-2016) after expert validation was reduced to 124 questions. The BEAT was based on SSI Biology curriculum on concepts of Ecology covered in the Edutainment Instructional package. The test items covered different levels of understanding based on Bloom's taxonomy of educational objectives (i.e. Knowledge, comprehension and application of knowledge). Each of the questions of the BEAT had four options (A - D) as possible answers to the question. Students were required to indicate their correct answers by ticking one of the letters (A - D) that corresponds to the correct option in each item. The instrument used for field trial validation of the package was a researcher-developed questionnaire. All the items in instrument were constructed to elicit responses from various validators (expert, teachers, computer specialists, educational technology specialists and students) with respect to the use of package. The questionnaire was divided into six parts, namely, content, interactivity, navigation, feedback, screen design and students' preference toward the use of interactive EIP package compared to normal classroom instruction methods of learning. The 4-point Likert scale consisting of 30 questions was used in questionnaire, namely, 1 as Strongly Agree, 2 as Agree, 3 as Disagree and 4 as Strongly Disagree.

Development: The EIP simulation/game package is in two-in-one package, developed by the researcher and a computer programmer. The simulation package was developed using HTML, CSS and JavaScript languages. These languages are general purpose scripting language used to develop dynamic web applications and in which various simulated and animated contents can be embedded. The game package on the other hand was built with action script 3.0. Action script is an object-oriented programming language originally developed by Macromedia Inc. (later acquired by Adobe Systems. It is influenced by Hyper Talk, the scripting language for HyperCard. Action Script is primarily for the development of websites and software targeting the Adobe Flash Player platform, used on Web pages in the form of embedded SWF files. The simulation package contained four topics which were subdivided into four lessons: Lessons one, 2, 3, and 4 respectively. The main menu of the package consisted of introduction and logout.

The game package termed (WWTAM) developed to access the students on the ability to retain and recall what they have learnt consists of fifteen (15) questions. This package allows students to login and logout at any time they want to use the package. Its 'Next' button allows the

students to move to the next question, while the restart game allows the students to start the game again after failing a question.

Implementation: After content expert validation by biology teachers, subject officials from external examination body and test measurement experts, approximately 124 questions were extracted to form the final BEAT. The BEAT was pilot tested to 46 randomly selected SS1 Biology students. Each of the questions of the BEAT had four options (A - D) as possible answers to the question. Students were required to indicate their correct answers by ticking one of the letters (A - D) that corresponds to the correct option in each item. On the scoring of the multiple-choice items, '1' was awarded for each correct answer and '0' for each wrong answer. The test was administered once on the pilot samples. After the test, item analyses was used to select 50 questions that was analyzed using IBM SPSS Statistics 23 at 0.07 using the Kudar Richardson (KR-21) which was considered adequate for the research study.

The instrument used for field trial validation of the package was a researcher-developed questionnaire. All the items in instrument were constructed to elicit responses from various validators (expert, teachers, computer specialists, educational technology specialists and students) with respect to the use of package. The questionnaire was divided into six parts, namely, content, interactivity, navigation, feedback, screen design and students' preference toward the use of interactive EIP package compared to normal classroom instruction methods of learning. The 4-point Likert scale consisting of 30 questions was used in questionnaire, namely, 1 as Strongly Agree, 2 as Agree, 3 as Disagree and 4 as Strongly Disagree. The simulation package consists of the introductory part and four lessons (Lesson 1-4) in this order:

Introduction of the Simulation Package

Lesson 1: Abiotic and Biotic Factors

Lesson 2: Types of Habitat

Lesson 3: Energy Flow

Lesson 4: Food chain and Food web

The lessons in the package were assigned to each student to watch as video projected in the computer laboratory. The Game Package (WWTBAM) on the other hand consists of 15 questions that were played by individual student after watching the simulation package to test the students' understanding of the package. The sampled students were exposed to Biology using the EIP for 80 minutes duration per lesson which lasted for three days. The students were allowed to work on the computer systems in order to ensure the functionality of the package in terms of content (visual quality), interactivity, the navigation, and feedback from the game package, screen design, students' preference towards the package and general attitude to the package.

Evaluation: The BEAT was pilot tested to 46 randomly selected SS1 Biology students. Each of the questions of the BEAT had four options (A - D) as possible answers to the question. Students were required to indicate their correct answers by ticking one of the letters (A - D) that corresponds to the correct option in each item. On the scoring of the multiple-choice items, '1' was awarded for each correct answer and '0' for each wrong answer. The test was administered once on the pilot samples. After the test, item analyses were used to select 50 questions that was analyzed using IBM SPSS Statistics 23 at 0.07 using the Kudar Richardson (KR-21) which was considered adequate for the research study.

For the EIP, the students were trial tested to work on the computer systems in order to ensure the functionality of the package in terms of content (visual quality), interactivity, the navigation, and feedback from the game package, screen design, students' preference towards the package and general attitude to the package. At the end of this stage, 30-item questionnaire consisting of tables 1-6 was administered to 39 intact class biology students and retrieved immediately after they had responded to it. The students' responses were analyzed using simple percentages. (See table 1-6).

Interview: Some students were also interviewed orally to determine their preference and interest in the package. During the interview which was recorded, all the SS1 biology students

interviewed agree that EIP is awesome package that enhanced their understanding of ecology concept of biology.

Validation of Instrument

The instrument used for field trial validation of the package was a researcher-developed questionnaire. All the items in instrument were constructed to elicit responses from various validators (expert, teachers, computer specialists, educational technology specialists and students) with respect to the use of package. The questionnaire was divided into six parts, namely, content, interactivity, navigation, feedback, screen design and students' preference toward the use of interactive EIP package compared to normal classroom instruction methods of learning. The 4-point Likert scale consisting of 30 questions was used in questionnaire, namely, 1 as Strongly Agree, 2 as Agree, 3 as Disagree and 4 as Strongly Disagree.

Procedure for Validating the Edutainment Instructional Package (EIP)

The validation of EII package was done in three stages: (i) experts' validation (computer programmers & educational technology experts); (ii) content validation (biology specialists); and (iii) field validation trial (individual learners).

Expert Validation

The developed package was given to four computer programmers to determine the appropriateness of the package in terms of language, typography, legibility, navigation, interface, animations, functionality, packaging, and durability. Their suggestions and commendations were used for modifying the package. Similarly, five educational technology experts were requested to validate the package in terms of its suitability for instruction, simplicity, unity among illustrations, emphasis on key concepts, colour use, and text. The experts' comments were used to correct some mistakes while their suggestions were used to improve the package.

Based on the experts' suggestions some text font sizes were increased, some background colours were seen to be distractive were changed; the package was burn on CD, copied in flash-drive to ensure good storage.

Contents Validation

The biology contents of the package were validated by four biology experts from Ahmadu Bello University, Zaria and Federal University of Agriculture Umudike, three subject officers from NECO, measurement and evaluation expert from NECO, and three biology teachers from three secondary schools in Abuja before the package was developed. They were requested to carry out the contents validation of the instrument by ensuring that all items were derived from the content that would be presented to the students. The face validity in relation to the background of the students was also considered. Subject matter content of the EIP adequately and sufficiently covered the Nigerian secondary school physics curriculum. After the package was developed, it was validated to determine the appropriateness of the package for teaching the chosen topics; clarity and simplicity of the packages as well as its suitability for the level of the students; the extent to which the contents cover the topics they are meant to cover; possible errors in suggested answers; and the structuring of the package. After the validation, some sentence errors, spelling mistakes, wrong use of subscript and superscript, and misrepresentation of some symbols in the package were corrected. Some paragraphs and formatting errors discovered were also corrected. The test items and contents of the package was later corrected or modified on the basis of suggestions and recommendations of the experts.

Field Trial Validation

The Edutainment Instructional package (EIP) was trial-tested on 39 SS1 Biology students from one senior secondary school in Abuja (school E), which is part of research population, but will not take part in the actual study. The 39 students from an intact class of school E were made to watch the video (simulation package) and play the Who Wants to be A Millionaire (WWTBAM) game package installed in the computers in the school computer laboratory. The simulation package consists of the introductory part and four lessons (Lesson 1-4) in this order:

Introduction of the Simulation Package

Lesson 1: Abiotic and Biotic Factors

Lesson 2: Types of Habitat

Lesson 3: Energy Flow

Lesson 4: Food chain and Food web

The lessons in the package were assigned to each student to watch as video projected in the computer laboratory. The Game Package (WWTBAM) on the other hand consists of 15 questions that were played by individual student after watching the simulation package to test the students' understanding of the package. The sampled students were exposed to Biology using the EIP for 80 minutes duration per lesson which lasted for three days. The students were allowed to work on the computer systems in order to ensure the functionality of the package in terms of content (visual quality), interactivity, the navigation, and feedback from the game package, screen design, students' preference towards the package and general attitude to the package. At the end of this stage, 30-item questionnaire consisting of tables 1-6 was administered to the students and retrieved immediately after they had responded to it. Some students were also interviewed orally to determine their preference and interest in the package. The students' responses were analysed using simple percentages. See appendix G.

RESULTS

Content Validation

The content validation of the Edutainment Instructional Package (EIP) for biology in senior secondary students one was conducted using Content Validation Questionnaire. Eleven specialists in biology which include three secondary school biology teachers, four university lecturers in biology and four biology experts from NECO responded to the questionnaire. The result obtained showed strongly agreed with every statement in the questionnaire. However, some minor errors and observation were made which was later corrected. They all agreed that the content of EIP package covered senior secondary school biology year one syllabus. Other statement items of the questionnaire were strongly agreed and agreed respectively. Their comments, observation, and suggestions on the contents were noted and fully implemented. These include typographical errors such as spelling errors, misrepresentation of words and punctuation marks, among others.

Expert Validation

This includes three experts (computer programmers/educational technologists) which their contributions are immensely appreciated. Three computer programmers were requested to determine the appropriateness of the package in terms of language, typography, legibility, navigation, interface, animations, interactivity, packaging, and durability of the program language used. They rated each of the statement very good and excellent respectively. However, two of the experts suggested that food chain should be illustrated in a linear form and not cyclical. On the basis of the comments and suggestions of the experts, corrections and other recommendations were made.

Field Trial Validation

The EIP was validated by experts and trial tested on 39 SS1 Biology students of a school in Abuja which is part of the research population but will not take part in the actual study. The 39 students from an intact class of school E were made to watch the video (simulation package) and play the Who Wants to be A Millionaire (WWTBAM) game package installed in the computers in the school computer laboratory. At the end of the administration of the package, validation questionnaire was administered to the students. This questionnaire was collected by the researcher and analyzed using percentages. All the students were in support of the use of the package for teaching Biology (see tables 1-6).

Conclusion

After the development and the validation of the EIP package to determine its suitability for teaching SS1 biology student's ecology, it was revealed that student' attitude and retention to biology increased as each student actively participated in the learning process. This enabled the researcher to conclude that EIP will be very useful for better students' achievement in biology and that EIP can be used to minimize the believe that some concepts in biology seem to be more abstract than the other.

Recommendations:

Based on the findings of this study, the following recommendations were made:

1. Teachers should adopt EIP classroom instruction as it is student-centered instruction that engages the students to learn better.
2. Teachers should be trained on how to develop and use innovative technologies like EIP to facilitate better teaching and enhance better academic achievement of students.
3. Government should make fund available to any teacher that want to develop EIP in any subject area since students' academic achievement, retention and attitude to learn will be enhanced through this medium of instruction.

Fig. 1: The ADDIE Model Instructional Design

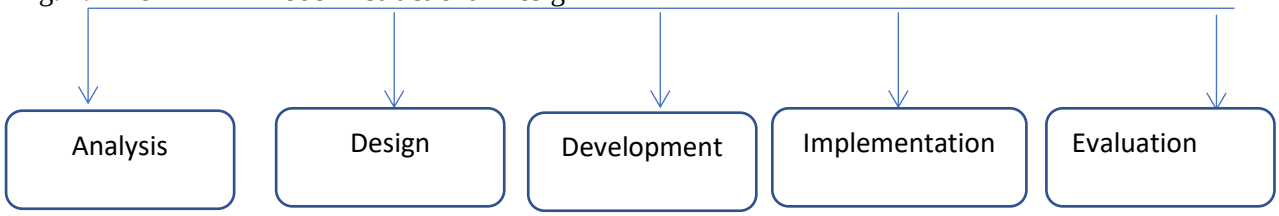

Table 1:

Content in the Simulation Package

S/No	STATEMENT	RESPONSE			
		Strongly Agree	**Agree**	**Disagree**	**Strongly Disagree**
1	The messages in the package are easy to understand	36 (92.3)	3 (7.7)	0 (0)	0 (0)
2	The content in the package has been well organized (arranged in order)	30 (76.9)	9 (23.1)	0 (0)	0 (0)
3	The images/pictures/illustrations in the package are very clear to me.	37 (94.9)	2 (5.1)	0 (0)	0 (0)
4	The examples used in the various sections of the lessons in the package are relevant.	38 (97.4)	1 (2.6)	0 (0)	0 (0)
5	It was easy to understand the lesson because information was presented from simple to more difficult one.	33 (84.6)	6 (15.4)	0 (0)	0 (0)
Total		**82.22**	**10.78**	**0**	**0**
Summary of Agree and Disagree		**100**		**0**	

Table 2:

Interactivity of the Simulation Package

S/No	STATEMENT	RESPONSE			
		Strongly Agree	**Agree**	**Disagree**	**Strongly Disagree**
1	It is easy to operate the package with computer keys and icons.	27 69.2)	12 (30.8)	0 (0)	0 (0)
2	This package permits me to repeat the	38	1	0	0

	section, and exit the lesson at any time.	(97.4)	(2.6)	(0)	(0)
3	The frequent display of images/pictures/ illustrations to the learners does not interrupt the learning process.	33 (84.6)	6 (15.4)	0 (0)	0 (0)
4	This package enables me to apply what I have learnt rather than memorize it.	34 (87.2)	5 (12.8)	0 (0)	0 (0)
5	This package allows me to discover information through active learning.	35 (89.7)	4 (10.3	0 (0)	0 (0)
Total		**85.62**	**14.38**	**0**	**0**
Summary of Agree and Disagree		**100**		**0**	

Table 3:
Navigation of the Simulation Package

S/No	**STATEMENT**	**RESPONSE**			
		Strongly Agree	**Agree**	**Disagree**	**Strongly Disagree**
1	From the main menu, learners are allowed to register his/her name.	38 (97.4)	1 (2.6)	0 (0)	0 (0)
2	The LOGOUT key enables me to exit from the lesson/programme.	35 (89.7	4 (10.3)	0 (0)	0 (0)
3	The PREVIOUS key enables me to revisit the previous section(s) of the lesson.	36 (92.3)	3 (7.7)	0 (0)	0 (0)
4	The NEXT key directs me to go to the next section of the lesson.	36 (92.3)	3 (7.7)	0 (0)	0 (0)
5	The OPTION keys allow me to select the correct option.	38 (97.4)	1 (2.6)	0 (0)	0 (0)
Total		**93.82**	**14.38**	**0**	**0**
Summary of Agree and Disagree		**100**		**0**	

Table 4:
Feedback from the Game Package

S/No	**STATEMENT**	**RESPONSE**			
		Strongly Agree	**Agree**	**Disagree**	**Strongly Disagree**
1	This package provides immediate feedback after selecting the option.	37 (94.9)	2 (5.1)	0 (0)	0 (0)
2	This package displays the correct or wrong answer chosen with some sound.	37 (94.9)	2 (5.1)	0 (0)	0 (0)
3	This package allows me to proceed to the next lesson only if the chosen answer is correct.	38 (97.4)	1 (2.6)	0 (0)	0 (0)
4	This package terminates my activities if after one attempt I got the answer wrong.	36 (92.3)	3 (7.7)	0 (0)	0 (0)
5	This package appreciates my efforts by congratulating me after completing the game correctly.	37 (94.9)	2 (5.1)	0 (0)	0 (0)
Total		**94.88**	**5.12**	**0**	**0**

Summary of Agree and Disagree	**100**	**0**

Table 5:
Screen Design of the EIP Package

S/No	STATEMENT	RESPONSE			
		Strongly Agree	**Agree**	**Disagree**	**Strongly Disagree**
1	The presentations of the information in the package attract my attention.	37 (94.9)	2 (5.1)	0 (0)	0 (0)
2	The use of proper lettering (fonts) in terms of style and size make the information legible.	29 (74.4)	10 (25.6)	0 (0)	0 (0)
3	The colours used for the various presentations are quite appealing.	32 (82.1)	7 (17.9)	0 (0)	0 (0)
4	The quality of the text, images, graphics and video are interesting.	35 (89.7)	4 (10.3)	0 (0)	0 (0)
5	The animations (moving picture) in the package assist in understanding the lessons better.	37 (94.9)	2 (5.1)	0 (0)	0 (0)
Total		**87.2**	**12.8**	**0**	**0**
Summary of Agree and Disagree		**100**		**0**	

Table 6:
Students' Preferences toward the Use of the EIP Package Compared to Traditional Methods of Learning

S/No	STATEMENT	RESPONSE			
		Strongly Agree	**Agree**	**Disagree**	**Strongly Disagree**
1	I prefer to learn Biology with an interactive package like EIP with a teacher acting as a facilitator.	35 (89.7)	4 (10.3)	0 (0)	0 (0)
2	Learning Biology with an interactive package is more preferable than using text books.	33 (84.6)	6 (15.4)	0 (0)	0 (0)
3	The activities provided in this package are more effective compared to normal classroom instruction.	33 (84.6)	6 (15.4)	0 (0)	0 (0)
4	I will suggest to my friends to use Edutainment Instructional Package in learning Biology instead of textbooks.	30 (76.9)	9 (23.1)	0 (0)	0 (0)
5	I prefer the use of this instructional method than normal classroom instruction.	35 (89.7)	4 (10.3)	0 (0)	0 (0)
Total		**85.1**	**14.9**	**0**	**0**
Summary of Agree and Disagree		**100**		**0**	

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PATTERN OF INTERNET USE FOR MASSIFICATION AND QUALITY LEARNING OF 2016/2017 200LEVEL INSTRUCTIONAL TECHNOLOGY STUDENTS IN FACULTY OF EDUCATION, BENUE STATE UNIVERSITY MAKURDI.

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Abstract
The study investigated the Pattern of Internet Use for massification and Quality learning of 2016/2017 200Level Instructional Technology Students in Faculty of Education, Benue State University Makurdi. The intact class of 900 students with a sample of 384 were used. Six research questions and five Hypotheses were employed with 30-Items research questionnaires validated by specialists in curriculum and Teaching and Research and development. Means and standard deviations were used to analyze the research questions, and the hypotheses tested using Chi Square and ANOVA. and The results showed that; The students use hand held devices more than cyber café internet in surfing the Internet; learners do not as much as use internet sources to get direct academic contents; learners do not use internet sources to get direct academic resources; learners do use internet sources for Cyber loafing activities; gender has little or no effect on the learners use of internet sources; age does not affect learners' use of internet sources for learning. Based on the findings, recommendations were made that; in massification and Quality of contents, the software should be designed to be compatible with hand held devices for maximum utility, the school authority should device strategies to check the cyber loafing activities of both gender and age in the learning process.

Introduction
In dealing with Internet resources, mediated environment does not refer only to the mediations in the immediate class, media Center or laboratory environments but to the vast worldwide vast Internet Cloud Computing environment, which the user's diversity defines its scope. The community of users also is defined by the user's level of selection and involvement in the various professional and non-professional groups. This will include all that makes up the Open Education Resource: Website, You Tube, Personal Learning Network, Lesson Plans, Presentations, Rubrics, Blog, Face book, Twitter, LINKEDIN, and Professional Portfolio. In training of the prospective teachers, some courses and practices ar**e v**ery important; to give them knowledge in their teaching subjects, equip them with some pedagogical knowledge and skills and professional practices and ethics. The Instructional Technology is a course of study that is designed to equip the learner with skills in Curriculum Implementation aspect of Educational Technology that uses Systems Approach in analyzing educational tasks, designing, implementing and evaluating learning process with application of organized knowledge, human and non-human resources for effective learning, (Ikyumen, 2013). It has to do with the curriculum, learning theories, old and new educational media, assorted Internet Learning resources and ubiquitous mobile e-resources. In the Benue State University this course is being taught in the 200 Level of the students' four years training; as Instructional Technology Code EDU 204 in the Faculty of Education.

Theoretical Considerations
This work is anchored in the temporary scaffolding framework theory of Jerome Seymour Brunner, which has to do with the concept of an expert (or older experienced adult) assisting a novice (or younger learner). The process has to do with the interactional support in which adults create mediations needful to enable the young learner acquire new learning beyond his independent efforts. (Simons and Klein, 2007) This may take the levels of soft and hard scaffolding (Simons and Klein, 2007) and reciprocal scaffolding. (Holton and Clarke, 2006)

As the learners share the internet facilities it enables them to develop the cognitive abilities. And as the cooperatively use the facilities in the community of users, they have shared cognition that will develop to meta-cognitions (Holton & Clark, 2006) among the collaborative learners and users.

Massification for Internet Use in Education

The ever-increasing population of student's enrollment at all levels of education calls for mass production of education materials and contents for equal education opportunities for all learners. It is also very important that the learning materials should be of quality, hence only quality education materials can produce quality education products or graduates. The current paradigm shift in education has much to do with the use of andragogical approach in making the learner (child) assume responsible in realizing, organizing and assuming responsible for his learning process rather than pedagogical approach, (Ikyumen and Nwafor, 2012). He therefore, with the assistance of the facilitator and more capable peers identify his learning needs and locate the relevant material sources to concentrate and progress in his learning. This leads to collaboration of likeminded learners with common interest in an area, which share learning resources and attain onto sharing of cognitive properties. In this, they can interact meaningfully and productively with each other and with their mediated environment which carries their learning contents. Researchers like Hall (2006); Ikyumen & Nwafor (2012) and Bruffee (1993) are of the opinion that there should be a change in the way learners are organized to learn; from traditional pedagogic methodologies to andragogical, collaborative learning. This will lead to joint exploration, discovery, digest and utilization of learning materials, with the facilitator (teacher) creating the enabling environment, setting the scene and motivating the learners to actively participate in their learning activities. This will serve as the bedrock for massification of education contents and materials for quality learning in the current paradigm shift in the new millennium.

Internet resources and patterns of accessing it in the academic environment

The current education landscape is being gradually and progressively changed by the numerous e-resources employed diversely for e-learning. The Internet resources in particular are used both for synchronous and asynchronous formats of information presentation in the learning process. Some are dumped, while some use connectivity to link with others for exchange of various forms of information; between facilitator(s) and learners, collaborative learners and collaborative workforce. Interconnectivity plays vital roles in the teaching learning process. There are various interconnectivity devices that can be used to transfer information at a close range like the devices with IrDA (Infrared) ports (currently replaced by Bluetooth and wi-fi IrDA) or globally through the telecommunications over cellular network of specialized base cell sites (Wikipedia, 2007), and Internet services. Infrared according to Wikipedia (2007:1), is electromagnetic radiation with a wavelength between 0.7 and 300 micrometers, which equates to a frequency range between approximately 1 to 430 THz.

This is extra high frequency for information communication. The most widely used of the interconnectivity devices is that of the International Network (Internet) for communications used to digitally link people and places worldwide. The Internet is basically a collection of millions of computers that share communication lines located at various geographical distances (Nwana, 2008). At the inception and luxurious stage of the Internet facilities, they were accessed through the Cyber Cafes, but in the current dispensation, we have a lot of hand held/mobile/ubiquitous resources that offer effective access to the Internet facilities just like the Cyber Cafes. For productive and useful venture in the massification and quality in the information and Communication Technology use in education, it becomes imperative of us to find out the best format of designing and producing education materials for most effective accessibility and utility among education stakeholders and learners, hence this research.

Purpose of Study

The purpose of the study is to:

1. Examine the extent the learners use cybercafé Internet compared to hand held devices source.
2. Examine the extent learners use Internet sources to get direct academic contents.
3. Examine the extent learners use Internet sources to access academic resources.
4. Examine the extent learners use Internet sources for Cyber loafing activities.

5. Examine the extent gender affect learners' use of Internet resources.
6. Examine the extent age affect learners' use of Internet resources.

Research Questions

To guide these research activities, the following research questions were raised and answered:

1. To what extent do learners use cyber café Internet compared to hand held devices source?
2. To what extent do learners use Internet sources to get direct academic contents?
3. To what extent do learners use Internet sources to access academic resources?
4. To what extent do learners use Internet sources for Cyber loafing activities?
5. To what extent does gender affect learners' use of Internet resources?
6. To what extent does age affect learners' use of Internet resources?

Research Hypotheses

The following research hypotheses were also raised and addressed:

1. There is no significant difference in the learners' use of Cyber café Internet and the hand held devices Internet sources.
2. There is no significant difference in the gender use of Internet resources of learners.
3. There is no significant difference in the age use of Internet resources of learners.
4. There is no significant difference in the cyber loafing activities of learners according to gender.
5. There is no significant difference in the cyber loafing activities of learners according to age.

Emenalo and Nwankwo (2012), investigated into access and usage of Internet among lecturers and students of Imo State University, Oweri. They utilized four research questions and four null hypotheses on a population of 479 lecturers and 27,199 students to collect data with researchers' made 21-item questionnaire. They analyzed the collected data using mean scores with 2.05 bench mark and Z-test at 0.5 level of significance. They discovered that there was low access and usage of Internet among lecturers and students in the University with no significant difference among the user group. They therefore recommended that, Government should liaise with the Internet Service Providers to reduce the cost of Internet Services to afford its use in teaching and learning process. They should also collaborate with the Universities to organize regular workshops/seminars on the use of Internet for teaching and learning.

Research Questions

Data collected for each research question is answered as follows:

Research question one: To what extent do learners use cyber café internet compared to hand held devices source?

Table 1:

Means of Respondents Accessing the Internet

		Frequency	Percent
Valid	GSM Hand Set	335	87.2
	School Computer Laboratory	33	8.6
	Other Hand Held Devices	16	4.2
	Total	384	100.0

Table 1 revealed that 335 (87.2%) of the students use GSM Hand Set, 33 (8.6%) use the School Computer Laboratory and 16 (4.2%) use Other Hand Held Devices. So, the question can be answered that the students use 8.6% of cyber café internet compared to hand held devices source.

Research question two: To what extent do learners use internet sources to get direct academic contents?

Table 2:
Learners use internet sources to get direct academic contents

			Use of internet for academic				Total
			Not at all utilizing	Moderately utilizing	Utilizing	Highly utilizing	
Means of Respondent Accessing the Internet	GSM Hand Set	Count	114	214	4	3	335
		Expected Count	117.8	211.1	3.5	2.6	335.0
		% within Means of Respondent Accessing the Internet	34.0%	63.9%	1.2%	0.9%	100.0%
	School Computer Laboratory	Count	14	19	0	0	33
		Expected Count	11.6	20.8	.3	.3	33.0
		% within Means of Respondant Accessing the Internet	42.4%	57.6%	0.0%	0.0%	100.0%
	Other Hand Held Devices	Count	7	9	0	0	16
		Expected Count	5.6	10.1	.2	.1	16.0
		% within Means of Respondant Accessing the Internet	43.8%	56.3%	0.0%	0.0%	100.0%
Total		Count	135	242	4	3	384
		Expected Count	135.0	242.0	4.0	3.0	384.0
		% within Means of Respondant Accessing the Internet	35.2%	63.0%	1.0%	0.8%	100.0%

From Table 2, it can be seen that all the means or internet accesses, the highest percentage associated with each means are indicating that students do not use them for direct academic content. Even with the GSM Hand Sets, the highest percentage is on the column for 'not all utilizing'. So the question can be answered that do not learners use internet sources as such to get direct academic contents.

Research question three: To what extent do learners use internet sources to get direct academic resources?

Table 3:
Learners use internet sources to get direct academic resources

	N	Mean	Std. Deviation
Accessing On-line live Teachings in my course	384	1.4792	.62547
Accessing Moodle management teachings	384	1.3099	.49044
Accessing Researchers' Directories	384	1.6641	.61246
Accessing Education Soft wares	384	1.7344	.75601
Accessing On-line Journals	384	1.5104	.59141
Using Mailing list for professional group Discussion	384	1.4583	.70680
Using LINKEDIN for professional updates	384	1.4557	.64482
Accessing Academic Library Catalogues	384	2.0625	.98620
Getting Journal Abstracts through the 'NET'	384	1.8333	.89579
Using SKYPE for live interaction (face to Face)	384	1.6276	.79118
Participating in the Web Based Seminar	384	1.3724	.56842
Grand Mean	384	1.5916	.28537

From table 3, it can be seen that all the items have their mean ratings below 2.50. this means that do not use internet sources to get direct academic resources. The grand mean of 1.59 with standard deviation of .29 can be used to answer the question that learners do not use internet sources to get direct academic resources.

Research question four: To what extent do learners use internet sources for Cyber loafing activities?

Table 4:
Learners use internet sources for Cyber loafing activities

	N	Mean	Std. Deviation
Always watch my interesting videos	384	2.3854	1.17520
Watch Football on the 'NET'	384	2.4323	1.20945
Communicating with friends on face book	384	3.3047	.97401
Watch blues on the 'NET'	384	2.0182	1.17065
Frequently use 2go to chat with friends	384	2.9870	1.11591
Use live messaging (chats) with friends	384	3.0286	1.14336
Watch several U-tube scenes a day	384	1.8073	1.01392
Surveying friend's picture updates on-line	384	2.9089	1.11694
Playing games on-line	384	2.7865	1.21403

Always utilize my free calls (bonus)	384	3.1302	1.10007
Cyber lofting use of internet	384	2.6789	.68452
Valid N (listwise)	384		

From Table 4, it can be seen that majority of the items capturing internet sources for Cyber loafing activities have their mean ratings above 2.50. The grand mean of 2.68 with standard deviation of .68 can be used to answer the question that learners do use internet sources for Cyber loafing activities a lot in the school.

Research question five: To what extent do gender affect learners use internet sources?

Table 5:
Gender's effect on learners use of internet sources

	Gender of Respondents	**N**	**Mean**	**Std. Deviation**	**Std. Error Mean**
Internent	**Male**	205	2.0626	.27563	.01925
Access	**Female**	179	2.0773	.30359	.02269

From Table 5, it can be seen that the mean ratings of 205 male and 179 female students of 2.06 and 2.08 are similar indicating that gender does little or no effect on the learners use internet sources.

Research question six: To what extent does age affect learners' use of internet sources for learning?

Table 6:
Age effect on learners' use of internet sources for learning
Internet Access

	N	**Mean**	**Std. Deviation**
Between 15 to 22	109	2.1349	.27864
Between 23 to 28	231	2.0483	.29770
29 and Above	44	2.0182	.23967
Total	384	2.0694	.28871

From Table 6, it can be seen that the mean ratings of 109 respondents Between 15 to 22, 231 respondents of Between 23 to 28 and 44 respondents of 29 and Above students of 2.13, 2.05 and 2.02 are respectively similar indicating that age does not affect learners' use of internet sources for learning as such.

Hypotheses
The hypotheses formulated for the study are tested at 0.05 level of significant. Decisions on the hypotheses are based on associated probability denoted by Sig. =p. If the p is less than 0.05 it is significant to reject the hypothesis. But if the p is greater than 0.05 the hypothesis is accepted.

Hypothesis one
There is no significant difference in the learners' use of Cyber café Internet and the hand held devices internet sources.

The analyzed result for testing the hypothesis is given in Table 7.

Table 7:
Learners' use of Cyber café Internet and the hand held devices internet sources

	Observed N	Expected N	Chi-Square	Df	Asymp. Sig.
GSM Hand Set	335	128.0	503.266[a]	2	.000
School Computer Laboratory	33	128.0			
Other Hand Held Devices	16	128.0			
Total	384				

a. 0 cells (0.0%) have expected frequencies less than 5. The minimum expected cell frequency is 128.0.

From Table 7, it can be seen that Chi-Square =503.266, df =2, and Asymp. Sig. =.000 =p. Since p is less than 0.05, the hypothesis which stated that there is no significant difference in the learners' use of Cyber café Internet and the hand held devices internet sources is rejected.

Hypothesis two
There is no significant difference in the gender use of Internet sources of learners.

Table 8:
Gender use of Internet sources of learners

	Gender of Respondents	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Internent Access	**Male**	205	2.0626	.27563	-.497	382	.620
	Female	179	2.0773	.30359			

From the Table 8, it can be seen that t =.497 (absolutely), df =382 and Sig. =.620 =p. Since p is greater than 0.05, the difference in the gender use of Internet sources of learners is not significant. So the hypothesis is accepted with conclusion that there is no significant difference in the gender use of Internet sources of learners.

Hypothesis three
There is no significant difference in the age use of Internet sources of learners.

Table 9:
ANOVA of Internet sources of learners
interment Access

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	.685	2	.342	4.177	.016
Within Groups	31.239	381	.082		
Total	31.924	383			

From Table 9, reading across the row heading Between Group, F =4.177, df =2, and Sig. =.016 =p. Since p is less than 0.05 the hypothesis which stated that there is no significant difference in the age use of Internet sources of learners is rejected.

Hypothesis four
There is no significant difference in the cyber loafing activities of learners according to gender.
The analyzed result for testing the hypothesis is given in Table 10.

Table 10:
Cyber loafing activities of learners according to gender

	Gender of Respondents	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
Cyber lofting use of internet	Male	205	2.7205	69787	1.275	382	.203
	Female	179	2.6313	.66765			

Table 10 revealed that t =1.275, df =382, and Sig. (2-tailed) =.203 =p. Since is greater than 0.05, the cyber loafing activities of learners according to gender difference is not significant and the hypothesis which stated that there is no significant difference in the cyber loafing activities of learners according to gender is accepted.

Hypothesis five

There is no significant difference in the cyber loafing activities of learners according to age.

Table 11:
ANOVA of difference in the cyber loafing activities of learners according to age
Cyber lofting use of internet

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	3.982	2	1.991	4.323	.014
Within Groups	175.477	381	.461		
Total	179.459	383			

From Table 11, reading for significant difference in the cyber loafing activities of learners according to age on the row heading Between Group, F =4.323, df =2, and Sig. =.014 =p. Since p is less than 0.05, the hypothesis which stated that there is no significant difference in the cyber loafing activities of learners according to age is rejected.

Discussions

Students use hand held devices more than cybercafé internet in surfing the Internet. The hypotheses also showed that; There is significant difference in the learners' use of Cybercafé Internet and the hand held devices, that is to say, for more efficiency and quality, massification of education resources should utilize format that are compatible with hand held devices for educators use. Learners do not as much as use internet sources to get direct academic contents, and they do not use internet sources to get direct academic resources; they should be given orientation on how to get the direct academic contents and resources. Gender and age have little or no effect on the learners' use of internet sources; Learners do use internet sources for Cyber loafing activities; The hypotheses also showed that; there is no significant difference in the age use of Internet sources of learners, there is no significant difference in the cyber loafing activities of learners according to gender and that there is no significant difference in the cyber loafing activities of learners according to age.

Conclusion

The descriptive survey research investigated the Pattern of Internet Use of 200Level Instructional Technology Students for massification and Quality learning of 2016/2017 200Level Instructional Technology Students in Faculty of Education, Benue State University Makurdi. The researcher used Six research questions and five Hypotheses 30-Items research questionnaires validated by specialists in curriculum and Teaching and Research and development on a sample of 384 respondents, and used means and standard deviation to analyze the research questions. And the hypotheses tested using Chi Square and ANOVA. It was discovered that; students use hand held devices more than cybercafé internet in surfing the Internet; learners do not as much as use internet sources to get direct academic contents; learners do not use internet sources to get direct academic resources; learners do use internet sources for Cyber loafing activities; gender has little or no effect on the learners use of internet sources; age does not affect learners' use of internet sources for learning. The hypotheses also showed that; There is significant difference in the learners' use of Cybercafé Internet and the hand held

devices, with hand held devices being in much use, there is no significant difference in the gender use of Internet sources of learners, there is no significant difference in the age use of Internet sources of learners, there is no significant difference in the cyber loafing activities of learners according to gender and that there is no significant difference in the cyber loafing activities of learners according to age. Based on these recommendations are made.

Recommendation

In massification and Quality of contents, the software should be designed to be compatible with hand held devices for maximum utility. The school authority should device strategies to check the cyber loafing activities of both gender and age in the learning process. Government should also collaborate with the Universities to organize regular workshops/seminars on the design and production of education materials and contents on formats compatible with hand held devices for learners to learn at their pace and convenience for quality use of Internet for teaching and learning.

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EFFECTIVENESS OF ADO-EKITI STUDY CENTRE IN THE IMPLEMENTATION OF THE NATIONAL OPEN UNIVERSITY TEACHER EDUCATION PROGRAMME

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Abstract

Open and distance learning system of education started as correspondence education and has grown tremendously around the world. The main purpose of this study was to examine the effectiveness of Ado-Ekiti study centre in the implementation of the National Open University teacher education programme. This study was a descriptive survey covering National Open University of Nigeria (NOUN), Ado-Ekiti study centre because it is the only uni-mode institution in Nigeria operation open and distance learning. 244 students and 12 facilitators which consists of all 200 level, 300 level and 400 level students of the Faculty of Education were involved in the evaluation of the programme implementation. Researcher-designed questionnaire was used to elicit responses from the respondents. Weighted mean was employed to answer the research questions raised. It was reported that majority of the respondents' perceived that course contents are in line with the objectives of teacher education programme. Also, it was established that majority of the respondents' perceived that educational resources were not adequately utilized for implementing the teacher education programme. It was recommended amongst others that ministry of education should employ full-time facilitators to visit and assist teachers at their bases; and power supply in the country should be improved and areas not linked to the national power source should be linked.

Introduction

Open and Distance Learning system of education started as correspondence education and has grown tremendously around the world. Correspondence education served as a fore-runner to modern distance learning that started in response to the demands of the educationally able but neglected and under-privileged Nigerians for the provision of more access to continuing higher education. Angara (2010) opined that open learning can eliminate all unnecessary barriers to learning while also providing students with a reasonable chance of success in an education and training system centred on their specific needs and located in multiple areas of learning. Distance education as a complementary mode of delivery was also initiated as an effort to overcome the challenges of access to education, equity, cost-effectiveness and quality for higher education (Association for the Development of Education in Africa (ADEA), 2004).

Dhanarajan (2001) defined distance education as the means by which the teacher is taken literally to the student. It is a teaching and learning process in which student are separated from the teachers by a physical distance which is often bridged by communication technologies. Perraton (2001) sees distance education as an educational process in which a significant proportion of the teaching is conducted by 'someone' removed in space and time from somewhere and the learner. The link between that 'someone', 'somewhere' and the learner is therefore necessarily provided by different means of communication and instruction. Communication technologies are important instruments in distance education because they bridge the gap between the students and the teacher. Distance Education is used for in-service training of active but untrained teachers and for professional upgrading of already trained teachers in schools (Ogunojemite, 2010).

Open and distance delivery of teacher education has been used for several years. The number of distance delivered teacher education programmes continues to grow and the 21st century is seen as a time of exciting possibilities for distance-delivered teacher education. Those possibilities are often linked to the use of networked computing and communications technologies. Technologies for distance learning can be classified into print, audio, video and computer. Print technologies include; textbooks, study guides, workbooks and fax. Audio

technologies include; radio, telephone, voicemail, audio-conferences, audio files/CDs, podcasts. Video technologies include; videotape, satellite delivery, broadcast video, DVD. Computer technologies include; E-mail, web-based resources, video conferences, CD-ROM, smartphones (Gambari, 2014).

The demand for higher education in Nigeria predicated the revitalization of the National Open University in Nigeria which has the mandate to: ensure equity and equality of opportunities in education but specifically in University education; provide a wider access to education generally but specifically university education in Nigeria; enhance education for all and lifelong learning; ensure the entrenchment of a global culture; provide educational resources via an intensive use of ICT; provide flexible and qualitative education and reduce the cost, inconvenience and hassles of education delivery (National Open University of Nigeria (NOUN), 2003). The commitment of the need for lifelong learning, as well as huge requirement for redress for millions of adults structurally prevented from reaching their potential, creates an environment in which distance education should thrive.

Consequently, teacher professional development is a sine-qua-non at improving the capacity of teachers to effectively handle any learning situation in schools. Therefore, teacher training and professional development are considered as essential mechanisms for enhancing teachers' content knowledge and developing their teaching practices in order to teach to high standards (Creemers, Kyriakides & Antoniou, 2013). However, many misunderstandings exist about teacher professional development, its purpose, and how it functions (Mizell, 2010). Teacher education is aimed at addressing the problem of professional development such that trainees teaching practices would be enhanced.

The importance of teachers to the success of any system of education has been clearly recognized in the National Policy on Education (Federal Republic of Nigeria, 2013). In the document, it is stated that no education system can rise above the quality of its teachers. That is to say, their profession, competence, creativity, and dedication among other qualities are central to the success of the learners in the education system. Therefore, in order to achieve the desired goals of education at all levels, special attention should be paid to teacher preparation. In Nigeria, the importance of effective education for teachers has been recognized, hence, it is stated in the National Policy on Education (FRN, 2013) that teacher education shall continue to be given major emphasis in all educational planning and development.

Olusegun (2011) defined Teacher education as the planned programme of specialized education for producing teachers with the skill and competence of teaching in schools and colleges. The teachers who after their training are referred to as professional teachers are expected to educate the learners in a way that will make them responsible citizens in the society. Teacher Education is the provision of professional education and socialised training within a specific period for the preparation of the individuals who intend to develop and nurture the young ones into responsible and productive citizens (Oyekan, 2000). Demand for qualified teachers has been high and will continue to be so as countries around the world work to ensure that all their citizens can access education through to high school level (upper basic) as a minimum, and beyond, a highly desirable goal (UNESCO, 2007).

The major goals of teacher education are: to produce highly motivated, conscientious and efficient classroom teachers for all levels of our education system; to encourage further the spirit of enquiry and creativity in teachers; to help teachers to fit into social life of the community and the society at large and enhance their commitment to national goals; to provide teachers with the intellectual and professional background adequate for their assignment and make them adaptable to changing situations; to enhance teachers' commitment to the teaching profession, produce teachers in specialised areas for people with special needs; produce educators who have good understanding of the increasing complexity of technology; and provide serving teachers and educational administrators and research workers with the technical skills so as to expose Nigerian students to awareness by exploring usable options in the world of works. (NOUN, 2017).

Successful program development cannot occur without evaluation (Sanders, 2000). Evaluation helps distance educators to gather information about learners and their needs and desires. It is needed because distance education is still in its formative stage and pioneering activities are still taking place within the industry. It assists distance educators in thinking about what they are trying to do and what they hope to achieve as they implement programs and

activities. Evaluation can also provide information needed by external bodies, funding agencies, businesses, colleges, students, and other clients who want to know if distance education accomplishes what it sets out to do. The literature on evaluation of teacher education programme at a distance mostly deals with comparison studies of one mode over the other, mostly correspondence over traditional, face-to-face over distance education or of one medium over the other.

Statement of the Problem

Educators have noted some major problems in assessing teachers' quality. They questioned the quality of entrance into the teaching profession through teacher education programme, that is, the entry qualification of most pre-service teachers. The requirement into entry level of the profession is sub-standard as the rules are not properly adhered by. In gaining admission to study any educational course, the required scores are very low compared with other profession. In Nigeria, students with scores below 190 can apply for admission into education while the minimum for other courses is 200. Very talented students are not attracted to the teaching profession, thus, most university students selecting education major tend to be drawn from lower part of academic ability distribution and students with academic standing are twice likely to leave the profession than their counterparts (Yusuf, 2010). Most teachers entering the teaching profession has been reported to have adequate content knowledge but need improvement in the areas of pedagogy. The ability to transmit the known content into the students lies in the pedagogical skills and the absence of these skills may mar the teaching and learning process.

These professionals may not want to leave the classroom in quest for pedagogical skills, hence, open and distance education provides them with the opportunity of gaining the pedagogical skills at their convenience without having to leave the classroom. Therefore, despite the acknowledgement of being successful in increasing access of teachers to further education, the quality of distance teacher education remains questionable to some people. Among other aspects, the capacity of distance teacher to provide appropriate teaching practicum at a distance is a big concern of teacher educators as well as of teachers' employers (Isman, Dabaj, Altinay & Altinay, 2004).

Anne and Judith (2009) worked on opportunities and challenges of distance learning and teacher education in Botswana. Their findings revealed that enrollment of students was based on last resort, rate of completion of program was low and the major problem of the programme was inadequate learner support from tutors. Kwasi (2009) worked on evaluation of a distance education program in a university in Ghana and found out that teachers' preparation is effective. It was observed that the gap between the objectives and the program's performance, as perceived by students in the program, faculty, and administrators, is not so wide that it cannot be closed and recommended constant review of performance to close the gap.

It is observed that researchers have identified various challenges of distance teacher education in different institutions and have recommended constant review of the program. The researcher therefore intends to find out if the observed challenges are prevalent in National Open University of Nigeria (NOUN) and also to examine the standards of the programme in line with the teacher education objectives. Also, the previous studies on evaluation of teacher education programme at a distance were carried out outside Nigeria and none known to the researcher has been carried out on the only uni-mode institution in Nigeria operating the open and distance learning programme NOUN especially Ado-Ekiti Study centre. Hence, this study intends to fill the gap by examining the effectiveness of Ado-Ekiti study centre in the implementation of the National Open University teacher education programme.

Purpose of the Study

The main purpose of this study was to examine the effectiveness of Ado-Ekiti study centre in the implementation of the National Open University teacher education programme.

Specifically, the study was set to:

1) Investigate the quality of course content in achieving teacher education objectives
2) Investigate if educational resources are adequately utilized in the implementation of Teacher Education programme.

Research Questions

Based on the stated purposes, the following research questions were raised:

1) Are the course contents in line with the objectives of teacher education programme?
2) Are educational resources adequately utilized for implementing the teacher education programme?

Methodology

This study was a descriptive survey covering National Open University of Nigeria (NOUN), Ado-Ekiti study centre because NOUN is the only uni-mode institution in Nigeria operation open and distance learning. 244 students and 12 facilitators which consists of all 200 level, 300 level and 400 level students of the Faculty of Education were involved in the evaluation of the programme implementation. Questionnaire was used to elicit response from the facilitators on teacher education objectives and educational resources used in the implementation of teacher education program. Provus' Discrepancy Evaluation Model was adopted because it was found relevant in capturing the major issues of interest for this study. Weighted Mean was employed to answer the research questions raised.

Result

Four research questions were raised, research question one to four were answered using cumulative mean statistical tools.

Research Question 1: Are the course contents in line with the objectives of teacher education programme?

Table 1:

Cumulative Mean of Course Contents in Line with the Objectives of Teacher Education Programme

S/N	Teacher Education Objectives	Mean
1.	leads to production of highly motivated teachers	3.92
2.	leads to production of conscientious and efficient classroom teachers	3.75
3.	encourage the spirit of enquiry in teachers	3.67
4.	encourage the spirit of creativity	3.67
5.	help teachers to fit into social life of the community	3.42
6.	enhance teacher's commitment to national goals	3.58
7.	provides teachers with adequate intellectual and professional background	3.50
8.	Enhance teacher's commitment to teaching profession	3.25
	Weighted Mean Score	28.75

Table 1 revealed that majority of the respondents' perceived that course contents are in line with the objectives of teacher education programme, because the benchmark weighted mean score stood at 20 and their weighted mean score was 28.75 which is above the benchmark weighted mean score.

Research Question 2: Are educational resources adequately utilized for implementing the teacher education programme?

Table 2: Cumulative Mean of Educational Resources Adequately Utilized for Implementing the Teacher Education Programme

S/N	Educational Resources	Mean
1.	Television programme	2.00
2.	Radio programme	1.58
3.	Phone network	1.67
4.	Audio-tape	1.67
5.	Fascimilie (Fax)	1.67
6.	Internet facilities	1.83
7.	E-mail	2.42
8.	Computer programme	2.50
9.	Satellite Broadcast	2.33
10.	Textbooks	2.25
11.	Study guides	2.58

12.	Audio-conferences	1.75
13.	Video tape	2.00
14.	Broadcast video	1.92
15.	Video-conferences	2.17
16.	Voicemail	2.17
17.	E-library	2.00
18.	Facilitators	2.67
19.	Instructional Developers	2.75
20.	Technician/Electrician	2.92
21.	Counsellors	2.92
22.	Administrative staff	3.00
	Weighted Mean Score	**48.75**

Table 2 revealed that majority of the respondents' perceived educational resources were not adequately utilized for implementing the teacher education programme, because the benchmark weighted mean score stood at 55 and their weighted mean score was 48.75 which is below the benchmark weighted mean score.

Discussion

Finding revealed that the course contents are in line with the objectives of teacher education programme revealed that majority of the respondents' perceived that course contents are in line with the objectives of teacher education programme. This finding is in consonance with that of Peter and Isaac (2014) who reported that the of the achievement of the objectives of teacher education programme can be achieved with the course contents adopted by National Open University of Nigeria.

Another finding shows that the educational resources were not adequately utilized for implementing the teacher education programme. Despite the advent of the Global System of Mobile (GSM) telecommunication, the use of ICT resources for educational purposes in general and Open and Distance Learning in particular is still very low in Nigeria, this could the reason for the finding of this study. This finding is in agreement with that of Peter and Isaac (2014) that reported low-extent of adequacy of the National Open University of Nigeria educational resources utilized for implementing the teacher education programme. As indicated by Onifade (2003), and Kpolovie and Obilor (2013), funding of education in Nigeria is nothing to write home about. Yet the greatest causes of woe in the National Open University of Nigeria are poor power supply and grossly epileptic internet connectivity.

Conclusion

Although students appreciate the opportunity accorded to them and the skill and knowledge they have acquired in the program, they are concerned about the challenges they face and the length of time it takes to graduate. The challenges, which include limited learner support from facilitators, frequent turnover of facilitators, inadequate learning materials, late delivery of modules, and others are real and need to be addressed. It was recommended that;

i. The Ministry of Education should employ full-time facilitators to visit and assist teachers at their bases;
ii. Power supply in the country should be improved and areas not linked to the national power source should be linked. Open and Distance Learning is an illusion in any place with the type of power supply Nigeria has. The National Open University of Nigeria cannot reach its bloom with the present state of power supply that is regularly irregular; and
iii. Internet connectivity must be improved upon if the National Open University of Nigeria is to realize its objective of access to quality education for all.

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EFFECTS OF SOCIAL MEDIA ON STUDENTS' ACHIEVEMENT IN LEARNING AUTOMOBILE LIGHTING SYSTEM IN TECHNICAL COLLEGES IN NIGER STATE

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Abstract
This study determined the effects of social media on students' achievement in learning automobile lighting system in technical colleges in Niger State. Two research questions and two null hypotheses tested at (P< .05) level of significance guided the study. A quasi-experimental design was adopted for the study. The population for the study was 203 TC II Motor Vehicle Mechanic (MVM) students; this consists of 197 boys and 6 girls. Two intact class made up of 64 TC II students in GTC Minna were assigned to conventional teaching method and 139 TC II students in Sulaiman Barau Technical College (SBTC) Suleja were assigned to the Social Media Instruction (SMI) technique. The instrument used for data collection was the Automobile Lighting System Achievement Test (ALSAT). ALSAT was subjected to face and content validation by three experts in MVM. The study found out that the students taught with conventional lecture method had significantly higher mean achievement score than students taught automobile lighting system with SMI. Despite the fact that the students performed better in the use of conventional lecture method, however, the use of SMI appreciably increased the performance of the students based on gender. It was, therefore, recommended among others that, automobile teachers should be taught the application and usage of various modern teaching techniques such as Social Media Instruction (SMI) for effective teaching and learning of automobile lighting system and other technical vocational courses in technical colleges.

Keywords: Achievement, Automobile, Gender, Lighting System and Social media

Introduction

The world is in the present day rejoicing the advancement in communication technology which has widened the reach of communication through Information and Communication Technologies (ICTs). These ICTs include among others, cable data transmission, computer-assisted equipment, internet and satellite. Today, most frequently utilized media of communication is the social network. The social network is a structure consisting of nodes (individuals or organizations), which are linked by one or more definite form of interdependencies, such as common interest, friendship, kinship and relationship of beliefs, understanding or stature. The nodes, to which an individual is connected, are the social contacts of that individual; the network can also be employed to determine social investment worth that an individual obtains from the social networking sites such as Badoo, Blackberry Messenger (BBM), Facebook Messenger, Instagram, Twitter, WhatsApp and Yahoo Messenger (Thelwall, 2014).

These networking sites are used today by nearly everyone to interrelate with new and old associates either physically or virtually (internet). Amichai-Hamburger and Hayat (2017) stated that development in technology has also affected internet software such as Google Chrome, Internet Explorer and Mozilla Firefox, as a result, leading to chatting sites identified by the name "social media". Furthermore, with social networking sites, an individual can send and receive messages instantly. Buttressing this fact, researchers state that the internet makes a way into more homes because it serves as a universal scene to seeing the youths (particularly the students) discussing in a well-ordered place like the schools (Ahmed & Qazi, 2010; Cramer, Song & Drent, 2016).

In the present day, vital schools' activities like reading and writing are influenced with ICT and as a result, students' interest have been changed by interacting with other associates either visible or virtual from either within or outside the school environment. This trend has grown to be the foundations that need to be concerned to lots of researchers who have the strong believe in knowledge and skill acquisition for the construction, tuning-up and revamping the economic, educational and social sectors of Nigeria (Mustapha, 2017). Mustapha (2016) stated that one of the places of obtaining both knowledge and skill for lifelong learning in Nigerian schools is the Technical Colleges (TCs).

At the TCs, students are being encouraged to take up Science, Technology, Engineering and Mathematics (STEM) and other related subjects; one of the subjects that cut across the STEM is the Motor Vehicle Mechanic (MVM). MVM is a branch of Mechanical Engineering that deals with the practical application of Physics and Material Science, for analysis, design, manufacturing and maintenance of mechanical systems (Mustapha, 2014). In addition, the cardinal objective of the MVM programme at the TCs is to prepare students to acquire appropriate skills and knowledge for employment in the world work (Mustapha, Idris, Abubakar & Ewugi, 2016). In accordance with the stated objective, the curriculum places emphasis on among other field studies and guided discovery. At the TCs, the MVM course is divided into the following departments, viz; engine maintenance and refurbishing and auto-electricity (Idris, Saba & Mustapha, 2014). The components of auto-electricity include the following systems: sensors, battery, ignition, charging, starting and the automobile lighting system (Mustapha, 2018).

The automobile lighting system syllabus consists of the headlights, filament lamps, headlight alignment, lighting circuits, direction indicators (flashing lights), lighting faults and their remedies. This study is intended to provide the MVM course to meet the needs of the society through relevance and functionality in its content, application, process and method of teaching. The method employed for successful teaching and learning of the automobile lighting system is an issue of concern to educators, because, the methods of teaching play an important role in thrilling the students' creative and critical thinking by persuading students' teamwork in viewing an event or problem from many standpoints ((Jim, 2010; Mustapha, 2018). These can only be reached when a proper instructional method that would enable MVM practitioners to get hold of both the cognitive and psychomotor competencies in the automobile lighting system (Mustapha, 2018). At the present days, the complexity in the MVM industry is growing exponentially in response to the necessity for technologies to pull off low pollutant discharge and to match and maintain the trail of its development via the Information and Communication Technology (ICT). Due to the advancement in ICT and expansion in the use of internet software, students at all levels of education now have divided attention to studies, as a result of available opportunities to be harnessed from the emergence of the social media.

Academic achievement is dependent on several factors including teaching methods and strategies, intelligence, background, motivation, environmental factors and gender (Antherson, 2003). Gender is very important in the study because there is an educational controversial issue which varies from one research to another. When it comes to technical education, some researchers believe with the reason that the female students perform better than male students, while some are on the contrary. Gender is a parallel and socially unequal division into masculinity and feminity. It is the different socially constructed roles and responsibilities expected of women or men in society. Gender is a factor that dominated many educational research efforts in these later years.

Different researchers have conducted research to ascertain the influence of social media on users; for example, Moon (2011) in a study on "impact of Facebook on undergraduate academic performance", averred that social media have a negative impact on students. According to the result, the more students make use of Facebook, and hence, the more it affects their academic performance. Similarly, most of the students use social networking sites mainly for socializing activities, rather than for an academic purpose. Oye (2012) observed that most of the students do feel that social networking sites have a more positive impact on students' academic performance. In another study conducted by Shana (2012), it was revealed that 74% of students use social network mainly for making friends and chatting at the other end, the result showed that only 26% of the students indicated that they use social media for academic purpose. This

resulting finding has been contentious and raised the eyebrows among the academicians on the effect of social media on students' academic achievement.

Purpose of Study

The Study is therefore, set to determine the effects of social media on students' academic achievement in automobile lighting system in Technical Colleges in Niger State, Nigeria; distinctively, the study sought to determine the effect of:

1. Social media on students' academic achievement in learning automobile lighting system in technical colleges in Niger State
2. Social media on students' academic achievement in learning automobile lighting system in technical colleges in Niger State based on gender

Research Questions

The following research questions were raised

1. What is the effect of Social media on students' academic achievement in learning automobile lighting system in technical colleges in Niger State?
2. What is the effect of Social media on students' academic achievement in learning automobile lighting system in technical colleges in Niger State based on gender?

Hypotheses

The following null hypotheses were formulated and tested at P< .05 level of significance

H_{O1} There is no significant difference in the mean achievement scores of students taught automobile lighting system using the social media instructional strategy and conventional method of teaching

H_{O2} There is no significant difference in the mean achievement scores of students taught automobile lighting system using the social media instructional strategy based on gender.

Methodology

The study adopted a quasi-experimental design with a pre-test, post-test nonequivalent comparison group and intact classes assigned to treatment groups. The population for the study was 203 TC II Motor Vehicle Mechanic (MVM) students; these consist of 197 boys and 6 girls. 64 TC II students in GTC Minna constituted the control group assigned to the conventional teaching method while 139 TC II students in Sulaiman Barau Technical College (SBTC) Suleja constituted the treatment group assigned to e-content instruction method. SBTC Suleja was purposively sampled since the study seeks to determine the student's achievement based on gender and SBTC Suleja is the only technical college in Niger State that has female students in the 2017/ 2018 academic session and GTC Minna was randomly selected among the technical colleges in Niger State. The instrument used for data collection was the Automobile Lighting System Achievement Test (ALSAT). ALSAT was subjected to face and content validation by three experts in MVM. ALSAT was trial-tested on 83 students in Government Technical College, Bunza to determine their psychometric indices. A total of 20 items of ALSAT had good difficulty and discrimination indices. Kuder-Richardson (KR-20) was used in determining the reliability which gave a coefficient of 0.85.

A pre-test was administered to the students' in their intact classes in the two colleges which lasted for 30 minutes. To achieve the objective of the study, the students were subjected to 6 weeks of formal instructions. The subject teachers served as a research assistant. The researcher provided written lesson plans validated by experts in MVM. The lesson plans served as guides to the research assistant used for both groups. The research assistants taught all the topics to the control and treatment groups. The method of teaching in the experimental group was e-content while conventional teaching method was used for the control group. The questions administered as pre-test was also given as post-test. The scores obtained from the post-test exercise provided post-treatment data for the study. The ALSAT was re-administered as retention test after two weeks interval. Mean was used in answering the research questions, the standard deviation was

used to validate the mean and Analysis of Covariance (ANCOVA) was used in testing the null hypotheses.

Results

Research Question 1: What is the effect of social media on students' achievement in learning automobile lighting system in technical colleges in Niger State?

Table 1:

Mean and Standard Deviation of Experimental and Control Groups of the Effect of Social Media on Students' Academic Achievement in Learning Automobile Lighting System.

GROUP	Pre-test			Post-test		
	N	$\overline{X}$	SD	$\overline{X}$	SD	Mean Gain
Experimental (SMI)	91	48.08	2.65	71.23	3.34	23.15
Control (Lecture Method)	102	48.93	2.32	78.76	3.06	29.83

Data in Table 1 showed that the experimental group had a mean of 48.08 with a standard deviation of 2.65 in the pre-test and mean score of 71.23 and standard deviation of 3.34 in the post-test making the pre-test - post-test gain in the experimental group to be 23.15. The control group had a mean score of 48.93 with a standard deviation of 2.32 in the pre-test and a mean of 78.76 and standard deviation of 3.06 in the post-test, resulting in a gain of 29.83. With these results, the two groups were effective in enhancing students' achievement in the automobile lighting system, but the effect of lecture method on students' achievement in the automobile lighting system is higher than the effect of the SMI strategy.

Research Question 2: What is the effect of social media on students' academic achievement in learning automobile lighting system in technical colleges in Niger State based on gender?

Table 2:

Mean and standard deviation of experimental and control groups on the effects of social media on students' achievement in learning automobile lighting system based on gender

Achievement	Gender	N	Pre-test		Post-test		Mean Gain
			$\overline{X}$	SD	$\overline{X}$	SD	
Experimental (SMI)	Males	95	45.50	4.87	63.05	2.04	17.55
	Females	15	43.56	3.44	65.34	4.09	21.78

Data in Table 2 indicated that the effect of gender on the achievement scores of students taught Automobile Lighting System with SMI. The result showed that male students taught the Automobile Lighting System with SMI had a pre-test mean achievement score of 45.50 and a post-test mean achievement score of 63.05 making the pretest, posttest mean gain of the male students taught with SMI to be 17.55. Similarly, female students taught with SMI had pretest mean achievement score of 43.56 and posttest mean achievement score of 65.34 making the pretest, posttest mean gain of the female students taught with to be 21.78. The result further indicates that the use of SMI teaching method significantly increased the achievement of both male and female students than the use of lecture method. Hence, computer-assisted instruction is not gender-sensitive as it increased the achievement of both genders significantly.

Hypotheses

Table 3:
Summary of Analysis of Covariance (ANCOVA) of the Students Achievement and Scores in Learning Automobile Lighting System

Source	Sum of Squares	df	Mean Square	F	Sig.	Remark
Corrected Model	209.2270	2	17.437	2.432	.000	
Intercept	504.2260	1	504.224	84.230	.000	
Pre-test	.9500	1	.950	4.589	.003	
Method	202.9422	2	488.790	3.768	.059	Accepted
Gender	.0020	1	.443	2.936	.106	
Method and Gender	.3270	2	53.446	2.623	.862	Accepted
Error	93.9780	454	.208			
Total	1011.6452	463				
Corrected Total	209.6435					

Data presented in Table 4 showed the F-calculated for method, interaction treatment and gender on students' achievement in the automobile lighting system. The F-calculated value for the method 488.790 with the significance of F at 0.59 which is greater than 0.05 signifies that the null hypothesis of no significant difference in the mean achievement scores of students taught automobile lighting using SMI strategy and conventional method of teaching is accepted at 0.05 level of significance. Therefore, both SMI and the conventional teaching method enhance students' achievement in the automobile lighting system. The interaction effect of method and gender has F-calculated value of 53.446 with the significance of F at 0.862 which is greater than 0.05. Therefore, the hypothesis of no significant interaction effect of treatment given to students and their gender with respect to their mean scores on the automobile lighting system is accepted. This implies that there is no significant interaction effect of the method given to students taught automobile lighting system using the SMI strategy based on gender.

Discussion of Findings

The findings revealed that the effect of SMI on students' academic achievement is lower than the effect of conventional teaching method. This implies that students in the control group had a higher mean gain compared to their counterparts in the experimental group after treatment. The result of the study agrees with Moon (2011) on the "impact of Facebook on undergraduate academic performance" averred that social media have a negative impact on students. According to the result, the more students make use of Facebook, the more it affects their academic performance. Contrary to these findings, Oye (2012) also found out that most of the students do feel that social networking sites have a more positive impact on students' academic performance. Corroborating this assertion, Shana (2012) found out that 74% of students use social network mainly for making friends and chatting at the other end, the result showed that only 26% of the students indicated that they use social media for academic purpose.

Accordingly, the findings of on the effects of gender on students' achievement showed that the use of SMI techniques significantly increased the mean achievement scores of both male and female TCII students of MVM trade. This declared that there is no significant effect of gender on students' achievement in relation to the treatment showed that SMI strategy is not gendered sensitive and can produce the same learning effect on both male and female students. In addition, this result is also in agreement with the studies of Iwu and Uzoma (2015) and Ajai and Amoco (2015) whose separate studies reported no statistically significant difference existed between male and female students' mean achievement scores when tested at 0.05 level of significance. Hence, this study found no interaction effects of gender and teaching methods on the achievement of the students in motor vehicle mechanic trade. The findings of this study on interaction effects are in consonance with the opinions of Azih and Nwosu (2011) which equally reported that gender had no significant interaction with the teaching approach on students mean achievement. Furthermore, the effect or influence of gender on students' achievement has been an area of focus by researchers. There are different opinions on which

gender achieves better than the other. There are those that claim that males perform better than the females, yet others uphold that females achieve better than their counterparts. This is why Buadi (2000) opined that the difference in gender as it affects students' and academic achievement is inconclusive.

Conclusion

Students who spend more time on social media are likely to perform poorly in their academics. This is because, instead of reading their books, they spend their time charting and making friends via the social media and this will definitely have a negative effect on their academic performance because when the students do not read, there is no way they can perform well academically.

Recommendations

Based on the findings of the study, the following recommendations were made:

1. Teacher training institutions should structure and restructure the special methodology course to include synergy between the conventional teaching method and SMI in the automobile lighting system.
2. The government should consider the possibility of evolving a policy on teenagers' exposure to social media.
3. Students should reduce their exposure to social media and pay more attention to their studies.

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INFLUENCE OF WHATSAPP ON ACADEMIC PERFORMANCE OF UNDERGRADUATES IN KWARA STATE

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Abstract

WhatsApp is a smartphone application for instant messaging. It is an amazing application, which has helped students and teachers to connect to the society and the world at large. The question many people asked was how WhatsApp influenced students' learning. This study examined the influence of WhatsApp on academic performance of undergraduates from selected universities in Kwara State, Nigeria. The design for the study was a descriptive research using cross-sectional survey. The population comprised 200 undergraduates selected from 3 universities in Kwara State using purposive and simple random sampling techniques. An adapted questionnaire from Michael (2016) was used for data collection. The instrument was validated and reliability coefficient of 0.87 was obtained. Mean, frequency counts and percentage were used to answer the research questions, while t-test statistics was used to test the research hypothesis. The findings of the study showed that undergraduates in Kwara State used WhatsApp mainly to kill loneliness, chat with friends and for romantic relationships. The findings also revealed that 78% of undergraduates find WhatsApp helpful in getting relevant information to their learning. It was established that there is no significant difference in the academic performance of male and female undergraduates who use WhatsApp application for learning [$t(198) = 0.658$, $p > 0.05$]. The study recommended that undergraduates should create a balance between chit-chatting and academic activities; educational stakeholders should organize guidance and counselling session for the undergraduates on the use of social media, and mobile learning should be encouraged among the undergraduates.

Key Words: ICT in Education, WhatsApp, Academic Performance & Undergraduates

Introduction

Information and communication technology (ICT) play a vital role in learner's achievement at all educational levels and its significant in education cannot be overemphasized. ICT has penetrated all areas of human endeavour and it has helped people to become better informed, enlightened, and kept abreast with world developments. The technology exposes mankind to better ways of doing things and makes life better (Kent & Facer, 2004). It has broadened and improved communication systems using diverse tools like social media and Internet. These new technologies which are electronic in nature and cost effective have changed the process of communication and enhance teaching and learning.

The Internet expands access to learning, strengthens and raises educational quality by making teaching and learning an engaging, active process connected to real life. Social networking is characterized by the trend of online chat tools also known as communication tools or social media. Kimberly (2009) reported that chat tools are used to construct a public or semi-public profile within a bounded system, articulate a list of other users with whom they share a connection, and view and transverse their list of connections and those made by others within the system. Chat tools as electronic learning platforms are indispensable in quality education. Ellison, Steinfield and Lampe (2007) defined chat tools as web-based services that allow

individuals to construct profiles, display user connections, search, traverse within that list of connections. Examples of common chat tools include: Facebook, WhatsApp, Marketplace, Google Plus, Twitter, 2go, YouTube, MySpace, Flickr, LinkedIn, among others. WhatsApp as a part of social media forms an essential part of the instant chat tools, which is quite popular in Nigerian society and amidst youths which form most of the Nigerian undergraduates. WhatsApp has recently become the most popular messenger with more than 1 billion people as its user-base, and is the first messenger app to hit this milestone (Tole, Lina, Deris, Munawar & Imam, 2016).

Also, the role of WhatsApp in the socio-economic life of individuals cannot be over-emphasized. Michael (2016) opined that through two ways communication between senders and receivers, WhatsApp creates an enabling platform for engagement and networking. In its initial years, it charged the user as much as USD 0.99 per year (the first 12 months was a free trial period). Later, subscription charge was completely cancelled since 18th January, 2016. This platform provides services for text and audio messaging, free voice calls and exchanging photos or videos and even for sharing of limited types of documents. The main advantage of WhatsApp is the extensive engagement between users in user-created group known as WhatsApp group, which serves as a learning platform. It is user friendly to all users, both the old and young ones. Integrating technology into education has gone beyond human thinking. Part of this integration is the formal introduction of WhatsApp into teaching and learning. WhatsApp is a relatively new tool in education, though it has similar positive characteristics as previous technological tools that are implemented, but it seems that WhatsApp has more updated features that encourage teachers and students to use it to enhance instruction (Bouhnik & Deshen, 2014).

Yeboah and Ewur (2010) conducted a research on the impact of WhatsApp messenger usage on students' performance in tertiary institutions in Ghana. The study revealed that WhatsApp instead of making communication easier and faster thereby enhancing flow of information and idea sharing among students rather has impacted negatively on the performance of tertiary students. Fawzi (2015) investigated usage WhatsApp for e-learning and its impact on academic performance in Irbid National University in Jordan. The sample size was 364 students from Irbid National University in Jordan. The findings revealed that there is a significant relationship between the use of WhatsApp and academic performance of students. Hamiyet (2016) examined the effect of students' usage of WhatsApp Instant Messaging for learning and improve students' achievement. The sample composed of 92 higher students (teacher candidates) attending Biruni University. It was revealed that WhatsApp use for learning in higher education needs to be understood of better learning with technology especially in teacher education, because they will be the future educators to have the learning and communication skills.

Given this insight, it infers that WhatsApp is reshaping the way students communicate and function in school. It is obvious that the prevailing interest of the Nigerian undergraduate in the shared world keeps increasing. It has been noted by many scholars that social media is of great effect on the performance of the students in their undergraduate programmes.

Purpose of Study

The study was set to specifically:

1. Examine undergraduates' perceived usefulness of WhatsApp for learning.
2. Determine how often do undergraduates use WhatsApp for learning.
3. Determine the influence of WhatsApp on academic performance of undergraduates.

Research Questions

This study answered the following research questions:

1. What are the undergraduates' perceived usefulness of WhatsApp for learning?
2. How often do undergraduates use WhatsApp for learning?
3. What is the influence of WhatsApp on academic performance of undergraduates?

Research hypothesis

H_{01}: There is no significant difference in the academic performance of male and female undergraduates who use WhatsApp for learning.

Methodology

This study adopted a descriptive research type of a cross-sectional survey design. This type of research design is a non-experimental descriptive research method that is used when a researcher wants to collect data on phenomena that cannot be directly observed (Creswell, 2014). This research method was considered appropriate in this study, because it focused on students and their views, opinions, perceptions and knowledge of how WhatsApp influences their academic performance. The population for this study were undergraduates of universities in Kwara State. A total of two hundred (200) undergraduates from three (3) universities in Kwara State were purposively chosen to participate in the study, taking 50 undergraduates each from Al-Hikmah University, Ilorin, Kwara State University, Malete and 100 undergraduates from University of Ilorin based on accessibility and convenience. Then, random sampling technique was used to select respondents from each university.

An adapted questionnaire from Michael (2016) was used for data collection in the study. The original questionnaire was modified giving a total of 15 items in four sections that answered the research questions posed. The instrument was validated by the researchers. Mean, frequency count and percentage were used to answer the research questions while t-test was used to answer the research hypothesis.

Results

Table 1:
Demographic Information of Respondents

DEMOGRAPHICS	FREQUENCY	PERCENTAGE%
GENDER		
Male	87	43.5%
Female	113	56.5%
Total	**200**	**100.0**
INSTITUTION		
University of Ilorin	100	50.0%
Al-hikmah University	50	25.0%
Kwara state University	50	25.0%
Total	**200**	**100%**
STUDY AREA		
Physical Science	36	18.0%
Environmental Science	50	25.0%
Arts	48	24.0%
Basic Medical Science	49	24.5%
Law	17	8.5%
Total	**200**	**100%**
AGE		
16-20 years	59	29.5%
21-25 years	102	51.0%
26-30 years	5	2.5%
31 and above	34	17.0%
Total	**200**	**100%**

Table 1 revealed the demographic information of respondents who took part in the study. The table revealed that 87 (43.5%) respondents were male while 113 (56.5%) respondents were

female. This indicates that more female than male took part in the study. Based on demographic institution factor, the table revealed that 100 respondents representing 50% were from University of Ilorin, 50 (25%) were from Al-hikmah University, while the remaining 50 representing 25% were from Kwara state university. In terms of study area, 36 representing (18%) respondents were from Physical Science, followed by Environmental Science with 50 (25%) respondents, 48 representing (24%) respondents were from Arts, 49 representing (24.5%) respondents were from Basic Medical Science, while 17 respondents representing (8.5%) were from Law. This shows that the majority of the respondents were from faculty of Environmental science. The age distribution, of the respondents revealed that 59 representing (29.5%) respondents falls within the age range of 16-20 years, 102 representing (51.0%) respondents were in range of 21-25, 5 respondents (2.5%) respondents falls within the age range 26-30, while 34 respondents representing 17% falls within the age range of 31 and above. This inferred that majority of respondents are between the ages 21-25years.

Research Question 1: How useful is WhatsApp in learning?

Table 2:
Usefulness of WhatsApp in Learning.

S/N	Item	Strongly Agreed (%)	Agreed (%)	Disagreed (%)	Strongly Disagreed (%)
1	WhatsApp facilitates my research work	46 (23.0%)	81 (40.5%)	55 (27.5%)	18 (9.0%)
2	WhatsApp facilitates networking with other students	86 (43.0%)	104 (52.0%)	8 (4.0%)	2 (1.0%)
3	WhatsApp aids collaboration with other students	79 (39.5%)	108 (54.0%)	12 (6.0%)	1 (0.5%)
4	Using WhatsApp facilitates better relationship with my lecturers	8 (4.0%)	36 (18.0%)	108 (54.0%)	48 (24.0%)
5	WhatsApp makes me an active learner	14 (7.0%)	71 (35.5%)	82 (41.0%)	33 (16.5%)
6	I get information on class schedule and assignments through WhatsApp	47 (23.5%)	109 (54.5%)	30 (15.0%)	14 (7.0%)
7	The use of WhatsApp affects my academic performance positively	44 (22.0%)	110 (55.0%)	32 (16.0%)	14 (7.0%)
8	I find WhatsApp very useful	54 (27.0%)	116 (58.0%)	25 (12.5%)	5 (2.5%)

Table 2 revealed the usefulness of WhatsApp in learning by undergraduates. It showed that 81(40.5%) respondents agreed that WhatsApp facilitates students work, while 55 (27.5%) disagreed with this opinion. Second item on the table reveals that 104 respondents representing 52.0% agreed that WhatsApp facilitates their networking with other students, while 8 (4.0%) disagreed with the statement. 108 (54.0%) respondents agreed that the use of WhatsApp aids collaboration with other students, while 12 (6.0%) students disagreed. It is evident that WhatsApp does not facilitate better relationship between students and lecturers. Item 4 reveals that 36 (18%) respondents agreed that WhatsApp facilitates better relationship between students and lecturers, while 108 (54%) disagreed with the opinion. This means that very few students have contact with their lecturers via WhatsApp. Item 5 shows that 71(35.5%) out of the entire respondents agreed that WhatsApp makes them an active learner, while 82 (41.0%) disagreed with the statement. From the responses as interpreted, it is evident that WhatsApp is useful in learning.

Research Question 2: How often do the undergraduates make use of WhatsApp?

Table 3:
Undergraduates' Use of WhatsApp

Item	Frequency	Percentage (%)
Very often	50	25.0%
Often	75	37.5%
Sometimes	45	22.5%
Rarely	30	15.0%
Total	**200**	**100.0%**

Table 3 revealed how often undergraduates make use of WhatsApp. The table showed that 50 (25%) use WhatsApp very often, 75 (37.5%) use WhatsApp Often, 45 (22.5%) Sometimes use WhatsApp while 30 (15%) rarely make use of WhatsApp. It can therefore be concluded that majority of undergraduates make use of WhatsApp often.

Research Question 3: What influence does the use of WhatsApp have on the academic performance of undergraduates in Kwara State?

Table 4:
Influence of WhatsApp on Learning

S/N	Item	Strongly Agreed (%)	Agreed (%)	Disagreed (%)	Strongly Disagreed (%)
1	WhatsApp distracts me from carrying out academic assignments	11 (5.5%)	56 (28.0%)	92 (46.0%)	41 (20.5%)
2	WhatsApp distracts my concentration and participation during lectures	8 (4.0%)	33 (16.5%)	105 (52.5%)	54 (27.0%)
3	Using WhatsApp for learning enables me to accomplish tasks easily	23 (11.5%)	85 (42.5%)	68 (34.0%)	24 (12.0%)
4	WhatsApp increases my academic performance and productivity	11 (5.5%)	62 (31.0%)	97 (48.5%)	30 (15.0%)
5	I use WhatsApp to perform academic activities	18 (9.0%)	80 (40.0%)	74 (37.0%)	28 (14.0%)
6	I get information on relevant educational groups on WhatsApp	20 (10.0%)	73 (36.5%)	79 (39.5%)	28 (14.0%)

Table 4 showed that 56 (28%) respondents are of the opinion that WhatsApp distracts them from carrying out academic activities, while 92 (46.0%) submitted that WhatsApp does not distract them from carrying out their academic activities. Item 2 reveals that 33 respondents 16.5% agreed that WhatsApp distracts their concentration and participation during lectures, 105 (52.5%) however disagreed. Based on the findings, it can be deduced that undergraduates do not agree to the fact that WhatsApp distracts their private study, concentration and participation during lectures and their overall academic performance. 85 (42.5%) respondents agreed that the use of WhatsApp has helped to accomplish learning tasks, while 68 (34.0%) disagreed to the fact that using WhatsApp for learning enables tasks to be accomplished easily. 62 (31.0%) agreed that WhatsApp increased their academic performance and productivity. 97 (48.5%) disagreed, in their opinion WhatsApp does not increase their academic performance and productivity. 80 (40.0%) agreed that they use WhatsApp to perform academic activities, while 74 (37.0%) disagreed that they use WhatsApp to perform academic activities. 73 (36.5%) agreed that they get information on relevant educational groups on WhatsApp, while 79 (39.5%) disagreed that they get information on relevant educational groups on WhatsApp. It

can be deduced that WhatsApp does not have any influence on undergraduates' academic performance.

Hypothesis: There is no significant difference in the academic performance of male and female undergraduates who use WhatsApp for learning.

Hypothesis One

H_{01}: There is no significant difference in the academic performance of male and female undergraduates who use WhatsApp for learning.

Table 6:
Academic performance of undergraduates based on gender

Variable	N	X	SD	df	T	Sig	Remarks
Male	87	3.11	0.895	198			
					0.658	0.511	**Accepted**
Female	113	3.03	0.884				

Table 8, revealed that df =198, t = 0.658, p = 0.511 This means that the hypothesis was accepted. This was as a result of t-value of 0.658, resulting in 0.511 p value greater than 0.05 significant alpha level. By implication, the stated hypothesis established that there is no significant difference in the academic performance of undergraduates who use WhatsApp application for learning based on gender.

Conclusion

The study investigated the influence of WhatsApp on academic performance of undergraduates in selected universities in Kwara State. This study concludes that WhatsApp is an effective collaborative tool which is very useful in teaching and learning process by both students and instructors. WhatsApp is an educational tool with the potential of making learning interesting. Despite all these potentials, WhatsApp must be carefully integrated into teaching and learning as its abuse by students can negatively affects their academic performance. Also, this study had revealed that, WhatsApp is a useful tool for learning as it facilities networking and aids collaboration with other students.

Recommendations

Based on the findings and conclusions of this study, the following recommendations were made:

1. Students should create a balance between chit-chatting and academic activities. More attention should be directed to research.
2. Educational stakeholders should arrange guidance and counseling sessions in institutions on the use of Social media platforms.
3. Nigeria universities commission should consider introducing training programs for less experienced lecturers that center primarily on embracing and inculcating the 21st century learning skills into classroom learning.
4. Mobile learning should be encouraged among the students.

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OPEN EDUCATIONAL RESOURCES FOR MASSIFICATION OFTERTIARY EDUCATION IN NIGERIA: ARE STUDENTS AWARE

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Abstract

The growth in the demand for tertiary education is increasing as there is a paradigm shift from education for the elite to education for all /masses. Massification is therefore a necessity and Open Educational Resources is a means of achieving them. This paper focused on open educational resources for massification of tertiary education in Nigeria specifically the awareness of students in three major institutions in Zaria. The study was guided by one research objective, research question and two hypotheses. The descriptive survey research design was used. The target population for the study was all the undergraduates' students of the three major tertiary institutions in Zaria metropolis. Closer sampling technique was used to distribute a researcher designed questionnaire to 750 students across the three institutions and 732 were returned. Mean, t-test and analysis of variance were used to analyze the research question and hypothesis respectively. The findings showed that students in Federal College of Education (2.28), Nuhu Bamali Polytechnic (2.42) were not aware of Open Educational Resources and Ahmadu Bello University (2.61) have an average awareness. It was also revealed that there is a significant difference in the awareness across the institutions and between male and female students. It was concluded that although massification is a current driver of tertiary education in Nigeria, the awareness of Open Educational Resources which is a key driver of massification must be given adequate attention.

Keywords: OERs, Students, Massification, Awareness, Tertiary

Introduction

The introduction of e-learning brought about a revolution in instruction and learning with instructional activities no longer bounded by time and space. This makes it necessary for the learner/students to possess knowledge and information on how to get resources which are essential for participation in the global information society (Onaifo, 2016). Knowledge once available to few is now freely open to anyone with the Internet connection (Maaji, 2019). In the Medieval period, learning resources were not available to everyone except the privileged few who are regarded as masters or sage. The invention of the printing machine is one of the notable improvements in knowledge distribution. The internet came with the E-revolution leading to digitization of knowledge at some cost. This continued until the advent if open education, open content and open educational resources.

Open Educational Resources (OER), Open Content (OC) and Open Education (OD) came into the picture by harnessing the new possibilities afforded by digital technology to address common educational challenges (Murray, Caulier-Grice & Mulgan, 2010). Anything declared open implies that it can be accessed by anyone at anytime, anywhere. UNESCO defines open educational resources as "teaching, learning or research materials that are in the public domain or released with an intellectual property license that allows for free use, adaptation, and distribution (UNESCO, 2016). Hewlett Foundation defined "OER as teaching, learning, and research resources that reside in the public domain or have been released under an intellectual property license that permits their free use and repurposing by others.

Open educational resources include full courses, course materials, modules, textbooks, streaming videos, tests, software, and any other tools, materials or techniques used to support access to knowledge." Similarly, according to Orr, Rimini and Van Damme (2015), "Open educational resources are digital learning resources offered on line (although sometimes in

print) freely and openly to teachers, educators, students, and independent learners in order to be used, shared, combined, adapted, and expanded in teaching, learning and research. They include learning content, software tools to develop, use and distribute, and implementation resources such as open licenses. The learning content is educational material of a wide variety, from full courses to smaller units such as diagrams or test questions. It may include text, images, audio, video, simulations, games, portals and the like."

The focus of OER is on the possibility of taking original work from other providers and being able to adapt and repurpose it to produce a new learning resource. In this sense, open means free to access and free to change. It is for this reason that one of the central characteristics of an OER is the liberal licensing (e.g. through Creative Commons), which facilitates this process (Pitt 2015). OERs embody the conviction that access to information and education is a fundamental human right; a belief formally expressed in the Universal Declaration of Human Rights (UN General Assembly, 1948). Due to the adaptable nature of OERs, they can foster professional development of Home Economics teachers by virtue of their openness, and easy access.

New pedagogies, content knowledge, professional practices and skills in various fields are easily distributed through OER. Sharing and reuse are important aspects of OER, the "four Rs" of OER as outlined by (Wiley, Bliss and McEwen, 2014; Wiley, 2009) are reuse, revise, remix, and redistribute. These characteristics make OERs indispensable for massification of tertiary education. Massification has been defined as the mass adaptation of a phenomenon by the suppression of its distinguishing features. Scott (1995) used the term massification in the context of higher education systems to describe the rapid increase in student enrolment in the latter part of the twentieth century. Trow (2000) provided a typology to the term massification and coined the terms elite, mass and universal higher education. As civilization steps further, there is an increase in the demand and enrollment for tertiary education. Tertiary education refers to all forms of organized educational learning and training activities beyond the secondary level (Goolam, 2008). These may be at universities, polytechnics, training colleges as well as in all forms of professional institutions, etc.

Statement of the Problem

Students in tertiary institutions in Zaria are often faced with the problem of getting reading materials for their study. Many have resorted to photocopying and taking pictures of available books. Many of the lecture notes and textbooks in the study area available to the students as observed by the researchers are not regularly updated. Also, the issue of globalization of knowledge via massification is not feasible if materials and educational resources that is free are not utilized. Open Educational Resources are innovations that were brought up to solve this problem. Rogers identified awareness as the very first step in the diffusion of innovation. Despite the fact that OERs are not new, many students do not know what OERs are or aware of the forms and ways in which they can use it for their study. The study intends to find out the awareness of students of OERs in the public higher institutions in Zaria.

Review of Related Literature

Goolam (2008) asserts that majority of African higher education institutions have a large number of students/turnout but do not have adequate planning and proportionate, accompanying increase in resources (human, financial, physical) to enable them to cope with the situation. The OERs are available for all to use and are vital to the massification of education. OERs can be utilized by teachers, students, and other professionals. Most especially, OERs are beneficial to teachers and students. Prince and Saravanan (2015) in a study found out that majority students and lecturers were using open access resources for their course related work and satisfied its uses in their academic activity. Similarly, Fayomi (2015) found out that majority of students are aware of one form of OERs which is e-books and use them often for learning and self-study. Olanrewaju & Soetan, (2015) also discovered that gender can influence awareness of instructional media. Fayomi (2015) in a study on usage of OERs especially e-books also found out that gender influences the use of e-books in tertiary institutions.

Purpose of Study
Specifically, the study is set to:
Investigate if students are aware of OERs in the tertiary institutions in Zaria.

Research Question

Are students aware of OERs in the tertiary institutions in Zaria?

Research Hypotheses

Ho_1: There is no significant difference in the awareness of OER among students in Higher institutions in Zaria, Kaduna state.
Ho_2: There is no significant difference in the awareness of male and female awareness of OERs in higher institutions in Zaria.

Methodology
The study was based on the descriptive survey research design. The population for this study comprised of all the undergraduates in all the tertiary institutions in Zaria, Kaduna state. There are three higher institutions in Zaria which are Federal College of Education, Nuhu Bamali Polytechnic and Ahmadu Bello University. Due to the large population of the students in the schools, a total of 250 students were randomly sampled from each institution across the departments. A total of 750 questionnaires were distributed while 705 was successfully retrieved. A researcher-developed questionnaire was used for data collection the study. The instrument contained statements on the meaning of OERs and formats which were used as indices for the assessment of the students' awareness. The instrument was divided into two sections, Section A contained the personal data of the respondents such as gender, level, faculty/school and institution. Section B contained items on what OERs are and the response mode was a point Likert rating scale with the alternative of Strongly Agree (4), Agree (3), Disagree (2) and Strongly Disagree (1). In order to ascertain the validity of the instrument used, three copies of the questionnaire were given to two educational technologists in the department of educational foundations and curriculum, Faculty of Education, Ahmadu Bello University. The instrument was pilot-tested and Cronbach alpha was used to analyze thedata. A coefficient of 0.72 was obtained. The administration of the instrument was done by the researchers. Analysis of Variance (ANOVA) and independent sample t-test were used to analyze the stated null hypotheses at0.05 level of significance.

Results

The results of the data obtained in this are analysed as follow. A total of seven hundred and fifty questionnaires were distributed, seven hundred and thirty-two were retrieved. Two hundred and fifty-nine (259) female and four hundred and seventy-three (473) male students participated in the study across the three institutions. In the institutions, 249 (34%) of the students were from FCE, Zaria, 262(35.8%) were from NUBA poly while 221 (30.2%) wee students of Ahmadu Bello University.

Results
Research question
Are students aware of OERs in the tertiary institutions in Zaria?
The chart below shows the mean of students' responses on their awareness of open educational resources.

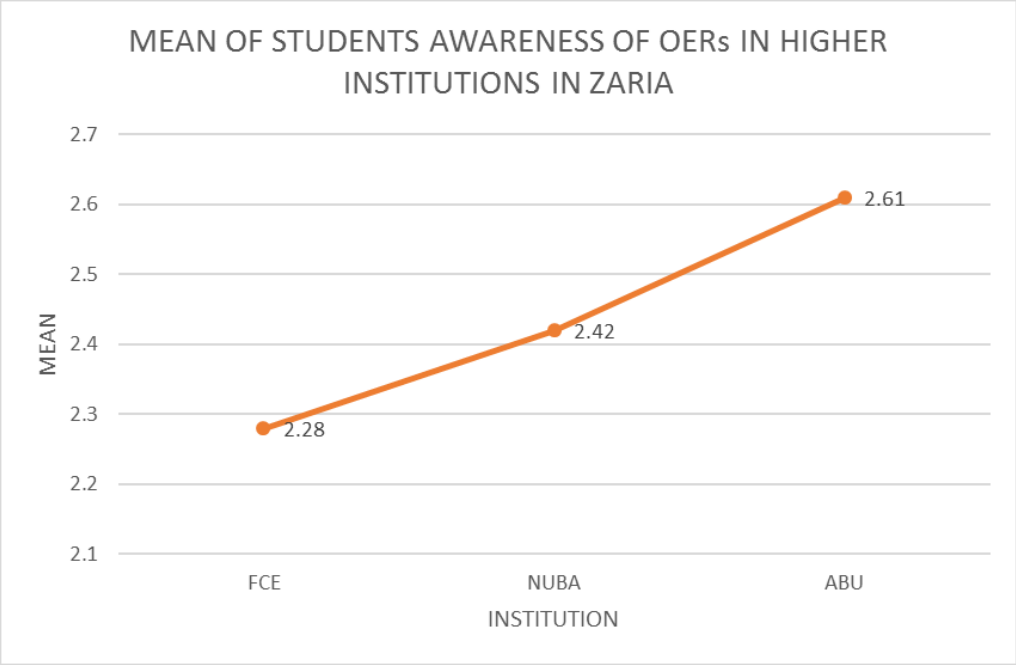

Fig 1: Chart showing the means of student responses on their awareness of OERs.
The data in table 1 showed that the students' level of awareness of OERs is low in Federal college of education, Zaria with mean 2.28, Nuhu Bamali Polytechnic with mean (2.43 but students of Ahmadu Bello University have a slightly above average level of awareness of OERs. Generally, the students are not aware of OERsin tertiary institutions in Zaria.

Hypotheses Testing

Table 1:
ANOVA analysis of the difference in students' awareness of OERs in Institutions in Zaria
Ho_1: There is no significant difference in the awareness of OER among students in Higher institutions in Zaria, Kaduna state.

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	.262	2	.131	1.259	.284
Within Groups	75.958	729	.104		
Total	76.220	731			

The data in the table 1 above shows the output of the ANOVA analysis of the difference in students' awareness of OERs in higher institutions in Zaria ($p = 0.284 > 0.05$). This implies that there is a statistically significant difference in students' awareness of OERs in higher institutions in Zaria.
Ho_2: There is no significant difference in the awareness of male and female awareness of OERs in higher institutions in Zaria.

Table 2:
T-test analysis of the difference in male and female students' awareness of OERs

Variable	N	X	SD	DF	t	Sig.	Decision
Male	473	2.62	0.32	730	2.907	0.035	Rejected
Female	259	2.47	0.32				

The data in Table2 above shows the output of the independent t-test analysis of the difference in male and female students' awareness of OERs in tertiary institutions n Zaria ($p=0.035 < 0.05$). This implies that there is a statistically significant difference in the awareness of male and female students of OERs in tertiary institutions in Zaria.

Discussion of Findings

Students in higher institutions in Zaria are not aware of OERs. Majority of the students in tertiary institutions in Zaria are not aware of OERs (FCE = 2.28, NUBA = 2.42 and ABU= 2.61). In an interaction with the students during data collection, majority of the students were not aware of the existence of OERs in other forms other than e-books. The students also indicated that they do not know of places or sources where OERs can be accessed. This is similar to the findings of Fayomi (2015) who found out that students aware of mostly e-books compared to other OERs. On the contrary, Prince and Saravanan (2015) discovered that many students in higher institutions are not aware of OERs.

There is a significant difference in students' awareness of OERs in tertiary institutions in Zaria. Amongst the three institutions in Zaria, Ahmadu Bello university had the highest mean of awareness of OERs (ABU= 2.61, NUBA = 2.42 and FCE = 2.28.

There is a significant difference in the male and female students' awareness of OERs in tertiary institutions in Zaria ($p=0.035 < 0.05$). This is similar to the findings of Fakomogbon, Olanrewaju &Soetan, (2015) who also discovered that gender can influence awareness of instructional media. Fayomi (2015) also found out that gender influences the use of e-books by students in Obafemi Awolowo University.

Conclusions

Open Educational Resources are necessary for the massification of tertiary education. OERs are able to serve two major purposes which are for teaching and learning, and self-study. But a problem arises when the end user especially students are not aware. Based on the findings of this study, it can be concluded that majority of students in the tertiary institutions in Zaria are not aware of OERs and there is a significant difference between the male and female students' awareness of OERs. This study also established that there is a significant difference in the students' awareness of OERs in higher institutions in Zaria. Although massification is a current driver of tertiary education in Nigeria, the awareness of OERs which is a key driver of massification must be given adequate attention.

Recommendations

Based on the findings of this study, the following recommendations were made:

1. The management of tertiary institutions should organize awareness campaign for students on OERs, how to get them and ways they can be utilized for learning through conferences, seminars.
2. Lecturers should be encouraged to use OERs and give to students or suggested to students where OERs can be found during lectures.
3. Since most OERs require use of smartphone or computer, institutions should encourage students to have Smartphone or enlarge their digital library with the provision of OERs in mind.

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FOUNDATION LAYING PRACTICES AMONG CRAFTSMEN TOWARDS REDUCING BUILDING FAILURE IN FEDERAL CAPITAL TERRITORY ABUJA, NIGERIA

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Abstract
The study was conducted to investigate foundation laying practices among craftsmen towards reducing building failure in Federal Capital Territory Abuja, Nigeria. A survey research design was adopted for the study. Two research questions were answered and two hypotheses were tested at 0.05 level of significance. Purposive sampling was used to select 150 craftsmen and 101 foremen in building construction. Structured questionnaire was used to as instrument for data collection. Mean and standard deviation were used to answer the research questions while t - test statistics was used to test the null hypotheses. The instrument was validated by three experts in building technology. Cronbach alpha was used to determine the reliability coefficient, the result was found to be 0.87. The instrument was administered to setting out practices include, among others that assembling of tools and equipment, before the commencement of building, finding out distance from site boundary to the building line with reference to the working drawing. the finding on the foundation laying practices adopted by craftsmen towards reducing building failure in federal capital territory Abuja include among others, blinding the excavated base to get level ground for the foundation. Based on the findings of the stud, it was recommended that craftsmen should be subjected to series of retraining programmers for setting out, foundation laying and concrete production practices to avoid building failures in Nigeria among others.

Keywords: *concrete production, craftsmen, foundation laying and setting out,*

Introduction

Foundation is one of the most important building fabrics beneath the ground upon which the entire loads of the building rest. Foundation is an indispensable integral structure of any construction work (Okure, 2016). Chudley and Greeno (2010) opined that the function of any foundation is to safely sustain and transmit to the ground on which it rests the combined dead, imposed and wind loads in such a manner as not to cause any settlement or other movement which would impair the stability or cause damage to any part of the building. Chudley and Greeno (2010) further explained that if foundation load exceeds maximum passive pressure of ground that is bearing capacity a downward movement of the foundation could occur. Remedy is to increase plan size of foundation to reduce the load per unit area or alternatively reduce the loadings being carried by the foundations.

The building regulation cited in Hall and Greeno (2009) states that the foundations of a building shall: Safely sustain and transmit to the ground the combined dead load and imposed load. This shall be done without causing any settlement or other movement which would impair the stability of, or cause damage to, the whole or any part of the building or of any adjoining buildings or works, it shall be taken down to such a depth, or be so constructed, as to safeguard the building against damage of swelling, shrinking or freezing of the subsoil and capable of adequately resisting, any attack by sulphates or any other deleterious matter present in the soil. Foundation is subjected to dead loads that constantly act directly downward and additive from the top of the building down. Live loads include wind pressure, seismic forces, vibrations caused by machinery, movable furniture, stored goods and equipment, occupant, and forces caused by temperature changes. Live loads are temporary and can produce pulsating, vibratory,

or impact stresses. In general, the design of a foundation for building must accommodate all possible dead and imposed loads (live) to prevent the building from settling or collapsing and to prevent any permanent distortion, excessive motion, discomfort to occupants, or rapture at any point (Hall&Greeno, 2009).

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Craftsmen skills exists both formal (classroom) and informal (on-the-job training) in Nigerian construction (Dantong, 2006). Ying (2009) posits that craft skills can be learned on-site through apprenticeship or other training programmes. Skilled craftsmen such as carpenter, bricklayer, plumber, and other construction trade specialist need either several years of information on the job experience or apprenticeship training. Most construction craftsmen learn their work skills informally by observation and leaning from experience workers. Individual who lean the trade on the job usually starts as helpers. These workers performed routine task, such as learning and preparing the worksite and unloading materials. Another alternative is to attend skills training in vocational/technical schools or other relevant education institutions where formal classes and handsome training are combined (Employment and Training Administration (ETA), 2004). Bricklayers as craftsmen in the building construction site practices different task to include among others laying blocks, laying bricks, concrete mixing, plastering, rendering, setting out as well as foundation laying.

Foundation laying practices is referred to the performance of the craftsman (bricklayer) in carrying out all the required sub operational tasks in order to construct a firm base footing where all the building loads are to rest on through the use of required tools and materials. Good foundation laying practices enhance the stability and durability of the building structure throughout it life span, but if incorrect practices can cause the building to become unstable, dangerous and above all building failure (Udo, 2009). Undoubtedly, laying foundation of a building is one among the most important tasks that is given optimum consideration.

Setting out of building foundation trenches is the process of demarcating down the excavation lines on the ground based on the building plan. The setting out process is also called as ground tracing that is performed before commencing the excavation process. Once the design of foundation is complete a setting out plan or foundation layout is prepared for a suitable scale and the plan is dimensioned accordingly (Dunham, 2017). The basic steps involved in setting out the foundation trenches are: The initial step is to mark the corners of the building. After which, the lengths of the sides are checked by diagonal measurements. The axial lines (center lines) of the trenches are marked with the help of profiles, sighting rails, strings, and pegs.

Concrete is a fundamental foundation laying material to municipal infrastructure, office buildings and homes. According to (Mindess et al, 2003) concrete is a composite material which consists of filler and binding materials where the filler materials are fine or coarse aggregate and binding materials such as cement paste. Concrete solidifies and hardens after mixing with water and placement due to a chemical process known as hydration. The water reacts with the cement, which bonds the other components together, eventually creating a stone-like material (Ata, 2014).

Statement of the Research Problem

The persistence building failures has apparently led to the enormous loss of human life, properties, and huge wasted investments in housing due to number of factors among which is poor design, lack of competent workforce, inferior materials to mention a few. The incidences of buildings failure in Nigeria has reached an alarming proportion; since it is so bad that; a record of a building failure is registered somewhere within the country in every six months. For instance, in the last 15 years alone, not less than 30 buildings have collapsed around Lagos (Ejeh, 2011). Other major cities such as Abuja, Port Harcourt, and Ibadan are not spared of these avoidable, distasteful and terrible phenomena partly caused by ineptitude, carelessness and lack of adherence to the recommendations of proper building regulations form the setting out of building to finishes. The losses caused by this unfortunate menace in monetary terms may be more than N500 billion since independence in 1960 (Ali, 2015). Craftsmen are the major construction workers in the building construction site, their activities are raging from one construction task to another to include among them is the foundation laying but how effectively are they practicing this aspect of the operation for construction of building is yet to be determined.

In addition, there is likely to be the problem of continual deviation in the practice of standard building requirements in the production of concrete for foundation, setting out building for foundation and foundation laying for the building by these craftsmen in the construction site which may likely be one of the causes of building failure in Federal Capital Territory, Abuja. Hence the problem of the study is; what are the practices adopted by craftsmen in foundation laying in construction site in Federal Capital Territory, Abuja?

Purpose of Study

The purpose of the study was set to:

1. Examine the setting out practices adopted by craftsmen towards reducing building failure in Federal Capital Territory, Abuja.
2. Identify the foundation laying practices adopted by craftsmen towards reducing building failure in Federal Capital Territory, Abuja.

Research Questions

The following research questions are state to guide the study

1. What is the setting out practices adopted by craftsmen towards reducing building failure in Federal Capital Territory, Abuja?
2. What are the foundation laying practices adopted by craftsmen towards reducing building failure in Federal Capital Territory, Abuja?

Research Hypotheses

The following hypotheses wasformulated and tested at 0.05 level of significance

HO_1. There is no significant difference between the mean response of Craftsmen and Foreman on the setting out practices adopted by craftsmen towards reducing building failure in Federal Capital Territory, Abuja

HO_2. There is no significant difference between the mean response of Craftsmen and Foreman on the foundation laying practices adopted by craftsmen towards reducing building failure in Federal Capital Territory, Abuja.

Methodology

The research design adopted for the research is the descriptive research design. The area of this study Federal Capital Territory Abuja. The population for this study was 251 subjects in 143 on-going construction sites under the supervision of large, medium and small construction companies which comprises of 150 Craftsmen and 101 Foremen in Federal Capital Territory, Abuja Metropolis. Purposive sampling was used to select150 Craftsmen and 101Foremen in Abuja Metropolis of Federal Capital Territory. This is because the respondent in these ongoing construction site have a good number of craftsmen who were their staff and are in a good position to provide accurate and reliable judgment in terms of setting out and foundation laying practices adopted by craftsmen towards reducing building failure in Federal Capital Territory, Abuja. A structured questionnaire of four-point rating scale was used and was validated by three experts in building technology. A reliability coefficient of 0.87 was obtained using Cronbach Alpha. A thirty-eight items questionnaire was used for data collection. Statistical package for Social Sciences (SPSS) was used for data analysis. The Data gathered was analyzed utilizing weighted mean, standard deviation and Improvement Need Index (INI) to answer the research questions raised, z-test was utilized to test all the null hypotheses at 0.05 alpha level of significance. The mean and standard deviation was used to answer the research questions based on the real and upper limit in table 3.1 while the z-test analysis was used to test the hypotheses at 0.05 level of significant.

RESULTS

Research Question 1: What is the setting out practices adopted by craftsmen towards reducing building failure in Federal Capital Territory, Abuja?

Table 4.1
Setting Out Practices Adopted by Craftsmen towards Reducing Building Failure in Federal Capital Territory, Abuja.

S/N	Items	N	$\overline{X}$	S.D.	Decision
1	Assemble tools and equipment before the commencement of setting out	150	3.76	1.26	Agree
2	Find out distance from the site boundary to the building line with reference to the working drawing	150	3.64	1.14	Agree
3	Always considered set back from within the four sides of the building	150	3.56	1.06	Agree
4	Locate corner A to place a peg in the ground	150	3.38	0.87	Agree
5	Tie the string between pegs A and B	150	3.17	0.66	Agree
6	Measure the diagonal A-D and B-C	150	3.02	0.51	Agree
7	Use of builder's square to check the corner at right angles.	150	2.98	0.50	Agree
8	Ensure site is cleared to avoid any obstructions of grasses and shrub	150	3.20	0.70	Agree
9	Set out building on to the ground with the given dimension from the plan without difficulties	150	3.09	0.60	Agree
10	Use of sharp pegs which measure 75×75×300mm	150	2.94	0.44	Agree
11	Follow the various work stages correctly in setting out operation.	150	2.97	0.46	Agree
12	They always have 30-meter measure steel tape	150	3.14	0.64	Agree
13	Use of profiles to replace the corner pegs	150	3.00	0.50	Agree
14	Use to determine the suitable size of the block on the line drawn for excavation	150	2.70	0.20	Agree
15	Use to measure accurately the parameters of the setting out	150	2.89	0.40	Agree
16	Use to reduce level to make an even working surface.	150	3.09	0.59	Agree
17	Use of spirit level to check all pegs and lines	150	3.16	0.66	Agree
18	Use of bricklayer's line and pins	150	2.78	0.28	Agree
19	Use 3-4-5 method in setting out of building without difficulties	150	2.98	0.48	Agree
20	Locate the position of columns or piers in the building drawing for frame construction	150	2.97	0.47	Agree
21	Measure the positions on the ground and place pegs to mark the centre of the column	150	2.65	0.15	Agree
22	Run lines from the centre of the pegs in both directions to the opposite wall position or profile	150	2.79	0.30	Agree
	Average Mean		**3.08**		

Table 4.1 showed the mean response on setting out practices adopted by craftsmen towards reducing building failure in Federal Capital Territory, Abuja. The table showed that the average mean for all the responses was 3.08. From the average mean for the total responses, all the responses fall between 2.50 – 3.49. This indicates that the majority of the respondents agree that the standard setting out practices by craftsmen towards reducing building failure in Federal Capital Territory, Abuja like assembling tools and equipment before the commencement of setting out; finding out distance from the site boundary to the building line with reference to the working drawing; always considering set back from within the four sides of the building; locating the position of columns or piers in the building drawing for frame construction and measuring the positions on the ground and place pegs to mark the centre of the column among others are strictly followed.

Research Questions 2: What are the foundation laying practices adopted by craftsmen towards reducing building failure in Federal Capital Territory, Abuja?

Table 4.2
Foundation Laying Practices Adopted by Craftsmen towards Reducing Building Failure in Federal Capital Territory, Abuja.

S/N	Items	N	$\bar{X}$	S.D.	Decision
1	Blind the excavated base to get level ground for the foundation	150	3.75	1.25	Agree
2	Ensure thickness of the foundation concrete is 150mm	150	3.45	0.95	Agree
3	Spread mortar on the foundation for the first course.	150	3.26	0.76	Agree
4	Use to Construct column to specifications.	150	2.97	0.47	Agree
5	The width of the foundation is 3x thickness of the wall	150	2.79	0.29	Agree
6	Ensure uniform level throughout the building for foundation	150	2.79	0.29	Agree
7	Drive in pegs uniformly to determine thickness of foundation concrete	150	3.00	0.50	Agree
8	Correct sizes of reinforcement are place as specified	150	2.76	0.26	Agree
9	Use to identified the level of bearing capacity of subsoil for foundation	150	2.78	0.28	Agree
10	Ensure continuity of placement of concrete without breakage	150	2.89	0.39	Agree
11	Ensure timbering to foundation trenches to avoid side collapse where necessary	150	2.88	0.38	Agree
12	Ensure measures are taken in a building with different type of bearing capacity	150	3.16	0.67	Agree
13	Ensure back filling are well compacted	150	3.10	0.60	Agree
14	Ensure compliance to depth of foundation as indicated in the building drawing	150	2.90	0.40	Agree
15	Spread concrete as soon as it places in the foundation trench	150	2.93	0.44	Agree
16	Adequate time/days for concrete setting is adhered before laying the first course on the foundation	150	2.93	0.43	Agree
	Average Mean		**3.02**		

Table 4.2 showed the mean response on foundation laying practices adopted by craftsmen towards reducing building failure in Federal Capital Territory, Abuja. The table showed that the average mean for all the responses was 3.02. From the average mean for the total responses, all the responses fall between 2.50 – 3.49. This indicates that the majority of the respondents agree that the standard foundation laying practices by craftsmen towards reducing building failure in Federal Capital Territory, Abuja are all adopted which include blinding the excavated base to get level ground for the foundation; ensuring thickness of the foundation concrete is 150mm; spreading mortar on the foundation for the first course; using construct column to specifications and ensuring uniform level throughout the building for foundation among others.

Hypotheses One
HO_1. There is no significant difference between the mean response of Craftsmen and Foreman on the setting out practices adopted towards reducing building failure in Federal Capital Territory, Abuja

Table 4.3:
Summary of t-test Analysis of Mean Response of Craftsmen and Foremen on Settingout Practices Adopted towards Reducing Building Failure in Federal Capital Territory, Abuja

Group	N	df	$\bar{X}$	SD	t-value	P-value
Craftsmen	150		64.51	9.23		
		249			0.017	0.000
Foremen	101		72.84	7.92		

Significance at 0.05.

Table 4.3 shows the t-value was 0.017 and the P-value was 0.05, this means it was significant as such hypothesis one was rejected. The mean response score of the craftsmen respondents was 64.51 and standard deviation was 9.23 while the mean response score of foremen was 72.84 and the standard deviation was 7.92. This implies that the foremen adhere strictly to setting out practices adopted towards reducing building failure more than craftsmen in Federal Capital Territory, Abuja.

Hypotheses Two
There is no significant difference between the mean response of Craftsmen and Foreman on the foundation laying practices adopted towards reducing building failure in Federal Capital Territory, Abuja

Table 4.4:
Summary of t-test Analysis of Mean Response of Craftsmen and Foremen on Foundation Laying Practices Adopted towards Reducing Building Failure in Federal Capital Territory, Abuja.

Group	N	df	$\overline{X}$	SD	t-value	P-value
Craftsmen	150		46.78	5.93		
		249			0.457	0.000
Foremen	101		50.71	5.15		

Significance at 0.05.

Table 4.6 shows the t-value was 0.457 and the P-value was 0.05, this means there was no significant difference as such hypothesis two was rejected. The mean response score of the craftsmen respondents was 46.78 and standard deviation was 5.93 while the mean response score of foremen was 50.71 and the standard deviation was 5.15. This implies that the foremen adhere strictly to foundation laying practices adopted towards reducing building failure more than craftsmen in Federal Capital Territory, Abuja.

Discussion
It was found out that the majority of the respondents agree that the standard foundation laying practices by craftsmen towards reducing building failure in Federal Capital Territory, Abuja are all adopted which include blinding the excavated base to get level ground for the foundation; ensuring thickness of the foundation concrete is 150mm; spreading mortar on the foundation for the first course; using construct column to specifications and ensuring uniform level throughout the building for foundation among others.
Finding revealed that the majority of the respondents agree that the standard setting out practices by craftsmen towards reducing building failure in Federal Capital Territory, Abuja like assembling tools and equipment before the commencement of setting out; finding out distance from the site boundary to the building line with reference to the working drawing; always considering set back from within the four sides of the building; locating the position of columns or piers in the building drawing for frame construction and measuring the positions on the ground and place pegs to mark the centre of the column among others are strictly followed.

Conclusion
From this study, it is concluded that the setting out practices, foundation laying practices, concrete production practices were adopted by craftsmen towards reducing building failure in Federal Capital Territory, Abuja. It was also found out that the strategies for improving the foundation laying practices were adopted by craftsmen towards reducing building failure in Federal Capital Territory, Abuja. Finding revealed that there is significant difference between the mean response of Craftsmen and Foreman on the setting out practices, foundation laying practices and concrete production practices adopted by craftsmen towards reducing building

failure in Federal Capital Territory, Abuja. Finally, finding revealed that there is no significant difference between the mean response of Craftsmen and Foreman on the strategies for improving the foundation laying practices adopted by craftsmen towards reducing building failure in Federal Capital Territory, Abuja.

Recommendations

Based on the findings of this study, the following recommendations were made:

1. Craftsmen should be subjected to series of retraining programmes for setting out, foundation laying and concrete production practices to avoid building failures in Nigeria.
2. Emphasis should be attached to practical examination in the curriculum for teachers of building construction in order to instill in the learners, the importance of practical exercise for skill acquisition.
3. Federal and state governments in Nigeria should have a serious re-think in overhauling technical education for sustainable development.

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SENIOR SECONDARY SCHOOL TEACHERS' PERCEPTION ON THE USE OF ICTs FOR TEACHING AND LEARNING IN IGARRA, EDO STATE

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Abstract
This study adopted a descriptive survey research design to assess the perception of senior secondary school teachers in Igarra, Akoko-Edo Local Government Area of Edo State. The target population for the study were all the senior secondary school teachers in the three senior secondary schools in Igarra. 57 male and 78 female teachers constituted the population and census for the study since the number was manageable by the researchers. The instrument used for data collection was researchers designed and titled "Teachers' Perception of the Use of ICT Questionnaire TPUICTQ)". The instrument had two sections: 'A' on demographics information of the respondents and B contained the questionnaire items structured following 4-point Likert rating scale. The instrument was face validated by three ICT experts and three senior secondary school teachers. The instrument was pilot tested in two senior secondary schools which involved 20 teachers. Cronbach Alpha was used to determine the reliability co-efficient which yielded 0.89. 135 questionnaire instruments were administered by the researchers and one assistant and a total of 131 was retrieved out of which 129 representing 95.6% were found usable and was used for the study. Findings revealed that senior secondary school teachers' perception was negative and this affected the actual use of ICT for teaching and learning in Igarra. It was recommended that the teachers should rescind on their perception and explore the use of ICT for teaching and learning.

Keywords: Senior Secondary School, Teachers' Perception, ICTs, Teaching and Learning

Introduction

The senior secondary school education in Nigeria is the education that lasts for three years expected to be enrolled into after the completion of the compulsory 9-years of continuous education (lower basic – 3 years, middle basic – 3 years and upper basic – 3 years). At the completion of the senior secondary school, a learner is expected to enrol for the terminal examinations in either West African Examination Council (WAEC), National Examination Council (NECO) and National Business and Technical Examinations Board (NABTEB). It is the performance from any of the above examinations that determine the preparation of the learner for further studies. Education at this level has four filed of studies which include: Science and Mathematics, Technology, Humanities and Business Studies. Teachers who teach this category of learners are trained teachers with at least first degree in education.

The use of Information and Communication Technologies (ICTs) in the classroom which connotes ICTs in teaching and learning has come of age. It has been widely discussed with the potential inherent in classroom activities. The term ICTs has been variously defined by several scholars in the field of education such as Mavellas, Wellington & Samuel (2016) defined ICTs as information handling tools, applications and services that are used to produce, store, process, distribute and exchange same. Similarly, ICTs are said to be tools used for collecting, storing, editing and dissemination of information in various forms including classroom setting (Issa, Daramola, Aladelsusi & Udoh, 2017).

The use of ICTs in education is for both academic and non-academic activities. According to Okojie, 2016, the use of ICTs encompasses both academic and non-academic activities which involve the use of whiteboards, computers, internet, laptops, modem, flash memory, overhead projector and CD-ROM packaged software to mention but few.

The use of ICTs in the process of teaching and learning is of great benefits to both the teachers and the learners. These benefits include improving instructional delivery and learning environment (Onwuagboke, Singh & Fook, 2015). This will benefit both the teachers as less stress will be expended and the learners would understand better. It is based on this that Matthew. Joro & Manasseh (2015) submitted that there was a need for ICTs in to be considered as the main priority in Nigerian Secondary schools. Yunus, Nordin, Salehi, Sun & Embi (2013), stated that the use of ICTs encourages cooperative learning, enhances the process of teaching and learning among others.

Several studies have been conducted on teachers' perception on the use of ICTs for teaching and learning by several researchers among whom are: Adomi and Kpangban (2010) who reported that teachers' perception about ICTs for teaching and learning was negative which led to his conclusion that teachers' perception was one of the factors confronting the adoption of ICTs in Nigerian secondary schools. In similar studies, Al-Munawwarah (2014) who found that teachers have positive perceptions towards the use of ICT in teaching and learning of subject such as English. Sinbada, Mapenduka & Furusa (2016) in another study found that laptop was used for lesson preparation, interactive boards were used for delivering lessons and that teachers and students communicate through E-mails among others.

On the effect of teachers' perception of the use of ICTs for teaching and learning, Cubukcuoglu (2013) found that teachers who had a negative perception towards ICT use, do not use ICT in teaching. Similarly, Agbo (2015) discovered from a study that teachers' attitude and perception affect their use of ICTs in teaching and learning in Nigeria. However, Kervin (2013) who in a study found that Australian teachers use technology for lessons preparation and mobile technologies to communicate with their students. Likewise, the report of the study by Ejinkeonye et al (2016) who reported a finding from a study carried out, that Nigerian secondary school teachers seldom use ICTs in their lesson delivery in Abia State, Nigeria.

On gender difference on teachers' perception of the use of ICTs for teaching and learning, several studies have been carried out and reports show that Kehinde & Salami (2018) found no significant difference in the male and female students' perception. Similarly, Utoware & Agbonaye (2018), Ebele, Onokpaunu & Ikonomwan (2018) and Olyinka & Joshua (2018) in their individual studies also found no significant differences. However, other researchers have also found in their studies that there were significant differences in the male and female students' perception on ICTs, they include; Mahdi & Al-Dera, (2013), Teo (2014), Buabeng-Andoh (2015) and Usman, Orji & Sule (2018).

Statement of the Problem

The era when teaching and learning is the 'face to face' tradition mode of delivering lessons, also known as the use of 'talk and chalk' method of teaching which teacher-centred activities are now becoming obsolete the world over, it has also been noticed here in Nigeria that it is becoming ineffective in meeting the educational demands of the learners in technology-driven generation (Onwuagboke, et al 2015). An era that Information and Communication Technologies have permeated every aspect of human endeavours without exception to the field of education (teaching and learning inclusive). It has however been noticed that teaching and learning in some parts of the country (Igarra inclusive) still rely very much on this method of teaching. This study was therefore designed to seek senior secondary school teachers' perception of the use of ICTs for teaching and learning.

Purpose of Study

The study was set to:

1. Examine what perception do senior secondary school teachers hold on the use of ICTs for teaching and learning in Igarra.
2. Examine if senior secondary teachers' perception on the use of ICTs affect its actual use for teaching and learning in Igarra.

Research Questions

The following research questions were raised for the study:

1. What perception do senior secondary school teachers hold on the use of ICTs for teaching and learning in Igarra?
2. Do senior secondary teachers' perception on the use of ICTs affect its actual use for teaching and learning in Igarra?

Hypothesis

$H0_{1:}$ There is no significant difference in the mean responses of male and female senior secondary teachers' perception on the use of ICTs for teaching and learning in Igarra

Methodology

This study adopted a descriptive survey research design to assess the perception of senior secondary school teachers in Igarra, Akoko-Edo Local Government Area of Edo State. The target population for the study was all the senior secondary school teachers in the three senior secondary schools in Igarra. The teacher comprised 57 male and 78 female teachers. The entire population participated in the study since the number was manageable by the researchers. The instrument for the study was researchers designed and titled "Teachers' Perception of the Use of ICTs Questionnaire TPUICTQ)". The instrument had two sections: 'A' on demographics of the respondents and B contained the questionnaire items structured following 4-point Likert rating scale. The instrument was face validated by three ICT experts and three senior secondary school teachers outside Igarra. The instrument was pilot tested in two senior secondary schools which involved 20 teachers. Cronbach Alpha was used to determine the reliability co-efficient which yielded 0.89. The researchers and one assistant administered the 135 instruments on the respondents, 131 were retrieved which lasted for 3 days, 129 representing 95.6% was found usable and was used for the study. Frequency counts, percentage, mean set at 2.50 and the standard deviation was used to analyse the data collected to answer the two research questions and t-test was used to test the only hypothesis.

Result

Demographic information of the respondents

Figure 1 showed that 44% (n=47) teachers were male and 56% (n-72) were female.

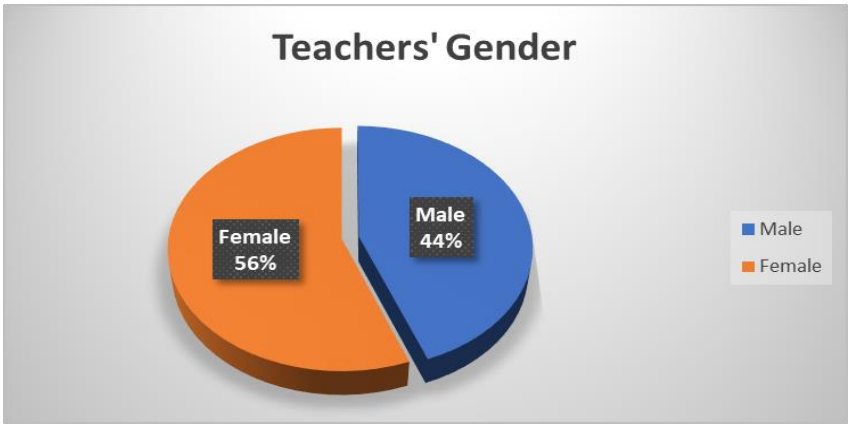


Figure 2 showed respondents' qualifications: Degree holders in Education were 61% (n=79), Master Degree holders in education were 33% (n=42) and others qualifications were 6% (n=8).

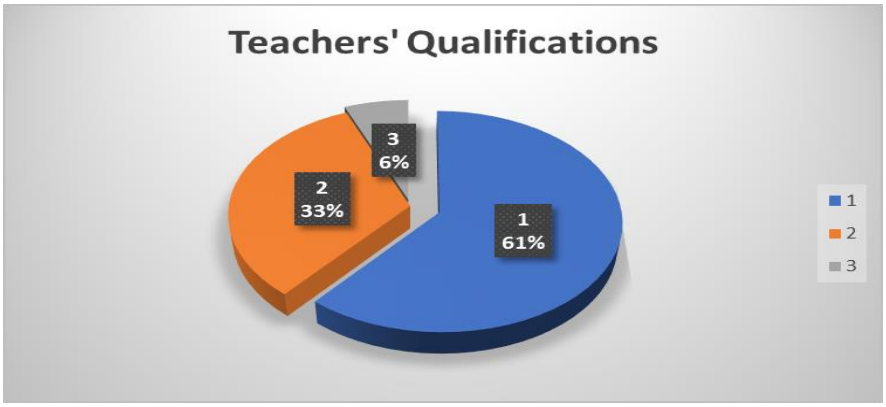
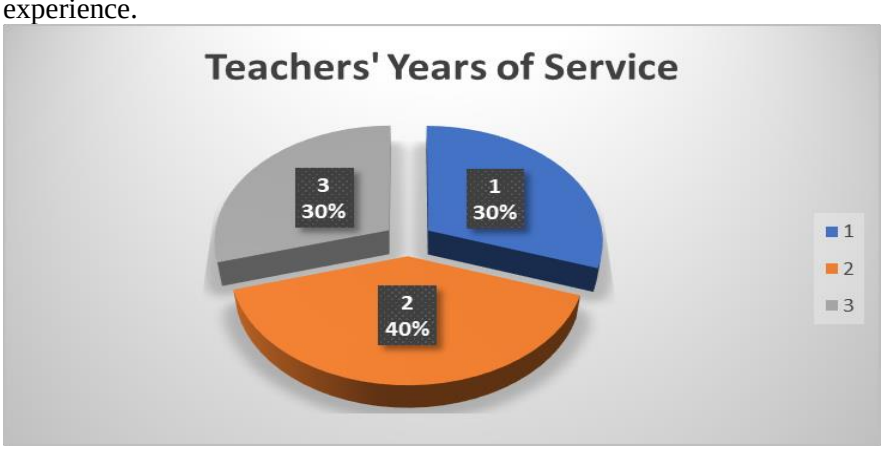


Figure 3 showed that 30% (n=39) had between 1 – 10 years working experience, 40% (n=51) had between 11 – 20 years working experience and 30% (n=39) had 21 years and above experience.



Research Question 1: What perception do senior secondary school teachers hold on the use of ICTs for teaching and learning in Igarra?

Table 1:
Showing the responses of the senior secondary school teachers on the use of ICTs for teaching and learning in Igarra

S/N	Items	Mean	StD.	Decision
	The use of ICTs in teaching:			
1	makes my teaching easy	2.51	0.82	Positive
2	enhances my lesson delivery	2.49	0.68	Negative
3	Promotes problem solving	2.47	0.84	Negative
4	Foresters learning in collaboration	2.42	0.78	Negative
5	Increases innovation in learners	2.31	0.73	Negative
6	Promotes teaching and learning based on research	2.14	0.81	Negative
7	Raises quality in education	2.34	0.71	Negative
8	In training teachers in capacity professional development	2.15	0.77	Negative
9	Should be facilitated for teachers use	2.10	0.73	Negative
10	And learning is time-consuming	2.90	0.91	Positive
11	Facilitates problem-based learning	2.44	0.69	Negative
12	Absence of ICTs in teaching keep teachers out of current happenings	2.34	0.77	Negative
Cluster Mean		**2.39**	**0.77**	**Negative**

Table 1 showed that only two items regarding teachers' perception on the use of ICTs for teaching and learning in senior secondary schools in Igarra were positive while ten items had

their mean below mean score value of 2.50 signifying that the items were negative. Grand mean of 2.39 while the standard deviation of the items ranges between 0.68 and 0.91 which implies that respondents are not far from one another from the mean in their responses.

Research Question 2: Do senior secondary teachers' perception on the use of ICTs affect the actual use for teaching and learning in Igarra?

Table 2:
Showing the effect of senior secondary school teachers' perception of the actual use of ICTs for teaching and learning in Igarra

Items	Mean	StD	Decision
I use ICTs: Computer and internet to search for materials for teaching	1.59	0.88	Disagree
Laptop and internet to search for materials	1.70	0.78	Disagree
Interactive board to direct learners' attention	1.09	0.77	Disagree
Projector to direct learners' attention	1.10	0.76	Disagree
To motivate learners for collective learning	1.89	0.70	Disagree
To motivate learners to solve problems collectively	2.01	0.83	Disagree
E-reader in my lesson delivery	1.76	0.74	Disagree
Internet in the classroom for teaching and learning	1.07	0.76	Disagree
Alone to avoid being seen making errors	2.90	0.82	Agree
Confidently in teaching	1.89	0.80	Disagree
Learners have access to ICTs in the classroom	1.19	0.88	Disagree
Learners do use to ICTs in the classroom	1.03	0.79	Disagree
1.60	**0.79**	**Disagree**	

Table 2 revealed that only item 21 had a mean value of 2.90, all other items had their mean scores between 1.03 and 2.01 with standard deviation ranging from 0.70 to 0.88 which showed that respondents were not far from one another their responses. The grand mean is 1.60 which implies that senior secondary school teachers' perception affects the actual use of ICTs in teaching and learning in Igarra.

Research Hypothesis: There is no significant difference in the mean responses of male and female senior secondary teachers' perception on the use of ICTs for teaching and learning in Igarra.

Table 3:
t-test Analysis of Male and Female Teachers' Responses on their Perception of the use of ICTs for teaching and learning in Igarra

Gender	N	Mean	StD	Df	t-cal	P-value (2-tailed)
Male	57	12.45	4.14			
				127	-1.45	0.15
Female	72	16.16	5.10			

Table 3 shows that t (-1.45) at df=127 and P-value .015. Since P-value is greater than 0.05, the implication is that the null hypothesis which stated that there is no significant difference in the mean responses of the male and female teacher on the perception of teachers on the use of ICTs for teaching and learning is retained. The implication is that there is no significant difference.

Discussion

The result of the data analysed in Table 1 showed that the senior secondary school teachers in Igarra have a negative perception of the use of ICTs for teaching and learning. This finding is in line with the finding of Adomi and Kpangban (2010) who in a study found that teachers' perception about ICTs for teaching and learning was negative and concluded that it was one of the factors confronting the adoption of ICTs in Nigerian secondary schools. However, the finding of this study disagrees with several research reports by Al-Munawwarah

(2014) who found and reported that teachers have positive perceptions towards the use of ICT in teaching and learning of subjects such as English. Sinbada, Mapenduka & Furusa (2016) that laptop was used for lesson preparation, interactive boards were used for delivering lessons and that teachers and students communicate through E-mails among others.

The result in Table 2 revealed that ICTs are not in use in senior secondary schools in Igarra. This finding is in agreement with the report of Cubukcuoglu (2013) who reported from a study that teachers who had a negative perception towards ICT use, do not use ICT in teaching. Similarly, Agbo (2015) discovered from a study carried out in Nigeria that teachers' attitude and perception affects their use of ICTs in teaching and learning. However, the finding of this study is not in alignment with the result of Kervin (2013) who found from a study conducted in Australia that Australian teachers use technology for lessons preparation and mobile technologies to communicate with their students. Likewise, the report from a study by Ejinkeonye et al (2016) who reported a finding from a study carried out, that Nigerian secondary school teachers seldom use ICTs in their lesson delivery in Abia State, Nigeria.

Result of the analysis of the hypothesis in Table 3 showed that there was no statistically significant difference in the mean responses of male and female senior secondary school teachers on their perception on the use of ICTs for teaching and learning in Igarra. This finding is in line with the reports by several researchers, such as Kehinde & Salami (2018), Utoware & Agbonaye (2018), Ebele, Onokpaunu & Ikonomwan (2018) and Olyinka & Joshua (2018) who in their various studies found no significant differences between the male and female students 'perceptions. Conversely, the finding disagrees with several other reports from different studies such as Mahdi & Al-Dera, (2013), Teo (2014), Buabeng-Andoh (2015) and Usman, Orji & Sule (2018) who in the reports of their studies found significant difference in the perception of male and female students' perception on use of ICTs for teaching and learning.

Conclusion

Generally, the results showed that senior secondary school teachers in Igarra, Edo State, Nigeria, hold negative perception about the use of ICTs for teaching and learning. Their negative perception also had an effect on the use of ICTs in schools. Furthermore, the study revealed that statistically, there was no significant difference in the male and female teachers' perception on the use of ICTs for teaching and learning in Igarra.

Recommendation

In view of the findings of this study, the following recommendation was put forward:

1. Senior secondary school teachers in Igarra should rescind their negative perception on the use of ICTs for teaching and learning so that they can benefit from the potentials inherent in ICTs for teaching and learning.
2. Teachers should take steps in exploring the use of ICTs for teaching and learning in senior secondary schools in Igarra.

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