2021 Association for Digital Education and Communications Technology Conference Proceedings

2021 ASSOCIATION FOR DIGITAL EDUCATION AND COMMUNICATIONS TECHNOLOGY CONFERENCE PROCEEDINGS

Digital, Technological and Education Divides in a Borderless World

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There is no better time than now, especially since the emergence of the COVID 19 pandemic and the sudden transition to remote teaching/learning, to talk about the **innovative educator** and strategic moves necessary to bridge the "**Digital, Technological and Education Divides in a Borderless World.**" This international hybrid Conference proceedings provided a common ground for collaboration and integration of ideals to meet the educational needs of teachers, students and other stakeholders

The 2021 ADECT conference brought together scholars to share with and learn from each other on the continued power of technology in education. The conference began with keynote addresses by innovative educators such as **Tony Carr** who spoke on *Growing online professional development across Africa*; **Prof Robert C.M. Branch** on *How to promote Instructional design and facilitate student-centred learning* and **Prof Tutaleni I. Asino** on *"Learning without Borders: from advocacy to implementation."* The conference consisted of numerous

sessions that explored the use of technology across educational systems and outlining the issues faced by innovative educators as well as challenges from digital divides.

There are numerous conferences around the world that deal with the topic of Information Communication Technologies in Education, which is also commonly referred to as Educational Technology. What distinguishes ADECT from many others is the ability to bring together scholars and practitioners across Nigeria to share about their context as they see it, as well as experts from AECT to explore topics together. The proceedings that result from this conference are not only a matter of cataloguing a collection of papers, rather they continue to be a way for the involved scholars to share with each other and an intentional contribution of Nigerian Scholarships to the global knowledge body.

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FOREWORD TO THE PROCEEDINGS

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The ADECT AECT 2021 international hybrid conference featured scholarly sessions that were informative, scientific and practical, and relevant to the field of information and communication technology (ICT). The conference theme: The Innovative Educator: Bridging Digital, Technological and Education Divides in a Borderless World, exemplified the mission of the Association for Educational Communications and Technology (AECT), which is to " Provide international leadership by promoting scholarship and best practices in the creation, use, and management of technologies for effective teaching and learning." Educational technology professionals study and practice procedures, and develop products that focus on increasing the potential for student success through meaningful learning.

These proceedings represent the academic content from a forum where educational technology

professionals convened to exchange ideas about proven strategies for the effective practice of instructional design based on in-depth knowledge and skills about the process, products and designer competencies associated with the systematic design of teaching and learning materials. The content of the proceedings represent empirically supported procedures that are interdependent, synergistic, dynamic, cybernetic, systematic and systemic with regard to maintaining student learning outcomes as the focal point of instructional activities.

The articles included in this publication offer the reader an opportunity to review effective teaching philosophies, criteria for utilizing a preferred instructional technology, and frameworks for establishing course goals and identifying specific learning tasks that underpin most teaching and learning spaces. The content of these proceedings are replete with samples of work, case descriptions and typical instructional design strategies that apply contemporary learning theories, and produce authentic solutions for closing performance gaps that are caused by a lack of knowledge and skills. The ideas contained herein will benefit all education professionals who work with trainers and teachers to create student-centred teaching and learning materials and delivery systems.

CHAPTER 1.

MUSIC EDUCATION AND THE IMPACT OF ICT IN THE FACILITATION OF TEACHING AND LEARNING OUTCOMES IN NIGERIA'S HIGHER INSTITUTIONS IN THE ERA OF THE NEW NORMAL (COVID-19)

OKAFOR JUSTINA ENOH (PHD) AND OFOSU OFORI OSBORNE

Abstract

With the surge of the corona-virus pandemic, world economy including school activities were disrupted. All facet of education acquisition were affected not excluding music education programme run in Nigeria's higher institutions. How do nations and educational sector survive this new normal especially the dissemination of knowledge (teaching and learning)? The use of Information Communication Technology (ICT) and accessories became suddenly important as a tool to disseminating information between teachers and students. This need also presented challenges, a large

percentage of music teachers and students are not ICT compliant. How can ICT impact the interface and facilitation of teaching and learning of Music Education in this new normal? The paper implicates descriptive analysis and participant observation method; related literatures were also perused to form the bulk of the discourse; finally, applicable suggestions were identified; the paper conclude that appreciable knowledge of ICT applications and accessories would significantly impact greatly on easy interfacing between music teachers and students in the new normal.

Key Words: ICT, Music Education, Impact, Epoch, New Normal

Introduction

ICT, an acronym for Information and Communication technology, which deals with the processes, storages and transfers of information through the use of computers, telecommunication networks and other electronic devices have greatly affected every nooks and crannies of world activities and ideas. Its emergent strongly rooted in science and technology picture in the 21st century. Today, ICT has turned the world into a global center with increase accessibility to information through active communication systems. The major components and devices of ICT are heavily conceived in audio cassette recorders, audio cassettes, radio, television, computers, satellite communication, telephony, teleconferencing, video conferences, networks, internet services, cellular mobile phones, hardware and software etc. ICT is a basic player in every facet of human activities/endeavours globally. Its adverse effect is strongly felt in the dissemination of information generally. What role did ICT play during the pandemic?

With the surge of the corona-virus pandemic, world economy including school activities were gravely affected and disrupted. Kirti (2021) observed that 'the transmittable disease Corona Virus known as Covid-19 has deeply affected the global economy. This situation has also shaken up the whole education system. Due to the Covid-19 pandemic many schools and colleges have to remain closed temporarily. Several areas are affected in the world and there is fear of losing this ongoing year for education. Various Schools, Colleges and Universities have discontinued off line struggling to find options to deal with this challenging situation.' (p. 49). He further noted that at this time of crisis, it becomes challenging to keep the education continuous and unaffected due to this Corona Virus pandemic. Educational institutions are not much capable to transform all their curricula unto online resource overnight. The Nigerian educational sector was not left out in this monster 'covid-19'; teaching and learning encounter was adversely affected by the global pandemic (covid-19). How do educational sectors embrace, surmount and survive this new normal especially in the aspect of teaching and learning in Nigeria's higher institutions? As reiterated before all facet of education acquisition were greatly affected including the music education program. There must be a vanguard, an obtainable approach, thus the use of Information Communication Technology (ICT) applications and devices which was already in existence became suddenly important as a tool to disseminating information between teachers and students. With this knowledge presented another challenge – how many music teachers and students in Nigeria's higher institutions are ICT compliant? How can ICT impact the facilitation and

interfacing of teaching and learning of Music Education curricula in the new normal?

Conceptualizing of Music Education and ICT

Information and Communication Technology according to Abifarin (2003) refer to the various infrastructures used in creating, storing, processing communication and the dissemination of information and their application in the numerous services rendered by the infrastructures. Hunt (2001) and Okolo (2005) perceive Information and Communication Technology as a complex of artifacts, techniques and knowledge use in solving man's problems involving Information and its Communication. Omeiza (2009) also see Information and Communication Technology as involving the three technologies of computer, electronics and communication to satisfy various kinds of man's information needs. Citing Obanya (2002) and Onuma (2007), Ezele & Tedjere (2019) stated that ICT is broad term that has to do with the harnessing of process, the methods and the product of electronic and communication related technologies and other related resources in today's knowledge-driven society for enhancing the production, the spread and efficiency of a set of programmed activities geared towards the achievement of clearly determined goals (p. 159).

On the other hand, Eliotte (1995) cited in Onyiuke (2009) perceive music education via four angles of education: education in music, education about music, education for music and education by means of music. The author further gave an explicit observation of what the four angle of education in music entails. Education in music that involves the teaching and learning of music, making music and listening; Education about music

which refer to the teaching and learning about music making, history and theory; Education for music involving the teaching and learning as in preparation for a career as a performer, composer, historian, critic, researcher or teacher; while Education by means of music is seen as over lapping with the first three angles of education mentioned above. According to Aibuedefe, and Abologba (2016:239), 'music education is that aspect of education that is geared toward the actualization of its aims and objectives. It is the process of imparting musical knowledge to an individual or group of individuals for self-actualization, reliance and the betterment of the society in general'. These definitions clearly explore the entire essence of music education in its entire ramification. Hence music education encompasses the education in music teaching, learning and making music in its theoretical and practical skills. In summary, ICT is the utilization and manipulations of the application of different tools of science and technology to facilitate information and its management. From the foregoing, Information and communication technology would play multifarious roles in administration and management of teaching and learning outcome in the music education programme in various higher institutions given the necessary receptiveness.

ICT's Impact in Meandering through and Facilitating Easy Interaction and Interfacing between Music Teachers and Students

Information and Communication Technology in educational system globally would aid and improve the act of teaching and learning in music in the new normal epoch. ICT has tremendous effect in the dissemination of music and musical concept through the facilitation of

appropriate skills, knowledge and understanding of general musical concepts. The application of ICT in the teaching and learning of music in Nigeria's higher institutions would provide the means by which teachers and students seek out, access and communicate in a wide variety of sounds, factual musical information and resources in teaching and learning of music and musical concepts. Information and communication technology application would serve as knowledge sharing-portal, search engines, public administration, social service and business solution to music education programme. ICT also provide a wide range of music software and hardware that has enable students in music training in the acquisition and utilization of music and musical skills in various contexts that have encourage magnitudes of thought and managements of musical processes. Knowledge of ICT application and accessories would also help to development students' musical skills in reading and writing of staff notation, rhythmic tone patterns, distinguish tone colours, texture and structures of music through working with electronic sounds including interaction and interfacing between music teachers and students. Savage (2010) report that 'ICT can be used within the classroom in at least two ways; they can function as tools to facilitate models of practice 'extrinsic' to the technology itself or they can be used to generate what might be called an 'intrinsic' model of practice, one that leads to a greater exploration and engagement with sound itself. Corroborating Savage above Ehiwario (2010:5-7) enumerated that ICT is used for recording or listening to music, through these students in colleges develop good skills in the use of their voices and instruments which enable them display good

performances during ensemble, and choir or group singing in churches and entertainment Centre. The device of ICT responsible for this is the audio tape and cassette recorder of audio visual medium. During ensemble performance recorded music through these medium help students and learners learn their parts faster while they listen to the recorded music they are able to appreciate the different styles, forms and technicalities in music compositions. ICT enable students evaluate their works as they listen to different compositions played by the tape recorder, mobile phones, and audiovisual medium of television set. ICT trains teachers and students confidence and independence as individual they are expected to work at their own pace. This enables students to review their work and modify their work to improve their ability. This development is possible through the use of some software such as Aurelia, and musition; this software is interactive programme that allow musical drill on aural training. This software also enable students develop skills in pitches, rhythms, intervals, melodic dictations, triad and tone recognitions. CD ROM entitled Teach Me Piano is designed to support the development of practical music skills through acquiring keyboard skills. Through this software many students have acquire keyboard skills. Reading music notation and rhythmic skills are profoundly enhanced using recorded materials as they are played back in the classroom through the medium of audio and visual medium of radio and television and especially the tape recorder and cassette player of videos and compact disk player (CD), through which students create and choreograph their dance skill which they perform with great confidence. Recorded music with the aid of ICT

help students to be creative and inventive, creativity is the ability to invent by imagination while inventiveness is the act of bringing about changes in a given situation. This brings about novel and useful sense of situations. In teaching composition the student's creativity and inventiveness are employed together because they bother on the ability of the students to articulate sound ideas mentally and put them together into a perceptible product of ingenuity. ICT help students to recognize sound pattern, relationships and behavior in compositions and form analysis. Some features like modulation, sequence, theme, tonal features, and auxiliaries are recognized in a playing CD ROM of musical pieces. These developments are also possible through the use of software such as the Acid-xpress program which allows students to study and listen to choosing pieces and analyses. Likewise it makes students recognize colour of each layer of a chosen piece of music.

Also, ICT provides means to access a wide variety of resources of information and provide the opportunity for interaction between people of different levels of musicians and composers. This is achieved through the internet services. Students also make and explore sounds recorded for different purpose and compare structure of music of different cultures. The internet has likewise improved student's ability on various concepts of music and musical concepts. Through the internet students search for materials and information they use in solving numerous task in researches and assignment given to them in the classroom situation. Students acquire knowledge, skills and understanding of music through ICT to capture changes and combine sounds they hear. This is also possible through the exploration of internet

services that students engage themselves. Students have used various software designs to enable the exploration of sounds become easier and feasible. Examples of such software are the Finale, Sibelius and Musition. ICT enable students to work at appropriate pace and depth in their specialized areas such as conducting, ethnomusicology, musicology, performances, dance choreographing, and music education. Various midi and audio recording working shops help students to use their best performing skills on instruments or voice to explore sound and create their own pieces of music. This is also an ICT device that incorporates a set of performance instruction to which compatible software and electronic devices that respond by producing musical notes, changing sounds adjusting volume. Students have also used software to produce music. This software include the programme software of sound-processing toys capable of producing a range of effects and transforming the voice of sound like for example a robot, ghost of cartoon character. In addition Jonathan Savage stated that the use of ICT in the music classroom has the potential to challenge traditional approaches to music teaching and learning although it can continue to reinforce existing ways of teaching music.

The importance of ICT to music studies enumerated above though laudable they are, today's ICT's impact on dissemination of knowledge is more than already enumerated facts. It is the interface between teachers and students beyond the four walls of the classroom. Thus the authors contend that it has gone beyond classroom application to more of an online collaboration and interaction between teachers and students online with the aid of ICT devices such as Zoom, Facebook,

WhatsApp and other ICT educational apparatus available for the purpose of transmitting information between teachers and students. Since during the Coronavirus global pandemic lockdown music teaching and learning was not an easy feat reasons being that there were students and teachers inclusive who were not ICT compliant in addition to not having an android phone, coupled with network problem teaching and learning outcome became inefficient and ineffective. Therefore, ICT experts should be invited to adequately train both music teachers and students in order to avert cases of inefficiency and ineffectiveness in the facilitation of teaching and learning outcome in case of any advert of another coronavirus occurrence.

Suggestions

The following suggestions by Oshinaike, A. B. and Adekunmisi, S. R. (2012) culled from the internet succinctly reflect and express the writer's view on the role the Federal government, State government, Higher institutions' management, including music associations and music education stakeholders in Nigeria in facilitating, enabling and actualizing ICT facilities in the music education programme to enhance teaching and learning in Nigeria's higher institution and beyond the classroom walls. Thus;

- Nigerian federal government should see ICT integration effort at the university as an embracing project to development in education and should support by allocating and releasing adequate funds to invest in massive internet connectivity, as well as purchase and installation of ICT infrastructures. Also, the university must

aim to ensure accessibility, availability and reliability of ICT facilities such that every lecture room and staff offices have computers linked to Internet and have equipment appropriate for accessing a range of electronic resources.

- If the government is not forthcoming, the university management can solicit for both internal and external funds and support from willing individuals, philanthropists and international organizations. They can also embark on networking and partnership programmes for funds, technical supports etc. but should ensure that funds or support realized are geared toward sustainability of ICT integration and application efforts.
- The government can also help by subsiding or reducing the tariffs on importation of ICT facilities so that lecturers and others can afford the purchase of these ICT facilities and accessories since the price will come down.
- University lecturers should be exposed to training and development skills in the use of these high technology facilities. Integrating the use of technology into curriculum in a purposeful and meaningful way is one of the many problems facing lecturers today. ICT training should be given to lecturers and other members of staff in the university on integration of technology instruction.
- Adequate, competent and experienced ICT technical staff must be made available should

problem arise.

In addition to the stated views above the writer advocate for the availability and adequacy and workable ICT facilities for music education programme in all higher institutions where music programme are run. In addition, ICT experts should be invited to train both teachers and students on proper application and usage of ICT virtual and other related packages for easy interaction and communication between teachers and students.

Conclusion

The paper highlighted the impact of ICT in the facilitation of teaching and learning outcome in the music education programme therefore there is urgent need to improve, facilitate and upgrade music education curriculum to bridge the gap in this epoch of the new normal – ICT is the key to bridging the gap. The adequacy and availability of ICT facilities and accessories in the teaching and learning in the music education programme in Nigeria's higher institutions where music programme is run is of utmost importance. Yet, the presence and availability of ICT facilities and accessories related to the music programme will not stimulate significant changes if teachers are not willing to be ICT compliant and avidly involved. Teachers are important ingredients in the implementation and facilitation of ICT instructions. Therefore, Music teachers need to learn and re-learn the use of ICT applications relevant to the music programme in order to teach students. Without the involvement of music teachers, most students may not take advantage of all the available potential benefits of ICT applications and integration in the classroom activities and beyond the classroom to enhance thinking

and creativity among students. Hence, in order to be relevant in the 'new normal' epoch, both teachers and students must be ICT compliant and ready to interface with one another either online or otherwise.

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CHAPTER 2.

THE IMPACT OF SOCIAL MEDIA IN ENHANCING AGRICULTURAL EXTENSION IN NIGERIA: A CASE OF IKA SOUTH LOCAL GOVERNMENT AREA OF DELTA STATE.

SALUBI HANNAH OYEYINKA

ABSTRACT

Agriculture plays an important role in Nigeria economy. Sustainable *agricultural production requires current and relevant information by expert in the field .The delivery of agricultural extension services, agricultural science centers and agricultural universities are limited and unstable with little impact There is a need to fill the gap by exploring other optional for alternative agricultural extension service delivery mechanisms. Information and communication technology (ICT) can provide information on agricultural extension with more precision, faster relevant and higher quality. With the present challenges of corona virus, social media including the internet is now the most important source of useful information among the farmers in Nigeria.*

Social media is yet another ICT-based tool that is used purely for entertainment, with great potential for knowledge sharing and collaboration in agriculture. These ICT devices are relatively easy to use and gaining popularity in the agricultural sector. Social media has great potential to be used as a tool of communication and networking for the benefit of the farming community, many farmers recognized it and started using it. Facebook is the most used social media platform in the world, with more than 1.87 billion monthly active user on its site. Social media channels enhanced and strengthened the relationship of agro based communities and helped rural workers combat the segregations created by their work. It has crossed geographical boundaries, thereby connecting the peasant communities to mutual interest. Blogs have a large presence covering topic on agriculture, animal husbandry, health and other topics of general interest. Social media plays a significant role in agricultural information among majority of young farmers in Ika South. This is because; it has been connecting young farmers and agro business farmers within the graphical area. It enhance interactions and information flows among the young farmers. In addition, distance is more a barrier. However, the use of social media is without few hindrances. Some of the challenges faced by Ika South young farmers in accessing social media are network problem, costly charge when accessing the internet as well as poor power service

From the study, it was deduce that public extension officers in Ika South area are insufficient hence the need for innovative services to fill the gap.

KEYWORDS: Social media, Agricultural Extension, Ika South.

INTRODUCTION

Nigeria as a country is presently facing economic

recession due to Corona Virus pandemic. There is therefore need for a corresponding increase in agricultural production to meet the recommended level for human health as well as economic development.

Agricultural production implies the production of crops and farm animals that are useful to human beings. It further involves gathering, processing, recording, storing, distributing, selling of farm yields and provision of raw materials for local and foreign industries. Agricultural production in no doubt enhance growth and development of any nation, sadly, farmers are not meeting up with the high demand for agricultural output.

Today, meaningful agricultural production involves using the internet to access relevant agricultural information, retrieve, download, record, disseminate and communicate useful farm ideas about crops and livestock production, processing storing and marketing of farm yields using information and communication technology. The high demand for food items expansion and diversification in industries that utilize agricultural produce have placed a need for agricultural education to revolutionize its production sector pattern in order to meet the challenges.

Social media has become a powerful tool that connects millions of people globally from the comfort of our homes. Social media is revolutionizing the way business is carried out bringing new ways of communication and exchange of information across the globe. Social media is becoming a very important tool in farming because it has the ability to connect with farmers and agribusiness people from around the world over large geographical distances. The benefits of this can be as large or small as the farmer's choose, depending on how much time we

wish to spend on it. Social media plays a very important role in enhancing interactions and information flows among different actors involved in agricultural innovation and also enhance capacities of agricultural extension.

The power of social media is in the features that allow it to be applied to a whole range of applications that involve interactions between people (Chuli, et al, 2012). It has also remove the limitations of geographical distance from users, which enables a platform that shares knowledge and culture and can play a part in the economic and political power.

LITERATURE REVIEW

The agricultural sector globally is embracing social media and utilizing it to promote knowledge within the industry as well as networking with other like-minded agricultural professionals. The communities and relationships that agriculture is largely based on are further extended through social media channels and rural workers have begun to use social media to combat the feeling of isolation which arises due to the nature of their work.

Social media has taken us back to the days of storytelling, where everyone in a group has the opportunity to add to the story or share another point of view. This is so because it taps into one of humans most basic natural needs. Forming groups and sharing information, providing entertainment and communicating. Information and communication technology (ICT) can provide information on agricultural extension with more precision, faster, relevant and higher quality. (Goyal, 2011, Kritiken 2012 and World Bank,

2016). These technologies are reviving agricultural expansion and advisory services worldwide. (World Bank, 2016). ICT –based tools in agriculture vary from web portals, mobile telephone and hybrid project (ICT with traditional extension elements) (Shantichandra et al, 2013). Mass media including the internet is now the second most important source of useful information for agricultural families.

Advantages of social media in Agricultural extension as discussed by (Saravanan et al., 2015)

- Highly cost-effective
- Simultaneously reaches large numbers of clients
- Location and client-specific, problem –oriented.
- User-generated content and discussion among community members.
- Easily accessed from mobile phones
- Increase the internet presence of extension organizations and their client reach
- The democratization of information by making it accessible to all.
- Brings all stakeholders into single platform
- Can measure reach and success by tracking the number of visitors, friends, followers, mentions, facebook 'likes', conversation index and number of shares

Social Media Tools Commonly Used in Agriculture Extension

The use of social media in agriculture sector and expansion has gained momentum in recent times, with

only popular platforms such as Facebook, Twitter, and Youtube being used for agriculture and extension related works. Whatsapp is another major platform used by extension professionals to communicate with peer or client farmers but as communication (individual and group) is personal, more information is available about groups other than being referred to by media. The various social media tools popular these days are listed below

Facebook

Facebook is the most used social media platform in the world, with more than 1.87 billion monthly active users on its site (We Are Social, 2017). And this means a huge potential for extension professionals. Some examples where Facebook is being used as an extension tool by individuals, professional networks, and extension organizations.

Twitter

Microblogging site Twitter is one of the most popular social media platforms globally with more than 300 million users. In a social context, it has been one of the major catalysts used for creating public opinions and for organizing people into groups. In agriculture too, it is one of the most used platforms.

YouTube

YouTube It is the video-sharing platform with a mission to give everyone a voice and show them the world and is based on four values: Freedom of expression, Freedom of information, Freedom of opportunity, and Freedom of belonging. Users can upload and watch the videos, and there is provision for sharing and commenting on videos with additional facilities for the subscription of other users.

Blogs

Blogs contain detailed information on specific topics. They create and facilitate an in-depth discussion on any issue through comments from the readers. With increased popularity, many blog competitions are also organized worldwide for rural youth to encourage them to start a discussion about farming. Even organizations like World Bank, Food and Agriculture Organization (FAO) and International Food Policy Research Institute (IFPRI) have their blogs not just to discuss issues but announce their new publications like policy papers, working papers, and reports and so on; communicate summaries of important publications, and to increase awareness and discussion on important issues related to agriculture and rural development.

WhatsApp

A messenger app for smart phones, it is an internet-based messaging platform that supports text, audio, video, pdf, and various other forms of files. Real-time video chatting has also been integrated recently, making it more popular among users. Currently, there are more than one billion users of the app in 180 countries. Though initially used for personal messaging, it is gaining more popularity among agricultural professionals and practitioners to share information, which is aided by the group messaging feature.

Role of Social Media in Farming

In the global context, the agricultural sector is using social media to promote relevant information and knowledge within the industry and to network with other like-minded agricultural professionals. Social media channels enhanced and strengthened the relationships of agro-based communities and helped

rural workers combat the segregation created by their work. It has crossed geographical boundaries, thereby connecting the peasant communities to mutual interest.

So far, blogs have a large presence covering topics on agriculture, animal husbandry, health, education, and other topics of general interest. Social media such as Facebook, Twitter, YouTube, and blogs are emerging as an appropriate platform to share information and create awareness among various stakeholders to generate and shape the content of the event.

These media complement traditional media as a viable source of information and facilitate the marketing of agricultural products and their products using pictures, links, and videos. They provide opportunities for users to share and exchange information and to discuss burning issues in agriculture based on their knowledge and

MATERIAL AND METHODS

The study adopted a descriptive survey and farmers in Ika South Young Farmers Association were purposively sampled due to its relatively conventional mode of small scale farming hence the small scale farmers in the area met the characteristics of the study. The study randomly sampled 80 small scale farmers in the area and questionnaires and focus group discussion was also used to obtain information from the farmers.

Of recent, the number of extension workers has been decreasing drastically while the number of small scale farmers has been increasing therefore creating the need for innovative services to address this gap. (Gakuru et al., 2009). Compared with agriculture sector in developing countries, agriculture is becoming increasingly knowledge intensive. As agriculture systems become more complex, farmers' access to reliable, timely and

relevant information sources become more critical to their competitiveness. Information must be relevant and meaningful to farmers, in addition to being packaged and delivered in a way preferred by them. (Diekmann Loibl & Batte, 2009).

FINDINGS

From the study, it was established that farmers required agricultural information to make the right decisions. The study further revealed that farmers require adequate and reliable agricultural information.

Furthermore 90% of the respondents agreed that they seek information from different sources in terms of literacy levels 80% of the respondents were well educated and hence are able to educate other farmers. On the other hand, 95% of the respondents had educational background in agriculture which gave them more advantages than other farmers.

In terms of availability of extension services, the study revealed that few extension officers were in place but they were not readily available to give farmers extension services due to the high demand of the extensions services and the present restriction caused by Corona Virus. This forced many farmers to seek alternative avenues like social media to get agricultural information. The study revealed that 85% of, the respondents agreed that extension officers provide information on small holder include enterprise selection, farm planning, market price information and farm visits.

The study established that Besses' District has public extension officers available for the entire district which is insufficient and this supports Gakuru et al. (2009) who stated that the number of extension workers has been decreasing while farmer numbers have been increasing;

hence the need for innovative services to address this gap. Furthermore, the extension information offered is out of date, irrelevant and not applicable to small farmers' needs, leaving such farmers with very little information or resources to improve their productivity.

Majority of the farmers use social media to seek for a variety of agricultural information, mostly scientific, educational and technology based, including training information, agrochemicals and technological information. The study further revealed that 65% of farmers however do not take as much interest in market based agricultural information including market trends, price, and stock available as well as credit facilities, source, terms and conditions.

It follows then, that, farmers in the study area source for agricultural information from a variety of avenues, key among which include the internet, social media and extension services. As such, the social media, as compared to other sources is significantly adopted among farmers in the study area.

Extension services can be made available using various 1CT channels. Broad basing agricultural extension activities; developing farming system research and extension; having location-specific modules of research and extension; and promoting market extension, sustainable agricultural development, participatory research, etc. are some of the numerous areas where ICT can play an important role (Mbugua et al., 2012). They further state that IT can help by enabling extension workers to gather, store, retrieve and disseminate a broad range of information needed by farmers, thus transforming them from extension workers into knowledge workers.

Respondents were further asked to indicate the various challenges they encountered when trying to obtain information from social media. Among the most common challenges faced include poor network access, power outages, and costly charges when accessing the internet.

CONCLUSION

From the study, it can be concluded that majority of farmers have a positive attitude towards the use of social media in seeking agricultural information. Facebook is the most common social media platform among farmers in the study area.

Further deduction indicated that while most farmers using social media are active on the same, few either rarely or never use the media to obtain agricultural information. Majority of the young farmers' source for agricultural information from variety of avenues. They have only little interest in market-based agricultural information, market trend, price and stock availability and credit facilities.

It can be concluded that majority of the young farmers in Ika South highly require agricultural information especially on training information, agrochemicals and technological information.

RECOMMENDATIONS

From the study it is recommended that the authority in Ika South should establish government owned information centers for young farmers to access agricultural information online with stable power supply.

Instead of much effort given to communication campaigns, social media can complement especially now

that we're observing social distancing, as a result of Corona Virus pandemic.

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CHAPTER 3.

USE OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN AGRICULTURAL EXTENSION SERVICE DELIVERY IN DELTA STATE, NIGERIA

ONYEMEKIHIAN FELIX (PHD)

Abstract.

This study investigates the use of Information and Communication Technology (ICT) in agricultural extension services in Delta State, Nigeria. A field survey was used to collect data from 94 extension officers in the State in 2018/ 2019 growing season using the full count method. The collected data were statistically analyzed and interpreted using percentage, frequency distribution and chi-square test. The descriptive statistics showed that the majority of the respondents 72.3% used the ICT in their extension services given to farmers and the majority of them 93.6% reported that there are many constraints facing the use of ICT in agricultural extension services in the State. Chi-square test revealed that there was no significant association between ICT and constraints facing the

use of them in the delivery of agriculture extension services to the targeted audience in the State. Thus, the authors recommend that the extension officers and farmers should be trained in the use of ICT and the constraints facing the use of ICT in the agricultural extension services in the State should be solved in collaboration with all partner organizations.

Introduction

The role of public agricultural extension service has traditionally been to provide the important link between agricultural research and farming communities, especially for technology transfer in support of agricultural and rural development. However, strong criticism of public agricultural extension services has circulated in recent years (FAO, 2004). According to Qamar (2002), this criticism is due to its top-down approach, which has been supply-driven, technically weak, catering only for large farmers (progressive farmers) and providing insufficient coverage of the small-scale farmers. This implies that proven agricultural technologies, which are needed to ensure higher productivity and food security, are not able to reach the millions of small-scale farmers scattered in the rural areas. Consequently, these farmers have managed to obtain information from other sources such as other farmers, inputs dealers, produce buyers and NGOs. Given the urgent need for current agricultural knowledge and information system (AKIS) by farmers the use of conventional communication channels such as farm/ home visit, personal letters, and use of contact farmers, for disseminating agricultural information is counterproductive. This calls for the adoption of Information and Communication Technologies (ICTs) by

both researchers and extension workers to transmit relevant information to farmers in a most efficient way.

Meaning of ICTs and its Application in Agricultural Extension Service Delivery

ICT is an acronym that stands for Information and Communication Technologies, which can be broadly interpreted as technologies that facilitate communication and the processing and transition of information by electronic means (CTA, 2003). This definition encompasses the full range of ICTs from Radio and Television to Telephones (fixed and mobile), computers and the internet. FAO (1993) defined ICT as technologies involved in collecting, processing, storing, retrieving, disseminating and implementing data and information using microelectronics, optics and telecommunications and computers. Agricultural Extension, which depends largely on information exchange between and among farmers and a broad range of other actors, is an area in which ICT can have significant impact. Research Scientists can relate directly with the farmers through ICTs. Frontline extension workers, who are the direct link between farmers and other actors in the agricultural knowledge and information system, are well positioned to make use of ICT to access expert knowledge or other types of information that could be beneficial to the farmers.

Arokoyo (2005) listed the potential applications of ICTs in agricultural extension to include:

- Capacity to reach a large audience, e.g. the use of radio, TV and Internet
- Can be effectively used for training and demonstrations e.g T.V., Video, VCD, and CD-

ROM.

- Can be used to make the extension systems and structures more efficient through better management of information and scarce resources e.g the use of Data bases for MIS and Networking soft wares
- For the search and packaging of information on demand and for exploring of alternative production options and technologies e.g the use of search engines, the web and data bases ICT may be used for normal weather forecasts and as a warning system for disease/pests outbreaks and other disasters before they occur and also for the provision of timely and sensitive market information e.g. with the use of Radio, TV, and SMS. ICTs are important for networking among and between the key stakeholders in the Research-Extension-Farmers-Inputs-Linkage System (REFILS) e.g. with the use of Telephone, Video, SMS, and;
- ICTs can also be effectively used for community mobilization, learning and action e.g Radio, TV, public address systems and the Web. Meera *et al* (2004) noted that ICT can bring new information services to rural areas where farmers (end users) will have much greater control, than ever before, over current information channels. Access to such new information source is a crucial requirement for the sustainable development of the farming systems. They added that ICT can be of immense help by enabling extension workers to gather, store, retrieve and disseminate a broad range of

information needed by farmers, thus transforming them from extension workers into knowledge workers (KW). The emergence of such knowledge workers will result in the realization of the much talked about bottom-up, demand-driven technology generation, assessment, refinement and transfers.

Agricultural extension is an educational service which brings information and new technologies to farming communities to enable them improve their production, incomes and standards of living. With the problem that extension agents face in facilitating direct contact with farmer clients and with researchers due to the physical distances involved and lack of transportation needed for their mobility, the application of ICT offers excellent possibilities, for strengthening research – extension systems and beyond the urban focus. Thus, for effective and efficient service delivery, the extension services and research organizations need to be appropriately supported with the use of ICTs. Van den Ban and Hawkins (1998) have even argued that in many countries the costs of maintaining full complement of extension agents are increasing progressively while the price of computers in the global market has decreased rapidly. This, therefore, makes the use of ICTs for information dissemination more economical.

Material and study

2.1Area of the study

The Delta State is an oil and agricultural producing state in Nigeria, it is situated in the region known as the south-south geo-political zone with a population of 4,112,445 (Males 2,069,309, females 2,043,136). The

capital city is Asaba located at the northern end of the state, with an estimated area of 762^2 km. The state is characterized by vast land suitable for agriculture, and the largest projects for rainfall agriculture in Nigeria. The most important cultivated crops are sesame, maize, fishery, millet, gum Arabic, sun flower and horticultural crops such as lemon, watermelon and vegetables such as tomatoes and okra, squash and others.

2.2Population and Sample size

The total number of agricultural extension officers working for the Agricultural Extension and Technology Transfer Administration, a State is 94 agricultural extension officers. This number represents the population size of the study.

2.3. Data collection

The study was based on primary (qualitative) data. Qualitative methods are ways of finding out what people do, know, think and feel by interviewing, observing and analyzing data from documents. The data were gathered by administering a questionnaire among all agricultural extension officers of the State using the full count method in 2018/2019 growing season.

2.4. Data analysis

The collected data were statistically analyzed and interpreted using percentage and frequency distribution and .chi-square test. Chi square is given by:

$\chi^2 = \sum \sum (O_{tc} - E_{rc})^2 \chi E/rc$

r-cal c-cal

With degrees of freedom (v) given by (R-1) (C-1), where:

R: Rows of the contingency table

C: Columns of the contingency table

Orc: Observed frequency in row (r) and column (c)

Results and Discussion

3.1Social-economic profile of extension Officers

The data presented in table 1 indicate that 50% of extension officers were males, while 50% were females. Selected socioeconomic characteristics of agricultural extension officers and farmers such as gender, age, and education level play a key role in the adoption and use of ICT Anastasios (2010), Tata and McNamara (2016). The majority of extension officers (61.7%) were married while (35.1%) (2.1%) (1.1%) of them were single, divorced and widowed respectively. Research has shown that married people are more creative and have more stability.

The majority of extension officers (91.5%) reported that they are bachelor holders, compared to (3.2%) (3.2%) of them reported that they are MSc and Diploma holders respectively. (2.1%) of them reported that they are secondary school certificate holders. Educational level of extension officers contributes directly to job performance and impact of extension work with rural people. Education level of extension officers is one of the most serious problems of extension in many countries as shown in the literature; therefore the success of extension services depend mainly upon selection of qualified and motivated extension officers. Tata and McNamara (2016) found that extension officers with advanced degrees (MSc) in Southern Africa encountered no technical challenges when using ICT in comparison to less-educated colleagues. Strong *et al.* (2014) mentioned that education level was the important socioeconomic factor that influenced technological preferences and competency in Caribbean agricultural extension officers. Mwansa (2004) reported that agricultural extension officers attitude towards technology was the primary

reason for a lack of ICT use when teaching and transferring information to farmers.

The majority of extension officers (62.8%) were between 26 -33 years old, (24.5%) of theme between 36-45 years old ,(5.3%) of theme between 15-25 years old and (7.4%) of theme have 45 and more years old. Research showed that employing young people can be cost effective and can provide the skills and workforce needed in the future and a source of future management. About 42.6% of extension officers reported that their work experiences less than 5 years. About 31.9% of them reported that their work experiences five to ten years and 25.5% reported that their work experiences 11 years and above. In Nigeria showed that significant relationships exist between sex, age, level of education, years of working experience of the extension agents with the level of use of ICT.

3.2. Use of ICT in agricultural extension service delivery

Table 2 revealed that the majority of extension officers (72.3%) reported that they used ICT in the delivery of agriculture extension services to their audience, while (27.7) of them reported that they did not use ICT in the delivery of agriculture extension services to their audience. Farmer's demand for information has increased in recent years due to greater market instability, more complex production technologies among others. Lack of timely information can prevent good quality decision and thus lower the efficiency of production decision among farmers. Therefore ICT can be used to strengthen the capacities of rural development workers, farmers, farmer organizations and rural communities as a whole.

Similarly, in Delta State Nigeria the majority of extension officers used ICT in their agricultural extension services.

Table 1. Distribution of the extension officers according to their selected socioeconomic characteristics

	Socioeconomic characteristics	Frequency	%
	Sex		
1.	Male	47	50
2.	Female	47	50
	Social status	**Frequency**	**%**
1.	Married	58	61.70
2.	Single	33	35.10
3.	Divorced	02	2.10
4.	Widowed	01	1.10
	Education level	**Frequency**	**%**
	Secondary school certificate	02	2.10
	Diploma	03	3.20
	BSc.	86	91.50
	MSc.	03	3.20
	Age group	**Frequency**	**%**
	15-25	05	5.3
	26-35	59	62.8
	36-45	23	24.5
	45 and more	07	7.4
	Work experience	**Frequency**	**%**
	less than 5 years	40	42.6
	5 to 10 years	30	31.9
	11 years and more	24	25.50

Distribution of the extension officers according to their use of ICT in agricultural extension service delivery

Use of ICT	Frequency
Use ICT	68
Did not use ICT	26
Total	94

3.3. Kind of ICT used in the delivery of agriculture extension services

Table 3 showed that most of extension officers (34%,

53%, 35.1%, 33% and 27.7%) reported that they did not use computer, video, audio-visual aids, television and mobile respectively in the delivery of agriculture extension services to their audience. Some extension officers (34%, 10.6%, 51%, 57.5% and 63.8%) reported that they often used computer, radio, audio-visual aids, television and mobile respectively in the delivery of agriculture extension services to their audience. (22.3%, 7.4%, 9.6%, 7.4% and 6.4%) of extension officers reported that they used computer, video, audio-visual aids, television and mobile respectively some times in the delivery of agriculture extension services to their audience. (9.7%, 29%, 4.3%, 2.1% and 2.1%) of extension officers reported that they used computer, video, audio-visual aids, television and mobile respectively rarely in the delivery of agriculture extension services to their audience.

The role of ICT in improving agricultural extension communication with beneficiaries to share information, skills, experiences and other purposes of communication was found to be the backbone of successful agricultural extension services that in turn will lead to the targeted agricultural development. Found that in Delta State Nigeria the majority of extension officers used radio, TV and mobile phone in their agricultural extension services. Found that that despite the rapid growth of emerging ICTs, the more traditional ones such as radios and TVs remain popular in Africa, particularly in rural areas. Rahman and Hamid [6] reported that in the Delta State, Nigeria the majority of vegetable farmers still depend on the use of mobile phone and the traditional ICTs (radio and TV) only to obtain various agricultural extension services. Also a study carried out by Ezeh (2013) revealed

that in South East Nigeria radio and television followed by phone were the most accessed and utilized ICT among the extension officers, however the extent of access and utilization of contemporary ICTs such as internet is still very low.

Distribution of extension officers according to kind of ICT used in the delivery of Agricultural Extension services

Kind of ICT Used	Computer		Radio		Audiovisual aids	
	Fr.	%	Fr.	%	Fr.	%
Not used	32	34	50	53	33	35.1
Often	32	34	10	10.6	48	51
Some times	21	22.3	7	7.4	9	9.6
Rarely	9	9.7	27	29	4	4.3
Total	94	100	94	100	94	100

3.4Purpose for which ICT were used

Table 4 indicated that (34%, 53%, 35.1%, 33% and 27.7% of extension officers reported that they did not use computer, radio, audio-visual aids, television and mobile respectively in the delivery of agriculture services to their audience. (26.6%, 16%, 31.9%, 37.2% and 12.8%) of extension officers reported that they used computer, radio, audio-visual aids, television and mobile respectively in the delivery of agriculture extension services to their audience as extension methods. (6.4%%, 5.3%, 2.1%, 1.1% and 6.4%) of extension officers reported that they used computer, radio, audio-visual aids, television and mobile respectively in the delivery of agriculture information. (7.5%, 6.4%, 3.2%, 00.% and 5.3%) of extension officers reported that they used computer, radio, audio-visual aids, television and mobile respectively in the delivery of agriculture extension services to their audience as extension services to their

audience as sources of problem solving practices. (25.5%, 19.1%, 25.5%, 26.6% and 47.8%) of extension officers reported that they used computer, radio, audio-visual aids, television and mobile respectively in the delivery of agriculture extension services to their audience as extension services to their audience for multiple purposes.

The use of ICTs in the delivery of agriculture extension services to extension audience ca have economic impact to their users because they can save time and money especially for those who do not prefer leaving their work sites and travel into near towns and cities to make their own purchases of agricultural inputs and other farm needs. Rahman and Fadol (2015) found that in Delta State, Nigeria the majority of extension officers used the available ICT as extension methods, sources of problems solving practices and other extension services.

Table 4: Distribution of the extension officers according to purposes for which ICTs were used.

Kind of ICT Used	Computer		Radio		Audiovisu
	Fr.	%	Fr.	%	Fr.
Not used	32	34	50	53.2	35.1
extension methods	25	26.6	15	16	30
		6.4	5	5.3	2
sources of problem solving practices	7	7.5	6	6.4	3
Multiple purposes	24	25.5	18	19.1	24
Total	94	100	94	100	94

3.5 Constraints facing the use of ICT in the delivery of agriculture extension services

Table 5 revealed that (3.2%) of extension officers reported that they have no computer, video, audio-visual aids, television and mobile. (2.1%) of extension officers reported that they lack technical know-how which can

help them to get more benefit from ICTC if they are trained in the proper use of them. (1.1%) of extension officers reported that ICT have high cost including their prices and usage. the majority of extension officers (93.6%) reported that they faced many constraints in their usage of ICT in the delivery of agriculture extension services.

Table 5: Distribution of the extension officers according to constraints facing their use of ICT in the delivery of agriculture extension services in Delta State.

Constraints facing the use of ICTs	Frequency	%
Lack of ICT	3	3.2
Lack of technical know-how	2	2.1
High cost of using ICT	1	1.1
Collective of constraints	88	93.6
Total	94	100

3.6Association between use of ICT and constraints facing the use of them:

Chi-square test was used to determine the association between the use of ICT and constraints facing use of them in agricultural extension services in Delta state. The results revealed that there was no significant association between lack of ICT and use of them in agricultural extension services in Delta State. There was no significant association between lack of technical know-how and use of them in agricultural extension services in Delta State. There was no significant association between the high cost of using ICTs and use of them in agricultural extension services in Delta State. There was no significant association between collective of constraints facing the use of ICT and use of them in agricultural extension services in Delta State.

Using depth interview with extension officers revealed that they have no smart mobile phones as a result of the high price and use of them in Nigerian and/or lack of them in all agricultural extension complexes in the State. The State lacks internet centres affiliated to Ministry of Agriculture in the villages which can provide information services with reasonable prices for farmers. The State lacks internet cafes in the villages which can provide information services with commercial prices for farmers. They have no personal computers (lap top device) because of high price of them in Nigeria and/or lack of them in all agricultural extension complexes in the State.

Inadequate ICT basic infrastructure, high price and use of ICT, lack of technical know-how and lack of electricity power problems have been cited as some of the constraints facing the use of ICT in agricultural extension services Ahmed and Musa (2008), Deichmann, Goyal and Mishra (2016).

Table 6. Chi-squire test for association between use of ICT and constraints facing the use of them in agricultural extension services in Delta State.

Constraints facing the use of ICTs	Use of ICTs		Total	Sig.
	Yes	No		
Lack of ICT	2	1	3	.447
Lack of technical know-how	1	0	1	
Collective of constraints	63	25	88	
Total	68	26	94	

Significance level 0.05 or less

Conclusion

From this study, we can conclude that a considerable number of agricultural extension officer of Delta State still depend on the use of traditional ICT such as Radio and Television. Thus the authors recommend that the

extension officers and farmers should be trained in the use of ICT and the constraints facing the use of ICT in the agricultural extension services in the State should be solved in collaboration with all concerned stakeholders.

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CHAPTER 4.

DIGITAL TECHNOLOGY SKILLS OF LECTURERS IN TERTIARY INSTITUTIONS IN ABIA STATE, NIGERIA

EJINWA, EMENIKE (PHD); OJIAKU F.C, (PHD); AND NNAJI STEPHEN

Abstract

This study examined the digital technology skills of lecturers in three tertiary institutions in Abia State, Nigeria.The design of this study is descriptive survey research design. The population of this study is 1300 which comprise of 630male and 670 female lecturers. Purposive sampling techniques was used in this study to select 260 lecturers which comprise of 120 male and 140 female lecturers in three tertiary institutions in Abia State. Findings show that lecturers in Abia State possess to a great extent digital technology skills to enable them function effectively as teachers in a digital era. It was recommended that the Federal Government should encourage and support lecturers in tertiary institutions

in Abia to improve on their digital capabilities through workshop and retraining. The Government should alsoprovide incentives for staff to improve their digital capabilities as well as fund mandatory training programme for staff.

Key words: Digital skills, digital technologies, ICT

Introduction

Digital skills training and development for lecturers is critical to future academic activities in a world presentlypermeatedwith technologies**. Research has shown that learners' digital experiences in the context of education are strongly influenced by the confidence and capabilities of their teachers.**Digital skills are the abilities possessed by an individual which is necessary to understand, navigate through, and make use of digital technologies and the Internet, with little or no assistance.Digital technology skills are important means of promoting contemporary methods of instruction and new approaches of curriculum delivery thereby facilitating learning environment that are not only stimulating and attractive but also inviting and interesting to students (Atsumbe, Raymond &Duhu, 2012). The acquisition of digital skills by lecturers serve as catalysts for innovation and quality in higher education by increasing students motivation, interest and engagement. The acquisition of digital skills and by engaging in training that will improve communication and knowledge sharing through technology integration, lecturers in the education sector will in no small measure contribute positively in the teaching and learning process (Pavel, Fruth & Neacsu, 2015)

Digital literacy training equip students and teachers with the basic skills of information and technology.

Digital skills ensure better performance in teaching and learning processes and generally advances the education sector. Digital technology skills are set of knowledge and competences for using computer systems, surfing the internet and engaging in the use of other electronic technologies for information management activities. Digital skills covers computer manipulative skills, internet navigation skills and online social media communication skills that are required for taking advantage of digital technologies, the online environment and using all forms of e-learning resources as well as engage in internet based education activities. Teaching in the context of post covid 19 which is characterizedby physical distancing requires that lecturers possess digital skills which positioned them to be confident and comfortable with diverse digital devices and the skills for using them to carry out educational activities.

According to Musliudeen (2020) training of teachers in digital technology for classroom delivery will help improve the quality of learning in basic education. Training teachers on how to use digital technology in classroom delivery is a way to update teachers' delivery skills and adapt to the challenges posed by the COVID-19 pandemic and other emergencies. Digital technology training is focused on how to utilize digital technology to propel classroom delivery.It is becoming increasingly important and inexcusable not to possess digital knowledge to deliver classroom teachings. It is very vital for teachers to be equipped with digital technology skills in order to catch up with the global trends.Digital technology is focused on teaching in the 'New Normal' with emphasis on use of Digital technology to propel classroom delivery.According to Joseph Erunke

(2021),the transition to digital education involves the integration of digital tools and technologies as well as the adoption of new pedagogical approaches. It requires updating the skills of teachers in the aspect of digital technology. Training in digital education should also be provided for teachers in instructional design by digital education experts. The training programme will put theory into practice by focusing on the transformation of existing face-to-face courses into online ones, and enable the assimilation of pedagogical tools and practices to teach using digital technology devices and internet based platforms.

Digital skills are key competences for lifelong learning with focus on creative and confident use of ICTs for actualization of goals related to learning and other educational activities (Ferrari, 2012). Digital skills covers the wide range of knowledge, skills and competences for using digital technologies, computer system, the internet and e-learning resources. Emiri(2015) posited that digital skills enable teachers to develop competences that add to their teaching status and improve their overall performance in the classroom full of digital devices. These digital skills are essential for resource sharing, digital collaborative learning, surfing the internet, instant messaging, blogging, sourcing information and engaging in educational activities. According to Olutola and Olatoye (2018) for students and teachers to utilize e-learning resources, they must possess the skills for using them.

Kuni (2021), stressed that digital technology education will chart an effective safe teaching system amid the COVID-19 pandemic.COVID-19 brought with it a lot of challenges in the education system. Teachers need to be

taught the nitty-gritty of the pedagogical knowledge and skills they will require to teach in pandemic situations and other emergencies. Ogundare (2020) was of the view that digital training for public school teachers and stakeholders in the education sector is aimed at strengthening their capacity while also preparing them ahead of post-COVID-19 and integrating strategies to enhance teaching and learning. Virtual learning using zooms webinar is the best teaching and learning practices towards managing challenges posed on the education sector by COVID-19. Teachers in the post covid19 need to be equipped with necessary skills to use virtual learning which is going to be the new normal.

The theoretical framework for this study is anchored on Technology Acceptance Model (TAM) which is an information systems theory that models how users come to accept and use technology. The TAM model propounded by Davis (1989) argues that when users are presented with a new technology, a number of factors influence their decision on the use of such technology notably perceived usefulness and perceived ease of use. Perceived usefulness is the degree to which a person believes that using a particular technology or system would enhance his job performance and perceived ease of use is the degree to which an individual believes that using technology would be free from hassles. This model is relevant to this study in that it brings to focus the need for teachers to acquire digital skills to enable them use technology in the classroom effectively. Information and communication technology (ICT) is revolutionizing the education sector, thereby making it more attractive and interesting to students of the 21st century who are regarded as digital natives. Taking advantage of ICT

devices, internet and social media platforms for education purposes requires the possession of digital skills for manipulating computer systems, navigating the internet and online environment, communicating through the diverse social media platforms for sharing ideas, information and knowledge. Hence, it is on this backdrop that this study seeks to evaluate the digital technology skills of lecturers in tertiary institutions in Abia state, Nigeria.

Statement of the Problem

In this digital era, lecturers in higher institutions are supposed to possess digital technology skills to enable them deliver instruction through the numerous ICT devices integrated in the classroom. Staff development or Capacity building of lecturers in digital technology skill is vital if they are **to navigate…… Digital technology skills enables lecturers to ……** But unfortunately most lecturers do not possess these skills for 21st century navigation in the field of education presently being permeated by technologies. Most lecturers havephobia when it comes to the use of technology in the classroom.They are still stuck with the classical method of delivering lectures through chalk and talk despite the pervasiveness of technology in the field of education. It is based on the forgoing that the researchers decided to examine the digital technology skills of lecturers in tertiary institutions in Abia State.

1.3 Purpose of the Study

The purpose of the study is to evaluatedigital technology skills of lecturers in tertiary institutions in Abia state, Nigeria.Specifically, the study seeks to:

- find out theextent lecturers in tertiary institutions

in Abia state possess digital technology skills

- examine the challenges involved in acquiring digital technology skills by lecturers in tertiary institutions in Abia state.
- determine the strategies for enhancing digital technology skills of lecturers in tertiary institutions in Abia state

Research Questions

The following research questions guided the study:

- To what extent do lecturers in tertiary institutions in Abia state possess digital technology skills
- What are the challenges involved in acquiring digital technology skills by lecturers in tertiary institutions in Abia state?
- What are the strategies for enhancing digital technology skills of lecturers in tertiary institutions in Abia state

1.5 Hypotheses

The following null hypotheses were formulated and was tested at .05 level of significance.

$H0_1$: There is no significant difference between the mean responses of male and female lecturers on the extent they possess digital technology skills.

$H0_2$: There is no significant difference between the mean responses of male and female lecturers on the challenges involved in acquiring digital technology skills.

$H0_3$: There is no significant difference

between the mean responses of male and female lecturers on the strategies for enhancing digital technology skills.

Methodology

The design of this study is descriptive survey research design. A descriptive survey design according to Anyanwu, (2016) is one, in which a group of people or items are studied by collecting and analyzing data from only a few people or items considered to be representative of entire group. This design is appropriate for the present study because it involves collecting data from a sample of respondents on the evaluation of digital technology skills of lecturers in tertiary institutions in Abia State, Nigeria.

The population of this study is 1300 which comprise of 630male and 670 female lecturers. Purposive sampling techniques was used in this study to select 260 lecturers which comprise of 120 male and 140 female lecturers in three tertiary institutions in Abia State.The sample represents 20% of the total population. The instrument for data collection was a researcher developed questionnaire titled "Digital Technology Skills of Lecturers (DTSL)". The instrument consist of two sections (1 and 2). Section one covers background information of the respondents while section two was divided into three clusters developed from the literature. Cluster one will focus on the indices of the extent lecturers in tertiary institutions in Abia State possess digital technology skills. Cluster two covered the challenges of acquiring digital technology skills of lecturers in tertiary institutions in Abia State and Cluster three focused on the strategies for enhancing the acquisition of digital technology skills. The questionnaire

was be designed using four point rating scales with rating options of; VGE,GE,LE and VLE, Strongly Agree (SA) 4, Agree (A) 3, Disagree (D) 2, Strongly Disagree (SD) 1.The instruments were subjected to face validity. The instruments were validated by two experts for their inputs and check for error in language usage, suitability of items, appropriateness of the items and relevance of the items taking into consideration the purpose of the study, research questions and hypotheses.

To determine the reliability of the instrument, the instrument was trial tested. The instrument was administered to ten male and ten female lecturers Imo State which was outside the study sample to ensure reliability. These respondents were chosen because they were situated outside the study area and they share the same characteristics as lecturers with the respondents in main study. The data obtained was computed using Croncbach Alpha statistics to determine the reliability coefficient index value. Mean and standard deviation were used to answer the three research questions posed for the study. The mean scores was determined by assigning values to the four point scale of: Strongly agree = 4, agree = 3, disagree = 2 and strongly disagree =1. The mean scores were computed as follows

$$\bar{X} = \frac{\sum Xn}{4+3+2+14=104}$$

= 2.50. Thus, the mean score of 2.50 and above was considered as agree while the mean scores below 2.50 was considered as disagree. In addition, the three hypotheses were tested using t-test analysis technique at .05 level of

significance. The null hypotheses were upheld since the t-calculated value is less than the t-table value at .05 level of significance while the null hypotheses were rejected since the t-calculated value is greater than the t-table value at .05 level of significance.

Discussion

Research Question 1: To what extent do lecturersin tertiary institutions in Abia state possess digital technology skills?

Table 1: Mean Ratings and Standard Deviation ofextentmale and female lectures in tertiary institutions in Abia state possess digital technology skills.

N (260)					
FEMALE LECTURERS (140)					
S/ No	**Items**	**SA**	**A**	**D**	**SD**
1.	Start up and shut down the computer	46	31	30	23
2.	Use mouse pointing devices	30	62	34	14
3.	word processing skills	35	56	29	20
4.	Microsoft excel.Spreadsheets Skills	37	52	27	24
5.	power point Presentation Skills	43	25	32	40
6.	E-Mail Management Skills	36	39	41	24
7.	Use search engines to find information	40	32	36	32
8.	Web Navigation Skills	46	28	39	27
9.	Copy files/document from hard disk to other storage devices	35	46	27	32
10	Create folders on computer for storing and retrieving documents	41	37	30	32
11	Use printers for printing documents	39	46	33	22
12	Use scanners for scanning documents	24	29	40	47
13	Use social media tools for communications	40	38	45	17
14	Database Skills	24	30	37	49
15	Digital Cameras skills	22	27	39	52
16	Downloading Software From the Web	38	37	41	24
17	Skills in Installing Computer Software	31	40	37	32
18	Videoconferencing skills	20	24	36	60
19	Knowledge of keyboard short cuts	29	34	36	21
20	Keyboards skills	40	32	35	33
Mean for female lecturers =2.59 Standard deviation for female lecturers=1.50					
Grand mean for both female and male lecturers =2.54 Grand standard deviation for both adult female and male = 1.47					

Results in table 1 showed that out of the 20 items that seek information on the extent lecturers in tertiary institution possess digital skills, female lecturers had high mean ratings of 2.64, 2.77, 2.76, 2.73, 2.51, 2.62, 2.57, 2.66 and 2.60. Female lecturers also recorded low mean ratings on items 12, 14, and 15 with corresponding item means of 2.21, 2.20 and 2.41. The grand mean for female lecturers is 2.59 while the standard deviation is 1.50.The result in table 1 also showed that male lecturers had high mean ratings on all items apart from items 12, 14 and

15 with corresponding low mean ratings of 2.08, 2.14 and 2.42 The mean for male lecturers is 2.67 while the standard deviation is 1.43. The overall grand mean for both female and male lecturers is 2.66. This indicated that lecturers in tertiary institutions in Abia state possess digital technology skills.

Research Question 2: What are the challenges against digital technology.

Table 2: Mean Ratings and Standard Deviation of lecturers responses on the challenges against digital technology.

N (260)						
FEMALE LECTURERS (140)						
S/No	**Items**	**SA**	**A**	**D**	**SD**	**X**
26.	Lack of personal computer	36	35	38	31	2.5
27.	Poor internet services	39	41	25	35	2.6
28.	Poor digital skills	38	28	41	33	2.5
29.	Poor electricity supply	47	27	36	30	2.6
30.	inadequate finance to obtain digital skills	41	27	36	36	2.5
31.	**Religious barriers**	38	42	33	27	2.6
32.	**Lack of gender parity in political appointment**	44	36	39	21	2.7
33.	**Cultural bias in land ownership**	50	43	27	20	2.8
Mean for female =2.63 Standard deviation for female=1.57						
Grand mean for both female and male lecturers=2.62 Grand standard deviation for both female and male lecturers = 1.54						

Results in table 2 showed that out of the 8 items that seek information on lecturers responses on the challenges involved in the acquisition of digital technology skills**.** Female lecturers had high mean ratings of 2.54, 2.6, 2.51, 2.65, 2.52, 2.65, 2.74 and 2.87 on all items. The mean for female is 2.63 while the standard deviation is 1.57.The result in table 2 also showed that male lecturers had high mean ratings on items 26, 27, 29, 30, 31, 32 and 33 with corresponding means of 2.54, 2.6, 2.51, 2.65, 2.52, 2.65,2.74 and 2.87. Female lecturers recorded low mean

on item 28 with the mean of 2.43. The mean for male is 2.62 with standard deviation of 1.51. The overall grand mean for both female and male lecturers is 2.62 while the grand standard deviation is 1.54. This indicated that there are challenges involved in the acquisition of digital technology skills**.**

Research Question 3: What are the strategies for enhancing digital skills of lecturers?

Table 3: Mean Ratings and Standard Deviation of male and female lecturers on the strategies for enhancing digital skills of lecturers

N (260)						
FEMALE LECTURERS (140)						
S/ No	**Items**	**SA**	**A**	**D**	**SD**	**X**
34.	Encourage and support staff to develop their digital capabilities.	35	32	41	32	2.50
35.	Provide incentives for staff to digital capabilities	32	38	37	33	2.51
36.	Funded mandatory training programme for staff	41	28	34	37	2.52
37.	Read books on how to improve your digital skills	42	37	41	20	2.72
38.	Find a digitally savvy teacher to help you learn.	39	36	41	24	2.50
39.	Take a course either online or classroom-based	37	42	38	23	2.66
40	Teach others what you've learnt	37	39	28	26	2.44
41	Attend digital training workshop.	38	30	40	32	2.52
42	Daily integration of digital technologies into teaching activities	38	36	45	21	2.65
43	hands-on digital experience through internship	32	39	46	21	2.55
44	Free online learning or paid online learning	40	37	34	29	2.62
Mean for female lecturers =2.56 Standard deviation for adult female=1.60						
Grand mean for both female and male lecturers =2.55 Grand standard deviation for both female and male lecturers = 1.59						

Results in table 3 showed that out of the 8 items that seek information on adult responses on the strategies for enhancingdigital skills of lecturers. Female lecturers had high mean ratings of 2.50, 2.51, 2.52, 2.72, 2.50, 2.66, 2.52, 2.65, 2.55 and 2.62 with low mean rating of 2.44 on item 40. The grand mean for female lecturers is 2.56 while

the standard deviation is 1.60.The result also showed that male lecturers agree strongly on all items ranging from 34-44 with corresponding mean of 2.52, 2.53, 2.56, 2.63, 2.64, 2.52, 2.75 , 2.57, 2.56,2.80 and 2.52. The grand mean formale lecturers is 2.55 with standard deviation of 1.59. The overall grand mean for both female and male lecturers in respect to the strategies for enhancingdigital technology skills of lecturers is 2.55. This indicated that the respondents agreed strongly on the stated strategies for enhancing digital technology skills of lecturers.

Hypothesis 1: There is no significant difference in the mean responses between female and male lecturers on the extent they possess digital technology skills.

Table 5: t-test Analysis of Difference between the Mean Rating of female and male lecturers on the extent they possess digital technology skills.

	X	SD	N	Df	t-cal	t-critical	Decision
Female	2.63	1.50	140	258	1.10	1.61	Not Rejected
Male	2.62	1.45	120				

Table 5 showed that the t- calculated value of 1.10at .05 level of significance was less than the t- critical of 1.61. Since the t- value was less that the t- critical value, the null hypothesis was therefore not rejected. This means that there was no significant difference in the mean ratings of female and male lecturers on the extent they possess digital skills

Hypothesis 2: There is no significant difference in the mean responses between female and male lecturers on the challenges involved in acquiring digital technology skills.

Table 6: t-test Analysis of Difference between the Mean Rating of female and male lecturers on the

challenges involved in acquiring digital technology skills.

	X	SD	N	Df	t-cal	t-critical	Decision
Female	2.63	1.57	140	258	0.44	1.61	Not Rejected
Male	2.62	1.51	120				

The t-test analysis in table 6 showed that the t -calculated value was 0.44at 0.05 level of significance. This value is less than the t- critical of 1.61. Since the t- value is less that the t- critical value, the null hypothesis is therefore not rejected. This means that there is no significant difference in the mean ratings of female and male lecturers on the challenges involved in acquiring digital technology skills.

Hypothesis 3:There is no significant difference in the mean responses between female and male lecturers on the strategies for enhancing digital technology skills.

Table 7: t-test Analysis of Difference between the Mean Ratings of female and male lecturers on the strategies for enhancing digital technology skills.

	X	SD	N	Df	t-cal	t-critical	Decision
Female	2.56	1.60	140	258	0.79	1.61	Not Rejected
Male	2.55	1.59	120				

The t-test analysis in table 7 shows that the t -calculated value of 0.29 at 0.05 level of significance is less than the t- critical of 1.61. Since the t- calculated value is less that the t- critical value, the null hypothesis is therefore not rejected. This means that there is no significant difference in the mean ratings of female and male lecturers on the strategies for enhancing digital technology skills.

Conclusion and future works

It is becoming a new normal for all lecturers in tertiary institutions in Nigeria to possess digital technology skills if they are to function effectively in modern education enhanced and supported by technology. The old classical chalk and talk method of teaching is gradually phasing out and giving room to technology enhanced methodology of teaching and leaning.

Recommendations

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

1.The Federal Government should encourage and support lecturers in tertiary institutions in Abia to improve on their digital capabilities through workshop and retraining.

2. The findings indicated that there are challenges involved in the acquisition of digital technology skills, therefore, the Government should provide incentives for staff to improve their digital capabilities**.**

3. Since the respondents agreed strongly on the stated strategies for enhancing digital technology skills of lecturers, the federal Government shouldFund mandatory training programme for staff

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CHAPTER 5.

THE ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGY IN TEACHING AT BASIC EDUCATION LEVEL IN DELTA STATE: IMPLICATIONS FOR TEACHERS.

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Abstract

With the advancement in information communication and technology (ICT) the world today is experiencing digital revolution in every spheres of life. There are rapid technological advancement which are transforming the processes and practices of education to meet the challenges of the 21st century teaching and learning,. This paper examines the role of ICT in teaching at the Basic Education Level and Implications for teachers. The concept and types of ICT used for teaching and learning were discussed. It viewed the Basic Education Objectives, features and its application at the basic education level. The roles of ICT at in teaching and learning for both

teachers and learners were explained. Finally, it highlighted the implications for teacher to include, training and retraining of teachers, recruiting teachers with ICT skills and competencies, making ICT as a compulsory course in all institutions involved in teachers' preparation, among others. Teachers pedagogical practices should be ICT compliant.

Introduction

The rapid growth in Information Communication and Technologies (ICT) have brought remarkable changes in twenty-first century and affected every facet of life and the modern society. ICT is becoming increasingly important in our daily lives as well as in educational system Buabeng Andoh (2012) Therefore, there is the growing demand and necessity to use ICT in teaching and learning at the basic education level.

Teaching and learning has gone beyond the teacher standing in front of group of students and disseminating information to them without the students' adequate participation. But with the aid of ICT, teachers can take students beyond traditional limit, ensure adequate participation in teaching learning process. ICT in teaching enhance the quality of teacjing and learning. ICT provide encouragement for teacher and students on knowledge and skills acquisition, making teaching and learning more visible Radloff (2001) opined that ICT encouraged collaboration and team work among teachers and learners, offering greater access to learning for more people and increasing the skill and status of the school teachers.

Ononyekan (2013) defined education as an aggregate of all the process of learning by which an individual develops his/her abilities attitudes and other forms of

behaviour which are positive values to the society he lives in. Education is aimed at developing and preparing the individual for survival in the society. Surviving in this age depends on access to information and ICT is seen as the bedrock to all necessary educational information at preparing students at the Basic Education level. Aware of the significance of ICT educational programmes in the world several measures had been adopted to facilitate acquisition of ICT education by enhancement of teachers training programmes to enable teacher play effective role in teaching and learning at the basic education level.

Concept of Information and Communication Technology

Information and Communication Technology (ICT) in its widest sense are technological tools and resources used to communicate, create, organize, disseminate, store and manage information. (Chaka (2008) and Efediogho (2002). Information and Communication Technology (ICT) then connotes the designed production application and means, modes and devices for managing storing and disseminating information Isoun (2006) describes information and Communication Technology as a term used to indicate a whole range of technologies involved in internal, electronic mail and video conferencing. This concept is buttressed by Yusuf (2007) expressing ICT to include electronic technologies used for accessing, processing, gathering manipulating, presenting and communicating information.

Abolade and Yusuf (2005) viewed Information and Communication Technology in relation to mainly studying concepts skills, processes and application of electronic devices. Here the concept embraces both scientific principles and artistic ingenuity put into the

design, production, application and management of the ICT tools. ICT is a method to improve principle, method and device applied in the aspect of human communication.

In the same vein, Grace (2003) opined that ICT is an umbrella term that includes any communication device or application, encompassing, radio, television cellular phone, computer and network, hardware and software, satellite systems as well as various services and applications associated with them such us video conferencing and distance learning. Therefore making information and communication technology include a full range of computer hardwares computer softwares and communication facilities.

Information and Communication Technology is a collective term for computer, soft ware, networks satellites, link related systems that allow people to access, analyze, create exchange and use data information and knowledge in ways that until recently were almost unimaginable (Beebe 2004). For him, ICT is the processing and maintenance of information and the use of all forms of computers, communication Networks and mobile technologies to mediate information. According to Nasiru and Bashiru (2015) communication technologies ICT include all that is employed in transmitting audio, video, data, or multimedia such as cable satellite, fiber optics wireless (Radio, Bluetooth, Wikipedia) network technology personal area network (PAN) campus area network (CAN) internets extranets LANS, MANs and the internet computer technologies include all removable media such as optical disc, dick, flash removable, video books and multimedia projectors

interactive electronic and continuous emerging states of the arts.

In 2004, America Association on Information Technology (AAIT) described information ICT as the capability of electronically input process store output that transmit, receive data and information including: text, graphics, sound and video as well as the ability to control machine of all kinds electronically. ICT refers to the generalized technologies involved in information. It includes the radio, video, computers, sensors, mail and other machines and technologies used in education for teaching and learning. Grace (2003) added that ICT constitutes of facilities that could be use to complement teaching and learning. It also promotes the development of information technology in the context of using ICT as a teaching and learning facilities for the improvement of education.

Information and Communication Technology ICT has become within a short time one of the basic building blocks of modern society. Many countries now regard the usage, understanding and mastering of basic skills and concepts of ICT as part of the core education alongside reading, writing and numeracy. Information and communication technology now supports teaching and learning and a range of activities in education. Similarly the teacher cannot be left out since the knowledge of ICT would enhance the effectiveness and development of better teachers in Nigeria.

Types of Information and Communication for Teaching Learning

Information and Communication Technology for teaching and learning many facets Technology is a force that operates in many facets of life and in many fields

of study depending on the area of application. There are many types of ICT according to Tinio (2002) as cited by Nasiru and Bashiru (2015). They include:

- **Active learning –** learner (students) learn as they do and wherever appropriate work on real life problems in-depth making learning less abstract and more relevant to the learner life situation learning. In this way learning is contrast to memorization or rate learning ICT enhances learning and promotes increased learner engagements. The learner can choose what to learn and when to learn it.
- **Collaborative learning**: there is co-operation among students, teachers and experts regardless of individual differences and class. Apart from real world interaction, ICT supported learning provides learners opportunity to work with people from different cultures thereby helping to enhance learners teaming and communication skills as well as their global awareness. (Adjudeonu & Idiagbe 2014).
- **Creative learning –** ICT supported learning promotes the manipulation of existing information and the creation of a real world products rather than the regulation of received information. Education and learning is best nourished in a creative setting where learners are encouraged to innovate and invest ideas and concept as well as utility programmes
- **Integrative learning**: integrative learning is an approach that facilitates the mitotic, interactive

and holistic approach to teaching and learning. It eliminates the artificial separation between the different discipline and between theory and practice that characterize the traditional setting.

- **Evaluative learning:** Learning in this setting is diagnostic, since the setting is for learners, so the learner is capable of discovering his/her strengths and weaknesses and allowing him/her to choose between alternative approaches to solution in solving problems.
- **E- learning,** Wikipedia (2020) defined E-learning as all forms of electronic assisted teaching and learning. It is a learning mode which depend heavily in information and communication facilities which serve as the media for learning. E-learning uses various types of ICT tools for learning, rallying on the use of electronic applications and processes to acquire knowledge and skills. Some of the E-learning modes include computers, mobile phones, networks, web-based learning, virtual classrooms, digital collaborations, audio-conferring , video-conferring and such like. Here the learner is free and have access to information knowledge and skill from wherever in the globe.
- **Blended learning:** Another term that is gaining currency is blended learning. This refers to learning models that combine traditional classroom practice with e-learning solutions (Tinio 2002). For example students in a traditional class can be assigned both print based and on line based materials, have online mentoring session

with their teacher through chat, and can subscribe to a class email list. Blended learning was prompted by the recognition that not all learning is best advice in an electrically mediated environment but sometimeslife instructor is needed to achieve the optimum objectives of the lesson.

- **Open and Distance learning:** Open and Distance learning as expressed by Keegani (2000) is a way of providing learning opportunities that are characterized by the separation of teacher and learner in time and space or learning by the use of a variety of media including print and electronic two way communication that allow learners and teacher to interact.

Basic Education

Basic education is the bedrock on which the sustainability of every nation is anchored. Basic education is the prerogative of every human being. Basic education constitutes an essential component of developmental strategy as well as the priority of any developing country. Its importance is recognized all over the world hence it was the focus of Education for All (EFA) movement led by UNESCO and featured as goal number 5 in the sustainable Development Goals (SDGS) which replaced the MDGs. Basic education is the basic foundation for sustainable life – long learning. It inculcates reading, writing and numeracy skills. It is both formal and non-formal system of education with a range of activities and programmes designed to enhance functional literacy skills. International classification of Education (ISCED)

categorized basic Education into primary and lower secondary education.

In Nigeria, Basic Education is referred to Universal Basic Education (UBE). The Universal Basic Education includes primary, junior secondary, Nomadic and Adult literacy programme in Nigeria. According to Okonkwo and Obindi (2013) Universal basic Education (UBE) encompasses the following levels of education in a hierarchical order. Early childhood care Development – pre-school /Nursery/ Kindergarten, primary Education, Junior secondary Education and Non-formal Education. Here the basic Education include children, adolescent, young and adults who did not start school early as well as special needs persons. Universal Basic Education was introduced in 1999 by the Federal Government of Nigeria as an educational programme with the aim of providing greater access to, and ensuring quality of basic education throughout Nigeria.

The UBE objectives programme include:

Ensuring an uninterrupted access to 9-year formal education by providing free and compulsory basic education for every child of school going age under.

- Providing Early Childhood Care Development and Education (ECCDE)
- Six years of primary Education
- Three years of Junior secondary Education
- Reducing school drop-out and improving relevance, quality and efficiency
- Acquisition of literacy, numeracy, life skills and values for life long education and useful living.

Universal basic Education Act 2004

- The Federal Government intervention shall provide assistance to the states and local government throughout Nigeria.
- Every government in Nigeria shall provide free, compulsory and universal basic education for every child of primary and junior secondary school age
- Every parent should ensure that his/her child or ward attends and completes
- Primary school education and
- Junior secondary school education
- The stakeholders in education in a local government area shall endure that every parent or person who has the care and custody of a child performs the duty imposed on him/her under the universal Basic Education Act 2004.
- Transition from primary to Junior secondary school (JSS) should be automatic; as basic education terminator at the Junior secondary school level thus entrance examination may no longer be necessary. Emphasis will be placed on effective continuous assessment, while final examination and certification will now be done at the end of the nine-year basic education programme.

The secondary school system should be restructured so as to ensure that JSS component is disarticulated from

the senior secondary school (SSS) as stipulated in the National Policy on Education (NPE, 2004).

Basic Features of the UBE Programme

- Free formal Basic Education
- Compulsory uninterrupted nine years of primary and Junior secondary school education
- Emphasis on curriculum diversification and relevance to effectively and adequate cover individual and community needs and aspirations
- Disarticulation of Junior secondary school from senior secondary schools.
- Introduction of rudiment of computer literacy
- Appropriate continuous teacher professional development
- Community ownership of schools including participation in decision making process in schools.

Information and Communication Technology and Basic Education

Information and Communication Technology Education in Nigeria and the policy of the government should describe the steps by which computers and laptops will be placed on schools. The basic emphasize should be on how teachers and students should be provided with basic computer programming skills. In a need analysis conducted by universal Basic Education Commission (UBEC) in the area of ICT infrastructure in the basic education sector revealed that only eight states 22% can be said to be ICT complaints (Onocha 2013). In

a similar research by Ajudeonu and Idiaghe (2014) it was evidenced that many teachers do not have much exposure in using computers or internet for collaborative learning and they lacked competence on the use of ICT services. The only way to develop awareness and that teachers and learners would benefit from ICT teaching and learning is through the provision of ICT infrastructures in Basic Schools.

Researchers and discussions in Education have satisfactorily orchestrated the potentials of Nigerian children to be ICT complaints. ICT is seen as a way to promote educational changes, improve the skills of learners and prepare them for global economy and the information society.

ICT vision of promoting an ICT Education to meet the human resources requirements of the nation in attaining and enhancing sustainable socio-economic development, global competiveness as well as individual ability to survive in a contemporary environment (Federal Ministry of Education 2010) it has become imperative for every school child to be ICT complaint in view of the fact that all examination are done on line including the Joint Admission and Matriculation Board (JAMB). Therefore to meet the education need of Nigerian children in a world governed by technology, educational institution at the Basic Education level must adopt ICT in carrying teaching and Learning on all its ramifications.

Roles of Information Communication and Technology at Basic Education Level

The role of Information and Communication Technology (ICT) have become common place entities in all aspects of life. With education, ICT has begun to have a presence but the impact on Basic Education is not

as extensive as in other fields like banking and finance. Education is very socially oriented activity and quality education has been traditionally been associated with strong teachers having high degrees of personal contact with the learners. But with the role of ICT in education many changes will be brought to facets in teaching and learning and between the teacher and the learner.

For teachers:

- Information Communication and Technology offers the teacher new roles that prepare learners to manipulate information for solving social political and economic problems.
- According to Jonkins and Springer (2000) ICT is a willing instructional tool which the teacher can use to present information and manage class activities in order to help students achieve educational goals.
- ICT facilitates the sharing of resources and advices with learners
- ICT gives access to update student, with data anytime and anywhere (Ajudeonu & Idiaghe 2014)
- ICT encourages critical thinking and offers unlimited means of achieving educational goals
- ICT enhances efficiency and effectiveness in teaching at the Basic Education level.
- The quality in teaching various subject and lessons could be improved through the use of ICT.
- Also ICT can enhance the knowledge on the part of the teachers on problem solving skills thereby improving the delivery and access to knowledge

and improve the curriculum.

- ICT help the teacher to get students do more task; and computers used during lesson motivates students to continue learning outside school hours. (Backer 2000).
- ICT usage in teaching enhances professional image of the teacher. Ajudeonu & Idiaghe (2014).

For learner (Students)

- The field of education has been affected by ICT, which have undoubtedly affected teaching and learning. ICT have the potential to innovate, accelerate, enrich and deepen skills. This helps students to relate school experience to work practices, strengthening learning among students (Yusuf 2005)
- Ajudeonu & Idiaghe (2014) stressing on the relevance of ICT to the learner in the classroom highlighted the following.
- ICT increases the flexibility of delivery of education so that learners can access knowledge anytime and from anywhere. Easy access to learning where students can now browse through e-books, sample examination papers, previous year papers and also have easy access to resource persons, mentors, experts, researchers professionals and peers.
- ICT increase learner motivation and engagement by facilitating the acquisition of basic skills
- ICT are transformational tools which when used

appropriately can promote the shift to a learner centred environment.

- It gives students opportunities to address their work to an external audience and to collaborate on assignments with people outside or inside school.
- ICT provides the encouragement of independent and active learning- and self responsibility for learning.
- ICT helps learners to develop their individual intellectual and creative abilities by providing higher interactive potentials. (Samuel and Ede 2005).
- ICT significantly engages students' interest as well as encouraging active learning and self responsibility in learning.
- Regular use of ICT across different curriculum subjects can have beneficial motivational influences on student learning.

Barriers to Effective use of ICT in Teaching and Learning at Basic Education Level

As much as Information Communication and Technology is being advocated to be used in teaching and learning at Basic Education Level, there are barriers which could hinder the effectiveness.

- **Lack of competency and skills status:** Lack of human skill knowledge and competence to fully employ ICT in teaching in the education sector (Samuel and Ede 2002).

- **Inadequate ICT infrastructural facilities Basic**: ICT facilities like electric, telephone lines, well ventilated classrooms and air conditioned classrooms are unavailable in our schools.
- **Cost of consumers and cost of ownership**: The cost of ICT services are expensive and owning a computer /laptops by staff and students is great problem due to the high cost.
- **Non viability of ICT instruction materials:** in our basic schools in Nigeria, Yusuf (2005) reported in his investigation on teachers. Self-efficiency is implementation of computer education found out that most teachers in schools do not have the needed experience in the use of computer in teaching.
- **The level of ICT awareness of the people:** Many people in the rural areas have very low awareness of the use of ICT. Apart from the cell phone used by some of them, majority of the people are still ICT illiterate.
- **Lack of technical knowledge** for the maintenance of both hardware and software components of ICT equipment.
- **Poor school environments:** In Nigeria schools in rural areas are yet to have access to common computers and this non availability posses a threat.

Implications for Teachers and Recommendations

The importance of ICT is quite evident from contemporary studies of the use in all facets of life. The

emergence of information communication and Technology (ICT) has helped the society in diverse ways. The field of education has been affected by ICTs which have undoubted, affected teaching and learning. These has implications for teachers of the Basic Education level.

- Great emphasis should be place on recruitment of teacher with appropriate ICT knowledge during the period of recruitment.
- Teachers should be trained and retrained on continuous basis in order to possess the requisite knowledge of ICT so as to meet up with current technological trends in the society.
- Computers and internet services should be provided in the schools where both teachers and students have access to ICT in teaching and learning.
- Teachers should develop ICT pedagogical competencies
- Sufficient facilities and resources should be provided to in-service and pre-service teachers to practice the ICTs in teaching learning process.
- Environment should be provided for teachers to develop ICTS based competencies.
- ICT should be a compulsory course in all teacher preparation institutions like the Colleges of Education, Polytechnics that offer education courses and faculties of education in the universities.
- Workshops, seminars and conferences on ICT should be organized regularly for up-dating the

skills and knowledge of teachers.

- Government should urgently embark on the provision and installation of ICT facilities and the provision of constant power supply for teachers efficiency in the use of ICT in teaching and learning.
- Every teacher must own a personal computer, laptop or other accessories for personal improvement and development.

Conclusion

The contemporary teacher need to have knowledge and skills on the use of ICT in teaching and learning process in the classroom. Teachers' pedagogical practices should be influenced by the use of ICT. The use of ICT provides several kinds of materials, methods, skills and learning experiences. Utilization of ICT in teaching and learning can assist both teachers and learners. The use of ICT can help to make learners active participants, working on their pace becoming independent and having self motivation which facilitate mental development ICT has proven to be a very powerful tool in education.

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CHAPTER 6.

IMPACT OF CURRICULUM, INSTRUCTION AND EDUCATIONAL TECHNOLOGY ON COGNITIVE ABILITY OF SECONDARY SCHOOL STUDENTS IN DELTA STATE

CHRISTIANA C. NWADIOKWU (PHD)

Abstract

The study sought to examine the impact of curriculum, instruction and technology on cognitive ability of public secondary school students in delta state. Two research questions were raised for the study. The target population comprises of 11,112 secondary school teachers across the three senatorial district in Delta State. Simple random sampling techniques was used in selecting 100 teachers from the target population. The questionnaire was the instrument for data collection comprising the four point likert rating scale of strongly agree (SD), Agree (A), Disagree (D) and Strongly Disagree (SD). The instrument was faced validated by two experts, one from department of curriculum studies and educational technology and the other from department of measurement and evaluation both from the College of Education, Agbor. The reliability of the instrument was ascertain using Pearson product moment correlation statistics

which yielded 0.82 reliability co-efficient. Data of 2.50 was used for decision taking on the respondents responses as benchmark. Data collected were analysed using frequency distribution, mean rating scale and standard deviation. Findings revealed amongst others that curriculum as a planned guided learning experience is for desired learners continuous growth; that technology has the potential to enhance instruction in multi-dynamic ways of interactive and collaborative engagement between teachers and learners. It was recommended among others that government should provide necessary technological facilities and electricity supply for effective teaching/learning of educational technology in secondary schools.

Keywords: *Curriculum, Instruction, Technology, Secondary schools, Delta State.*

Introduction

In the school system the use of Educational Technology is a strong skill known as digital literacy to be possessed by all and sundry in the school curriculum and instruction in order to compete favourable globally in all aspects of life to be successful. In the school system, the use of Educational Technology cannot be overemphasized as it forms the bedrock of all planning with high speed of doing things effectively and efficiently in a digital order.

There is the digital divide still, and it seems as if the gap is widening the more between the non-digital and digital literate persons. The reasons may not be farfetched in the sense that, some teachers are digital phobia, some lack skills to manipulate the devices, economy down turn to purchase the needed gadget(s) is another reason, unemployment, cultural and or religion affinities among others. To bridge this gap essentially, it would take a bold move by the government and the citizens create full interest with open mind, to venture into the Technology

enterprise; knowing fully well that, this is the digital order and global language, of doing all things. No one must be left out in the expedition (Faisa, 2010).

There is need for the inclusion of Technology in the Nigerian school curriculum in the recent past; for learners at all levels to become skilful in the enterprise. To this effect therefore, when these learners are digitally skilful, they would be able to compete in all spheres favourably and effectively with peers in global competitiveness in education, economy, business, sports and other ventures. But, to a large extent, its introduction or inclusion has not been felt as such, or given much desired impact as expected in all ladders of the nation's educational system. This might be largely due to some factors inhibiting its growth and development. The critical factors and underlying conditions for proper growth and development of Educational Technology in Nigerian secondary schools should be studied, looked into critically, and ways to ameliorate or remove the bottle necks inimical to its overall development be fashioned out, so that its full implementation can be attained and sustained (FRN 2012).

Therefore, this paper discusses among other things meaning of curriculum, instruction, Educational Technologies and its impact on cognitive learning of secondary schools in Delta State.

Concept of Curriculum

The word curriculum was translated from its latin equivalent curere. This latin word means a race course or runway or a track. The word curriculum has a tangled definitional history and is shrouded in definitional controversy. Unfortunately, the issue of definition is not trivial because it carries implications for the curriculum

worker's job and for the politics of curriculum as a field within educational scholarship. Put another way, curriculum has become a field in search of a concise definition. Hence Tanner and Tanner (2007) noted that curriculum has undergone marked changed during the twentieth century but contemporary curriculum scholars are far from agreement as to how the term should be defined.

Pinar (2010), has also underscored the fact that curriculum is now a symbolic concept and an extraordinarily complicated discussion. One may ask why is this so? Ornestein and Hunkins (2009) reported that some people believe that the field lacks purpose and direction because it has extensively adapted and borrowed subject matter from a number of other disciplines, including its major principles, knowledge and skills.

Three factors may help to explain this divergence in the conceptualization of curriculum:

1. Curriculum is contextual and means different things to different people depending on the Context in which it is defined, or practiced.
2. Curriculum is associated with ideological leanings and beliefs about education and the world.
3. Curriculum is issues-laden.

What then are some of these definitions and how have they helped to shape school curriculum? To help make sense out of several definitions of curriculum it is important to do a grouping of some sort. For our purpose here, the different definitions of curriculum may be grouped thus:

1. Curriculum as experiences provided by the school.
2. Curriculum as a socio-cultural phenomenon.
3. Curriculum as process and product (that is curriculum as technology).
4. Curriculum as programme of studies, activities and guidance.

The curriculum is the plan made for guiding learning in schools, usually represented in retrievable documents of several levels of generality, and the actualization of those plans in the classroom, as experienced by the learners and as recorded by an observer; those experiences take place in learning environment that also influences what is learnt (Glatthorn, Boschee, Whitehead & Boschee, 2012).

Relationship between Curriculum and Instruction

Curriculum and Instruction go hand in hand. The relationship between the two is one that is closely related as the delivery of the curriculum would constitute an instruction. The term instruction is usually referred to as teaching and it is the direct result of lesson planning on which the teacher carefully plans ahead the delivery, tools, and resources that will be used in order to instruct the present curriculum.

Curriculum and Instruction (C&I) is a field within education which seeks to research, develop and implement curriculum changes that increase student achievement within and outside schools. The field focuses on how students learn and the best ways to educate.

According to Random (2016) the term Instruction is derived from the late middle English word intruccioun meaning to provide structure and direction. The

relationship between Curriculum & Instruction is intimate. It is so intimate that it is often said that its one word. Curriculum provides direction for instruction, since the instruction is the method of delivering academic curriculum. Instruction may exist without curriculum but would serve no direct purpose. Curriculum and Instruction must be compatible and maintain a close relationship in order to maximize students learning.

Concept of Educational Technology

Educational technology as an innovation in education is playing a great role in teaching and learning process to the extent of using organized combination of people, materials, facilities, equipment and procedure which interact to achieve educational goals. This is as a result of series of researches in education, on how to teach, what to teach, what to learn, and how to learn it.

These variables have created challenges in education over the years but can be tackled by application of technology (Olugbemi, 2015).

Educational Technology is concerned with the systematic application of science and technology in the field of education in order to further the cause of education (Mangal & Mangal, 2013). Aruind (2017), pointed out that educational technology helps to grip future generations to tap into their creativity which is simply their ability to create solution out of thin air through a powerful sense of imagination. The use of digital or electronic technologies and materials to support teaching and learning, recognizes that technology alone does not enhance learning. While exploring wide ranging technology forms, the guide recognized the centrality of programme design and implementation, teacher support and outcome

measurement, clear and specific curriculum focus, relevant curriculum materials, and focusing on teacher development and pedagogy are identified as characteristic of effective educational technology programme. There is need to support teachers to develop appropriate relevant practices using educational technology, how such practices are enacted in schools, and what factors contribute to or militate against successful outcomes (Alikem, 2014).

Teachers play an important role in the teaching-learning process. They are the agent that will make use of technology in the classroom. The curriculum has shifted from, "Content-centered" to "Competence-based" the mode of curriculum delivery has now shifted from "teacher-centered" forms delivery to 'Student-centered" forms of delivery.

The Impact of Curriculum, Instruction and Educational Technology on Cognitive ability of Students in Secondary Schools.

Educational technology helps to individualize instruction, it helps to take care of individuals academics needs and abilities through the use of modern instructional technology. Through the adoption of computer-assisted instruction (CAI) and programmed instruction (PI) in a textual form, individual learners progress in their studies at their own pace/rate and convenience.

Educational technology also cares for large number of learners at the same time through the use of audio-visual materials to commutate information in the classroom to all learners at the same time. It makes all the members of the class to be taught at the same time. Whatever hardware and software that would be essential in

reaching all learners at the same time would be used in the accomplishment of education technology roles. Olugbeomi (2015), identifies the following as the impact of educational technology in teaching and learning:

1. The use of educational technology processes and devices help to making learning more permanent it creates impressions that are so vivid and powerful that the learners hardly forgets the experience into which he was exposed;
2. Educational technology awakens learners' interest by its ability to arise the curiosity to know more. Once more, the use of audio-visual aids makes the learners to be more alert and effective. It captivates their interest and they would like to follow the explanation, procedures, or the exercise sequentially and faithfully in order to get the precise meaning of the whole event. There is usually the natural desire to want to have more;
3. Educational technology provides more scientific base. The field provides frame work necessary for designing conditions of learning that are more closely based on what is known about how human beings learn. Educational technology guides research into asking the right questions also how to apply research result to school and colleges;
4. Educational technology provides and proffers solutions to problems of designing, producing and utilizing instructional materials for effective teaching and learning. Teachers are encourage and taught how to improvise instructional materials during seminars, workshops and conferences

organised by experts of educational technology and

5. Educational technology enhances the standard of teacher's performance through effective media integration and use of verities of methods in classroom interaction. With the use of educational resources, teachers are able to combine other pedagogical strategies like demonstration, experimental, study trips project, peer teaching and dramatization methods of teaching.

Contribution of Educational Technology to Curriculum and Instruction.

Educational Technology has contributed immensely to curriculum and instruction in the following ways:

1. Inadequate and irrelevant curriculum: The field Educational Technology has assisted in the development of new curriculum innovations and designs. This is possible by establishing flexible instructional strategies including modules and programmed materials in textual form (Alikem, 2017);
2. Inadequate equipment, materials and facilities: Education technology can assist in the development and production of inexpensive, low cost but high quality technologies. It also helps in determining and developing alternative strategies to cater for the unavailable equipment (Aruind, 2007);
3. Shortage of adequately qualified teacher. This is handled by the development of modules, audio

tapes and video tapes, which could be reproduced and utilised extensively for different groups of people irrespective of their location and population.

4. Inadequate programmes for the training of teachers'. Educational technology can assist by developing appropriate competency-based teacher education programmes as used as the utilisation of microteaching strategies and facilities. (Stosic, 20l5);
5. Educational technology is designed to support policy makers, education planners, practitioners and advocates strengthening the design, implantation and evaluation of programmes as needed in innovative curriculum and
6. Educational technology is defined as the use of digital or electronic technology alone does not enhance learning while exploring wide ranging technology forms, the guide recognise the centrality of programme design and implementation1 teacher support and outcome measurement. Clear and specific curriculum focus, relevant curriculum materials, and focusing on teacher developments and pedagogy are identified as contributions of detach to curriculum (Mongai, 2013).

Solutions to Problem and Practices of Curriculum Instruction through Educational Technology

Solution to problem and practices of curriculum instruction through Educational Technology are as follows:

1. Educational technology has helped in the development of new curriculum designs to replace irrelevant and inadequate curricula. This is possible by establishing flexible instructional strategies including modules and programmed materials in textual form (Esu 2013);
2. By using instructional materials in teaching and learning in our classrooms, educational technology tends to evoke the various senses of seeing, smelling, hearing, feeling and tasting. This discourages rote learning and encourages meaningful learning (Youniss, 2013).
3. There is a problem of inadequate and qualified teacher, educational technology helps by the development of modules, audio tapes and video tapes which could be reproduced and utilized extensively for different groups of people irrespective of their location (Okorn 2014);
4. Nigeria does not only lack computer technology infrastructure, it also lacked the human skills and knowledge to fully integrate computer technology in Secondary Schools in Nigeria. (Alikem, 2017).

Purpose of the Study

Specifically the study sought to:

Investigate the extent to which curriculum, instruction and educational technology have an impact on the cognitive ability of the secondary school students in Delta State

Examine the extent to which Educational Technology have an impact on the cognitive

ability of the secondary school students in Delta State.

Research Questions

The study was guided by the following research questions:

1. To what extent does curriculum, instruction and educational technology have an impact on cognitive ability of secondary school students in Delta State?
2. To what extent does Educational Technology have an impact on cognitive ability of secondary school students in Delta State?

Research Methodology

The type of Design adopted for this study is known as descriptive survey design. This is because a representative sample of the total population was used to collect data from the respondents. The population for this study comprises 11,112 teachers from public secondary school in Delta State. Simple random sampling techniques was used in selecting 100 teachers from the target population.

The questionnaire was used to gather information from the respondents. The instrument was faced validated by two experts, one from the department of curriculum studies and educational technology while the other was form the department of measurement and evaluation both from the College of Education, Agbor. The instrument consisted of 10 items, structured and designed by the researcher tagged "Impact of Curriculum, Instruction and Educational Technology on cognitive ability of secondary school students in Delta State.

(ICIEDTCAS). The items in ICIEDTCAS were grouped into two parts. Part A is on the respondent personal data while part B has 10 items which addressed Impact of Curriculum, Instruction and Educational Technology on secondary school students. The questionnaire items were structured on a four (4) point rating scale of Strongly Agree (SA); Agree (A) Disagree (D) and Strongly Disagree (SD) and was rated 4,3,2 and 1 point(s) respectively. The respondents were expected to choose from any of the options.

The reliability of the instrument was tested using Pearson Product Moment Correlation Statistics which yielded 0.82 reliability co-efficient indicating a high reliability index of the instrument. The instrument was administered on the respondents by the researcher with the help of research assistants. There was on the spot retrieval of all the questionnaire. Data collected were presented in frequency tables, Mean and Standard Deviations were used to answer the research question of the study. Decision rule of 2.50 was used as Benchmark: Strongly Agreed (3.5 – 4.00); Agree (2.50-3.49), Disagree (1.50 – 2.49) and Strongly Disagree (.050 – 1.49).

Sample Size of the Study

Senatorial District	Target Population of Teachers	Sample	Sampling Technique
Delta North	4,980	40	Simple
Delta Central	4,020	40	Simple
Delta South	2,112	20	Simple
Total	11,112	100	

Presentation of Data/Result

Research Question 1: To what extend does

curriculum, instruction and educational technology have impact on cognitive ability of Secondary School Studies in Delta State?

Table 1: Mean Ratings with Standard Deviations on Impact of curriculum, instruction and educational technology on Cognitive ability of Secondary School students in Delta State

S/N	ITEMS	4	3	2	1	$\bar{X}$	SD	Remark
		SA	A	D	SD			
1.	Technology Education inclusion into the curriculum & Instruction has an impact on the cognitive ability of students to cope with the current digital age to produce intended learning.	36	40	12	12	2.60	1.10	Agreed
2.	The Cognitive ability that deals with knowledge cannot be activated from the use of Educational technology in curriculum and instruction as a planned guided learning experiences for desires learners growth.	10	20	40	30	2.1	0.98	Agreed
3.	Teaching and learning of Educational Technology in the school curriculum enables learners to be digitally skillful in cognitive ability.	40	30	5	25	2.85	1.20	Agreed
4.	Activity based learning in Technology leads to critical thinking, reasoning, creativity and the development of inquisitive mind which is the realm of curriculum & instruction.	30	27	19	24	2.63	1.15	Agreed

5.	The inclusion of Technology for learners in the school curriculum has not given desired impact as expected in all ladders of the Educational System.	33	30	17	20	2.83	1.12	Agreed
	Grand Mean Total ($\bar{X}$)					**2.92**		

Table 1 above, revealed that 70% out of 100 teachers agreed that curriculum, instruction and educational technology have impact on the cognitive ability of students to cope with the present digital skills. They responded positively to items 1 – 5 which has the following mean score of 2.6; 2.1; 2.85; 2.63; and 2.83; respectively. The total grand mean of the five items is 2.92 which were above the benchmark of 2.50 indicating that Educational Technology has impact on the cognitive performances of students.

Research Question 2: To what extent does Educational Technology have an impact on cognitive ability of secondary school students in Delta State?

Table 2: Mean rating with standard deviation of impact on Educational Technology on cognitive ability of secondary school students in Delta State.

S/N	ITEMS	4	3	2	1	$\bar{X}$	SD	Remark
		SA	A	D	SD			
6	Technological facilities and electricity supply are lacking in most secondary schools in Delta State	40	30	5	25	2.85	1.20	Agreed
7	Technology has the potential to enhance instruction in multi-dynamic ways of interactive and collaborative engagement between teachers and learners	30	27	19	24	2.63	1.15	Agreed
8	Lack of trained personnel to install, maintain and support computer technology affects teaching/ learning in the curriculum and instruction of secondary schools	40	30	5	25	2.85	1.20	Agreed
9	Students lack access to the internet due to lack of funds for internet connectivity	30	30	17	20	2.76	1.12	Agreed
10	Absent of relevant software and hardware resources made teaching of computer irrelevant in secondary schools curriculum	40	20	30	9	2.92	1.03	Agreed
	Grand Mean Total ($\bar{X}$)					**3.2**		

Table 2 shows that items number 6 – 10 had mean rating scores above the cut-off point. The mean rating of these items are as follows: Item 6: 2.85, item 7: 2.63; item 8: 2.85, item 9: 2.16, item 10:2.92 and the Grand mean of

the five items are 3.2 which were above the bench mark of 2.50 indicating that lack of educational technology facilities have an impact on the cognitive ability of secondary school students in Delta State.

Discussion of Findings

It was found out that in research question 1, table 1, the respondents were of the view that Curriculum, Instruction and Educational Technology in secondary schools have impact on the cognitive ability of the students. This is in line with Aruind (2017) who pointed out that Educational Technology help to grip future generations to tap into their creativity which is simply their ability to create solution out of thin air through powerful sense of imagination. Okorn (2014), is in agreement with the above opinion when he indicated that the use of Technology transforms the learning/teaching proves in which students deal with knowledge in an active, self directed and constructive way.

The findings in Research question 2, table 2 revealed that lack of Educational Facilities have an impact on the cognitive ability of secondary school students. It is in line with Alikem (2017) who opined that Nigeria does not only lack computer technology infrastructure it also lack the human skills and knowledge to fully integrate computer technology into secondary schools in Nigeria. Again respondent in item 8-10 are in agreement that lack of trained personnel and relevant materials has impact on cognitive ability of students which is in line with Stosic, (2015). Curriculum, Instruction and Educational technology seems to be an array of tools that might be helpful in advancing students learning.

Conclusion

Educational technology, curriculum and instruction

which is a new innovation in education has contributed immensely to curriculum innovation through the way teaching and learning has been accessible to both teachers and learners thereby leading to increase in cognitive ability. The use of information and communication technology (ICT) has created a powerful learning environment and its transformation in the teaching -learning process in which students deal with knowledge in an active, self-directed and constructive way. No adequate funding to maintain few equipment and devices provided; as well as gross inadequate of skilled personnel (teachers and supports staff) to drive Technology meaningfully in Nigeria schools especially in Secondary schools in Delta State.

Recommendation

Based on the findings of the study, the following recommendations are made:

Government should ensure that Educational Technology Policy statements are translated into reality;

Qualified skillful teachers in Computer Technology should be posted to various secondary schools in Delta State;

Computer Technology should be integrated into secondary school curriculum without further delay and also be considered as examinable subject at secondary school level as one of the criteria for providing sound background for the study of computer in tertiary institutions;

The Federal Ministry of Power should work towards stabilizing electricity supply in secondary schools;

Regular in-service training for teachers must be pure ICT based package and

Government should provide necessary technological

facilities for effective teaching/learning of Educational Technology in Secondary Schools in Delta State.

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CHAPTER 7.

ISSUES AND CHALLENGES IN THE APPLICATIONS OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) TO HUMAN KINETICS AND SPORTS

PETER O. OBOH (PH.D) AND CHIDI A. SYLVESTER (PH.D)

Abstract

The purpose of the paper is to take a look at the issues and challenges in the applications of Information and Communication Technology (ICT) to Human Kinetics (Physical Education) and sports programmes. ICT is simply a set of activities which facilitate the process, transmission and display of information, using modern electronic devices, principally the computer, the internet and other

devices such as the telephone, television and others. Digital Divide is the gap between the individuals, households or geographical areas which are of different socio-economic leagues with regards to their opportunities or ability to have access to ICT and their use of the internet for a variety of activities. Human Kinetics and sports are integral parts of the educational system therefore, make use of ICT facilities just like any subject or discipline in education in line with global trends. To adequately explore the antecedents on this discourse, the following areas were examined: the Digital Divide, issues in Human Kinetics and, sports programmes, challenges and contributions of ICT to Human Kinetics and sports programmes, summary, conclusion and recommendations.

Preamble

Modern technology these days have shown great developments and reforms in this present 21st century, which is apparently moving fast toward globalization. As a result of Information and Communication Technology (ICT), information and communication gap have never

been drawn closer to the door steps of mankind as in recent dispensation.

Information Communication Technology (ICT) is simply a set of activities which facilitate the process, transmission and display of information using modern electronic devices, principally the computer, the internet and other devices such as the telephone, television, etc (Lee, 2004). Proper availability of the right kind of information is however important for realization of the right policy programmes for economic development. Economic development without appropriate educational system to facilitate its operational tendencies may meet with little meaning, and as a result may run into a hitch.

According to Cooke (2004), education is the bedrock of any civilization and without adequate information and communication technology skills, it will result in a slow process to flourish. The Nigeria education system needs modern development in line with globalization to actualize its dreams and it is therefore imperative to harness all avenues to ensure the depository and flow of information to her every day existence.

However, among the subject domains in the education field are Human Kinetics and sports. Human Kinetics is an integral aspect of the total process of education which uses Human Movement activities for an all-round development of the individual. According to Ojeme (1998) Physical Education should be defined as an organised field of knowledge concerned with the study of man and his movement and the variety of applications to life in society. Sports is an institutionalised game governed by rules and regulations and that can be participated in from the amateur to the professional level of attainment.

The applications of Information and Communication Technology (ICT) in Nigeria education system with particular reference to issues and challenges in Human Kinetics and sports programmes is what this paper seeks to address.

In addressing the issues and challenges in Human Kinetics and sports programmes, the following were highlighted: the concept of Information and Communication Technology (ICT), Nigeria and the digital divide issues and challenges, contributions of ICT to Human Kinetics and sports programmes among others.

The Concept of Information and Communication Technology (ICT)

According to the Asian Development Bank ADB (2003), IT is an electronic means by which activities, such as processing, transmission and display of information are facilitated. Uwaje (2005) defined ICT as information transmission technology built on the potentials of electronic communication equipment, for connecting and accessing various ends in the information pathway.

Greenidge (2007) sees ICT as those technologies that can be used to interlink information technology devices such as personal computers with communication technologies such as telephone and their communication networks. According to Obenobe and Atjeromavwo (2009), it can be infered from these definitions, that the concept of ICT connotes sophisticated technologies designed for monitoring, gathering and display of geospatial information. These technologies include the satellites, personal computer, Computer Support Internet, Geographic Information Systems (GIS), Global Planning Systems (GPS) Remote Sensing and others.

The Technical Agriculture and Rural Co-operation CTA (2003), defined ICT as technologies that facilitate communication, processing and transmission of information by electronic means that embrace a multitude of other simple communication devices such as telephone (mobile or fixed line), television, radio, audio cassette or compact disc (cd) recorders/players, video tapes or VCD/DVD record/players, faxes and telex.

According to United Nation Development Programme, UNDP (2001), the definition of ICT should encompass a comprehensive outlook of the components and versatile aspects of the concept and must include not only the digital technologies of computers that embrace local area network, metropolitan and Wide Area Network internet technologies, but the older technologies of print, radio and television that have been used extensively in the dissemination of information. They must include 'old' ICT of radio, television and telephone and the 'new' ICT of computers, satellite and wireless technology and the internet (Lee, 2004).

Nigeria and the Digital Divide

The Digital Divide is the gap between individuals, households or geographical areas which are of different socio-economic leagues with regards to their opportunities or ability to have access to ICT and their use of the internet for a variety of activities. In other words, there is disparity amongst countries, just as there is amongst individuals in their ability to have access to information and the advantages of the inherent potentials of the internet in particular and ICT in general. Although, the divide is most obvious between developing and developed countries, it is worth noting that the divide

also exists even amongst developed countries (Finks & Kennedy, 2003).

According to the International Labour Organization (ILO) World Employment Report (2001) as cited by Aduge and Ogheneguke (2009), nearly 90% of all internet users are in developed countries with USA and Canada accounting for about 57%. In Nigeria, the rate of development of the ICT sub-sector has been very phenomenal over the past decade. This is due to the fact that some developing countries have been able to overcome some of the technical hitches of technological development faced by developed countries (Finks & Kennedy, 2003).

In comparison with some other African countries, Mike (2003) noted that the rate of ICT development and ICT diffusion in Nigeria until recently is not in any way comparable to that of Egypt, South Africa and Botswana, Ndukwe (2004). Aduge and Ogheneguke (2009) regret that in terms of teledensity which is the number of telephone lines per 100 of the population and personal computer penetration, Nigeria still ranks below countries like Egypt, South Africa and Botswana with figures less than 60%. Sweden for example tops the list of world leaders in e-learning.

Issues of ICT in Human Kinetics and Sports Programmes

Human Kinetics and sports are both science-related disciplines and are embedded in the science domain. Both are very interrelated and require the use of ICT to function very well in this era of globalization. The issues of ICT in Human Kinetics and sports programmes are as follows:

1. Low Level of Accessibility to the Internet: The low

level of accessibility to the internet is a major problem to Human Kinetics and sports programmes. This is affecting the smooth flow of information about sports news from all over the world, and the short-fall in retrieving information from the net. Network problem has equally been a contributory factor to this problem (Mobelaji, 2006).

2. Epileptic Power Supply: The ICT as it is, needs electricity to function effectively and functionally, but unfortunately it is a scarce commodity in Nigeria. Huge sums of money amounting into millions of dollars have been wasted in a bid to upgrade the existing Mega Watts, but to no avail (Mobalaji, 2006).

3. Low Level of Income: This is one of the most important factors inhibiting economic development of ICT in developing countries.Income level in most develping countries is still far less than average, and this is made more challenging by unemployment and high inflation rate (Mike, 2003).

4. Low Level of Education: In most developing countries there is absolutely a low level of education among its populace, and there is the tendency for this to seriously affect the awareness and use of ICT. Even if a reasonable proportion of the population can afford a personal computer, the basic and necessary skills and prerequisites of the potential of ICT is lacking because of high illiteracy level. This can affect Human Kinetics and sports programme, since it is not possible for ICT programmes to be effected without adequate knowledge (Ndukwe, 2004)

5. Low Level of Computer Literacy: The total number of educated persons when compared to those who are computer literate is low. There are computer centres

almost everywhere in our cities, advertising for students to become computer literate. A large number of Human Kinetics experts and sports men and women do not offer themselves the opportunities to be computer literate. (Okon, 2007).

6. Environmental and Climate Problems: Environmental and climatic problems are compounding the problem of the effectiveness and efficiency of ICT in Human Kinetics and sports programmes. Certain geographical locations are difficult to locate networks, especially in the rural areas, and climatic conditions of a given area will predispose it to clarity of network in ICT programmes. Stormy weather may bring about serious destructions to telecommunication masts and antennae, which may require time and money to replace.

The Challenges and Contributions of ICT to Human Kinetics and Sports Programmes

Due to modern globalization, the following are the challenges and contributions of ICT to Human Kinetics and sports programmes:

1. The Need to be Computer Literate

There is the need for every Human Kinetics professionals and other practitioners in sports, athletes and coaches to be computer literate in order to be abreast with modern ICT programmes. Being familiar with the computer and internet will open lee ways to globalization.

2. Global Positioning Systems (GPS)

According to Hellmick and Rubin (2003), recent medical research and technology has led to the development of new sets of training techniques, wrist-worn heart rate monitors. Global Positioning System

(GPS) use coded satellite signals that provide accurate coordinates to determine exact location. GPS technology has been integrated into the sports and fitness industries and incorporated into sports watches that are commonly used by runners and cyclists (Magill,2000). The integration of GPS technology into the watches makes it possible to determine the distance traveled, speed, and the system includes a GPS receiver and a watch monitor which are connected by a radio signal. The receiver (typically strapped to the upper arm) get the signal from a satellite and sends it to the watch for immediate feedback (Magill,200).

3. Ergonomics

Ergonomics also known as human factors engineering is a discipline that helps to develop tools and place setting that put the least amount of strain on the body. Biomechanical principles are used to help identify movements and positions that put individuals at greater risks for specific injuries and micro-trauma. One application of ergonomics is the design of effective workstations for computer users (Corbin &Welk, 2004).

4. Automated External Defibrillator

One form of new technology for saving lives is the automated external defibrillator (AED). After identifying cardiac arrest and performing cardio-respiratory resuscitation CPR, if ventricular filtration (chaotic electrical activity to heart muscle) occurs, it may be necessary to "shock" the heart back to a normal rhythm. The AED has a heart rhythm analysis system, which advises the operator when a "shock" is appropriate. The operator must then take action to deliver the shock (America College of Sports, Medicine, 2000).

5. Stretching Rope

An advance in equipment technology for flexibility training is the development of "stretching" ropes. These ropes have multiple loops which enable individuals to change the length of the rope and perform variety of exercises (Alter, 1996).

6. Resistance Training Equipment

Over the years, there have been major changes and developments in resistance training machines and recent developments, have allowed machines to overcome some of the well-known limitations. For example, many new machines allow movements to take place in multiple dimensions to allow for converging and diverging movements and independent arm function. Some examples include the cyber VRZ line, the Paramount ART line and the Actuate Line by Pacific Fitness. These machines provide additional variety for stretch training and a more natural motion (National Strength and Conditioning Association, 2004).

7. Healthy Eating Index

The United States Development of Agriculture (USDA) Centre for Nutrition Policy and Promotion (CNPP) has recently made its healthy eating index (HEI) available for free by consumers. This online dietary assessment uses the most comprehensive database of foods available and features one easy-to-use interface to analyze foods (US Department of Health and Human Services, 2000).

8. The Segway HT

Recently, a personal movement device known as the segway, Human Transport (HT) has become available on the market. These devices utilise a gyroscopic system to assist in balancing and a small system to assist in balancing and a small electric motor to propel people around. The manufactures of the segway HT emphasise

that increased use of the segway HT in society will have tremendous benefits on our society and this will shift away from car traffic and could indirectly encourage more walking (Tate; Wing & Winett 2000).

9. Modern Facilities and Equipment

New modern facilities, equipment and sophisticated supplies are being produced, replacing the old ones. Smith (2006) opined that, new paving materials, new types of equipment, improved landscapes, new construction materials, new shapes of swimming pools, partial shelters and synthetic grass are just a few of the many new developments. Facilities are moving from use of regular glass to either plastic and fiberglass panel or to overhead skydome. Light weight fiberglass, sandwich panels, or fabricated sheets of translucent fiberglass laminated over an aluminum framework are popular (Asher, 2000). Equipment and implements like Javelin, spike shoes, soccer boots amongst others are now being made lighter to meet up with latest technology, and modern sensitive electronics score boards are made and placed at strategic places during competitions.

10. Research and Publication

According to Oboh and Ovuema (2009), research and publications are not left out of the modern trends, for computers have replaced manual typewriters and access to important information is now easily accessible from the internet via websites. Recent research findings and publications around the globe can be instantly retrieved via internet services. Desktops and laptops computers of various sizes and capacities are now available for research methods and statistical analysis, and they have proved useful in Human Kinetics and sports programmes

(Ropeik& Gray, 2001; US Department of Health Human Service, 2000).

11. Random Doping Test

To curb the menace of the intake of performance enhancing drugs, the International Amateur Athletics Federation (IAAF) and other sports associations are embarking on random doping test on athletes. These tests are done during training and even at athletes' homes unannounced. This is to reduce to the barest minimum the use of performance enhancing drugs in sports by athletes. This advanced technology has helped to reduce the incidence of drug abuse and cheating in sports (Ropiek& Gray, 2001).

12. Measurement of Laboratory Test

The ICT over the years has been employed during measurement laboratory tests in Human Kinetics and sports in the following protocols;

i. Treadmill Protocol: Vo2max can be predicted from submaximal exercise duration. It can be estimated by equations that use the heart rate to exercise at different submaximal intensities accompanied by the ACSM equation for steady-state Vo2 (Roberg&Keteyian, 2003).

ii. Cycle-Ergometer Protocols: Bicycle ergometer tests are commonly used to measure and predict oxygen intake. One of the most common submaximal cycle ergometer protocols used to predict Vo2max was developed by the YMCA (Golding, Meryers& Shining, 1989).

iii. Lactate and Ventilatory Threshold: Lactate threshold (LT) is the term used to denote the intensity of exercise when there is a abrupt increase in lactate accumulation in blood or muscle. The best measure of success in running events longer than 1500m for running,

and also in long-distance road cycling is the pace or Vo2 at the lactate threshold (LT). The intensity of LT reflects an individual'smaxminal steady-state intensity. Research has continually revealed very high correlation (<0.9) between the pace at the LT and some expressions of race performance (time, average, pace, etc) (Londeree, 1986, Sjodin&Svedenhag, 1985: Tanaka & Matsuura, 1984).

iv. Measurement of Field Tests: Information and Communication Technology (ICT) had equally been very useful in the measurement of field tests in Human Kinetics and sports programmes in the following tests.

- **Coopers 1.5 Miles Run:** The 1/5Mi test, originally developed by Kenneth Cooper, is a popular test used to predict cardiovascular fitness. This test is conducted on a four hundred meter track. After subjects have warmed up, they walk, jog or run as fast as they can 6 items around track. Oxygen uptake is predicted by a formula.
- **Rockport Walk Test:** The Rockport walk test is an excellent test to predict cardiovascular fitness, especially for sedentary individuals. Individuals are instructed to "walk" as fast they can for 1-mi and then record their heart rate at the end of the walk. Vo2max is predicted by using a multiple regression equation developed by Kline and Colleagues (Robergs & Keteyian, 2003).
- **Step Tests:** The 3-min step test predicts oxygen uptake from the recovery heart rate following 3 min of stepping. The test is conducted on a bench 161½ in height. A metronome should set to 88 counts, or 22 steps/min for women, and 96 counts

or 24 steps/min for men. At the signal to start subjects step to a four-step cadence (up-up-down-down). At the end of 3 mins, the subject remains standing and a 15-a pulse rate is recorded between 5 to 20s recovery (Robergs&Keteyian, 2003).

14. Muscle Metabolite Accumulation (Anaerobic Capacity)

The rate ATP regeneration cannot be measured directly, but often estimated by sampling muscle tissue and assaying for key intermediates of glycogenolysis and glycolysis. It is assumed that during intense muscle contractions, there is minimal muscle blood flow resulting from high intramuscular pressures. Consequently, muscle contraction occurs in a closed system where the accumulation of glycoltic intermediates, reflects glucose-6-phospate flux through glycolysis, from which ATP regeneration can be estimated (Kelly, 2001).

15. Accumulated Oxygen Deficit (Anaerobic Capacity)

An indirect and noninvasive method for determining anaerobic capacity is to estimate the total energy requirements of exercise by calculating the theoretical Vo2 required for the exercise intensity and subtracting from this value the measured Vo2. Exercise is usually performed on a cycle ergometer or tread-mill, and the difference between these two integrated values has been termed the accumulated oxygen deficit and has been argued to reflect anaerobic capacity (Kelly, 2001, Robergs & Keteyian, 2003).

Summary

Information and Communication Technology is an

electronic means by which activities, such as processing, transmission and display of information are facilitated. The Digital Divide in Nigeria is still very high, in other words, there is disparity amongst countries just like amongst individuals in their ability to have access to information.

The issue of ICT in Human Kinetics was viewed as the problem that limits the effectiveness and efficiency of ICT to Human Kinetics and sports programmes and they are: low level of accessibility to the internet, epileptic power supply, low level of income and education and low level of computer literacy as well as environmental and climatic problems. The challenges and contributions to ICT to Human Kinetics and sports programmes ranged from: global positioning system (GPS), ergonomics, automated external defibrillator, stretching rope and resistance training equipment to anaerobic capacity tests.

Recommendations

The following were the recommendations drawn for this study:

1. All Human Kinetics experts and sports professionals, athletes, coaches and practitioners should endeavour to be computer literate.
2. Efforts should be made for students and lecturers of Human Kinetics to store their research works and publications in the computers and flash drive for preservation purpose.
3. Information and Communication Technology related courses should be introduced at departmental levels in Human Kinetics as a core subject

4. Human Kinetics students should have uninterrupted access to the internet services at departmental level.
5. The epileptic power supply should be addressed by the government of the day so as to provide power source for internal services.
6. Alternative power supply should be provided by universities for twenty four hours access to the internet for students and lecturers
7. Computers and its accessories should be provided in large number at Human Kinetics departments and sports centres.

Conclusion

The application of Information and Communication Technology (ICT) in Nigeria education system is not as encouraging as expected because of numerous associated problems in the system. The issues and challenges will help educationist especially in the field of Human kinetics and sports to evaluate the problems inhibiting the full potentials of ICT to the two disciplines, and how far it has been done and put in place solutions to update the Digital Divide in not only Human Kinetics and sports, but in all other disciplines in Nigeria educational sphere. By so doing the issue would be surmounted and challenges met.

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CHAPTER 8.

THE IMPORTANCE OF BLENDING TECHNOLOGY OF TEACHING IN EARLY CHILDHOOD CARE AND EDUCATION IN A BORDERLESS WORLD

IWERIEBOR VERONICA N.; NWABUWE H.I; AND MERCY AFE OSAGIEDE (PH.D)

Abstract

Blended learning is an innovative concept that embraces the advantages of both traditional teaching in the classroom and (ICT) supported learning that includes both offline and online learning (ICT) compliments and extend traditional means of learning. It reflects the real world inside and out. For this purpose, there is need for effective implementation of (ICT) in (ECCE) schools to enable proper planning which entails estimating the number of pupils in the school system. Blended learning has greatly influenced the teaching and learning in the ECCE which we know little about as educators and the use of these technologies in Early Childhood Care and Education. It is also expected that the use of Blended learning if well implemented, will bring about sustainable development, use of (ICT) in our communities and enhance quality teaching and learning in Early Childhood

Centres. Therefore, this paper will look at the conceptual framework. The need for blended learning and teaching. The need and uses of (ICT) in Early Childhood care and Education in Nigeria and suggest possible solutions where necessary.

Key words: Blended learning, Technology, Teaching, Early Childhood Care and Education and Borderless World.

Introduction

Education is the key to Nigeria's economic growth, prosperity and our ability to compete in the global economy. It is the path to good jobs and higher earning power for Nigerians. Nigeria needs education system that provides all children with engaging and empowering learning experiences to help them set goals, stay in school irrespective all odds; to obtain the further education and training needed for success in their personal lives, workplace, and their communities.

Besides there is need to develop creative, resourceful thinkers; informed citizens; effective problem-solvers; groundbreaking pioneers; and visionary leaders. This will help foster the excellence that flows from the ability to use today's information, tools and technologies effectively and a commitment to life-long leaning. All these are necessary for Nigerians to be active, creative, knowledgeable, and ethical participants in our globally networked society.

In order to achieve this, schools must be more than information factories; they must be than information experts; they must be collaborators in learning, seeking new knowledge and constantly acquiring new skills alongside their pupils. Pupils must be fully engaged in school-intellectually, socially, and emotionally. This level of engagement requires the chance to work on interesting and relevant projects. The use of technology

environments and resources, and access to an extended social network of children and peers who are supportive and safe.

Technology itself is an important driver of change. Contemporary technology offers unprecedented performance, adaptability, and cost effectiveness. Technology can enable transforming education only if, we get committed to the change this will bring to our education system. For example, pupils come to school with mobile devices that let them carry the Internet in their pockets and search the web for the answers to test questions. Is this cheating, or with such ubiquitous access to information is it time to change what and how we teach? Similarly, do we ignore the informal learning enabled by technology outside school, or do we create equally engaging and relevant experiences inside school and blend the two?

Conceptual Framework

The provision of modern technological equipment at all school levels depends on the levels of preparedness both on the side of the teacher and pupils. A thorough look at pupils ability to obtain the necessary flexibility in the world of information closely interrelated among others, level of information setting in the schools with different types of data in printed and electronic format with regular, updates and networks as well as those directed by experts.

It is based on the theory of constructisim which belief that people learn through constructing their own understanding and knowledge gained, through their personal experiences and reflection upon those experiences. The teacher is a facilitator whose role is to guide the learners in the construction of their own

knowledge. Learning new materials and concept is predominantly the responsibility of the learners while the teacher's responsibility is to stimulate curiosity and fully engage pupils in learning process that will enable them think and process information, (Dewey, 1933; and Adams and Burns, 1999). This constructism suggest the needs for pupils to develop thinking skills and enable the current schooling methods to provides such opportunities.

Technology provides opportunities for ideal learning, yet it has been neglected and the implementation has failed widely as it provides opportunity for a learner centred, learning environment with the ideas that they learn more from what they do. This will enhance positive attitude and skills for sustainable living in borderless world.

The Need for Technology Education in Classroom

Our education system today supports learning mostly in classroom and from textbooks and depends on the relationship between individual educators and their pupils. The role technology plays in the nation's classrooms varies dramatically depending on the funding priorities of states, local governments, and schools and individual educators' understanding of how to leverage it in learning, in meaningful ways.

Meanwhile, many pupils' love outside school are filled with technology that gives them mobile access to information and resources 24/7, enables them to create multimedia content and share it with the world, and allows them to participate in online social networks and communities where people from all over the world share ideas, collaborate, and learn new things. According to a national survey by the Kaiser Family Foundation, 8-to 18-years –old today devote an average of 7 hours, 38

Minutes To using Entertainment media in a typical day-more than 53 hours a week (Kaiser Family Foundation, 2009). The opportunities, access and information are limitless, borderless, and instantaneous.

Chen, Lambert and Guidry (2010) found that widespread use of the Web and other Internet technologies in postprimary education has exploded in the last 15 years. An increasing focus of this trend is blended learning. So popular has the uptake of blended learning been, that it has been called the "newnormal" in higher education teaching (Norberg, Dziuban, &Moskal, 2011), Blended learning contexts that integrate physical and virtual components are seen as critical strategies for higher education institutions (Cobcroft, Towers, Smith, & Bruns, 2006). This trend has intensified since the publication of a meta-analysis of 50 studies that found that while online students performed a little better than face-to-face students, students in courses that blended online and face-to-face components did much better than a straight online course, with an effect size of +0.35, p <.001 (means et al., 2010). The case for the effectiveness of blended learning devices from the observation that such courses offer students a greater range of affordances that enhance the learning experience beyond that of either online or face-to-face modes alone. Support is offered by Ramsden, (2003) who argued that blended environments increase student choice and this can lead to improved learning. Oliver and Trigwell (2005) also opined that a blended environment may offer experiences that are not available in non-blended environments and that the nature of these different experiences promote learning. while there is evidence to suggest the potential of blended learning, there is also considerable evidence that most

blended learning courses fail to fulfill this potential (Driscoll, 2002; Hofmann, 2006).

Technology brings similar opportunities to professionals in many fields. Physicians use mobile internet access devices to download X-rays and test results or to access specialized applications such as medicine dosage calculators. Earthquake geologists install underground sensors along fault lines, monitor them remotely, and tie them into early warning systems that signal the approach of seismic waves. Filmmakers use everyday computers and affordable software for every phase of the filmmaking process-from editing and special effects to music and sound mixing. Technology dominates the workplaces of most professionals and managers in business, where working in distributed teams that need to communicate and collaborate is the norm.

The challenge for our education system is to leverage technology to create relevant learning experiences that mirror students' daily lives and the reality of their futures. We live in a highly mobile, globally connected society in which young Nigerians will have more jobs and more careers in their lifetimes than their parents. Learning can no longer be confined to the years we spend in school or the hours we spend in the classroom: it must be life-long, and available on demand (Bransford et al., 2006).

Information and Communication Technology and Early Childhood Learning

Information and Communication Technology (ICT) can be defined as "anything which allows us to get information, to communication with each other, or to have an effect on the environment using electronic or digital equipment". In early childhood care and education

(ECCE), the term ICT could include computer hardware and software, digital cameras and video cameras, the Internet, telecommunication tools, programmable toys, and many other devices and resources. We can hardly imagine an education institution today, of any stage, without any presence of ICT. As Nwabuwe and Signer (2014) pointed out, young children today are growing up in a world which not only contains but is also increasingly shape by ICT. More and more children encounter a computer before they go to school, even before they go to preschool. It is then natural to notice that they are exposed to all kinds of impacts of ICTs. Thus, ECCE cannot ignore any of them. It must look for procedures and strategies and how best to engage them so that the learning objectives are achieved in a way closer to 21st century expectations and requirements.

ICT compliments and extends traditional means of learning; it reflects the real world inside and out. It provides opportunities for developing enquiry, exploration and other children's interests; it enables children to play roles they see in the adult world; it adds to children's possibilities for being creative; it can support independent learning; it allows children to record their own personal view of the world; it can provide opportunities for children to play with friends; it helps provide equal opportunities for all children; it supports all areas of learning including communicating, problem solving and developing self esteem.

Effective Implementation of ICT in ECCE Schools

There has to be proper planning which entails estimating the number of pupils that will be in our school system-this means keeping proper records of school age children in different wards, local Government Areas and

States. If the number of school on ground is not adequate then preparations have to be made to build new ones and renovate the existing ones instead of having children stay under the trees. Moreover, we must consider the curriculum itself which has to be reviewed so as to cater for the different needs of the people.

The rapid development of technology over the years has provided many new and creative ways for educators to present instructional materials effectively. Recently, those advancements have focused on desktop technology, wireless technology, compute projection systems and physical activity monitoring devices are moving technology into schools. The recent development of active gaming or "exergaming"-using video games that incorporate physical activity (Thompson, 2008) is adding another dimension in the teaching and learning. There are a number of factors that contribute to educators' decisions about whether to use technology when planning and teaching. This is a key consideration for designing and implementing instruction. Teachers now face a generation of students who have never known life without a computer, video game console, cellular phone or internet access; and that is changing the scope of education dramatically. Appropriate practice in physical education should include activities aligned to student learning expectations and that fit students' developmental levels, and content aligned to standards. using technology for technology's sake might not provide relevant instruction experiences for students, since technology is not the curriculum but rather a tool or device to supplement instruction (Nwabuwe and Singer, 2014).

Blended Learning and Teaching in the Classroom

Blended learning has been described as a mode of teaching that eliminates time, place, and situational barriers, whilst enabling high quality interactions between teachers and pupils (Kanuka, Brooks, & Saranchuck, 2009). It echoes the practice of distance education that emphasized flexibility of time, place and pace of student learning. Research suggests that the student experience varies considerably and results in variable learning experiences (Jeffrey, Kinshuk, Atkins, Laurs, & Mann, 2006; Zepke, Leach, & Prebble, 2006), indicating a need to clarify how a blended approach can support learning.

Technology has increased the breadth and depth of access of education. This is significant because it has been a hallmark of Western education that the co-location in time and space of teachers, pupils, and resources is the sine qua non of education. Changing from a classroom-only context to include a major online component requires adjustment for both teachers and pupils (Swenson 7 Redmond, 2009). The speedy adoption of educational technologies is evidence that new forms of teaching and learning are possible. However, shifts of this magnitude need major changes in approach from faculty and administrators in education, especially in higher education, where the lectures still dominate teaching practice.

Just as technology is at the core of virtually every aspect of our daily lives and work, we must leverage it to provide engaging and powerful learning experiences, content, and resources and assessments that measures pupil achievement in more complete, authentic, and meaningful ways. Technology-based learning and assessment systems will be pivotal in improving pupil

learning and generating data that can be used to continuously improve the education system at all levels. Technology will help us execute collaborative teaching strategies combine with professional learning that better prepare and enhance educators' competencies and expertise over the course of their careers. To shorten our learning curve, we can learn from other kinds of enterprises that have used technology to improve outcomes while increasing productivity.

The Need and Uses of ICT in Early Childhood Care and Education

It is hence timely for educators to ponder ways to optimize the wise and critical use of scientific Information and Communication Technology (ICT) to enhance quality educational leadership and promote essential skills for sustainable living with preparedness for disasters even in non-threatening environments. There is an increasing awareness in the advent of digital era that there are wider potentials for learning spaces to serve the new learning paradigm with more collaborative learning activities that could be facilitated within and among educational institutions using inter-organizational Open and Distant Learning (ODL) approaches. The definition of learning space has become broader over the past decade with its design involving long-term building of self-directed /self-accessed activities through e-platforms involving the emerging digital/non-digital learning tools and Open Educational Resources (OERs). Since self-motivated lifelong learners are so tech-savvy, educators need to find alternative strategies to facilitate meaningful learning through blended learning approaches.

Enhancing positive attitude and skills for sustainable

living in borderless world Attitudes determine whether we will responde to a given situation positively or negatively, with enthusiasm or reluctance. Attitudes are lasting patterns of beliefs and behavior tendencies toward other people, ideas or objects (Lefton, 2019). Attitudes are important attributes to determine people towards leading successful and sustainable living. Pupils' attitudes towards leading and motivation to be involved in learning activities with development of skills for sustainable living are interrelated with various internal and external factors. Pupils' learning is affected by teachers' instructional practices, attitudes and use of effective pedagogies. Educational researchers revealed that an important contributing factor for pupils' academic achievement is "teacher competencies," including cognitive abilities (i.e professional knowledge) and affective-motivational characteristics. The competencies consists of cognitive abilities (professional knowledge) (e.g. Subject matter Knowledge (SMK) and Pedagogical Content knowledge (PCK). The affective-motivational characteristics include professional beliefs, motivation, attitudes, willingness and self-regulation (Baba, 2013). These factors that are supported by affective teaching are the transfer of knowledge integrating human values, to inspire pupils and emulate examples of human values (Jumsai, 2003). For example, the review of studies involving federal, state and local policy on instructional roles as reported by Parahakaran (2013) revealed that teacher-student relationship were impacted by culturally drive values-based water education. Kahn (2008) emphasized the importance of cultural literacy, which is to develop an ecopedagogy, because cultural literacy develops a broader understanding at an anthropological

level of meaning about how people live within shared communities (Parahakaran (2013). The cultural literacy aspects related to sustainable education can be elicited from pupils if Open Educational Resource (OER) platforms include elements from pupils' cultural backgrounds in their educational contexts.

Blended Learning Environment and Sustainable Development

Growth in any nation is very crucial and serious to the fueling and development of any nation. Despite our human, material and natural resources, Nigeria has not been able to achieve significant development. In order to stop rural sluggishness, joblessness, and growing disparities in less developed country like Nigeria where growth is difficult to achieve, libraries is said to have all information needed to develop a country and a nation as a whole. Apart from using digital libraries in enhancing blended learning environment to improve preservation, teaching and learning in the society. Libraries in 21st century is seen as a learning and knowledge centre for people as well as the intellectual commons for their respective communities, where, to borrow the phrase from the key stone principles, people and ideas and interact both the real, digital and virtual environment to expand learning and facilitate the creation of new knowledge for sustainable development (Lee, 2005).

Blended learning environment facilitates access to information in all spheres of life through ICT facilities to keep abreast of current knowledge that is critical in sustaining national growth of the society. It provides access to information resource and sharing strategies from electronic and digital resources in concert with information as regards society's wealth and accumulated

knowledge for information seekers to discharge their duty to their respective nation. In an environment where information is available via internet in a society, it helps to facilitate the successful participation, cooperation and implementation of all societal activities in different sector of the nation. It can eradicate poverty in any nation, provided the right information is acquired and that is why libraries are critical provider of information which serves as a spring board for innovation and change.

Conclusion

Information Communication Technology are indispensable and have been accepted as part of the contemporary world especially industrialized societies. Through ICTs blended learning has become a key tool that is revolutionizing the instructional process. It involves a blended approach to learning, teacher skills and aptitude of students, teachers and researchers. It effective use enhances students' ability to identify, search effectively and present specific information in order to build knowledge and develop critical and creative thinking pertinent to their fields of student and pertinent to the development of their nation. Rojkoomar (2010) concluded that there is need for libraries to recognize the changes that have already taken place via ICTs and to be aware of the ways in which broader societal changes are affecting institutions since access to information or knowledge is critical, librarians and archivist must extend services methods and practices, developing innovative approaches to guarantee free and universal relevant information, and to ensure that the worlds' citizenry have access to the information for development and growth of the society and for participation in this democratic processes via blended learning environment.

Suggestion

Blended learning should be introduced.

- to all schools to facilitate access to information in all spheres of life through ICT.
- it should be introduced in the classroom teaching and learning since it eliminates time and space and situational barriers
- proper implementation of ICT in ECCE school should be put in place.
- Training of (ECCE) teacher should be consistent to enable them have proper knowledge on the use of the ICT instructional materials .

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CHAPTER 9.

BRIDGING DIGITAL DIVIDES THROUGH INDIGENOUS LANGUAGES FOR INNOVATIVE EDUCATION AND ENHANCED LIFE-STYLE AMONG RURAL DWELLERS IN NIGERIA

DIMEJESI SOPHINA IJEOMA; IHEZUONU GOODNEWS CHINASA; DIKENWOSI CLEMENT IJEOMA; AND NWAOKORO VALERIE

ABSTRACT

Information and Communication Technologies (ICTs) has since its inception been a global phenomenon which has orchestrated industrialization, economic growth and civilization in most countries of the world especially the developed nations such as America, Canada, Japan etcetera. It has continued to enhance educational and technological advancement in these countries while on the other hand, there is a big gap in the case of developing countries. This gap also known as digital divide or barrier is the bane of most sub – Saharan – African countries including Nigeria. This means

that these countries are not enjoying ICTs as much as the developed countries. The effects of course are enormous as there are no remarkable industrial development especially in the rural areas. In Nigeria for instance, students in rural communities do not have access to ICTs and so cannot compete with their urban counterparts who are enjoying a bit of it. This is an aberration information is power and it is in the right of every human to have access to it. Reasons abound for this lack but the major one being inappropriate mode of enlightenment. English language is usually employed which of course should not be because aside students, other rural dwellers are illiterates indigenous languages therefore should be utilized in educating them on the usefulness of ICTs. The researchers of this work are therefore advocating that this method can adequately bridge the digital divide among the rural populace thereby ushering in innovation in education and other human endeavour throughout the nation.

Keywords: *Bridging, Digital Divides, Language, Innovation, Education*

INTRODUCTION

According to UNESCO Institute for statistics as captured in Rusell and Steele (2013), Information, Communications and Technologies (ICTs) means a diverse set of technological tools and resources used to transmit, store, create, share or exchange information. It is an umbrella term that includes any communication device, encompassing radio, television, cell phones, computer and network hardware, satellite system including distant learning and conferencing (Wikipedia). In other words, ICTs simply implies a compendium of various information techniques which people utilize for various purposes.

Information, Communications and Technologies is the

aftermath of the age long scientific research and inventions by some notable technologists. For instance, Konrad Zuse invented computer known as ZI computers in 1936; in 1942, John Atanasoff and Clifford Berry invented ABC computers, while in 1946, John P. Eckert and John W. Mauchly invented ENIAC 1 computers and then BMI computers in 1951. In the 1970s, mobile phones, internet and World Wide Waves were developed. Android and smart phones started featuring in the 1980s, followed by the current feat performed by Philip Emeagwali, who is said to have developed the fastest computer in the world. He won the 1989 Gordon Bell prize for the price – performance in high – performance computing applications. Wikipedia: https://www.google.com

All these developmental stages have continued to usher in more inventions, discoveries, large scale of computer usage, creativity, efficiency; and have unarguably continued to better the lots of people, especially of the developed world. For them, there is financial freedom, effective and easy education and farming system, higher life expectancy, healthy, life – style and longevity. According to Rusell and Steeke (Ibid), the digital revolution has transformed much of the global economy and ICTs play a key role in this revolution.

Ibenegbu (google.com) opines that ICT provides great importance to economies by giving the digital world the possibility of becoming a real fourth Industrial Revolution that can provide a lot of possibilities. In other words, there are lots of gains to ICT subscribers and users. However it is sad to note that these gains are not equitably and evenly distributed across globe. The

developing countries such as Nigeria as far as ICT services are connected are highly disadvantaged.

This paper therefore will discuss digital devides and their effects on the rural communities, advantages of ICTs, factors limiting ICTs utilization in Nigeria, solutions are also proffered. All these are aimed at bridging the digital divides so that citizens can enjoy better life – style in all ramifications.

CONCEPTUAL CLARIFICATIONS

- **Bridging:** According to Oxford Advanced Learners' English Dictionary, bridging means overcoming obstacles or difficulties. In other words, it connotes proffering solution to an existing problem.
- **Digital Divide:** This means the gap between those with regular and effective access to digital technologies and those without. According to Carmen Steele (2019), the digital divide is the gap that exists between individuals who have access to modern Information Communications and Technology and those who lack access. Digital divide can equally be termed to mean barrier, obstruent, blockage and hindrance to persons who have no access to various ICT uses and in contrary to those who have.
- **Innovation:** This means introducing something new in any facets of life, be it in education, culture, rites, business, farming, fashion etcetera. Also according to Dictionary Definitions from Oxford Languages, innovation means the action or process that is crucial to the continuing success

of any organization.

- **Education:** Education means the process of imparting knowledge, skill, facts and ideas that have been learned, either formally or informally. According to Hornby (2014), education means systematic training and instruction (especially of the young in school, college etc). Again, education means a gradual process which brings positive changes in human life and behaviour. It brings a natural and lasting change in an individual's reasoning ability to achieve the targeted goal, in other words, a passage to progress. (passioneducation.com) (2019). Education therefore is power and it is the greatest asset parents or nations can give to individuals. Education enhances ones social life. It librates and enlightens. Most importantly, it brings several opportunities to individuals. And it is through education that the utilities of ICTs are inculcated thereby making the beneficiaries to be innovative and creative. No country can therefore afford to neglect education and ICTs because of their innumerable benefits.

ADVANTAGES OF ICTs

The usefulness of Information and Communications Technologies cannot be quantified, and are going to be discussed in this section as follows.

- **Effective and Fast Learning**
  ICTs make teaching and learning efficient and fast. This means that with digital devices such as computer or power point, teaching is made easy

and students learn many things in short space of time. According to Education Zone (2018), teachers will have a fast and effective way of teaching because they can just scroll up and down to teach the lesson and students perform better because what they see on the screen of the laptop or power points create lasting impression on their minds and make them remember points easily. It therefore makes teaching and learning easier and less tasking.

- **Creativity**
  People who have access to ICTs are proactive, creative and inventive. Students are exposed to rational thinking and are logically sound. With the application of ICTs in schools, rote learning is becoming obsolete because students now become pragmatic and practical in their orientations giving more attention to higher order, thinking and problem solving skills, learned through real world tasks. According to Ala-Mutka and Redecker (2008), information and communication technologies provides new opportunities for education and training, as they enhance learning and teaching, and facilitate collaborations, innovation and creativity for individuals and organizations.
- **Makes Students Smarter and more Confident**
  Students who genuinely access ICTs exhibit intellectual knowledge, social ability, dexterity and competence equipped with digital technology. They are confident because they are sure of their capabilities and can compete favourably without

any inferiority complex with their counterparts anywhere in the world.

- **Promotes Healthy Life – Style**
  Nowadays, many health tips are posted on the internet and people gain a lot reading them. By this, many get solutions to their health challenges while many as well get information that aid them prevent one ailment or the other and so maintain healthy living which of course is beneficial and crucial to nations development, because healthy individuals beget healthy nations according to Van Zyl Spies (2019), the ultimate goal of development is that there should be an increase in an individual's quality of life and the health is a major contributing factor to quality of life and also contributes positively to a country's economic development.

Information and Communication Technology (ICT) has a lot of potentials and is already being utilized in this field, he opined. And so in the health sector, ICT helps in diagnosing diseases and damages to the body with body scanning machines, and solutions also proffered.

- **Human Capital Development and Global Advancement**
  Information and Communications Technologies is the engine house of development and progress of nations and their citizens. Any nation that does not embrace technological breakthroughs well surely be industrially backward and cannot make any global advancement. ICTs build and develop nations and individuals. It reduces poverty to the

barest minimum while making the utilizers have robust economy and life – style. People make a lot of money through legitimate means like logging, crypto currency, forex, goldmine etcetera. According to Satish Patel and Gujarat V. (2014), device is about change. Change for the better. Development is about making a better life for everyone. It means meeting of the basic needs of food, protection, education, health and a healthy environment, where all people can live with dignity and respect.

- **Rescues People from Primitivity and Non – Standard Life – Style**
  Modern technologies have continued to better the lots of people. Most primitive and non – standard ways of doing things are now going into oblivion. Nowadays, beneficiaries of ICTs carry out their day to day activities with much ease, be it home, in the offices or in schools. For instance, digital computers have replaced analogue typewriters, people now wash cloths with washing machines as against stressful and energy sapping manual washing method, electric or gas cooker replacing stressful and smoking firewood method of cooking. Also mechanized farming has replaced manual labour system thereby making easier, faster, more effective and more productive. According to Mansi Bosania (2013), nowadays, many ICT gadgets are used in our life and they facilitate mobility, thus used anywhere and anytime. These gadgets operate for information, speed, and communication and reduce the

physical and mental human workload.

- **Makes Communication Easier and Faster** Modern ICT devices like SMS, telephone telegram, facebook, whatsapp, instagram, email yutube, etcetera have practically replaced the former means of communication like letter writing, journeying from one far or short distance to another in order to deliver message, ringing of gong and so on. All these previous means are now eroding. Communications can now be made in a flash. No matter the distance, messages can get to the receiver within one second. ICT tools are therefore used to communicate, create, disseminate, store, retrieve and manage information without stress and so it is communication made easy.

FACTORS LIMITING ICTS IN RURAL AREAS

Despite the fact that ICTs have contributed immensely in human capital and industrial development of societies and individuals; and is seen as a gateway to progress, advancement and globalization, it is lightly regrettable and sad that most countries from the Sub-Sahara Africa are not accessing them. In Nigeria for instance, rural communities are worst for it. They do not have simple access to these great and awesome opportunities, whereas as humans, they have the right to. Many factors are actually responsible for this lack and will be discussed as follows:

- **Discrimination against Urban and Rural Areas** There are undue favoritism for urban dwellers as

against their rural counterparts. More developmental projects are usually situated in the urban cities than in the rural. This in essence means insensitivity on the part of the government and stakeholders at various levels to the citizens legitimate needs. Good and standard schools, markets, hospitals, reads ICT centres and other social infrastructure are not built in the rural areas, and this is quite out of place.

- **Lack of Enlightenment / Inappropriate Means**
  There are absence of enlightenment and sensitization on the usefulness and benefits of ICTs to humanity especially the rural dwellers. No efforts have been made to educate these people so that they can develop interest on the potentials and opportunities inherent in ICTs. And if at all, there is enlightenment, inappropriate means are usually employed. This means that instead of using indigenous languages to educate the illiterate citizens, foreign languages like English or French are used. As far as language use is concerned, online content is only in a handful of languages. And this does not help matters because they will not assimilates not to take of practicalizing.
- **Failure of National Education Planners to make it Compulsory in the Curriculum**
  As important as ICT is, National Education Planners have not still made it compulsory at all levels of education in Nigeria. This is a draw back and has hindered a lot of individuals from benefiting and showcasing their talents.

- **Lack of Effective Network to Operate**
  Most of the time, there is much difficulty in assessing internet in rural areas because of ineffective network coverage; even to operate ordinary phone, not to talk of computer or other ICT devices.
- **High Charges from Network Operators**
  Another factor hindering ICT usage in rural areas is high tariff charges from various network owners, like MTN, Globacom, Airtel etcetera. This makes data and airtime usages extremely difficult because the rural dwellers are not enjoying robust economy either. There is also epileptic or unstable power supply. This makes utilitization of ICT devices even worse because most time, no electricity supply to power the devices.
- **Poor Standard of Living**
  So many people especially the rural communities still live below the International Poverty line of $1.90 or N950 per day and so do not usually find it easy to cope with the exigencies of life. To own most of the ICT devices is always a mirage. Rather we have poverty stricken communities, high rate of illiteracy, ill-health, high mortality rates among other challenges.

EFFECTS OF DIGITAL BARRIERS ON RURAL COMMUNITIES

The non – availability and inaccessibility of ICTs have impacted so adversely on rural dwellers. In communities where there are no manifestations of ICT presence, life is

bound to be boring, as there are no meaningful growth and development. Nothing seems to move forward. People of such areas still live in primitivity and they know nothing about technological advancement. Talents are caged and as such, no invention, no discovery, no creativity, no industrialization.

In these areas too are increase in health challenges and mortality rates, majority because they do not have access to internet where they would have continued to get tips on how to manage their health.

Digital barriers also make these rural dwellers to engage in primitive farming methods that are very stressful and less productive, as against the mechanized systems that are stressfree, fast, and highly productive. This in essence makes them to wallow in abject poverty and so are reduced to penury.

Teaching and learning in schools situated in these communities are very tasking, burdensome and less effective. This is because they still engage in teaching and learning methods it are becoming absolute and out-dated. They don't know anything about e-learning or e-commerce. Therefore instead of students being smart and creative, they became dull and inferior and so cannot exhibit competence in any field of endeavour.

The crux of the matter therefore is total retardation of mental, physical and industrial development of human persons, which of course is highly regrettable and sad indeed. Effects of the digital divide therefore are immensely felt in the following areas; education, job opportunities, communication, politics, consumer satisfaction, health information, community involvement, government and emergency information. htpp://www.digitaldividecouncil.com (2018).

THE INDISPENSABILITY OF LANGUAGE IN ICT OPERATIONS

Language implies communicating by means of signs, gestures, sounds or symbols employed by persons to persons in order to exchange or express ideas, messages, concerns, feelings or desires. Apart from humans, animals also have their own system of communication, majorly by sounds and gestures and these are called non – instinctive methods. In any case, it is only human beings that are endowed with the innate ability to speak. According to Babajide as cited by Njoku, J.C. et al (2018) in African Journal of Multidisciplinary Research, language constitute that quality of human peculiarity, that unique attributes of man's distinctiveness and that priceless mandate of superiority over entire creation. Also Dictionary.com defines language as a body of words and the systems for their use common to a people who are of the sane community or nation, the same geographical area, or the same cultural tradition, or a communication by voice in the distinctively human manner, using arbitrary sounds and conventional ways with conventional meanings. Language therefore connotes utterances made by humans so as to achieve various goals.

The usefulness and importance of language cannot be measured or quantified. It is one of the greatest endowment and privileges God has given to mankind. As man evolved language almost immediately followed suit. With language, Adam, the first man on earth was able to give names to every creature; animals, trees and human beings alike (Genesis 2:20).

Language can be said to be the most important aspect of any field of endeavour because without language, nothing can function. No area of study can be delved into.

It is therefore through the use of language that people get to be educated or trained. According to Mayell, (2003) as captured in Say lordotorg. Github pages, some linguistics go so far as to suggest that the acquisition of language skills is the primary advancement that enabled our prehistoric ancestors to flourish and succeed over other hominid species. Without language, the world will have been in complete chaos, confusion and anarchy. When every human being keeps mute without even gesture or sign, what an existential quaquire would the world have been!

Language has therefore brought about civilization, enlightenment, progress, advancement and lots more because people are taught and sensitized through the use of language. According to Fishman (1971) as cited in Dikenwosi and Dimejesi (2018) in African Journal of Multidisciplinary Research, language is not a mere carrier of content that is either latent or manifest to him language itself is content where lots of information and meanings can be drawn. Language therefore, is of paramount importance. and so, for any country to attain significant advancement in national development, such as a country must honour, nurture, cherish and develop her language. Dimejesi (2018).

ICT is majorly about disseminating information, instruction, guide and educating people on how to utilize and maximize potentials inherent in it. It builds nations and individuals and makes them highly productive and creative. Many things come into play when operating ICT devices, like computer, powerpoint, e-mail, SMS and much more. In all these it is only language that makes them workable and attainable. The indispensably of language is ICT operation them becomes non –

contestable. Two of them therefore are at interface. ICT operators therefore cannot practically do without employing language in their various activities.

Language is an area where open access resources, online course, virtual classrooms and social networks based on information and communication technologies are being increasingly used to give learners access to information, promote interaction and communication and enhance digital literacy skills. https://www.google.com. Also Antoni (2014) opines that language in general provides an interesting interface in the teaching of science, mathematics, philosophy, art, computing etcetera.

And so for any person to actually benefit from ICT opportunities, such persons must be ablest or conversant with the language of instruction, otherwise it becomes a wasted effort, time and resources.

INDIGENOUS LANGUAGES, RURAL DWELLERS AND ICT

Indigenous language is the language of ones immediate environment. It is the language spoken by indigenous people living in the same geographical or homogenous community with common ethnic, religious, linguistic and cultural inclination. Rural dwellers are indigenous speakers of mother tongue, also called local or indigenous languages. The rural dwellers are illiterates and they feel at home speaking their local languages. They also comprehend or assimilate more when being educated or enlightened using these languages. Being uneducated therefore, it becomes irrational and absurd to employ any language foreign or unfamiliar to them to instruct them on the use and applications of any sort.

According to the United Nations Permanent Forum

on Indigenous Issues (UNPEII), indigenous languages are not only methods of communication, but also extensive and complex systems of knowledge that have developed over millennia. They are central to the identity of indigenous peoples, the preservation of their cultures, worldviews and visions and an expression of self – determination. When indigenous languages are under threat, so too are indigenous people themselves. Also indigenous language implies a local means of communication between members of a people or community, it contains within it the essence of considerable information and knowledge and wisdom of the people or community. Its loss is therefore a loss of indigenous knowledge intelligence, IGI global.

Despite the fact that indigenous languages are of paramount importance, their existence are being threatened. Many have even gone into extinction because of negligence on the part of some government of the world and other stakeholders to preserve and nurture them. According to Clothey (2008) estimates suggest that approximately 6000 languages have disappeared in the last century, and also 3000 0f the world's languages are endangered across the globe (UNESCO 2011). Also, many indigenous people world wide have stopped passing on their ancestral languages to the next generation and so many indigenous languages have been subject to linguicide (language killing) Wikipedia. Also according to Fantognon et al (2005), as cited in Clothey (2008) (Ibid), a 2005 UNESCO study found that 80% of all web pages hosted in African domain were written in English, African languages accounted for only about 1.3% of the more than one million web pages examined in the study. These and many other instances was why the

United Nations declared 2019 as the International year of indigenous language (Iyll 2019) Wikipedia. This step was taken in order to stop indigenous languages from going into extinction and for the nations of the world especially African continent to be cautious of the impending doom.

This unfortunate trend has made ICT opportunities to continually elude the rural dwellers because many sub-Saharam Africans especially Nigeria do not take the indigenous dwellers interests serious. They don't bother whether they benefit from ICTs or not. And this is quite unlike Asian countries where a lot are being done to make sure that internet usage circulate to all their citizens irrespective of their status. For instance, according to World Internet (Stats 2011) Asia has the largest number of adult online learners in the world, Latchan and Jung (2011). Also, Massachusetts Institute of Technology (MIT) has developed what is known as Open Course Ware (OCW) through which free contents are placed on the internet for access by the general public. In any case, all are in English language.

According to Selwyn et al (2001) international agencies such as the United Nations Development Programme (UNDP) advocates ICT for facilitating access to education for remote populations and for developing literacy and promoting cultural preservation among indigenous population. This in essence should have been enough signal for the stakeholders to endeavour to drive home ICT gains and potentials to the rural areas, using appropriate means of course. This entails employing indigenous languages to educate and enlighten them so that they will benefit maximally as this will again ensure transformation, innovative education and enhanced life style.

SUGGESTIONS

These suggestions if religiously implemented will actually change the narratives of the rural dwellers in Nigeria.

First of all, indigenous languages should be made mandatory as medium of instruction and enlightenment to the rural populace. Also it should be made compulsory at all levels of secondary school so that children will be well grounded in the mastering of their mother tongue.

Second, when educating the indigenous communities on the utilization of ICT facilities, radio, jingles, community interactions and so on should be employed while in all, indigenous languages will be the mode of instruction.

At the grassroots, e-learning and e-commerce encoded in indigenous languages should be inculcated. All the citizens have the right to benefit from all angles of ICT potentials.

ICT should be made compulsory in the school curriculum and every student in the country to be knowledgeable about it. This will accelerate national development.

CONCLUSION

Much have been said about Information, Communications and Technologies as a very viable means of making progress in life both as a body and as individuals. Ado (2001) highlights how World Bank created the World Links for Development Program to assist developing countries in increasing connectivity and training for ICTs. But sad enough to note that rural communities are not benefiting from the kind gestures of World Bank, because if at all attempts are made, wrong mode of communication are usually applied. Instead of

utilizing indigenous languages, for instruction, foreign language such as English is used. So lack of indigenous knowledge is a big problem facing developing countries. This has to be addressed so that the potentials of ICT will be utilized by all and sundry irrespective of status. This will ensure innovation in all facets of life.

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CHAPTER 10.

APPLICATION OF TECHNOLOGY - SUPPORTED GROWTH MINDSET STRATEGY IN MINIMIZING CULTURAL STEREOTYPE THREAT EFFECT AMONG FEMALE PHYSICS STUDENTS

CLARA O. MOEMEKE (PH.D)

Abstract

The persistent low representation of women in STEM related career paths has been variously attributed to poor and under-performance of females in science, technology and mathematics. Studies (Beasley & Fischer, 2012) have found that certain non-cognitive factors which are stereotypical threaten the extent to which females perform in relation to males. In Nigeria, cultural, religious and traditional factors have assigned special roles to the female gender. There therefore exist certain expectations from the female gender. The ability to study science, particularly physics and Mathematics are worse affected. This study therefore focuses on finding out the effect of Technology supported mindset growing strategies in helping

female Physics students overcome the consequences of stereotype threat. Forty secondary school Physics students participated in a 12-weeks growth mindset seminar/ workshop in which they were given growth mindset motivational interactive activities digitally in a pretest-posttest design setting. Three hypotheses were tested and Interest in Physics Career Inventory (IPCI) and a Mindset Determination Questionnaire (MDQ) were used to collect data. Result from t-test showed a significant improvement in participants' interest in pursuing further career in Physics as well as evidence of improved growth in the mindset of subjects previously classified as fixed. It was concluded that the effect of stereotype threat can be overcome by digitally supported interventions and should be employed from time to time to help girls and women overcome certain cultural stereotypes that have implication for science learning and career success.

Key words: Stereotype threat; Achievement; Growth mindset; Non- cognitive skills for science learning.

Introduction

Huge bodies of research have pointed to the pervasive influence of cultural and social beliefs and stereotypes on the performance of females in science, Technology, Engineering and Mathematics (STEM) all over the world. This has been blamed for the low representation of women in STEM fields and careers as well as their low financial security, poor economic growth and innovativeness compared to males of the same status. Studies (Steele & Aronson, 1995, Beede, Julian, London,Mckittrick,Khan & Dom, 2011;) have shown that girls score less than boys of equivalent status in STEM test due to certain expectations and psychological beliefs inimical to their performance. Singletary, Ruggs, Hebl and Davis (2009) after an overview of literature

commented that stereotyped groups whether positive or negative, elicit a variety of emotions. Negative stereotypes often cause negative responses, which can manifest themselves in the stereotyped individual's reactions, performance on a task, motivation, and self-esteem. The effect of stereotyped threat on the performance of girls in Physics and Mathematics has been variously reported (Cheng, Kopotic & Zamarra, 2017) by research and blamed for the low representation of girls and women in Engineering and Computer Science careers. When individuals are aware that their groups are stereotyped, they begin to struggle both psychologically and physically which create a state of worry, fear of negative evaluation and less focus on tasks. This state is referred to as stereotype threat (Spencer, Steele & Quinn, 1999; Steele & Aronson, 1995)

Discussing the effect of stereotype threat, Singletary, Ruggs, Hebl and Davis (2009) noted that its psychological and physiological effects are enhanced, heightened and aroused by anxiety, fear, domain, individual differences, gender and working memory of the individual. These states, according to the review, singly and interactively influence peoples' major life decisions, prominent among which is choice of profession and careers. Another dimension to the understanding of stereotype threat is looking at the factors that activate stereotype threat among stereotyped groups. Studies have shown that individual and group knowledge about their existing devaluation heighten fear, anxiety and in turn predict negatively their achievement in science, mathematics and computer science (Seo & Lee, 2021; Spencer, Logel & Davies, 2016)

Efforts at understanding stereotype threat (Cheng,

Kopotic & Zammara, 2017, Nix, Perez-Felkner & Thomas, 2015; Yeager & Dweck, 2012) have directed attention to some non-cognitive factors such as gender, race, colour, socio- economic status as having debilitating impact on mindset of stereotyped individuals and groups. While some studies are emphatic that the performance and participation gap in science between males and females is traceable to stereotype effects to the disadvantage of the female gender, some studies find no such gaps.

In Nigeria, most ethnic cultures begin early in life to impact the belief that certain roles are reserved for male and females. The import of this early belief in the psyche of the girl child become manifest in the stereotypic career decisions and paths they often follow. Knowledge of society assigned roles may possibly pose threats that foster the feeling that women cannot perform as much as men and that women should only be found in traditionally assigned careers and profession in addition to their reproductive and home making roles. The threat posed by stereotyping in Nigeria according to Njoku (2006) is significant and if removed will improve girls' performance significantly. Nzewi and Ibenegbu (2017) thus recommended that female students be taught about stereotype threat to mitigate its effect.

Modern Psychology shows that one's belief system about own abilities and potentials fuels ones behaviours and predicts ones success. Dweck (2006) in her work, "mindset: The new Psychology of success" explains that conscious and unconscious beliefs have profound impact on every aspect of our lives including the choices we make and our perceived abilities. These sum up to define individual personalities. Fixed mindset, Dweck explains,

assumes that intelligence, ability and creative tendencies are static and striving for success by avoiding failure is a smart way out. On the other hand, she explains growth mindset as one that thrives on challenges and conceptualizes failure not as evidence of unintelligence but as springboard for growth and stretching of existing abilities. She also expressed the view that girls are more likely to possess the fixed mindset compared to boys of the same status and ability except otherwise helped.

Gibbons and Raker (2019) reviewing Bandura (1977) on the effects of the two components of self-beliefs on achievement noted that while self-efficacy is an individual's evaluation of their ability to achieve specific outcome by completing required tasks, self-concept refers to an individual's evaluation of their general ability within a domain rather than their ability to achieve a specific outcome. Self- belief therefore not only predicts future achievement and choice of science (Self-efficacy) but is also predicted by previous experience (self-concept) Bryan, Glynn & Kittleson, 2011, Sha, Schunn & Bathgate, 2015;Glynn, Brickman, Armstrong & Taasoobshirazi, 2011). In the context of this study, cultural influences contribute to the experiences individuals have growing up and the influence of self-concept of stereotyped groups' mindset formation may be a strong factor in predicting female choices and attitude toward physics and related career paths and should not be dismissed with a wave of hand. Viewed from Expectancy- value theory (EVT) (Simpon,Davis-Kean, &Eccles, 2006; Wigfield & Cambria, 2010), choice is an indication of motivation and is predicted by self-belief. In fact, Sha, Schunn & Bathgate (2015) reported a monotonic (near linear) relationship of self-efficacy and interest with choice preferences .

The influence of technology- supported training/ intervention in boosting interest and modifying behavior has been variously reported and documented. Egbejimi (2019) reported a positive effect of concept cartoons, animation and peer debates on chemistry students' motivation and interest in chemistry while Moemeke and Omoifo (2009) had earlier noted that certain instructional devices tend to favour females in the learning of science if they tend to fortify and help build their confidence in their ability to perform in science tasks. There is a dearth of studies on stereotype threats and possible remediation to mitigate the effects on stereotyped groups and individuals in Nigeria. This focus of this study therefore is to investigate the possible remediating effect of growth mindset development strategy using technology enhanced motivational and mind-building strategies in helping females improve their mindset and reduce the influence of stereotype threat in learning of Physics..

Statement of the problem

Bridging the supposed performance gap between males and females in science and consequently improving participation in science career path has been a topic of research for more than a decade. Dweck (2006) in the process identified two types of mindset that have high implication for learning and explained that individuals with fixed mindset tend to underachieve academically. She reported that females are more likely to have fixed mindset compared to males who most often possess growth mindset. While mindset is an ambiguous behavioural construct resulting from a variety of thought, value, feelings and emotions like attitude, they are context related (Van Aldermen-Smeets & Walma van der Molen,

2015), as well as have cultural affinities. Content – based interventions often contribute insignificantly to improvement of attitudes particularly towards science since gender belief about science is just one of the cognitive beliefs and which often act connectedly with anxiety, self- efficacy and context dependency in producing behavior as explained in the Tripartite model of attitudes.

Apart from self- beliefs, Dimitriadi (2013) has expressed the view that low choice of hard science such as physics is attributable to ignorance of the information of what the choice entails the benefits of science career paths and prejudiced mindset and inertia. She identified implications of female exclusion or low participation in science and physics to include economic, practical and moral which are necessary for every nation's development and manpower utilization. While the notion that the performance gap is genetic is strong in certain research quarters, the exist a body of studies (Steele, Aronson and Spencer,) which concede that test-score gaps probably can't be totally attributed to stereotype threat, the threat appears to be sufficiently influential to be heeded by teachers, students, researchers, policymakers and parents. They suggest that at least, there is a tendency to lay the blame on cultural factors, the effect of which can be better appreciated by understanding the psychology of stigma and stigmatization on human emotions and self-concept and their link with performance. Steele et al. also beamed the light on the possibility of decreasing the effect of stereotype threat on performance by altering the situations and enhance or perpetrate the threat such as prejudice, fear and anxiety. This study counted on the

motivating qualities of digital intervention options in providing the necessary help to mitigate stereotype threat in science learning by females.

Research Questions

1. What is the confidence level of female physics students in pursuing STEM careers after school?
2. Will the application of Digital growth mindset intervention strategy enhance female Physics students' interest in STEM careers?
3. Is there any difference in the mindset of the students before and after the intervention?

Research hypotheses

1. There is no significant difference in the confidence level of female physics students after the application of the growth mindset intervention
2. There is no significant difference in the interest of female students in engaging in future STEM career before and after the growth mindset intervention
3. There is no significant difference in the mindset of the students before and after the intervention digital growth mindset intervention

Materials and Methods

The study employed a quazi experimental design involving the pretest and posttests. The dependent variables were the student scores in interest in Physics and mindset score. The Interest in Physics Career Inventory (IPCI) is a 20- item inventory that rates the interest of the students in a 4-point likert scale. The mindset determination questionnaire (MDQ) is also a

20-item likert scale covering eleven key areas that differentiate fixed and growth mindset categories. The independent variable was the intervention strategy consisting of digital Growth mindset motivational interaction activities held during the 2019/2020 academic session in a middle level private girls' secondary school in Delta state as part of career development and awareness programme which lasted for twelve weeks. The two instruments were administered to the students at the beginning of the programme and at the end. At the pre workshop stage of the programme which involved counseling and career guidance, it became obvious that most of the students though chose biology; they tactically avoided courses that involved Physics and Mathematics. The MDQ and IPCI were then administered to collect pretest data. A ten-week mindset mitigating activities were sent to the participating students through Whatsapp or CD-Rom on weekly basis after a one-hour face to face interaction and peer review with the researcher. The topics covered 'science and I', 'science and my society', 'our world without science: a void', ''Physics the science of world and materials', 'the woman and the material world', 'women in physics', 'fear: the non-existent destroyer of destiny', 'women achievers in physics and material science'. These short videos non cognitive but consisted of stories, talks and speeches about females in science. During the programme, participants were exposed to various strategies of enhancing self- development through growth mindset strategies with in-built interactive sessions on avoiding self- defeatism, building a bridge between sexuality and professionalism, setting and achievement of professional goals, creating an innovative mindset and enhancing your decision

–making competencies While some of the videos were animated, others required hand-on but simple activities and yet other involved motivational speeches by women physicists. Each video lasted between 15 to 20 minutes and were viewed by the students at the career exploration time specifically created by the school for the purpose every Thursday by three o'clock in the computer pool since android phone were not allowed in the school for use by students. Only students who achieved 70% participation were used in the study. Students who scored 40 and below in each of the tests were judged as having the fixed mindset, while scores of above 40 are categorized as possessing the growth mindset. Also scored of 0 to 20 in the IPCI were grouped as low in interest and confidence in their ability to study Physics while scores of 21 to 40 and 41 and above ate categorized as moderate and high interest and confidence in the learning of Physics.

A total of 40 Physics female secondary school students participated in the 12-week growth mindset motivational interaction activities. The participants were selected after scrutiny of the academic performance of the students in sciences particularly physics and mathematics in senior secondary two examinations by the counseling unit of the school. The Interest in Physics Career Inventory (IPCI) and MDQ were re-administered after the mind building project to collect posttest data

Results

Result of the study is presented in the tables below.

Table 2: Mean and standard deviation of participants' Pretest and posttest scores by

variable

	Confidence		Interest		Mindset	
	N	M	SD	M	SD	M	SD
Pretest	40	22.98	10.299	29.60	11.879	37.35	14.063
Posttest	40	58.53	14.681	58.40	13.024	59.65	11.742

Table 3: Summary of paired sample t-test by variable at pre and posttests

	Pretest		Posttest		95% CI for mean Difference		Sig.		
Outcome	**N**	**M**	**SD**	**M**	**SD**		**r**	**t**	**df**	**2-tailed**
Confidence	40	22.98	10.29	58.53	14.68	-40.513, -30.587	267	-14.49	39	.000
Interest in future STEM career	40	29.60	11.8858.40		13.02	-32.73, -24.87	.516	-14.82	39	.000
Mindset type	40	37.35	14.06	59.65	11.74	-27.24, -17.359	.293	-9.13	39	.000

P<.05

As shown in the table above, the paired sample t-test showed that mean confidence of the participant (M=22.98,SD=10.29) increased significantly at posttest after the technology enhanced mind growing intervention (M=58.53,SD=14.68) at .000 level of significance t(39) = -14.49, p<0.05, at 95%confidence interval. Mean difference between pre and posttest was 35.55 and is significant at .000 level of significance. The positive gain due to the intervention is also evident in the minimum (8 and 48) and maximum scores ((20 and 80) of participants at before and after the intervention. This means that the participants gained more confidence in their ability to pursue STEM career in future from the intervention thus hypothesis of no significant difference in confidence level of participants due to the intervention was rejected.

In terms of hypothesis two, t-test of paired samples showed the participants' mean interest score in Physics

(M= 29.60, SD = 11.88) increased to (M = 58.40, SD= 13.02) after the intervention $t(39) = -14.82$, n = 40,p<.000, 95% confidence interval with a mean difference of 28.8. The technology-enhanced mindset growing intervention improved the participants' interest in Physics significantly. It is also evident in the minimum and maximum scores of the participants at pretest (8 and 48) and at posttest (20 and 80) respectively. The null hypothesis stating a no significant difference in the interest of participants towards physics was rejected.

The table also showed the participants pretest mean score (M= 37.35, SD = 14.06 on the mindset Determination questionnaire (MDQ) was significantly different after the intervention (M = 59.65, SD = 11.74) with $t(39) = -9.13$, p< .000 at 95% confidence level (mean gain = 22.3). Hypothesis three which states that there is no significant difference in the mindset of the participants before and after the intervention was rejected.

Discussion of findings

The objective of the study was to determine if the mindset of female physics students due to cultural influences can be mitigation by technologic/ digital interventions that inspire, motivate, inform, challenge and modify females students' notion of science and science careers since literature (Dweck, 2006; Dimitriadi, 2013)) has implicated the type of mindset predominantly possessed by females as partly responsible for underachievement and low interest in science learning and career. Three variables (confidence in ability to learn physics, interest in future STEM career and mindset change) were investigated. The improvement in participants' self- confidence, interest and mindset

supports the views of Van Aldermen-Smeets & Walma van der Molen, (2015) and Singletary, Ruggs, Hebl and Davis (2009) that content mediated intervention contribute insignificantly in improving attitude and other non- cognitive variables because attitude is composite in nature, context dependent and integrated. Thus non cognitive approaches seem to be effective in improving psychological and culturally reinforced stereotype as is prevalent in non- western cultures such as Nigeria. The significance of the difference in the three constructs corroborates the views of Nzewi and Ibenegbu (2017), Dimitriadi (2013) and Njoku (2006) that stereotypes and the mindset resulting from it can be mitigated by psychological mind building strategies and information enrichment of stereotyped individuals rather than domain specific content learning. Worthy of note is the finding that enhancing self- belief (self- concept and self-efficacy) are important in helping individual switch mindset and ultimately improve performance and participation in science career path. The potency of technology in increasing interest and motivation reported by Egbejimi (2020) was also corroborated by this study thus re-echoing the multifaceted imports of technology and digital designs in enhancing learning.

Conclusion

From the result of the study, the author concludes that mindset is a subtle but salient factor that determines individual and group performance and participation in Physics. Mindset is a psychological situation that changes with context and can be altered through appropriate non-cognitive interventions. Technology-enhanced interventions are effective in helping students change

their mindset about science without altering their science content knowledge.

Recommendations

There is need for regular psychological and motivational therapeutic interventions in non- cognitive skill development such as self-concept, self- efficacy and growth mindset development to help strengthen females in STEM career areas and motivate students to enter, succeed, remain and progress in STEM career options. They need this to stand up against age-long stereotype threats that mitigate their continued progress in the STEM career paths. Female organizations in science such as Women in Science in Developing World (OWSD), Forum for Women Academics (FAWE) and other gender focused organizations should direct their activities at the grass root (Secondary and Primary schools) where the motivation for learning and doing science is developed and cultivated. This will help sustain female presence in STEM areas in future generations especially in Africa. The need for cultural reorientation and awareness is also stressed since no nation can develop fully without harnessing the full potentials of her citizenry.

Teaching of physics should also be fortified with modern technology to boot students' interest since interest and self-belief are keyelements in motivation and effective science learning.

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CHAPTER 11.

PROMOTING CHEMISTRY LABORATORY PRACTICES THROUGH THE USE OF INFORMATION AND COMMUNICATION TECHNOLOGIES (ICT) IN A BORDERLESS WORLD

UMUDI QUEEN ESE (PHD) AND OBUKOHWO INNOCENT ERHIEYOVWE

Abstract

This paper presents a view of using and incorporating information and communication technologies (ICT) into the teaching and learning of chemistry. Studies that investigate students ' ICT skills in chemistry in particular and in science in general establish that ICT-based learning environments play a significant role in education. While this seems to be true as an overall assessment, the future is affected by innovations, fast-moving, and in many ways unpredictable. Effort is also at exemplifing visualisations in laboratories such as molecular modelling, data collection, and presentation. Emphasis was also on ICT use via the World Wide Web (WWW) and virtual reality

as well as the role of ICT for developing higher-order thinking skills, such as inquiry, graphing, and modelling. In addition examples of different assignments for teaching chemistry using ICT are introduced including some recommendations for the designing of new ones. For a proper teaching-learning environment, it is necessary to follow an integral educational program that considers the presential and non-presential activities as a whole, in the understanding of the utmost importance of the out of class students' time. From this point of view, it seems more than appropriate the use of a learning system that combines Internet and digital media with established classroom forms that require the physical co-presence of teacher and students, i.e. the blended learning. We made a proposal of implementation of virtual technological tools in non-presential activities with the aim of building a blended learning pedagogical framework for the subject "Chemistry". ,. Two virtual tools were selected for the mentioned purpose: video-tutorials and virtual laboratories. Both were implanted in a complete teaching methodology that, properly integrated with presential lectures, pursues the two main objectives that follow: be a solid reinforcement of the concepts developed in class and have enough scientific entity to launch new ideas on the less developed items in the presential lectures. Their advantages and disadvantages were spelt out.

Key words: Digital Media, blended learning, video–tutorials, virtual laboratories,
***i*mplanted**

Introduction

Innovation in teaching and learning activities is very interesting to discuss, as it is believed that implementation of the right teaching strategy would increase student's achievement in learning chemistry (M. Situmorang & A. Situmorang, 2014). Improving the

quality of education could be performed through innovation in the teaching and learning materials. Standard chemistry learning materials for teaching is very important to be used in the teaching and learning activities in Nigeria. It could help the students to understand chemistry concept clearly, and make the learner free from students misconception on specific chemistry terms. Many Senior Secondary School students consider chemistry as a difficult subject that make them not interested to study (Situmorang et al., 2006). Therefore, innovation in teaching and learning chemistry has to be made to make the students motivated to study chemistry.

One of such strategy was conducted through the development of innovative chemistry learning material to obtain good teaching materials that suit students' interest in science classes. The aim of this study is to develop an innovative chemistry learning in Nigeria. The development is carried out by enhancing the chemistry topics with local contents, followed by integration of laboratory experiments, learning media, the contextual applications, and the hyperlink of trusted website on relevant chemistry topics.

The innovation is conducted to provide standard learning material for students to make it easy to learn, to facilitate the students to learn chemistry intensively, and to improve students competence. The chemistry learning material is designed in separate chapters, and provided as printed and electronic formats. The learning material is then used as a learning media in the classroom, and probably used outside classroom depend on the subjects being taught, all are set to improve student's achievement in chemistry. The communication on the teaching and

learning process to meet the students achievement in chemistry is also been studied. Students motivation to study chemistry in teaching and learning activities is also investigated.

Literature Review

Innovative Learning Material

The development of innovative learning material is needed to help Senior Secondary School students to learn science subject such as chemistry. Innovation in teaching and learning has been conducted through many ways such as lesson study (Sudejamnong et al., 2014), inquiry-based learning (Maaß & Artigue, 2013), project-based learning (Situmorang et al., 2010; Toolin, 2004), by using interactive multimedia (Noor & Ilias, 2013), and implementation of learning media (H. Situmorang & M. Situmorang, 2009). It has been reported that innovative teaching is able to improve students ability (Qian & Xuefeng, 2013), and be able to facilitate the development of students' cognitive, enhance reasoning and social abilities, and provide more enjoyable lessons (Lu, et al., 2010). The development of interactive teaching and learning strategies for science has been explained (Baron & Chen, 2012; Holmes, 2006; Situmorang et al., 2011).

Innovation in science teaching and learning has been reported effective in learning practices to improve science education (Tytler, 2007). The innovative teaching approach have a positive influence on students' learning attitude and knowledge acquisition that may foster a stronger motivation to learn new skills, acquire knowledge, and to increase student learning satisfaction (Lee, et al., 2015). Laboratory experiments are compulsory in chemistry teaching and it needs to design suited to the curriculum. The example of chemistry

laboratory experiments can be seen in the references (Gooding, et al., 2001; Situmorang et al., 1998). Integration of relevant laboratory experiments in to a chemistry textbook has proven to be able to help the students to learn chemistry efficiently (Situmorang, 2013). The integrated use of ICT in subject curricula and classroom teaching and management, is a complex process, which is usually achieved by following a set of guiding parameters. In this module, there are two complementary activities : the first focuses on the theories and principles that underpin ICT integration in education ; and the second is teachers' computer-assisted practice in the use of ICT with support web-based portals.

The two main trends in content focus are as follows :

1. Pedagogical principles and theories of ICT integration in Education : ICT in Education Projects and Themes

2. ICT for Chemistry Teaching and Teacher Professional Development : Chemistry specific learning activities.

The module content provides a teacher training curriculum that incorporates the pedagogy, i.e. specific learning objectives and learning activities required to effectively integrate ICT into Chemistry education.

The module's general objective is to help student-teachers of chemistry, to know how to use ICT as a tool for designing new learning environments for their own subject-specific purposes and to help their future students to use ICT.

Text Book as Teaching Media

Textbook as a learning resource plays an important role in teaching and learning in the classroom (Abed & Al-

Absi, 2015; Carter & Mayer, 1988; Sinatra & Broughton, 2011; Yore et al., 2003). A good textbook provides correct and positive information that help the students to understand the concept theory, to lead the students to think, behave and develop (Chambliss, 2001). Textbook is commonly used in teaching and learning activities because it consisted of complete learning materials that can navigate the learner to learn based on their needs (Good, et al., 2010). For Senior Secondary school students, the textbook is very important in the teaching and learning activities because it can strengthen and support the information material presented by the teacher in the class. The textbook could help the students to learn complex material that has not been obtained in the class. The scientific information in the textbook can be learned repeatedly to achieve the desired competencies. Textbook is a central role in empowering students' competencies because the learning materials provided in the books become important source of information to the readers based on the student's interest. It is expected that a standard textbook be able to guide the student to learn from simple to difficulty, provide relevant practice questions, and solving scientific problems to enhance the student knowledge and competencies. Senior Secondary School science textbook is commonly design to satisfy demands stated in national curriculum that make it different to another book (Holliday, 2002). Therefore, science textbook may different from one to the other, depends on the students need and developments, such as for Senior Secondary School students.

The development of alternative learning material is very important for science teaching as it can be used to

develop both native language and second languages through reading and writing activities (Semingson et al., 2015). Learning material in the format of textbook or module provide learning instruction that can help the students to study science (Mantzicopoulosm & Patrick, 2011; Terrazas-Arellanes et al., 2013; Wood & Lewthwaite, 2008), or mathematics (Lim & Presmeg, 2011; Zahner, 2015). A good quality Senior secondary school science textbook serves as an effective learning media in teaching and learning activities that leads to achieve the objectives and students competence. The presentation in a textbook is expected contains learning activities that can be done by students and becomes communication tool to bring accurate information from learning resources to the learners (Tompkins et al., 2006).

Laboratory video tutorials

Until very recently, laboratory training was undertaken with a combination of laboratory experiences videos, connections to suitable web links, and use of blackboard (face to face instruction). This methodology was chosen based on the following criteria: (i) Time optimisation: considering the limited time dedicated to laboratory training , the methodology followed allows the students to view and discuss many more experiments than they would if they had to carry them out in a laboratory. (ii) Prevention of potential danger in the laboratory: as first year students are not trained enough in laboratory skills. The use of videos and web links allow them to experience important but dangerous chemical reactions.

The use of laboratory video tutorials that is propose in this paper would help to change the students perception on the laboratory activities in the learning and teaching methodology used until now:

(i) Instead of showing videos and web links to the students during the face-to face time, they would be embedded in the web media used to interact virtually with the students.

(ii) Instead of explaining face-to-face the steps of the reaction showed, the student should watch the videos and, using all the information obtained through the interactive lectures and the bibliography, try to explain the reactions observed.

(iii) Instead of having the right answer directly, during the face-to-face time their conclusions would be contrasted among them and with the teacher results.

The benefits of this change in the teaching methodology would be: (i) Increase in the reinforcement of the concepts developed in class, through the increase in the student self-learning effort. (ii) Improve the ability of the student to correlate different concepts with the aim to find the solution to a practical question. (iii) Enhance the critical ability of the student, through his results contrast with those of his classmates. (iv) Allow the student to connect the different learning methodologies.

Virtual laboratories

The complex teaching-learning process of laboratory training needs sometimes the finding of new methodological tools that help to achieve the right objectives in the context of the Senior Secondary Schools framework. One of these tools that have been thought to be effectively positive is the implementation of virtual laboratory sessions for the self-learning time. These tools, classified as ICT (Information and Communication Technologies), are of the outmost importance for the students training, since they reinforce the necessary sense of responsibility in the student and provide her or him

with the necessary learning autonomy that she or he must develop through life. The students, in this way, assume a very active role in their training and acquire responsibility towards themselves and their learning process.

Only then can one of the biggest challenges of this new teaching-learning paradigm be achieved, which is the students' acceptance that this process must continue through life and it is not to be restricted to their time spent behind the university walls. In this respect, virtual laboratories are very useful, since they can either be used as a tool for support and reinforcement so students make the most of their knowledge, or they can be implemented as a teaching resource in expository class sessions in order to encourage a participatory, constructivist environment. According to Salinas (2004): 'The training methodologies relying on ICT lead to new conceptions of the teaching-learning process that enhance the learner's active involvement in the learning process; the attention to the emotional and intellectual skills at different levels; the preparation of young people to take responsibilities in a rapidly and constantly changing world; the students' flexibility to enter a workplace that will demand lifelong learning; and the necessary competencies for this continuous learning process.' These quotes point out the importance of the continuous renovation of knowledge and of the correct use of the technological means available. These new technologies are very diverse and their incorporation into the classroom is subjugated to some criteria, according to Sangrá & González Sanmaned (2004): 'Two core elements are necessary for the integration of ICT to become a functioning reality that provides added value: the first one being a reorganization

of the institutions that endows those technologies with the necessary agility to respond to the last demands of the society of information and knowledge, and which allows them to provide the requested support to be able to enhance teachers' work. The second one, is the development of teacher training programs which fill the current gaps in the field and ensure that teachers are trained to properly use ICT resources in their classrooms.

The advantages of integrating ICT in university teaching are, among others, the following (Díaz, 2004; Rosado, 2005): (i) Increasing methodological diversity. (ii) Increasing accessibility and flexibility. (iii) Promoting the student's leading role. (iv) Improving the presentation and comprehensiveness of certain types of information . (v) Encouraging cooperative work. (vi) Improving individual work. (vii) Gaining access to new environments and situations. (viii) Optimizing resources and costs. These ICT technological tools allow the student to enhance her or his responsibility in the search of materials and documentation beyond class notes, and they provide key support for the student's experimentation of his or her own learning process Virtual Laboratories basically emerges from the need to create student support systems for their laboratory work with the objective of optimizing the time spent on doing those tasks. Nevertheless, the concept of Virtual Laboratory has been expanded throughout the last two decades (Alba Pastor, 2005; Gámiz Sánchez, 2009).

Materials

Among the tools for Virtual Laboratories which are available in the market (or freely on the web) include 'Virtual General Chemistry Laboratory' (VGCL), This tool is highly versatile as far as its scope of application in

a classroom is concerned. It brings a virtual environment in which students are free to make choices and decisions similar to those confronted in an actual laboratory. The feeling of experiencing a good practice is so realistic that the students tends to feel responsible of what happens in the laboratory with the advantage of being out of any danger.

Experiments include simulations of qualitative inorganic analyses, fundamental experiments of quantum chemistry, properties of gases, titration experiments, scanning calorimetry, organic synthesis and qualitative organic analysis.

Instruments

The instrumentation of Virtual Laboratories in the classroom can vary depending on the type of virtual tool we are talking about. Thus, implementing a virtual laboratory tool that is available as a free and toll-free program (free online software) can be relatively easy. However, if it is not a free license program, the economic factor, so important given the current situation, must be taken into account. The user license for 'Virtual General Chemistry Laboratory' (VGCL) is acquired when buying the book. If the methodology to be implemented involves using this tool in the classroom in an expository context, this expense is economically viable since each unit costs a little amount of money making it affordable for any institution. Nevertheless, if the aim is to provide a tool for students to be able to work from home, the purchase of so many programs as students enrolled is not viable. On the other hand, it is more viable to negotiate the purchase of multiple licenses with the publishers (each publisher has its own policy on this regard).

Procedures

We propose to explore the VGCL tool in two aspects: (i) On the one hand, it can be a complementary tool for the explanation of new chemistry concepts in the classroom . To that end, the VGCL tool can be used for the execution of several experiences in class, which might be afterwards followed by a proper debate on the treated issue. (ii) On the other hand, the program can be distributed among a limited number of students, so they can assess from home its utility as reinforcement to the practical sessions of the different subjects and to the concepts seen in class. Of course this depends on the number of students per class, and it is conditioned to treat with groups of, at the most, ten students.

Expected outcome

Although the expected outcome of the implementation of the VGCL tool is largely positive, it must be put under consideration on different aspects: i) VGCL must be checked inside the classroom, based on teacher's perceptions with respect to the students' response, both in the required time for the understanding of the concepts explained and the opinions obtained from the debate generated around the question posed; and ii) VGCL must be checked out of classroom, based on student's experience in using this tool at home. We can make a –a priority balance of expected advantages and disadvantages of using this tool within the different aspects commented above. The advantages of its use in the classroom are multiple since it is a tool that provides a lot of visual information (hence, direct reception), interactive (it holds both the teacher's and the students' attention for the achievement of the different steps required for the accomplishment of a experience) and produces immediate results, exempts from the

circumstantial problems which often arise in an actual laboratory (this makes it perfectly possible for the teacher to plan and schedule the activity in terms of time used in the classroom). However, this tool is not exempted from some disadvantages.

Advantages and Disadvantages of using Virtual General Chemistry Laboratory'

For the teacher

Advantages – possibility of adding laboratory experiences in the classroom

– perfect time control of the experiences, since there is no risk of experimental error.

– it helps to avoid overlapping with the practical sessions of other subjects.

– it reduces costs and assemblages, being a cheap and efficient alternative to an actual laboratory

Disadvantages – the activities require extensive planning and a significant investment in time to prepare

– it creates a situation of dependence on computer tools.

– heavy dependence on computer tools

For the students

Advantages – better understanding of the topics covered by relating them to experiences

– greater ease in relating phenomena and theories.

– there is no risk involved in experimenting

– absolute time flexibility to perform the exercises

– it is a self-learning tool

Disadvantages – lack of interaction with the experience Use at home by the students

– misjudgment of the laboratory circumstances

Conclusions

The implementation of virtual technological tools in non-presential activities for the subject "Chemistry" will lead to a blended learning pedagogical framework with many benefits for the students. On one hand, the use of laboratory video tutorials would: (i) Reinforce the concepts developed in class, through the increase in the student selflearning effort. (ii) Improve the ability of the student to correlate different concepts with the aim to find the solution to a practical question. (iii) Enhance the critical ability of the student, through his results contrast with those of his classmates. (iv) Allow the student to connect the different learning methodologies. On the other, virtual laboratories advantages in the classroom are also multiple: (i) Provide a lot of visual information (hence, direct reception) (ii) Interactivity (it holds both the teacher's and the students' attention for the achievement of the different steps required for the accomplishment of a experience) (iii) Obtaining immediate results, exempts from the circumstantial problems which often arise in an actual laboratory. However, this tool is not exempt from some disadvantages.

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CHAPTER 12.

SHEA BUTTER, THE PLANT AND ITS PRODUCTS WITH THE AID OF ICT

AKPOROBARO UYOYOU AGNES

ABSTRACT

Shea butter is a natural vitamin A cream to all care products. Grade A, unrefined, no addictive, is an off white or Ivory coloured fat extracted from the nut, raw shea butter is the most high quality. Shea tree is indigenous to sub-Saharan Africa and belongs to the family *Sapotaceae.* Based on distribution, nut species of the plant has been identified namely *Vitellaria paradoxa* and *Vitellaria nilotica. Vitellaria paradoxa* is produced mainly in the West African sub-region. Nigeria supplies shea nut of grade A quality. It can be used for anything from medicine, skin cream to soap. It is cleaned and processed in a smoke free area. Nigeria exports about 50,000 tons of shea butter and allied derivatives valued at about $3.8 billion every year. The rational behind this study is to compare the information gotten from individuals from two States in

Nigeria asking them through hand phone about shea plant, how it is being processed, it uses and how it is being sold in Nigeria with information gotten from online. Bearing in mind that information gotten from the individuals residing in those two States that are cultivating shea plant, processing it and selling shea nuts or butter will be more authentic than online information. Decades and recently, most authors go to internet/online to get information on shea plants, how it is processed, how it is sold and its importance in our global world. Information gotten from individuals residing in a particular location that are cultivating and producing shea butters was overlooked. Information about how shea plant is being planted, how it is produced, awareness of the farmers on exportation of shea butter and the importance of shea butter to individuals and global world was asked by the researcher through hand phone. The researcher visited two persons in Baleke and Old Lagos Asaba road markets, Agbor, Delta State, Nigeria that sells shea butter and asked them how they got the shea butter they sells? After answering the question, the researcher appealed for the phone numbers of the village women that they do purchased shea butter from. The shea butter seller from Baleke market, Agbor gave the researcher three phone numbers from Kwara State in Idofion, Omomere and Ayekale village in Ilorin while the shea butter seller from Old Lagos Asaba road markets, Agbor, gave the researcher two phone numbers from Oyo State in Shaki and Igbeti village in Oyo, Nigeria. Those shea butter farmers were called immediately through hand phone and they responded well to all the questions asked through hand phone and the information was recorded. Comparison of the information through hand phone

within the five persons were measured and the results revealed that there were three similarities and two differences within the information gotten from the five persons from the two States, comparison between the information gotten through hand phone and the information gotten from online, online shea plant and production of shea butter photos were compared with information gotten from the five persons through hand phone and online methods of packaging the shea butter for selling were compared with the information gotten from the five persons through hand phone on the methods of packaging the shea butter for selling and the results revealed that there were slightly differences between the online methods of packaging shea butter for either selling or exports with the information gotten from the five persons through hand phone on the methods of packaging the shea butter for selling. .

INTRODUCTION

Shea tree is a dicotyledonous woody plant it grows typically in the savannah and naturally stretches over Africa in the Northern hemisphere from southeastern Senegal to Ethiopia and Uganda. The plant thrives naturally in the dry savannah belt of West Africa from Senegal in the west to Sudan in the east, and onto the foothills of the Ethiopian highlands. It is grown in 19 countries across the African continent, namely Benin Republic, Ghana, Chad, Burkina Faso, Cameroon, Central African Republic, Ethiopian, Guinea Bissau. Cole D'lvoire, Mali, Niger, Nigeria, Senegal, Sierra Leone, Sudan, Togo, Uganda. Zaire and Guinea (FAO, 211).

Nigeria has a comparative advantage in the production and export of shea nut in Africa over her counterparts

due to the large available arable land and suitable climatic conditions for its production and out of the 923,766 square kilometers or 92. 376. 600 million hectares of the land area of the country, about 45 percent, that is 4,156,947 is suitable for the growth of the plant (Brandith, 2004). A shea tree currently grows in the wild in many States including Niger, Nassarawa. Kebbi. Kwara, Kogi, Adamawa. Benue, Edo, Katsina, Plateau, Sokoto, Zamfara, Taraba, Borno and Oyo (Brandith, 2004). Although it appears to be a rather obscure wild species growing side by side with arable crops, it is widely known, valued and exploited by the natives in all the areas where it grows (Brandith, 2004).

BOTANY OF SHEA BUTTER

Family:*Supataceae*

Botanical Name:*Vitellaria paradoxa and vitellaria nilotica*

English name:Shea

French name:karate

Igbo name:Okwuma

Yoruba name:Ori

Hausa name:Markade

Type of plant:Dicotyledonous

Nursery period:2 to 3 years

Gestation period:15 to 20 years

Maturity period:40 – 50 years

Fruiting period:40 – 200 years and above

Type of pollination:Bats and Insects pollination

Shape/colour o f fruit: Green plum shaped, which becomes brown when ripen.

Production period:At the beginning of November to March (but if fluctuates)

Ripening period: 4 – 6 months and above

Harvesting period:At the beginning of rainy season (April-October) it also

fluctuates considerably

Source (Ademola *et al..,* 2012) and (Bonkoungou, 2005)

METHODOLOGY

Two persons in Baleke and Old Lagos Asaba road markets, Agbor, Delta State, Nigeria that sells shea butter were visited and were asked about how they got the shea butter they sells?

The questions were answered and the researcher appealed for the phone numbers of the village women that they do purchased shea butter from.

The shea butter seller from Baleke market, Agbor gave the researcher three phone numbers from Kwara State in Idofion, Omomere and Ayekale village in Ilorin while the shea butter seller from Old Lagos Asaba road markets, Agbor, gave the researcher two phone numbers from Oyo State in Shaki and Igbeti village in Oyo, Nigeria.

Those shea butter farmers were called immediately through hand phone and questions were asked about:

1. How shea plant is being planted,
2. How it is produced,
3. Awareness of the farmers on exportation of shea butter and
4. The importance of shea butter to individuals and global world

RESULTS AND DISCUSSION

Two women from Kwara State in Omomere and Ayekale villages in Ilorin and the two women from Oyo State in Shaki and Igbeti villages in Oyo reported that

shea nut is being nursed for a period of 1 – 2 years before transplanting into field.

Information gotten from those women were almost the same with Ademola *et al.* (2012) and Bonkoungou (2005) who reported that shea nut is being nursed for a period of 2 – 3 years before transplanting into field.

One of the women from Kwara State in Ayekale village in Ilorin and the two women from Oyo State in Shaki and Igbeti villages in Oyo reported that the gestation period of shea plant before it can begin producing fruits is about 12 – 15

However, they also reported that time, seasons and period of nursery to transplanting into field can determine the shea plant gestation period.

Ademola *et al.* (2012) and Bonkoungou (2005) reported that shea plant gestation period is 15 – 20 years.

One of the woman from Idofion village in Ilorin reported that the shea plant begins to produced fruits from 25 – 33 years, woman from Omomere village in Ilorin reported 30 – 38 years, the woman from Ayekale village in Ilorin reported 38 – 46 years, woman from Shaki village in Oyo reported 42 – 47 years and woman from Igbeti village in Oyo reported 45 – 47 years.

Ademola *et al.* (2012) and Bonkoungou (2005) reported that shea plant get matured for production of fruits from 40 – 50 years.

The five women from the two States reported that shea tree can produced fruits as long as it exists.

Ademola *et al.* (2012) and Bonkoungou (2005) reported that shea tree can produce fruits from 40 – 200 years and above.

The five women from the two States reported that shea fruits are being picked from it tree and the fruits are

heap (if the fruits are not eaten) in warm environment to allowed its dried.

They also reported that during harmattan the fruits dried faster from 1 – 2 weeks while during rainy seasons the fruits delayed, it takes 3 weeks to a month for the fruits to dry. After proper or little dehydration, the shea fruits/ovaries are being removed by peeling using hand or small knife. After the removal of the ovaries from the shea nuts, the nuts are spread on rocks or floor cement for proper drying.

They further reported that when the intensity of the sun is high, its takes 3 – 5 days for the shea nuts to properly dehydrated. After proper dehydration of the nuts, the dried pericarp is hitted with slightly metal object and the dried pericarp are removed from the dried shea butter.

Thereafter, the dried shea butter are pounded in a mortar with pestle into dried garri in nature (they reported that this method of processing shea butter was only the means of producing shea butter in the 1980th – 1989th before mechanized method came in 1990th till date). After pounding the dried shea butter to garri form, it is poured in big round pot on slightly or very little fire and the butter will be stirred gently until all the garri form butter are melted to fine smooth butter. During this process no water is added.

Immediately after the butter has melted to fine butter, the shea butter is pour into a native pot and kept either on rain, when it is raining or kept under big tree for its to get cooled. It takes 5 – 6 hours under big tree while it takes 2 – 3 hours for the shea butter to mould when kept under rain.

Comparing the present study information gotten from

the five women in Kwara and Oyo States with Okuneye (2000) who reported that farmers do not pick the fruits from the tree but it must first mature and it falls to the ground from where it is collected. The farmers collect the fruits and carry it to where they perform the Shea Butter making process. The fruit is consumed, and the kernels are used to make the Shea Butter. First the nuts are sorted from the pulp. Then the nuts are parboiled. After parboiling, they are left in the sun to dry. They must be completely dehydrated. This part of the process can take up to a week. When they are completely dried, they are collected again and crushed. The farmer crush with a mortar and pestle or mechanized device, causing the nuts and the kernels to be separated. After this process, the nuts are roasted in a metal pot and put through a grinding process. This makes what looks like a brown paste. The paste is processed a second time in a very difficult procedure. This involves mixing, kneading and adding water into firm paste. One can observed considerably differences between the present study information and Okuneye (2000) information on how shea butter is being processed or produced.

With the exception of one of the women in Idofion village in Ilorin that was not aware of the exportation of shea butter, other women reported that they were aware of the exportation of shea butter from Nigeria to another countries and they also reported that although they don't have the means of exporting shea butter to another countries,. yet, since 1990th until date shea nuts and shea butter buyers come from Lagos, Enugu, Abba, Kano and Kaduna to Kwara and Oyo States to buy their shea nuts and shea butter from them by weighing in Kilogramms (Kg) and heavy money were being given them after

weighing, compared to 1980th – 1989th were only petty traders purchase only shea butter (no buying of shea nuts in those years) in small amount of cash.

Bonkoungou (2005) reported that Nigeria is the leading producer of shea butter in the world with a production capacity of about 600,000 metric tons is yet to fully realize her potentials in the processing and export of shea butter. Unlike other agricultural products such as ginger, sesame seed, peanuts whose export potential are well known, the export potential of Shea butter is not well documented by National Bureau of Statistics, Central Bank of Nigeria and National Export Promotion Council reported by Ekoja (2004).

Some of the women from Kwara and Oyo States listed some of the uses of shea plant and shea butter as follows:

They reported that the shea plant fruits are consumed like mango although they are smaller than mango, the shea butter are used as joint pain relief, it makes hair grow faster when applied under skull, it is used as traditional cream and it is used to smoothing skin burnt and fire burnt.

Alander (2004) who reported that the major uses of the shea plant to local communities and industries include consumption of fleshy pulp locally like mango, the fruit when ripen can be eaten raw; trunk, bark, cortex, roots and leaves are used in preparation of herbal remedies: trunk makes excellent charcoal and is also useful as building material. In addition butter is extracted from the nut. The butter is also locally used in traditional medicines and cosmetics, chocolates, candle and pastries as cocoa butter substitute. It is also used in pharmaceuticals and cosmetics because it is naturally rich in Vitamins A, E. and F. Furthermore Shea butter is

widely utilized for domestic purposes such as cooking, skin moisturizer, edible products. Traditionally, shea butter is used as cream for dressing hair, protecting skin from extreme weather and sun, relieving rheumatic and joint pains healing wounds/swelling/bruising, and massaging pregnant women and children. It is also used in treatments of eczema, rashes, burns, ulcers and dermatitis.

In Europe and Japan, shea butter is prized for its super healing and moisturizing properties. It is an ingredient in creams, sun screens, conditioners and in the treatment of burns and muscle pains. (Lovett 2004) concluded that Shea nut is a high-value export to Europe and the United States, where it is considered a luxury. In the international market, the price per ton for Shea nuts packed in 20 pound dark plastic sacks or 50 kilo dark plastic containers or coated steel drums ranging from US$1,800 to US$2,800 depending on the quality while the local market price ranges from NGN180,000.00 to NGN250,000.00 (that is $1,125 to $1,562.5 per ton) ex Lagos delivery.(Lovett 2004)

CONCLUSION

Getting a rightful information from persons through hand phone call can reduced inconveniences on travelling through the high-way. Also right information through hand phone call to asked about shea plant, how it is being produced, it exportation awareness and its benefits to individuals and global world will elevates our nation Nigeria and some other countries from ignorant of importance commodity that yield income for individuals and a nation. One of the importance commodities that yield income and also have many

benefits to individuals, a nation and global world is shea butter.

Most researchers go to internet to collect information about shea butter neglecting the importance of either face to face enquiring or hand phone call enquiring, more study should be done on both enquiring to validate studies already done on shea plant and shea butter.

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CHAPTER 13.

ENHANCEMENT AND GLOBALIZATION OF SOCIAL STUDIES EDUCATION THROUGH THE USE OF EDUCATIONAL TECHNOLOGY AND ICT IN

ARUBAYI PAUL . A AND OKOBIA A.O (PHD)

Abstract

This paper examines globalization and educational technology for quality enhancement, through the use of ICT in social studies education in Nigeria. It views the impact of educational technology in the teaching and learning of Social Studies, on students' achievement and performance in social studies education in Nigeria. It delves into some of the challenges facing the adoption of educational technology in the teaching and learning of Social Studies. It critically examines "the role of Socials Studies for quality enhancement through application of ICT in Socials Studies Education." The paper concluded that through Social Studies education high level of integrity must be demonstrated in the discharge of duties, while the culture of quality must be built into the educational system. According to Materu (2007), tertiary education is central to economic and political development. It recommends among others that ICT

facilities should be made available and accessible in our higher institutions for training and re-training of teachers and students, so as to make them computer literate.

Keywords: *Globalization, Educational Technology and Quality Enhancement*

Introduction

Globalization is a complex and multifaceted concept that has generated controversy from its meaning, its time line, its future as well as whether it is serving the interest of all or it is benefiting just a few countries or individuals in the world. This is due to the fact that it cuts across almost all disciplines each of the disciplines proffers varying definitions and interpretations of the concept. (Acosta and Gonzalez, 2010).

Iyayi (2004) posits that globalization "has been used rather loosely to stand for a variety of things; the shrinking of the world into a global village, the awesome changes brought about or mandated by the revolution in information technology, the collapse of boundaries between different worlds, expanding connectivity of all forms of interaction.

The Association of Educational Communication and Technology (AECT) defines educational technology as "the study and ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources" (Januszewski and Molenda, 2008). Educational Technology can be used by all educators who want to incorporate technology in their teaching (Jaflah, 2012).

Social studies education has continued to undergo various reforms designed to meet up with current global demands. These demands include those of industry, public service and self actualization. Two major global

issues, which are of interest to social studies graduates of tertiary institutions in Nigeria are educational technology and quality enhancement in teaching and learning process of social studies and other disciplines. These are among the challenges facing Nigerian education especially in the realm of globalization that demands some innovation in order to meet up with a dynamic world system. Social studies education in a globalized contemporary Nigerian society has changed in some cases, from the use of non-electronic media such as textbooks, charts, pictures, diagrams, chalkboard, to the use of electronic media such as radio, motion picture films, projectors, to enhance the teaching and learning process, in the tertiary institutions.

In Nigeria, there has been some concern what the quality of higher education and standards of teaching and learning. The basis of this concern is the fact that the old value of handwork, diligence and excellence have disappeared and nowadays, exam malpractice, poor attitude to work and poor policy implementation rank high in our schools. It also heightened the issues of crime and generated high sense of various forms of insecurity. It was the desire for quality in the educational system in higher institutions as earlier mentioned, that made the Federal Government of Nigeria to established the National Universities Commission (NUC). The NUC is to ensure that quality and standards are maintained in all universities across the country (Onu, 2010).

Clarification of Terms

Globalization: Shenkar and Luo (2004) refer to globalization as "the growing economic interdependencies of countries worldwide through the

increasing volume and variety of cross-border transactions in goods and services and of international capital flows as well as through the rapid widespread diffusion of technology and information. Globalization involves economic integration, the transfer of policies across borders, the transformation of knowledge, cultural stability, the reproduction relations and discourses of power; it is a global process, a concept, a revolution and an establishment of the global market free from socio-political control (Jaja, 2010).

Educational Technology: Educational technology according to Abimbode (1997), are hardware and software including television, radio, electronic classroom, instructional devices, skill and motion pictures, projectors, computer-assisted or managed instructional equipment and materials, communications, and other equipment and materials necessary to assist in the process of learning. The purpose of educational technology is to facilitate learning and improve performance. By so doing learning and performance become the bed-rock of the study of educational technology.

Quality Enhancement: Quality enhancement means increase in quality, but when applied to the teaching and learning of Social Studies it signifies an increase in the quality and standard of teaching and learning of Social Studies in tertiary institutions in Nigeria. Quality in higher education is a multidimensional concept which should embrace such activities as teaching and academic programmes, research and scholarship, staffing, students, facilities and academic environment (Van, Gunkel and Rodrigues Doris, 2007).

The Impact of Educational Technology in the Teaching and Learning of Social Studies

Educational technology is considered as the implementation of appropriate tools, techniques or processes that facilitate the application of senses, memory and cognition to enhance teaching practice and improve learning outcome of students in Social Studies (Hap Aziz, 2010). Educational technology improve interactions between students and their instructors in Social Studies teaching and learning process. Students can learn more in less time with technology-based instruction and end up liking classes more because learning is more practically oriented. Students learn more when they see what they are being taught. In addition it enables students develop more positive attitudes and concentrate more in learning Educational technology in the teaching and learning of Social Studies enables students to recall what they have been taught in time, because they have the practical knowledge of what they have been taught; in the class (An, Y. J., Reigeluth, C., 2011).

Most educators agree that educational technology can help teachers and students in tertiary institutions, to achieve efficiency, collaboration, communication, virtual experiences an so much more. However, cost, culture and other educational and environmental factors are among the reasons for not adopting educational technology by many educational institutions (Jaflah A., 2012).

Finally, educationally technology helps students in Social Studies to use multi-media to address all learning styles, provide more efficient interactivity between them and their teachers. It also enables the students to have well centered activities. On the part of the teachers, technology helps them in organization and efficiency in

doing paperless work. It makes teaching to be more practically oriented.

The Impact of Educational Technology on Social Studies Students' Achievement and Performance

Globalization has brought about the use of educational technology in the teaching and learning of Social Studies in tertiary institutions in Nigeria. Technology is seen by many as essential tool for improving Social Studies learning outcome because it encourages students' participation in the teaching and learning process. A research conducted by Kent State University's Bureau of Research Training and Services to examine growth in students' knowledge indicated that those students who used technology scored higher than those students who did not use it. In addition, the difference in means scores between the two groups grew over time, further suggesting that technology has a positive impact on students' learning in Social Studies, in tertiary institutions in Nigeria; and other parts of the world (Kent State university, 2005).

Educational technology has demonstrated a significant positive effect on achievement. Positive outcomes have been found in all major subject areas in higher institutions (Ellen R. B., Joy S. K., 1996). The use of technology as a learning tool could make a measurable positive difference in Social Studies students' achievement, attitudes and interaction with teachers and other students (E. R. Bialo, 1990).

Challenges in the Adoption of Educational Technology in Teaching and Learning of Social Studies

Most tertiary institutions in Africa in general and Nigeria in particular are not to embrace the idea of employing educational technology in the teaching and

learning processes. They barely register on world institutional rankings and produce a tiny percentage of world research output (UNESCO, 2009). Educational technology is still not being applied sufficiently in Social Studies and other disciplines, mostly for the following reasons:

- Lack of school equipment: There is serious lack of school equipment, necessary resources and qualified teachers for the implementation of these technologies (Lazar Stosic, 2015)
- Lack of interest: Some teachers in Nigerian higher institutions are showing unwillingness to accept the new technology for educational advancement. They feel satisfied with the age long method of instruction (the traditional method) (Okwuedei C. A., 2011).
- Cost: The cost of integrating educational technologies in teaching and learning can be very expensive. The high cost of the ICT equipment and facilities discourage the schools from trying to enhance educational technology. Some Nigerian tertiary institutions cannot afford to put in place those ICT facilities due to prohibitive cost. However, in some cases, some tertiary institutions do afford them, while others do not see the need to invest such huge amount of money in educational technology just to improve teaching and learning. Thus, inadequate funding becomes the bane of our educational technological development in this regard. Without adequate funding, curriculum innovation in the

model currently being discussed will be a mirage (Okwuedei C. A., 2011).

- Unavailability and inaccessibility of ICT facilities: Many teachers do not have access to ICT facilities in Nigerian tertiary institutions because they are not available in expected quantity or not even in existence at all. Lack of access to ICT resources like computers and internet can seriously impede what teachers can do in the classroom, as regard implementation of its program (Okwuedei C. A., 2011).
- Lack of adequate power supply: Power supply can also be a challenge due to the instability of power supply in Nigeria to power ICT equipments. It is common to discover that most organizations in Nigeria rely on a diesel generators for power supply. Not all tertiary institutions can afford to buy generators, talk less of buying the diesel to power their generators.
- Computer literacy: Lack of adequate computer literacy by students and teachers is also one of the challenges in using educational technology. Some teachers lack adequate skills to use computer and internet. The challenges will make it difficult for the teachers in integrating educational technology in their teaching of Social Studies in tertiary institutions in Nigeria.
- Ethnicity and Godfatherism: Ethnicity and Godfatherism on the part of management is also one of the major problems facing the adoption of ICT in Social Studies education. Management in

most tertiary institutions send staff for in house ICT training based on the factor mentioned above.

The Role of Social Studies for Quality Enhancement through Application of ICT in Social Studies Education

Adaregbe (1980) sees Social Studies as an interdisciplinary field of study, and problem solving discipline. Social Studies as a corrective course help to correct the ills of the society and also the deficiencies of our educational system which is ill-equipped to cope with the demands of social harmony, national unity and national consciousness. Social Studies education help to instill the kind of knowledge, skills, belief, attitudes and values which the Nigerian child should possess. Graduates of Social Studies from the tertiary institutions are the ones to teach the young Nigerians these tenets.

There is the need to employ the use of information and communication technology in Social Studies education, especially in tertiary institutions in Nigeria. Presently, in our contemporary society there is an unprecedented wave of globalization propelled by the use of ICT. Therefore it is important that Nigerians consider tertiary education system in the international context of computer, software, networks, satellite links and related systems that allow people to access, analyze, create, exchange and use data, information and knowledge. These should be used in Social Studies education in the Nigerian tertiary institutions. Social Studies education which is designed as instrument for effecting integrated development and nation building must incorporate ICT into its curriculum. This will go a long way in ensuring the quality of its products as well as achieving the

objectives for its introduction into the school system, under the New Partnership for African Develop (NEPAD).

Conclusion

Through Social Studies education, high level of integrity can be displayed by the people in the discharge of their duties. The culture of quality must be built on technology, and for a tertiary institution, this will help to produce graduates who have the digital requirements for the saturated labour market. According to Materu (2007), tertiary education is central to economic and political development and vital to competitiveness in an increasingly globalizing knowledge society.

International challenges must be addressed in the institutions whereby staff and students must be ICT compliant so as to fit into the global digital process. This will open up access; increase our competitive abilities and better graduates from the institutions.

Social Studies education is one of the vehicles for achieving the above objectives. Our higher institutions can contribute to national development through high level relevant manpower training to develop and inculcate proper values for the survival of the individuals and the society.

Recommendations

- Lecturers and Social studies students should develop competence to make personal use of ICT, competency to master a range of educational paradigms that make use of ICT, sufficient competency to make use of ICT as mind tools, competency to make use of ICT as a tool for teaching as well as competency in understanding

the policy dimension of the use of ICT for teaching and learning.

- Social Studies department in the institutions of higher learning in Nigeria should take deliberate steps to enforce the use of new technologies in teaching and learning analogue lecturers do not have much to offer. Lecturers should not rely on old notes. Dictating of notes should be de-emphasized and internet facilities should be made available and accessible to students at affordable rates, if not free.
- ICT facilities should be made available and accessible in our higher institutions for training and re-training of teachers and students so as to make them computer literate.
- Management of higher institutions should avoid the use of ethnicity and Godfatherism in the training and re-training of Social Studies teachers.
- There should be proper accreditation of all Social Studies programmes offered in Nigerian tertiary institutions to ensure quality.

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CHAPTER 14.

EVALUATION OF ON-SITE ACCIDENT PREVENTION TRAINING PROGRAMMES IN THE PETROLEUM INDUSTRY IN RIVERS AND BAYELSA STATES

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ABSTRACT

The study evaluated the On-site accident prevention training programmes in the Petroleum Industry in Rivers and Bayelsa States. The population of the study was 1,400 personnel playing different roles in an integrated Oil field where construction and production activities are carried out simultaneously. The analytic survey was used for the

study. A sample size of 446 (32%) was drawn randomly based on availability due to job rotation and schedule. Seven (7) instruments were used for field data collection, the research questions were answered using mean, and standard deviation, while seven hypotheses were tested using one-way ANOVA in six and independent sample t-test statistics in one, all at 0.05 level of significance. The finding showed that participants were highly satisfied with the training as their expectations were met; they acquired new competencies; participants demonstrated evidence of transfer of new competencies in the workplace; the training produced desired outcomes as incidents/violations were reduced drastically, and all the management sub-groups acknowledged high return on investment (ROI) in the programme evaluated. It was concluded that the on-site accident prevention-training programme is effective and beneficial to stakeholders, and should be sustained while ensuring continuous improvement in view of multiple dynamics in the industry.

Keywords: Accident prevention, On-site Training, Petroleum Industry

1.0 INTRODUCTION

Training is an integral aspect of the entire production and service delivery system in every organization and an essential means of communicating information from more knowledgeable authority to person believed to be less knowledgeable in content, skills and desired behaviour. Sharma (2016) refers to training as the process of planned programs and procedures undertaken for the improvement of employee's performance in terms of skills, knowledge, and behaviour. The ultimate objective is to develop the

necessary capabilities required by an individual to carry out present or future jobs in the organization.

In the petroleum industry, activities are generally of high risk and hazardous because of the terrain and complex nature of high-tech equipment involved such as seismic, drilling, construction, production, refining and transportation among others. In each of these activities, there is a high level of hazards, accidents and even death. Hazards resulting from faulty equipment, electricity, confined space entry transport equipment failure, lifting, unguarded and machinery-related, working at height, struck-by/caught-in/caught-between, fire, radiation, loud noise, temperature, and slips/trips and fall as well as chemicals, flammable, gases and explosive chemicals, are recorded daily in the industry. Drilling Formulas (2017) reported the top 10 world's most disastrous accidents in Oil and Gas sector that consumed the lives of hundreds of people and assets valued over several trillions of dollars with the Piper Alpha Platform of 1988 topping the list with 167 deaths recorded and the Usumacinta Jack-Up (Mexico) of 2006 and C.P. Baker Drilling Barge (USA) of 1964 being the least in the list with 21 deaths and several casualties. RPS Energy (2010) and Chand (2015) also highlighted other accidents that occurred since 1984, to include: Bhopal, Methyl Isocyanate gas leak-Union Carbide plant in 1984 with 4000 deaths; Bombay High, ship collision with platform and riser fire in 2005 with 22 deaths; Chongqing, Sour gas blowout where 243 people died in 2003, Skikda, the explosion on LNG plant resulting to 27 deaths in 2004; Nigeria, pipeline explosion where 100 people died in 2009; Jaipur, the explosion in gasoline storage claimed 12 lives 2009; and the Congo, gasoline

road tanker overturned incident in 2010 resulting to the death of 230 people. The International Labour Organization (ILO) reported that over 2.3 million people die annually due to work-related occupational accidents, illnesses, and diseases, and an estimated 313 million work-related accidents resulting in extended absence from duty. The ILO revealed that the global economy suffers a staggering annual loss of about $3 trillion because of work-related accidents and diseases alone (World Economic Forum, 2015). The combined cost of work related deaths, injuries, and diseases in the year was 3.94 percent of worldwide GDP, which is equivalent to $2.99 trillion (National Safety Council, 2017). These figures are indeed frightening and call for short and long-term intervention to halt the trend.

In Nigeria, The Directorate of Petroleum Resources (DPR) in 2017 raised alarm over increasing cases of accidents, such as; the Apapa jetty fire where four died; the gas skid explosion in Ogun state with six fatalities, the petrol tanker fire that claimed ten fatalities and injured six in the Felele area of Lokoja in Kogi State (Alike, 2017). The 12th July 2012 Okogbe fuel tanker explosion along East-West road that claimed over 100 lives. Anyanwu (2014) also revealed that other major accidents within the last three decades include the Escravos spill in 1978; the Forcados Terminal Tank failure in 1978; Texaco Funiwa-5 blowout 1980, and the Abudu pipeline spill of 1982. Okoli (2018) reported that a pipeline explosion claimed the lives of over 50 people in Abia State on October 12, 2018.

The economic consequences of these accidents on the nation that depends largely on Oil and Gas are immense. The upstream sector also recorded some ugly work-

related accidents since the beginning of the 21st century. For instance, the Shell group in Nigeria had 21 out of the 52 fatalities recorded in the year 2000; 22 out of 51 persons that died in 2002; 22 out of a total of 37 work-related deaths in 2006; and also 11 out of 26 fatalities that occurred in 2008, 3 out of the 5 work-related deaths in 2013; 5 died in 2014; 7 deaths in 2015, and 3 fatalities in 2016.

Hence, we cannot under-estimate the relevance of on-site accident prevention training programmes in the petroleum industry. This study, therefore, evaluates the on-site accident prevention training programmes in the petroleum industry in Rivers and Bayelsa States. The following hypotheses were tested at significant levels to guide the conduct of this study:

1. There is no significant difference in participants' level of satisfaction in the accident prevention training in the three different skill pools.

2. There is no significant difference in the mean achievement of participants in terms of the acquisition of new competencies after attending the general HSE Levels 1-3 training programme.

3. There is no significant difference in the mean achievement of participants in terms of the acquisition of new competencies after attending the Fall Prevention training programme.

4. There is no significant difference in the mean achievement of participants in terms of acquisition of new competencies after attending the Gas Testing and Confined Space Entry training programme.

5. There is no significant difference in participants' ability to apply new competencies gained during the accident prevention training in

managing workplace hazards to prevent accidents across the different sectional leadership

6. There is no significant difference in the extent to which the accident prevention training has contributed to the achievement of accident-free operations across three management sub-sections.

7. There is no significant difference in the extent of return on investment in accident prevention training in terms of cost savings, higher profits, and overall performance in the different management sub-sections

2.0STATEMENT OF THE PROBLEM

The Oil and Gas sector like other high-risk sectors has consistently provided mandatory and recommended workplace accident prevention training their employees to keep them free from harm, save lives, protect assets and the environment. This training is a legal requirement and employers are duty-bound to comply with the law. Aside from legal push, employers are morally bound to provide necessary training to safeguard the employee, who also has the right to a safe and healthful working environment. There are also the cost-saving benefits of training when the employer makes more money without suffering an undue loss due to an accident. Training is currently in a state of crises around the world especially due to harsh economic climate leading to organizations being pushed to cut down on training budgets among the first line of items in order to reduce cost. This means that the lofty ideas about continuous learning and professional development of employees have to give way to concrete justification with compelling evidence that such training will deliver bottom-line results, and

contribute to the accomplishment of organizational objectives (Kirkpatrick & Kirkpatrick, 2016).

The current economic challenges and crises in the training world are yet to deter the petroleum sector significantly, as employers have continued to deploy valuable resources to provide workplace accident prevention training to help employees acquire and improve requisite competencies on how to carry out assigned tasks without an accident. Sadly, despite huge investment in training intervention to achieve zero incidents there seems to be no end to accidents occurring at the workplace. This recurring accident has put some sorts of doubts on the veracity, relevance, and effectiveness of workplace accident prevention training provided for workers by employers. It is against this backdrop that the researcher would investigate the strength and weaknesses of such training to determine if the critical objectives are achieved, and what can be done to sustain performance or make an improvement to justify the investment to the benefit of the employee, employer, family, and society.

3.0 LITERATURE REVIEW

Unlike several related studies on evaluating training for quality, production, resources management and other programmes, there are only a few reported studies on the Evaluation of On-site Accident prevention training in the Petroleum sector. Vignoli, Punnett and Depolo (2014) in their work, "How to Measure Safety Training Effectiveness? Towards a More Reliable Model to Overcome Evaluation Issues in Safety Training" attempted to develop and promote the new 'mixed-methods' of testing the effectiveness of safety training intervention due to the inadequacies of existing (classical

and Realistic evaluation) approaches in Italy, and wider Europe. The paper advocated the adoption of a robust and time-efficient method that combines qualitative and quantitative measures in the collection and analysis of information for a better understanding of a research problem in order to provide possible answers to such a problem. The new way adopted for evaluating safety-training intervention was demonstrated in a pilot study at pre and post-training phases on safety training intervention course on the use of asbestos.

While examining the concept of training and development, Topno (2012) presented a broad understanding of the concept of evaluation and training evaluation in particular with an in-depth review of definitions of several scholars as he attempted to provide a comprehensive approach to the subject in his work entitled "Evaluation of Training and Development: An Analysis of Various Models". He identified evaluation as the most critical part of training intervention because it concludes the training process, and reveals whether or not learning really occurred, and the extent learners can apply what was learned during task execution. He also unveiled a number of training evaluation models available to practitioners, researchers, and organizations that may wish to test new or existing training programmes be it for long or short terms, including the widely used Donald Kirkpatrick's Four-level training evaluation model; the Context, Input, Process and Product (CIPP) evaluations model developed by Daniel L.Stufflebeam; the CIRO approach developed by Warr, Bird & Rackson in 1970; J Philips Five levels approach that formally introduced Return on Investment to support Kirkpatrick's four levels. Other models include;

Training Validation System strategy by Fitz-Enz; Bushnell's Input, Process and Output (IPO) model. The training investment model of Hassett; the Five-levels evaluation model of Kaufman and a host of others. Each of these models has strengths and weaknesses and cannot be applied in all situations but can safely be adapted and combined to achieve targeted results. On the assessment of employee training and development programme, Borate, Gopalkrishna and Borate (2014) adopted a case study approach to evaluate employee training effectiveness and development program in the quality department at a multinational company in India, using Kirkpatrick's four levels evaluation model. The investigation is predicated upon the fact that most companies have realized that human capital development plays the most critical role in economic competitiveness within and across states. Their main finding was that Training for continuous quality improvement was effective in the multinational company investigated as the acquired mean of all the seven hypotheses were significantly higher than theoretical mean, which suggested general effectiveness of the training implemented for continuous quality improvement.

Grohmann and Kauffeld (2015) focused on the importance of using an evaluation

tool that is psychometrically sound with the right properties by organization in testing the effectiveness of their training programmes to save time, cost and other resources and to avoid using inappropriate tools for evaluating training programmes.

4.0 RESEARCH METHODOLOGY

This research adopted a combination of descriptive and

analytic surveys. Ex post facto method was adopted to support primary data obtained through questionnaires and interviews to determine the outcome at level 4 of the accident prevention training. Purposive sampling technique was adopted during the administration of instruments due to the dynamic nature of site activities. The researcher developed, validated and administered instruments used to obtain responses from all levels of participants, and engaged targets respondents in face to face interviews to elicit additional feedback to support earlier responses on Level 3, 4 and 5. A direct observation technique was also used.

The study areas for this research were contractors' worksites in Agbada Oilfield in Rivers State and the Tunu Oilfield, Bayelsa State. The Agbada Oilfield is in Shell Petroleum Development Company (SPDC's) Oil Mining Licence (OML) 17, approximately 16 km North-East of Port Harcourt in Ikwerre Local Government Area of Rivers State. The oilfield on dry land area on latitudinal and longitudinal positioning of 2 7° 0′ 54.468″E and 4° 55′ 54.398″N for Agbada 2, and 6° 58′ 37.529″E and 4° 56′ 4.705″N for Agbada 1 determined through a GARMI Global Positioning System (GPS) on the field.

The population of the study was mainly 1,400 workers belonging to three main contractors who had undergone various accident prevention training in an integrated oil and Gas projects at remote locations for a client under a single management portfolio.

The sample of the study is 446 workers, which represents 32% of the population studied. The sample size was determined with the use of Taro Yamane's formula,

which yielded 311 as a minimum number of sample sizes for 1,400 populations.

1,047 questionnaires were retrieved out of 1,080 administered to the two main groups and three sub-groups of respondents by the researcher on a face-to-face basis. This number represents 96% of return rate, with 33 lost representing less than 4% mortality. Aside from questionnaire, other methods used for data collection include interviews and direct observations.

Data were analyzed using, mean and standard deviation, and Paired Sample t-test at 5% level of significance (α=0.05). Research questions were answered using mean and standard deviation. Hypotheses were analyzed using one-way ANOVA and independent sample t-test.

5.0 DISCUSSION OF FINDINGS

The study shows that those who participated in the accident prevention training had a high level of satisfaction in terms of instructor's expertise, module content, materials, and overall training environment. This finding collaborates Borate et al. (2014) investigation results, which affirmed that continuous quality training intervention contributed immensely to creating a positive response in trainees as their expectations were reasonably met. It also supported Dhliwayo and Nyanumba (2014) study on the related subject, which revealed that most workers who received on- the- job training expressed satisfaction that their expectations from the training were met. It was also revealed that participants' level of satisfaction and their understanding in the accident prevention training in different skill pools differs to an extent. Participants from the Indirect- skilled pool believed that their expectations

in the just-concluded and previous on-site accident prevention training were met. This was demonstrated in their varying degrees of interest and participation during the training as the Indirect- skilled asked and answered questions from instructors than the artisans. While the artisans were more active and revealed greater satisfaction than the unskilled workers. Feedback from interaction confirms clear alignment with the educational qualifications of each of the three groups of participants as Indirect- skilled with university degrees had the greatest satisfaction. Next to the Indirect- skilled were the Direct- skilled that have technical/trade school certificates, and finally, the unskilled workers with or without primary school certificates commonly referred to as helpers. This implies that the satisfaction level in the accident prevention training depends on the level of academic or professional qualifications attained by different categories of participants to an extent. It varies according to the degree of academic or professional achievement, which means the more qualified the more you are satisfied and vice versa. This finding was supported by a tested hypothesis, which confirmed that the level of satisfaction in the training programme among the different skill pools of direct-skilled, unskilled, and Indirect- skilled differed significantly.

The study also indicates that participants who attended the General HSE Levels 1-3 training have a high level of understanding in terms of acquisition of new competencies, module content, and materials. The finding clearly aligned with the researcher's observation and interaction as most of the participants demonstrated that they learned substantial new things from the training which they never knew and that the training was

beneficial to them. The outcome also supports findings from research conducted by Borate et al. (2014), Dhliwayo, and Nyanumba (2014) which affirmed that reasonable learning took place in the two different pieces of training. Most of the locals held firm to their hearts, the 12 lifesaving rules, the 3 EP HSE golden rules, the importance of personal protective equipment (PPE) et cetera, and could list as many as ten hazards and control measures. The researcher concluded that participants in the mandatory general Health, Safety and Environment (HSE) Level 1-3 training acquired new competencies as all of those interviewed were of the view that they will go for refresher training if nominated, and strongly recommend that every new joiner should undergo HSE level 1-3 training.

Findings also indicates that those who participated in Fall prevention training acquired a high level of understanding in terms of acquisition of knowledge, skills and attitude, module content, and materials in the accident prevention and training program. Findings are in line with the outcome of learning achievement by participants that attended the mandatory general Health, Safety and Environment (HSE) Level 1-3 training who confirmed that they acquired new competencies after the training. Findings also agree with the outcome from Borate et al. (2014) and Dhliwayo and Nyanumba (2014) which affirmed that reasonable learnings took place in the two different training. The participants' level of understanding in the Fall Prevention Training in terms of acquisition of new competencies, module content, and materials in the different skill pools differs to an extent as seen from their varying mean scores. Finding confirms varying degrees of understanding but differs in terms of

the pattern of achievement as recorded among the different categories where Indirect- skilled acquired most. Direct- skilled followed and unskilled least in HSE Level 1-3 training. Unlike the HSE level 1-3 training, the unskilled workers ranked highest in the acquisition of learning in fall protection and are followed by the Indirect- skilled and finally the Direct- skilled. This outcome appears somewhat strange. However, interaction and observation confirm that although the unskilled workers cannot authoritatively comprehend learning from fall prevention training more than the Indirect-skilled and Direct-skilled they demonstrated the highest level of compliance with fall prevention requirements, which largely implies the highest level of understanding. Most of those interviewed believed that work at height was perhaps the riskiest activity due to horrific videos of fatally injured or maimed people as a result of fall from height accidents, which they watched during the training, and was not ready to be used as statistics in future. Most of them wore their body harnesses to and from break without removing it. The Indirect-skilled was next in compliance but comprehended learning more. While the Direct-skilled were least in compliance because of the obvious complacency occasioned by overconfidence. However, they demonstrated a greater level of theoretical understanding of fall prevention training next to Indirect- skilled. The tested hypothesis also validated the fact that achievement level in the Fall Prevention training among the three different skill pools of direct-skilled, Unskilled and Indirect-skilled differed significantly.

Findings also indicate that participants who attended Gas testing and Confined Space Entry training have a

high level of understanding in terms of acquisition of competencies, module content, and materials. This indicates that participants were able to apply new competencies gained during the accident training programme in managing workplace hazards to prevent accidents to a large extent. The finding supports the outcome of Vignoli, Punnett, Depolo's (2014) investigation, which affirmed that most people that received safety training averred that what they learned from such training were useful during task execution in the workplace. This finding also agrees with Borate et al (2014), Ruttenberg (2013) and Dhliwayo & Nyanumba (2014), among other studies that confirmed transferred learning as trainee indicated capability to use acquired competencies to solve practical problems at the workplace. However, the percentage of what was really transferred out of quantity acquired was not established. It is believed that a substantial quantity of what was acquired in the training was actually transferred because 90% of the total package addressed knowledge and how to work without being hurt or killed. Transfer of learning was indeed encouraged by individual workers' consciousness to carry out activities at the workplace without being hurt, close supervision, strict compliance to safe work procedures, coaching, daily toolbox meetings, and job hazards analysis. One key finding during the interaction was the worrisome barrier to transfer of learning due to work pressure in order to meet delivery targets. More than 50% of those interviewed confided in the researcher that most times they face the dilemma of willful violation against compliance with safe work practices in order to complete assigned tasks on time because of sack threat if they fail to complete the

task as requested by the boss. And, in most cases, they were compelled not to apply known safe work practices as required in order to complete work within the specified timeframe, and therefore created room for normalization of non-compliance as right things were usually jettisoned in such instances.

The participants' ability to apply the new competencies gained during the training in managing workplace hazards to prevent accidents after training in the different skill pools (LCS, LOS and LSS) differs slightly to an extent. These varying mean scores indicate that participants applied the new competencies gained during the training in managing workplace hazards to prevent accidents after training in the different skill pools differs to an extent. Finding collaborated researcher's interaction and observation as the frontline supervisors and workers (LSS) rendering support services readily complied with safe work practices and procedures learned during training than the construction and operation spread probably because they exert less bodily stress. One of the Logistics officers interviewed revealed that upfront planning was a major key to translating learning from various accident prevention training to daily work execution as it has helped in preventing or reducing 'fire service 'response that would usually inhibit doing what is right. The construction spread (LCS) also demonstrated good use of what they learned from the three training packages evaluated despite the fact that they ranked next to the support spread. However, they faced multiple challenges because they are the key people actually doing the main work and due to other factors, which include: nature of work environment, type and integrity of equipment used, worksite restrictions and

interface issues, multiple and divergent instructions, the attitude of supervisors and colleagues as well as other intervening challenges from clients and worksite dynamics. Two of those interviewed confided in the researcher that, at times, multiple and divergent instructions are issued on how best to execute one task against known procedure and that has led to not really implementing the task in accordance with knowledge gained from training. Finally, the operation spread seemed to view daily tasks more as routine activity and demonstrated more complacent behavior to doing the right thing based on learning from accident prevention training. One of those interviewed informed the researcher that his manager would only get worried if the system is down or there is a fire outbreak, and that transfer of technical knowledge learned is of greater value to him than learning from accident prevention training. The tested hypothesis did not support this finding wholly as it indicated that ability to apply new competencies gained during the training in managing workplace hazards to prevent accidents after training across the different skill pool of LCS, LOS and LSS did not differ significantly.

This indicates that the accident prevention training has contributed to the achievement of accident-free operations to a large extent. This shows a positive result/ outcome of the on-site accident prevention training. The finding supported Ruttenberg (2013), Borate, Gopalkrishna and Borate (2014), The South Australian Freight Council (2015), Bianchini, Pellegrini, Peta and Saccani (2014), and Dhliwayo & Nyanumba (2014) earlier positions which revealed that safety training created a positive impact in terms of

accident prevention/ reduction, improved quality and even boosting production. The main objective of accident prevention training is to ensure the achievement of ZERO ACCIDENT, meaning no incident. Workers from the three companies contributed significantly to the achievement of over 20 million LTI-free man-hours within the last 5 years (2013-2018) on current projects for the same client. Monthly, Annual and Project-to-date report sighted from secondary data sources (HSE Statistics records) confirms very impressive HSE performance attributable largely to increased on-site HSE awareness resulting from planned accident prevention training.

It also revealed that accident prevention training has contributed to the achievement of accident-free operation to a differing extent as assessed by three different management sub-sections of Operations, Support and Construction as seen from their differing mean scores. Construction activities are high risk with great potential to cause harm, such as: mechanical and manual lifting, excavation, welding, coating, and electrical and instrument installation, radiography, pressure testing and all manners of activities carried out underground, surface, confined space and even at height, both in brown and green fields. It is therefore not surprising to note that construction workers mainly at the cool face of activities are required to undergo series of technical and safety competency training prior to engagement, and sustained refresher sessions throughout the duration of work. All the participants interviewed believed very strongly that they could not engage anyone to do work when such a person has not undergone the mandatory or recommended accident prevention

training. For instance, it is mandatory for everyone entering the workplace to undergo site safety orientation programme. Secondly, no worker touches an object if you have not undergone basic HSE levels1-3 training. It is on this premise that those interviewed believed that on-site accident prevention training contributed significantly to the achievement of accident-free operation, drastic reduction near-misses, unsafe acts and conditions in the workplace. The operation team interviewed also believed in the potency of accident prevention training in the achievement of goal zero or drastic reduction of workplace accidents but argued that facility integrity and health are also key contributors to the achievement of accident-free operations. One of the team leaders interviewed averred that facility health and integrity is critical in this era where most facilities are designed to run virtually unmanned and to burn down and wonder the critical role accident prevention training plays in the achievement of goal zero. For him, health awareness training is a priority for people in control rooms, security, and catering personnel. While, the support category also believed in the contribution of on-site accident prevention training to the achievement of goal zero but reasonably differed from both construction and support team as some of those interviewed stressed that it was a combination of training and luck. A section of those interviewed told the researcher it is God not any kind of training. Again, this accounts for the third-place roll of the support team. Tested hypothesis did not support finding as it indicated that the contribution of on-site accident prevention training in the achievement of accident-free operations across the different

management sub-divisions of Operations, Support and Construction did not differ significantly.

This shows that to a large extent, the returns on investment in accident preventing

are justifiable in terms of cost savings, higher profits and overall performance. This shows high and justifiable returns of investment of the accident prevention training. Finding from this study supported the outcome of nine companies' case studies investigations on ROI from different safety, quality and performance improvement training programme conducted in South Australian according to The South Australian Freight Council Inc. (2015). The management investigation team concluded that companies bottom line were generally improved through training as it impacted positively on safety, profitability and productivity, increase in worker's motivation and morale, customer satisfaction, the reputation of companies and profile. Ruttenberg (2013) study on The Economic and Social Benefits of OSHA-10 Training in the Building and Construction Trades also concluded that OSHA-10 training made a great difference as savings due to accidents averted run into millions of dollars. Investigator stated that if safety training could reduce injuries by 2% a year it means that savings could rise to $336 million per year, which will likely triple to $1billion dollars if we achieve 6% reduction of accidents. The position of these two and many other studies on the ROI was collaborated by the entire managers interviewed. Two of the Project managers and one Director recounted huge losses their companies suffered (on a non-SHELL project) due to accidents which occurred because the workers' lacked the basic knowledge, skills and attitude required to manage

workplace hazards which would have been acquired through on-site accident prevention training. All those interviewed agreed that recommendations on the urgent need to train or retrain workers were prominent in most (if not all) accident investigations reports.

Also, the returns on investment in accident prevention training are justifiable in terms of cost savings, higher profits and overall performance, and differs to an extent in the three different management sub-divisions of Operation, Support and Construction as seen from their differing mean scores.

6.0 CONCLUSIONS

Following investigations and findings, it is evident that the implementation of on-site accident prevention training interventions in the Petroleum Industry is in compliance with regulatory and industry requirements. Aside from these, the intervention is seen essentially as an integral part of the entire production and service delivery process, which enhanced cost-saving, higher profit, and overall well-being of organizations. The following conclusions were drawn from each of the indicators measured, as follows;

The study showed high level of participants' satisfaction with the on-site accident prevention training. It also revealed that all the participants acquired new knowledge, skills, and behavior from the training, which means that learning, took place. Also, participants applied new competencies they acquired from the accident prevention training in managing hazards at the workplace to prevent accidents after the training. The result of the study also showed mean score far higher than the criterion mean indicating that the on-site accident prevention training contributed immensely to

the achievement of accident-free operations to a large extent. for safety intervention, man-hours and other resources that would have been deployed to investigate accidents and the consequential costs were saved, improved site housekeeping, increased HSE compliance level and higher morale among workers, etc.

The study result showed that Returns on Investment (RoI) in the on-site accident prevention training are justified to a large extent in terms of cost savings, higher profits and overall performance.

The following recommendations are made:

1. Companies should continue to support every effort to ensure continuous improvement of on-site accident prevention training programme in order to sustain workers interest since the interventions meet their expectations and help in boosting their morale and motivation

2. Companies should continue to review learning experiences and delivery strategies in the three (and other existing) programme in order to sustain participants' interest and make learning relevant in order to enhance greater achievement.

3. Companies should leverage relevant research findings and best practices on the most suitable training environment to enhance the transfer and utilization of acquired competencies at the workplace.

4. Companies are encouraged to develop a robust and sustainable training department to consolidate the gains of reduced incidents, and workforce with vast competencies on effective hazard management in order to bridge gaps as a result of the incursion of new technologies, regulations, standards, procedures and site environmental challenges.

5. Companies should invest more in accident prevention training intervention as an integral aspect of production and service delivery since the intervention has been identified as viable means to save cost, boost productivity and improve the overall performance of individuals and organizations.

6. Additionally, every organization should launch or sustain an On-site accident prevention training programme due to its indispensability as an essential strategy for cost-saving and overall prosperity of any business organization.

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CHAPTER 15.

THE PROBLEM OF CLASSROOM MANAGEMENT IN SECONDARY SCHOOLS IN NIGERIA: IKA NORTH EAST LOCAL GOVERNMENT AREA, OWA OYIBU, AS A CASE STUDY

ELURO IFECHUKWUDE

ABSTRACT

The study analyzed teacher's perception of problems in classroom management in some selected public and private senior secondary schools in Ika North East Local Government Area Owa-Oyibu, Delta State Nigeria. Data were collected for the study using a self report designed questionnaire which was developed from literature by the researcher, validated and tested for liability Purposive non-probability random sampling technique was used to select the number of schools to be used. Two hundred and ten (210) teachers served as sample for this study. Research questions were raised to be answered and hypotheses formulated to be tested in the study. A one way analysis of various (ANOVA) was used to analyze data. The findings from this study revealed that teachers form the sampled schools perceived overpopulation as significant

problems in classroom management, but infrastructural deficiency, teacher personality and poor school learning proved to be insignificant problems in classroom management. Based on the findings of the study, it was concluded that the self needs of teachers must be revisited and efforts made by the government towards uplifting the learning conditions of the learners and teachers motivation and productivity. In other words, the state as well as the Federal Government should ensure that the classrooms are not overpopulated. The students should be better controlled and motivated by the teachers with assistance of school guidance counsellors and creation of conducive learning environment. The government also has a role to play in providing the necessary teaching aids and periodic maintenance of building facility and laboratories equipment. Thereafter, suggestions for further studies were made.

INTRODUCTION

In our system of education, classroom management plays a very vital role, it is a facility that could enhance learning if properly conditioned. The Nigeria educational system is divided into two: Formal and Informal System; in formal system, learning occurs in an organised and structured environment (such as in an education or training institution or on the job), informal system of education lacks the structure and standard of formal education, learning happens outside the classroom, before the introduction of formal education in Nigeria, the system adopted then was informal traditional or indigenous Nigeria education (fafunwa, 1974). The type of education takes place everywhere and throughout life. Classroom management has also defined as orchestration of the learning environment of a group of individuals within a classroom setting (Evertson, 2003).

STATEMENT OF THE PROBLEM

Teaching has been noted as one of the most difficult

jobs in the world. It becomes more difficult when the teacher is the one responsible for maintenance of student's interest, accompanied by cheating and the standard of education which continues to fall. Where good classroom management is lacking, there is chaos teaching and learning are disrupted and much learning does not take place.

Equally important in classroom management and the issues of discipline and the handling of disciplinary problems. Many secondary school teachers are yet to appreciate the importance of understanding the personality of the student he/she is handling in other to keep the classroom ready for the task at hand. This creates a picture of the activities that a teacher is involved in while in the classroom.

When the class is overcrowded with many students and the school management and the government refusing to provide enough learning space, it will adversely affect educational system. Infrastructural deficiency as in lack of facilities like good buildings, enough play ground, good roads, pipe borne water, laboratories could greatly affect teacher management of students and classroom. When teaching aids like: television, film strip, map video, graph and chart are not provided by the government and the school authorities. It will surely hinder the educational system. Some secondary schools are not well sited or located in conducive environments. When such schools are very close to the market, record studios, motel or wielding workshops, this will affect the learning outcomes because the noises coming out from such places will affect the attention span of the learner.

RESEARCH QUESTIONS

The following are the research questions of the study:

- What is the relationship between infrastructural deficiency and classroom management in Senior Secondary Schools in Ika North East Local Government Area of Delta State?
- What is the relationship between overpopulation and classroom management in Senior Secondary Schools in Ika North East Local Government Area of Delta State?
- What is the relationship between teacher personality and classroom management in Senior Secondary Schools in Ika North East Local Government Area of Delta State?
- What is the relationship between poor learning environment and classroom management Senior Secondary Schools in Ika North East Local Government Area of Delta State?

HYPOTHESIS

A null hypothesis is formulated to be tested in this study:

The composite joint contributions of the identified variables of infrastructural deficiency, overpopulation, teachers personality and poor learning environment are not significant problems.

SCOPE OF THE STUDY

The variables this study shall measure are infrastructural deficiency, overpopulation, teachers personality and poor school learning environment. This study is delimited to selected Secondary Schools in Ika North East Local Government Area of Delta State. The schools includes: Kings Solomon Secondary School, Ideal Secondary School, Calvary Secondary School, Unique

Secondary School, Ute-Okpu Secondary School, Owa Oyibu Secondary School and Owa Alero Secondary School. The sample selected for this study was two hundred and ten (210) Public and Private Secondary Schools teachers. Variables or gender will not be considered in this study but observation and a self-designed instrument shall be only source of data collection.

METHODOLOGY

The research design adopted for this study is the descriptive survey. Data were collected for the study using a self report designed questionnaire which was developed from literature by the researcher, validated and tested for reliability. Purposive non-probability random sampling techniques was used to select the number of schools to be used. Two hundred and ten (210) teachers served as sample for this study. Research questions were raised to be answered and hypotheses formulated to be tested in the study. A one way analysis of variables (ANOVA) was used to analyzed data.

Population of the study consist of all the Public and Private School Teachers (Secondary) in Ika North East Local Government Area, Delta State, Nigeria.

The instrument adopted for this study is questionnaire titled: 'Teacher's Perception of Problems in Classroom Management in Secondary Schools in Delta State, Nigeria was used to gather data for this investigation. The questionnaire was developed by the researcher from literature.

Research Question 1: Is infrastructural deficiency a significant problem in classroom management?

Table 2: Analysis of variance showing relationship

between infrastructural deficiency a significant problem in classroom management.

Source of Variation	Sum of Square	Degree of Freedom	Mean Square	Calculated F-Value	Critical F-Value
Between Groups	.037	1	.037	.146	.703
Within Groups	52.387	208	.252		
Total	**52.424**	**209**			

From table 2 analyses, the result has shown from the calculated value (0.14) which is less than the critical F-value (0.70) that infrastructural deficiency is not a significant problem in classroom management.

Research Questions 2: Is overpopulation a significant problem in classroom management?

Table 3: Analyses of variance showing relationship between overpopulation and classroom management.

Source of Variation	Sum of Square	Degree of Freedom	Mean Square	Calculated F-Value	Critical F-Value
Between Groups	.148	1	.148	.591	.443
Within Groups	52.275	208	.251		
Total	**52.424**	**209**			

Table 3 result posit that overpopulation is a significant problem in classroom management. With a different of 1208 and a calculated value of 0.59 and 0.44 critical F-value which is higher than the latter, it is obvious that overpopulation could account for df in teacher ability to manage his/her classroom.

Research Questions 3: Is Teacher Personality a significant problem in classroom management?

Table 4: Analyses of variances showing relationship between teacher personality and classroom management.

Source of Variation	Sum of Square	Degree of Freedom	Mean Square	Calculated F-Value	Critical F-Value
Between Groups	.000	1	.000	.000	.996
Within Groups	52.424	208	.252		
Total	**52.424**	**209**			

Table 4 analyses indicates that the critical f-value (0.99) is far greater than the calculated (0.00) under a df of 1 and 208. This result validates the fact that teacher personality is not a significant problem in classroom management.

Research Questions 4: Poor learning environment and classroom management?

Table 5: Analyses of variance showing relationship between poor school learning environment and classroom management.

Source of Variation	Sum of Square	Degree of Freedom	Mean Square	Calculated F-Value	Critical F-Value
Between Groups	0.079	1	.079	.344	.558
Within Groups	47.545	208	.229		
Total	**47.624**	**209**			

In table 5 analyses, the result herein shown poor school learning environment as not a significant problem in classroom management. Under a df of 1 and 208, the calculated f-value of 0.344 is less than then critical f-value of 0.55.

HYPOTHESES

The composite joint contributions of the identified variables of infrastructural deficiency, overpopulation, teacher personality and poor school leaving environment are not significant problems in classroom management.

Discussion of Results

Infrastructural deficiency as a problem in classroom management.

In table 2 result analysis, infrastructural problem has proved not to be a significant problem in classroom management. This is not surprising because the respondents in their response to the items showed that the use of generator set during light failure availability of sport facilities and equipment adequate laboratories for practical use and available classrooms for teaching in the school though not very satisfactory are noty so bad that they interfere with their classroom management.

From the result evident, it is glowing that though the schools might lack in provision, the teachers are still able to manage their students effectively and deliver positive learning outcomes though this finding does not collaborate that of Leichardt (1985) and Thompson (1994), it is not idealistic for the government to lay back in their efforts to boost infrastructural growth in schools in order to improve teacher – classroom management.

Overpopulation as a problem in Classroom Management

In the association between overpopulation and classroom management in schools, several educational research studies have played evidence to symbolic relationship between overpopulation and classroom management. This is due to the effect an over populated classroom could have on teaching and learning outcomes. The National policy on Education (1994-2009) has specified the conditions for effective learning and educational practices in schools. The concept "over population" ranges from a highly populated classroom. Some research results like those of Ebubechukwu (2002)

have revealed a positive correlation between the two variables under study. From Table 3 result analyses, overpopulation has proved to be a significant problem in classroom management.

This very substantial positive relationship once again highlights the ability of the government to afford the school aged children their right to a befitting education and standard. When there are so many students sitting in the bare floor or sharing chairs meant for one or two students, how easily could a teacher perform his/her job and at the same time have easy access to movement to administer discipline or control the students he/she should be teaching at the same time? This is an ugly situation most teachers in Delta State find themselves in during personal interaction with the researcher said that they are well trained and have several years experience but are forced to teach under unhealthy conditions. This finding is at variable from those of Foloyin (2000).

Teacher Personality As a Problem in Classroom Management

Table 4 result analysis has indicated a negative association between teacher personality and classroom management in schools. This means that though a teacher might portray a cheerful mastery teaching, but might occasionally miss his/her tenses in the course of the teaching exercise, the classroom might still be rowdy but he/she bringing his innate qualify into bear could still manage to calm the students down.

The present study brings to light the narrowed gap achieved in literature in the area of path links between teacher personality, classroom management skill and effective classroom management in schools. The finding

in this study though at variable from that of Eleleme (1998) has significance with those of Isyaku (1997).

Poor School Learning Environment as a Problem in Classroom Management

Learning environment is a construct in education which is determined by many factors to interpret its symbolic nature. The meaning ranges from a formal organized structure for imputing knowledge from an educator to a learner, a conducive friendly place for teaching and leaving experiences to a quiet and well situated area for a school to be set up in. Many researchers have tried to establish relationship between teacher method of teaching and classroom management in schools but few have gone ahead to examine the association between poor learning environment and classroom management.

In other words, the school, learning environment under studies are conducive, well arranged and situated for the students to learn in and the teachers to manage the classrooms effectively. This goes on to instigate, there is yet to be provided efficient data or evidence for prove that learning environment actually influences classroom management. The finding here is in support of those of Burkhan (2002)

Conclusion

This work has so far examined the identified problems of classroom management in secondary schools with a particular focused in Ika North East Local Government Area of Delta State, Nigeria.

This findings will further throw more light on the conditions of several schools in the area of the study and the need for the government to revisit overpopulation problem in several schools in the state, look into the need

to appoint more school counsellors to work aside the classroom teachers in the area of student discipline and pay more attention to improvisation of teachings aids to argument what is supplied to the schools in the area of study. All the aforementioned salient points shall go a long way to beef up classroom management challenges among teachers in the state.

Recommendations

Based on the results form the study, the following recommendations are offered:

- Teachers should be encouraged to stay on the job in secondary schools through motivation/ incentives. Teachers' ability to manage their classes should be recognized and reward as a regular process in order to motivate them to higher productivity.
- Government should intensify efforts in the provision of infrastructural facilities in all public schools in order to avoid overcrowded classrooms in Delta State and other Nigerian States.
- The age of the learner should not be considered as a hindering factor in classroom management, but there is need for the classroom teachers to design the curriculum to suit all ages of learners in the class to avoid misconducts and noise making during class instruction.
- Secondary school teachers should always portray a cheerful facial disposition and be very friendly to the students.
- Schools should be sited in ventilated area and the

building should be well situated.

- Refresher course and seminar workshops on classroom management should be organized periodically each year for the teachers by the state, federal government and non-government organizations to orientate them on their teaching skills and teacher personality.

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CHAPTER 16.

THE ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGY (ICT) IN TEACHING AT BASIC EDUCATION LEVEL IN DELTA STATE: IMPLICATIONS FOR TEACHERS.

AJUDEONU HELEN IHIEONYEMOLOR (PH.D)

Abstract

With the advancement in information communication and technology (ICT) the world today is experiencing digital revolution in every spheres of life. There are rapid technological advancement which are transforming the processes and practices of education to meet the challenges of the 21st century teaching and learning,. This paper examines the role of ICT in teaching at the Basic Education Level and Implications for teachers. The concept and types of ICT used for teaching and learning were discussed. It viewed the Basic Education Objectives, features and its application at the basic education level. The roles of ICT at in teaching and learning for both teachers and learners were explained. Finally, it highlighted the implications for

teacher to include, training and retraining of teachers, recruiting teachers with ICT skills and competencies, making ICT as a compulsory course in all institutions involved in teachers' preparation, among others. Teachers pedagogical practices should be ICT compliant.

Introduction

The rapid growth in Information Communication and Technologies (ICT) have brought remarkable changes in twenty-first century and affected every facet of life and the modern society. ICT is becoming increasingly important in our daily lives as well as in educational system Buabeng Andoh (2012) Therefore, there is the growing demand and necessity to use ICT in teaching and learning at the basic education level.

Teaching and learning has gone beyond the teacher standing in front of group of students and disseminating information to them without the students' adequate participation. But with the aid of ICT, teachers can take students beyond traditional limit, ensure adequate participation in teaching learning process. ICT in teaching enhance the quality of teacjing and learning. ICT provide encouragement for teacher and students on knowledge and skills acquisition, making teaching and learning more visible Radloff (2001) opined that ICT encouraged collaboration and team work among teachers and learners, offering greater access to learning for more people and increasing the skill and status of the school teachers.

Ononyekan (2013) defined education as an aggregate of all the process of learning by which an individual develops his/her abilities attitudes and other forms of behaviour which are positive values to the society he lives in. Education is aimed at developing and preparing the

individual for survival in the society. Surviving in this age depends on access to information and ICT is seen as the bedrock to all necessary educational information at preparing students at the Basic Education level. Aware of the significance of ICT educational programmes in the world several measures had been adopted to facilitate acquisition of ICT education by enhancement of teachers training programmes to enable teacher play effective role in teaching and learning at the basic education level.

Concept of Information and Communication Technology

Information and Communication Technology (ICT) in its widest sense are technological tools and resources used to communicate, create, organize, disseminate, store and manage information. (Chaka (2008) and Efediogho (2002). Information and Communication Technology (ICT) then connotes the designed production application and means, modes and devices for managing storing and disseminating information Isoun (2006) describes information and Communication Technology as a term used to indicate a whole range of technologies involved in internal, electronic mail and video conferencing. This concept is buttressed by Yusuf (2007) expressing ICT to include electronic technologies used for accessing, processing, gathering manipulating, presenting and communicating information.

Abolade and Yusuf (2005) viewed Information and Communication Technology in relation to mainly studying concepts skills, processes and application of electronic devices. Here the concept embraces both scientific principles and artistic ingenuity put into the design, production, application and management of the ICT tools. ICT is a method to improve principle, method

and device applied in the aspect of human communication.

In the same vein, Grace (2003) opined that ICT is an umbrella term that includes any communication device or application, encompassing, radio, television cellular phone, computer and network, hardware and software, satellite systems as well as various services and applications associated with them such us video conferencing and distance learning. Therefore making information and communication technology include a full range of computer hardwares computer softwares and communication facilities.

Information and Communication Technology is a collective term for computer, soft ware, networks satellites, link related systems that allow people to access, analyze, create exchange and use data information and knowledge in ways that until recently were almost unimaginable (Beebe 2004). For him, ICT is the processing and maintenance of information and the use of all forms of computers, communication Networks and mobile technologies to mediate information. According to Nasiru and Bashiru (2015) communication technologies ICT include all that is employed in transmitting audio, video, data, or multimedia such as cable satellite, fiber optics wireless (Radio, Bluetooth, Wikipedia) network technology personal area network (PAN) campus area network (CAN) internets extranets LANS, MANs and the internet computer technologies include all removable media such as optical disc, dick, flash removable, video books and multimedia projectors interactive electronic and continuous emerging states of the arts.

In 2004, America Association on Information

Technology (AAIT) described information ICT as the capability of electronically input process store output that transmit, receive data and information including: text, graphics, sound and video as well as the ability to control machine of all kinds electronically. ICT refers to the generalized technologies involved in information. It includes the radio, video, computers, sensors, mail and other machines and technologies used in education for teaching and learning. Grace (2003) added that ICT constitutes of facilities that could be use to complement teaching and learning. It also promotes the development of information technology in the context of using ICT as a teaching and learning facilities for the improvement of education.

Information and Communication Technology ICT has become within a short time one of the basic building blocks of modern society. Many countries now regard the usage, understanding and mastering of basic skills and concepts of ICT as part of the core education alongside reading, writing and numeracy. Information and communication technology now supports teaching and learning and a range of activities in education. Similarly the teacher cannot be left out since the knowledge of ICT would enhance the effectiveness and development of better teachers in Nigeria.

Types of Information and Communication for Teaching Learning

Information and Communication Technology for teaching and learning many facets Technology is a force that operates in many facets of life and in many fields of study depending on the area of application. There are many types of ICT according to Tinio (2002) as cited by Nasiru and Bashiru (2015). They include:

- **Active learning –** learner (students) learn as they do and wherever appropriate work on real life problems in-depth making learning less abstract and more relevant to the learner life situation learning. In this way learning is contrast to memorization or rate learning ICT enhances learning and promotes increased learner engagements. The learner can choose what to learn and when to learn it.
- **Collaborative learning**: there is co-operation among students, teachers and experts regardless of individual differences and class. Apart from real world interaction, ICT supported learning provides learners opportunity to work with people from different cultures thereby helping to enhance learners teaming and communication skills as well as their global awareness. (Adjudeonu & Idiagbe 2014).
- **Creative learning –** ICT supported learning promotes the manipulation of existing information and the creation of a real world products rather than the regulation of received information. Education and learning is best nourished in a creative setting where learners are encouraged to innovate and invest ideas and concept as well as utility programmes
- **Integrative learning**: integrative learning is an approach that facilitates the mitotic, interactive and holistic approach to teaching and learning. It eliminates the artificial separation between the different discipline and between theory and practice that characterize the traditional setting.

- **Evaluative learning:** Learning in this setting is diagnostic, since the setting is for learners, so the learner is capable of discovering his/her strengths and weaknesses and allowing him/her to choose between alternative approaches to solution in solving problems.
- **E- learning,** Wikipedia (2020) defined E-learning as all forms of electronic assisted teaching and learning. It is a learning mode which depend heavily in information and communication facilities which serve as the media for learning. E-learning uses various types of ICT tools for learning, rallying on the use of electronic applications and processes to acquire knowledge and skills. Some of the E-learning modes include computers, mobile phones, networks, web-based learning, virtual classrooms, digital collaborations, audio-conferring , video-conferring and such like. Here the learner is free and have access to information knowledge and skill from wherever in the globe.
- **Blended learning:** Another term that is gaining currency is blended learning. This refers to learning models that combine traditional classroom practice with e-learning solutions (Tinio 2002). For example students in a traditional class can be assigned both print based and on line based materials, have online mentoring session with their teacher through chat, and can subscribe to a class email list. Blended learning was prompted by the recognition that not all learning is best advice in an electrically mediated

environment but sometimeslife instructor is needed to achieve the optimum objectives of the lesson.

- **Open and Distance learning:** Open and Distance learning as expressed by Keegani (2000) is a way of providing learning opportunities that are characterized by the separation of teacher and learner in time and space or learning by the use of a variety of media including print and electronic two way communication that allow learners and teacher to interact.

Basic Education

Basic education is the bedrock on which the sustainability of every nation is anchored. Basic education is the prerogative of every human being. Basic education constitutes an essential component of developmental strategy as well as the priority of any developing country. Its importance is recognized all over the world hence it was the focus of Education for All (EFA) movement led by UNESCO and featured as goal number 5 in the sustainable Development Goals (SDGS) which replaced the MDGs. Basic education is the basic foundation for sustainable life – long learning. It inculcates reading, writing and numeracy skills. It is both formal and non-formal system of education with a range of activities and programmes designed to enhance functional literacy skills. International classification of Education (ISCED) categorized basic Education into primary and lower secondary education.

In Nigeria, Basic Education is referred to Universal Basic Education (UBE). The Universal Basic

Education includes primary, junior secondary, Nomadic and Adult literacy programme in Nigeria. According to Okonkwo and Obindi (2013) Universal basic Education (UBE) encompasses the following levels of education in a hierarchical order. Early childhood care Development – pre-school /Nursery/ Kindergarten, primary Education, Junior secondary Education and Non-formal Education. Here the basic Education include children, adolescent, young and adults who did not start school early as well as special needs persons. Universal Basic Education was introduced in 1999 by the Federal Government of Nigeria as an educational programme with the aim of providing greater access to, and ensuring quality of basic education throughout Nigeria.

The UBE objectives programme include:

Ensuring an uninterrupted access to 9-year formal education by providing free and compulsory basic education for every child of school going age under.

- Providing Early Childhood Care Development and Education (ECCDE)
- Six years of primary Education
- Three years of Junior secondary Education
- Reducing school drop-out and improving relevance, quality and efficiency
- Acquisition of literacy, numeracy, life skills and values for life long education and useful living.

Universal basic Education Act 2004

- The Federal Government intervention shall

provide assistance to the states and local government throughout Nigeria.

- Every government in Nigeria shall provide free, compulsory and universal basic education for every child of primary and junior secondary school age
- Every parent should ensure that his/her child or ward attends and completes
- Primary school education and
- Junior secondary school education
- The stakeholders in education in a local government area shall endure that every parent or person who has the care and custody of a child performs the duty imposed on him/her under the universal Basic Education Act 2004.
- Transition from primary to Junior secondary school (JSS) should be automatic; as basic education terminator at the Junior secondary school level thus entrance examination may no longer be necessary. Emphasis will be placed on effective continuous assessment, while final examination and certification will now be done at the end of the nine-year basic education programme.

The secondary school system should be restructured so as to ensure that JSS component is disarticulated from the senior secondary school (SSS) as stipulated in the National Policy on Education (NPE, 2004).

Basic Features of the UBE Programme

- Free formal Basic Education
- Compulsory uninterrupted nine years of primary and Junior secondary school education
- Emphasis on curriculum diversification and relevance to effectively and adequate cover individual and community needs and aspirations
- Disarticulation of Junior secondary school from senior secondary schools.
- Introduction of rudiment of computer literacy
- Appropriate continuous teacher professional development
- Community ownership of schools including participation in decision making process in schools.

Information and Communication Technology and Basic Education

Information and Communication Technology Education in Nigeria and the policy of the government should describe the steps by which computers and laptops will be placed on schools. The basic emphasize should be on how teachers and students should be provided with basic computer programming skills. In a need analysis conducted by universal Basic Education Commission (UBEC) in the area of ICT infrastructure in the basic education sector revealed that only eight states 22% can be said to be ICT complaints (Onocha 2013). In a similar research by Ajudeonu and Idiaghe (2014) it was evidenced that many teachers do not have much exposure in using computers or internet for collaborative learning and they lacked competence on the use of ICT services.

The only way to develop awareness and that teachers and learners would benefit from ICT teaching and learning is through the provision of ICT infrastructures in Basic Schools.

Researchers and discussions in Education have satisfactorily orchestrated the potentials of Nigerian children to be ICT complaints. ICT is seen as a way to promote educational changes, improve the skills of learners and prepare them for global economy and the information society.

ICT vision of promoting an ICT Education to meet the human resources requirements of the nation in attaining and enhancing sustainable socio-economic development, global competiveness as well as individual ability to survive in a contemporary environment (Federal Ministry of Education 2010) it has become imperative for every school child to be ICT complaint in view of the fact that all examination are done on line including the Joint Admission and Matriculation Board (JAMB). Therefore to meet the education need of Nigerian children in a world governed by technology, educational institution at the Basic Education level must adopt ICT in carrying teaching and Learning on all its ramifications.

Roles of Information Communication and Technology at Basic Education Level

The role of Information and Communication Technology (ICT) have become common place entities in all aspects of life. With education, ICT has begun to have a presence but the impact on Basic Education is not as extensive as in other fields like banking and finance. Education is very socially oriented activity and quality education has been traditionally been associated with strong teachers having high degrees of personal contact

with the learners. But with the role of ICT in education many changes will be brought to facets in teaching and learning and between the teacher and the learner.

For teachers:

- Information Communication and Technology offers the teacher new roles that prepare learners to manipulate information for solving social political and economic problems.
- According to Jonkins and Springer (2000) ICT is a willing instructional tool which the teacher can use to present information and manage class activities in order to help students achieve educational goals.
- ICT facilitates the sharing of resources and advices with learners
- ICT gives access to update student, with data anytime and anywhere (Ajudeonu & Idiaghe 2014)
- ICT encourages critical thinking and offers unlimited means of achieving educational goals
- ICT enhances efficiency and effectiveness in teaching at the Basic Education level.
- The quality in teaching various subject and lessons could be improved through the use of ICT.
- Also ICT can enhance the knowledge on the part of the teachers on problem solving skills thereby improving the delivery and access to knowledge and improve the curriculum.
- ICT help the teacher to get students do more task; and computers used during lesson motivates

students to continue learning outside school hours. (Backer 2000).

- ICT usage in teaching enhances professional image of the teacher. Ajudeonu & Idiaghe (2014).

For learner (Students)

- The field of education has been affected by ICT, which have undoubtedly affected teaching and learning. ICT have the potential to innovate, accelerate, enrich and deepen skills. This helps students to relate school experience to work practices, strengthening learning among students (Yusuf 2005)
- Ajudeonu & Idiaghe (2014) stressing on the relevance of ICT to the learner in the classroom highlighted the following.
- ICT increases the flexibility of delivery of education so that learners can access knowledge anytime and from anywhere. Easy access to learning where students can now browse through e-books, sample examination papers, previous year papers and also have easy access to resource persons, mentors, experts, researchers professionals and peers.
- ICT increase learner motivation and engagement by facilitating the acquisition of basic skills
- ICT are transformational tools which when used appropriately can promote the shift to a learner centred environment.
- It gives students opportunities to address their

work to an external audience and to collaborate on assignments with people outside or inside school.

- ICT provides the encouragement of independent and active learning- and self responsibility for learning.
- ICT helps learners to develop their individual intellectual and creative abilities by providing higher interactive potentials. (Samuel and Ede 2005).
- ICT significantly engages students' interest as well as encouraging active learning and self responsibility in learning.
- Regular use of ICT across different curriculum subjects can have beneficial motivational influences on student learning.

Barriers to Effective use of ICT in Teaching and Learning at Basic Education Level

As much as Information Communication and Technology is being advocated to be used in teaching and learning at Basic Education Level, there are barriers which could hinder the effectiveness.

- **Lack of competency and skills status:** Lack of human skill knowledge and competence to fully employ ICT in teaching in the education sector (Samuel and Ede 2002).
- **Inadequate ICT infrastructural facilities Basic**: ICT facilities like electric, telephone lines, well ventilated classrooms and air conditioned classrooms are unavailable in our schools.

- **Cost of consumers and cost of ownership**: The cost of ICT services are expensive and owning a computer /laptops by staff and students is great problem due to the high cost.
- **Non viability of ICT instruction materials:** in our basic schools in Nigeria, Yusuf (2005) reported in his investigation on teachers. Self-efficiency is implementation of computer education found out that most teachers in schools do not have the needed experience in the use of computer in teaching.
- **The level of ICT awareness of the people:** Many people in the rural areas have very low awareness of the use of ICT. Apart from the cell phone used by some of them, majority of the people are still ICT illiterate.
- **Lack of technical knowledge** for the maintenance of both hardware and software components of ICT equipment.
- **Poor school environments:** In Nigeria schools in rural areas are yet to have access to common computers and this non availability posses a threat.

Implications for Teachers and Recommendations

The importance of ICT is quite evident from contemporary studies of the use in all facets of life. The emergence of information communication and Technology (ICT) has helped the society in diverse ways. The field of education has been affected by ICTs which have undoubted, affected teaching and learning. These has implications for teachers of the Basic Education level.

- Great emphasis should be place on recruitment of teacher with appropriate ICT knowledge during the period of recruitment.
- Teachers should be trained and retrained on continuous basis in order to possess the requisite knowledge of ICT so as to meet up with current technological trends in the society.
- Computers and internet services should be provided in the schools where both teachers and students have access to ICT in teaching and learning.
- Teachers should develop ICT pedagogical competencies
- Sufficient facilities and resources should be provided to in-service and pre-service teachers to practice the ICTs in teaching learning process.
- Environment should be provided for teachers to develop ICTS based competencies.
- ICT should be a compulsory course in all teacher preparation institutions like the Colleges of Education, Polytechnics that offer education courses and faculties of education in the universities.
- Workshops, seminars and conferences on ICT should be organized regularly for up-dating the skills and knowledge of teachers.
- Government should urgently embark on the provision and installation of ICT facilities and the provision of constant power supply for teachers efficiency in the use of ICT in teaching and

learning.

- Every teacher must own a personal computer, laptop or other accessories for personal improvement and development.

Conclusion

The contemporary teacher need to have knowledge and skills on the use of ICT in teaching and learning process in the classroom. Teachers' pedagogical practices should be influenced by the use of ICT. The use of ICT provides several kinds of materials, methods, skills and learning experiences. Utilization of ICT in teaching and learning can assist both teachers and learners. The use of ICT can help to make learners active participants, working on their pace becoming independent and having self motivation which facilitate mental development ICT has proven to be a very powerful tool in education.

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CHAPTER 17.

BRIDGING BORDERLESS WORLD WITH VIRTUAL CLASSROOM TEACHING USING DIGITAL TECHNOLOGICAL DESIGN INNOVATIONS: A PANACEA FOR BASIC HEALTH EDUCATION TEACHER EFFECTIVENESS

SAMUEL ADEMU- AWUJA (PHD)

Abstract

The paper discusses how teacher uses digital instructional design innovation in Basic Health Education virtual classroom teaching effectiveness especially in the face of coronavirus pandemic which has necessitated closure of schools globally as well as negatively affecting teachers' effectiveness due to lockdown. The purpose of of this study is to guide Basic Health Educators in Delta North Senatorial District on how best to bridge technological gap between one on one teacher pupils normal classroom instructions with digital innovative education divides in borderless world using improved, improvised information technology media when original ones are not available. Some of the functions of the National Technological centre based in Kaduna is to bridge

digital, technological and provide education divides in Nigeria to accelerate promotion of teacher effectiveness and professional compentency by innovative educators' development via zoom conference, YouTube, WhatsApp, Facebook, radio, circuit TV educative programs. Also, utilization of video, tape recorders, 16mm and 8mm can be employed to boost teaching without teachers and pupils direct contact interactions thereby improving information and communication technological and instructional delivery systems in Nigeria.

Introduction

Basic health knowledge is a necessity to all human beings but with the recent unexpected outbreak of deadly coronavirus pandemic, it becomes very obvious that individuals or family need to learn and constantly practice personal hygiene on daily basis. Basic education is free, universal and compulsory for all children of school going age (FRN 2008, Awuja 2015). It is education given to children aged to 15 years which the Federal Ministry of Education co- ordinates and monitors activities of managers of basic education program via states' Ministry of Education plus Local Government Education Authorities (L.G.E.A) in Nigeria.

Gradually, sustainable Basic Health Education curriculum delivery methods are phasing out as a result of COVID 19 spreading like wild fire during harmattan around the world. There can be no better time than now that such that such all Important theme "BRIDGING DIGITAL, TECHNOLOGICAL AND EDUCATION DIVIDES IN A BORDERLESS WORLD. Hence, health educators as critical stakeholders undergo proper professional, technical, digital and innovative basic health education virtual classroom teaching effectiveness to overcome coronavirus pandemic by using improved instructional media such as application of zoom

conference, YouTube, whatsapp, Facebook, radio, circuit, television educative programs. Others include software, hardware and information technology that is capable of recording, broadcasting and disseminating lesson through various media to user (pupils). The media are magnetic drive, CDs, DVDs, flash drive, radio television, cameras, loudspeakers, cellular phones, computers, satellite, cable systems and so on. (Awuja 2012).

Innovation

A competent innovative health educator bridge digital, technological and educational divides in a borderless world through radio broadcast, news, entertainments and social activites taking place anywhere in the world. Furthermore, television relays health related news of events, happenings as well as computer networking capable of sending lecture materials to learners anywhere around the world.

E- science can be used where meteorological data in most countries of the world to study, collect, disseminate, monitor and control certain weather hazard like earthquake, floods and typoons. While communicable diseases can be properly thought by health educators using digital, technological and innovative tools on how to monitor, control, alert, diagnose certain ailment as well as engage on treatment (Okolo, Koki, Idowu and Yara, 2018).

Benefits of bridging digital, technological and innovative design to improve teacher effectiveness in Basic Health Education cannot be over- looked. Health is 'wealth' as the say goes and so, use of information technological devices to implement Basic Health Education curriculum with radio, television and other gadgets are of the part numerous values. Sudden

appearance of coronavirus is an 'eye- opener' to the benefits of bridging borderless world with virtual classroom teaching via zoom operations, AtomGram, video, satellite e.t.c.

Application of information technology (IT) in this study has exposed us to e- science, e- health and a lot more to deal with the study, monitor and treatment of communicable diseases.

Implementation Challenges of BHEC in **Delta State – Nigeria**

Technological implementation of Basic Health Curriculum is taskful and involving since it has grown beyond environmental classroom education targeted at getting learners out there to learn health habits as well as natural world of real-time and real-world learning experiences (Tella and Adu, 2009). It becomes more difficult to basic health education learners who may be confronted with the facts of digital age from push "button age". Curriculum experts usually employ manual tidius Tyler's model, Kerr's model or Wheeler's model in an attempt to explain a given curriculum design but the modern digital approach uses technological implementation via internet accessibility. It helps to enhance specialized teachers to produce physically, mentally, emotional and socially healthy persons who possess necessary industrial, economic, agricultural, political, educational and social skills for optimal national transformation. Problems of technological implementation of Basic Health ranges from inadequate funding, lack of health educators who are ICT literates, power failure and lack of computer teachers among many others. The focal point of technological curriculum implementation is to help the learners acquire

knowledge, skills and develop desirable health attitudes/ interests towards healthy living. However, resistance to change is one of the greatest challenges of basic health education technological curriculum implementation of our time.

Impediments to BHEC Implementation are classified as:

a. Teacher-related impediments,

b. Learner related problems,

c. School related impediments,

d. Community/Parents/Government related impediments and

e. External agencies like UNESCO and World Bank related problems.

Conclusion

Basic health education curriculum development and proper technological implementation provide opportunity for trained health educators to become reflective, creative thinkers and critical at the point of dissemination of knowledge to form essential health habits such as care of the eyes, ears, teeth, hair, fingernails, table manner and to avoid rough play anywhere anytime. The calibre of basic health educators who can use technical know how to implement BHEC as well as ICT experts has been examined. Mere initial qualifications cannot allow basic health education teachers to perform their duties intelligently well in the BHCDI without retraining in ICT, internet and computeroperations.

Recommendations

Hence, it is recommended that:

- Teachers are urged to intensify efforts to be ICT and computer literate to be able to implement BHEC so as to enable pupils make use of the available internet facilities,
- Government should equip primary schools with functional computers and finally,
- Government should adequately monitor effective utilization of the computer machines supplied to ensure proper utilization of the facilities.

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CHAPTER 18.

COVID- 19 SCHOOL CLIMATE AND BASIC EDUCATION CURRICULUM DELIVERY USING TECHNOLOGICAL - DIGITAL DEVICES TO BRIDGE BORDERLESS WORLD

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Abstract

The paper examined role of positive school climate as a panacea for effective BEC implementation. School climate in this work is seen as an "atmosphere" or "tone" which makes an institution to get a unique quality of her own so that parents and visitors to school can notice easily the tone soon after entering as it plays role of facilitating cordial relationships, safety, caring, participatory and responsive effort to foster greater learners' attachment to school. Positive school climate promotes cooperative learning, group cohesion, respect, mutual trust and communication flow within the school community leading to cognitive, affective and psychomotor development of the learners. School heads and teachers need to define sets of norms, goals, values and aspirations capable of shaping BEC implementation due to FME's decision to restructure and re-align all extant BEC into a 9-year programme in 2008 which poor implementation was largely noticed. Based on

the revised 2012 edition of BEC, the need for use of role of PSC like interpersonal relations to support school-home-community partnerships as prosocial democratic informed school system for effective BEC I becomes imperative in this work. The role of PSC assists in reducing absenteeism, less-violence, bullying but motivate learners to learn via collaborative efforts by the stakeholders. FME has therefore been urged to organize seminars/ workshops on the need to use role of PSC for BEC implementation.

INTRODUCTION

The advent of COVID-19 pandemic introduced social distancing, wearing facemask, washing of our hands with clean water plus soap applying sanitizer to rub hands, covering mouth/ nose while sneezing and so on has negatively affected educational, social, religious, political and economic activities of entire human race including Basic Education curriculum delivery in no small measures. The outbreak of coronavirus popularly known as COVID- 19 has negated relationships among parents, Government and private school owners, pupils and other stakeholders in educational industry especially when the World Health Organization (WHO) put on hold travels from one place to another. Schools have been affected because parents cannot visit their children's school to check academic progress without wearing face mask. Public gathering as well as school routine morning assembly are no longer allowed due to COVID- 19 pandemic or "chiness virus".

Arising from this ugly development, basic curriculum delivery can no longer meet the desired goal. Hence, a search for means of bridging digital, technological plus education divides in a borderless world to facilitate result oriented curriculum implementation. Technology refers to purposeful application of information in the design,

production and utilization of goods and services (Awuja 2020). It deals with creation and use of tools and their interactions with life, society and environs. Simply put, it is an application of knowledge in practical tasks in industry. Children need to learn by doing things practically on their own to be result oriented. This is the more reason why parents, pupils and basic educators' cordial relationship cannot be overemphasized as positive school climate cement such actions.

Actually, school leaders and teachers need to constantly strive to define clearly sets of norms, goals, values and aspirations capable of shaping teaching and learning (curriculum implementation) environment promoted by positive school climate believed to facilitate congenial communication free flow either vertically or horizontally. Ordinarily, the patterns of norms, goals, values, attitudes and interactions that shape relationships in schools provide an essential area of school climate (Cohen, 2012). Relationship between pupils and teachers in Kindergarten is closely linked up to later academic achievement and positive behavioural outcomes for learners. From psychological point of view, relationships concerning school climate connote not only how much one associates with others but also how we relate with ourselves, how we feel about and care for ourselves. Others include safe, caring, participatory and responsive school climate which tend to foster a greater attachment to school as well as providing the optimal foundation for social, cultural, emotional, physical and intellectual development for pupils and students (McNeely and Blum, 2002).

School climate is an umbrella under which positive and negative reside to facilitates or frustrates effective Basic

Education curriculum implementation (BECI). School climate is described as an "atmosphere" or "tone" of a school which makes the institution to get a unique quality of its own. In this context, climate refers to an organization's communication flow, interpersonal relations and the working conditions. Accordingly, parents, teachers and visitors to school would become aware of the tone of the school soon after entering it (Onwuegbu, 2014). Climate is known as "tone" or "atmosphere" in Australian schools and it constitutes the sum total of relationships among all the elements and stake-holders to promote curriculum implementation as a team work (Wilson, 2004). Positive school climate is closely related to employee's involvement, effort and performance to shape the school.

Role of Positive School Climate

Positive school climate for example is expected to enhance cooperative learning, group cohesion, respect and mutual trust. The ever-growing body of research on school climate continuously reveals various overlapping roles it plays which include mental, social, physical, emotional, safety, positive youth developments and healthy relationships (Guo, 2012). Positive school climate also plays the role of appropriate curriculum implementation, higher graduation rates, school connectedness, civic learning and teachers retention to uphold norms and values of the institution. Indeed, it has to be acknowledged that both roles of school climate and conditions which facilitate them are interconnected as a result of shared experiences of ever-changing econological system (Cohen, 2012).

No doubt, school climate has an extensive impact on students' mental and physical health as several negative

role of self-criticism which affect a widerange of students' self-esteem. As it were, positive school climate mitigate negative effects of socio-cultural meliu thereby contributing to less aggression, violence, less harassment but it acts as a productive mechanism upon which effective curriculum implementation can be achieved (Devine & Cohen, 2007). Positive school climate reduces students' number of absenteeism from classroom and motivate them to learn. However, the interpersonal variables that define school climate have indicated that many students and pupils do not feel physically and emotionally safe due to breakdowns of rules and regulations governing school system.

Challenges Facing Healthy School Climate Due to Covid 19 Pandemic

Apart from the supportive norms, structures, rules and disciplinary corrections within the school system which often followed by large number of students absenteeism in the school, further reduces high level effective curriculum implementation (Guo, 2012). It has equally been reported by Brown and Elias (2012) that students and pupils feel less safe in schools with a very large population due to verbal bullying believed to negatively affect curriculum implementation. As a result, where there is no bullying, students feel more comfortable seeking help from adult school personnel and possess more positive perceptions of school climate. Astor (2010) claimed that unsupervised areas of school premises can make students to feel unsafe due to unproductive factor against risky sexual violence and drug use behaviours. Infact, school space is another environmental dimension impacting students' feelings about less safety which further illuminates how environmental variables such as

lack of classroom activity, schedules and students' anti-social behaviours influence feelings of less safety.

2012 Basic Education Curriculum Review for effective Implementation

School climate is an important factor in the successful implementation of school reform programme like Basic Education Curriculum (BEC) according to Dellar (1998). For instance, teachers' perceptions of school climate influence their abilities to implement school based character development programmes. This is so because teachers are the chief implementers of curriculum of any nation around the world. They (teachers) need to be involved while developing or restructuring any curriculum in order to make their own contributions. This would help to ensure effective curriculum implementation.

The school curriculum is a dynamic and open document that is constantly changing with the needs, challenges and aspirations of the society. Following the decision of the Federal Government of Nigeria in 2012 to revise Universal Basic Education(UBE) programme, there arose the need to re-structure and re-align all extant primary and junior secondary schools (JSS) curricula into a 9 year Basic Education Curriculum for the attainment of the Education for All (EFA) Goals. Implementation of the 9 year BEC began nationwide in primary 1 and JSS 1 classes in September, 2008 respectively (FR N,2008). However, the feedback on the implementation of the 9 year BEC revealed ineffective implementation of the document (F ME, 2012). As a result, the Nigerian Educational Research and Development Council (NERDC) revised the 9 year BEC in line with contemporary global and national concerns which

identified and grouped related disciplines thereby attaining a reduction in subject-listings to include:

English studies, Mathematics, Basic Science & Technology, Religion & National Values, Cultural & Creative Arts, Business Studies, Nigerian Languages, Pre-Vocational Studies, French and Arabic.

The reviewers made further effort to reduce the overload within and across subjects without compromising depth, appropriateness and interrelatedness of the curricula contents to address issues of value re-orientation, poverty-eradication, peace, and diague as well as human rights education, family life/ HIV and AIDS education. The review was an attempt to ensure continuity and flow of themes, topics and learning experiences from primary to junior secondary school levels. It is necessary to note that curriculum represents the total experiences which all learners must be exposed to learn. The contents, objectives, activities for both teachers and learners, instructional materials plus evaluation guide are clearly spelt out in the curriculum. The minimum prescriptions to be taught in the schools in order to achieve the objectives of the 9 – year basic education becomes the issue of curriculum implementation.

What is Curriculum Implementation?

Curriculum implementation refers to the process of putting an approved curriculum into operation via interactions between the teacher and the learners through translation of the planned or officially designed course of study into syllabus, scheme – of work, lesson plan and notes to be delivered to learners. It deals with translation of planned curriculum objectives into action in the school system. Curriculum implementation is the

actual translation of goals/ objectives of curriculum from theory to practice (Okebukola, 2004; Offorma, 2005). It is interesting to view it as the actual engagement of learners with learning activities by the teacher. Curriculum is meant to be a guide to the implementer (teacher) who in turn organizes it for effective implementation. (FME 2012).

In order to adequately implement BEC, teachers are encouraged to enrich the contents with relevant materials and information from their immediate environment and adopting it to the needs and aspirations of the society. Additionally, indices for adequate BEC implementation include the content and structure of the syllabus, available-learners, quantity of qualified teachers, the quality and quantity of equipment used for instruction, adequacy of classroom, space available to play, relevant and reliable assessment instrument as well as methods being adopted need to be ascertained.

Role of Healthy School Climate (HSC) for Effective BEC Implementation

The roles of PSC to enhance BEC implementation include:

(a) The positive school climate plays the role of involving the management team, teachers, clerks, parents/ guardians, community leaders, school community, students/ pupils and visitors to school who have high relational trust such as social relationships among members of stakeholders likely to make changes to enhance BEC implementation worthwhile.

(b) Teachers' professional capacity, knowledge, skills and parent – school community tie is another role of positive school climate.

(c) The instructional guidance visa-vis-curriculum

alignment and nature of implementation technically sets up by teacher that is targeted at enabling the learners opportunity to acquire desirable knowledge, skills, values and attitudes could be encouraged when there is positive school climate.

(d) Initiating the need for collaborative efforts of stakeholders in enhancing BEC implementation. In this way, school climate can now reflects students', stakeholders', school personnel's, visitors', and parents' experiences of school life socially, emotionally, civically, democratically and ethically as well as academically (Cohen, 2012).

(e)To this effect, local, state and federal MOE's interest in school climate reform is seen as playing the role of effective means of curriculum implementation. The positive school climate is geared towards renewal efforts which support school – home – community partnerships as prosocial education and democratically informed school system. This new dimension necessarily refocuses on and supports students, parents, guardians and educators in considering how effective the current prosocial efforts are and how they can strengthen curriculum implementation efforts (Brown & Elias, 2012).

Conclusion

The role of positive school climate to enhance BEC implementation is the focus of this work. The paper noted that school climate leaderships and teachers needed to define clearly sets of norms, goals, values and aspirations as essential area of school climate capable of shaping effective BEC implementation. School climate is seen as an "atmosphere" or "tone" of the school which makes the institution to get a unique quality of her own so

that parents and visitors to school could notice the tone soon after entering. It facilitates cordial relationships, safety, caring, participatory and responsive effort that fosters greater learners' attachment to school. It equally provides basic cognitive, affective and psychomotor development of the learners to improve their future academic achievement. Positive school climate brings about communication free flow characterized by cooperative learning, group cohesion, respect and mutual trust which re-inforces collaborative efforts of stakeholders in-line with the decision of the Federal Ministry of Education (FME) to re-structure and re-align all extant primary and JSS curricula into a 9-year BEC to attain EFA Goals. However, poor implementation due to Covid -19 Pandemic was noticed which further led FME to reduce the overload within and across subjects without compromising depth, appropriateness and interrelatedness of UBE curricula contents as a result of lockdown during coronavirus episode. Based on the 2012 revised edition of BEC, implementation issues became imperative. Curriculum implementation is the translation of the goals/ objectives, visions and theories developed officially into practices. The paper is of the view that the roles of positive school climate when properly utilised in any school system could help mitigate negative tendencies such as violence, bullying and it acts as productive device to motivate students to learn during HEC delivery even the face of covid-19 Pandemic.

Recommendations

The following recommendations have been made with a view to enhance BEC implementation via positive school climate that:

(a)The Federal Ministry of Education in conjunction

with stakeholders like PTA, political class, wealthy individuals and community leaders are urged to help finance seminars and workshops in respect of using positive school climate to implement BEC.

(b) Basic education teachers need re-orientation on how to enhance BEC implementation through the role of positive school climate by way of training and retraining programmes.

(c) School leaders and teachers should set up norms and values involving students' felt needs to help in effective BEC implementation.

(d) The Ministry of education (Federal & States) have been urged to organize seminars, workshops and conferences for the stakeholders periodically.

(e) There is need to carryout survey research involving many more states of the federation to ascertain relationship between school climate and BEC.

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CHAPTER 19.

COVID-19 EPISODE AND BASIC SCHOOL COMMUNITY HEALTH SERVICES CURRICULUM DELIVERY IN DELTA NORTH SENATORIAL DISTRICT: ISSUES AND CHALLENGES

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Abstract

The paper is concerned with the catastrophic incident of COVID-19 on Basic school Health Community Services Curriculum delivery between April and August, 2020. The disruption of schooling system introduced anxiety, fear, stress, horror, "abnormal realities", hunger, historic sit at home order by governments of many nations of the world, new normal of wearing face masks, social distancing, washing of hands with clean running water, travelling restrictions death, isolation of victims, unprecedented swift shifting from face to face classroom-teaching to a remote and unstructured online basic school community health services curriculum delivery in Nigeria challenges (UNESCO 2020 & Awuja, 2021). Challenges of rapid

spread of COVID-19 pandemic quickly changed the rhythm of international relations from the perspective of a single country or multilateral levels to test that led to economic recession, poverty and all forms of calamity thereby hindering Basic School Community Health Services Curriculum delivery. Basic school Community Health Services is a cooperative and contributory activities of the school, home and community to protect, promote, maintain, establish an understanding working relationship among various stakeholders inside and outside school environment. It is sad to note that COVID—19 challenges disrupted teacher-pupils interactions, and normal face to face traditional method of teaching especially at basic education levels. The paper observed that COVID-19 pandemic took WHO experts, medical specialists, scientific researchers and health educators unaware due to unpreparedness. Lessons learnt from COVID-19 pandemic include humility; need to go back to personal hygiene, cleanliness and researches on how to combat such virus like COVID-19 in the nearest future. Hence, it recommends that parents, teachers, health personnel nurses/ doctors and Basic School managers need to constantly attend seminars, conferences and so on to acquaint themselves with COVID-19 preventive measures since it has no cure yet.

Keywords: COVID-19, Pandemic, School, Community, Health Services, Curriculum Delivery.

Introduction

The recent catastrophic incident of COVID-19 pandemic generated wide range disruptions to schooling around the world which pushed entire educational systems to remote and online curriculum delivery (UNESCO, 2020). Corona virus pandemic introduced social distancing, wearing of face mask, washing of hands with clean running water, use alcohol based sanitizer to rub hands, avoid touching of eyes, nose/mouth, cover mouth/nose with bent elbow or tissue when you cough or sneeze, clean and disinfect surfaces frequently especially those which are regularly touched remained rules and

regulations for COVID-19 Pandemic. The presidential tax force set up by Buhari administration to monitor these regulations also advised citizenry to avoid 3C's that are crowded or avoid close contact as well as meeting people outside and keep up to date latest information from trusted sources like WHO or Nigeria Centre for Disease Control (NCDC).

COVID-19 pandemic out-break no doubt degenerated and distressed prior social relationships which has been existing among school children, teachers, ministry of education officials and other stakeholders like politicians, contractors, foreign nationals, traders, businessmen and women to mention but a few as travels from one place to another and transactions were put on hold by the World Health Organization. Schools were negatively affected because, parents could not pay monthly visits to their children's schools in order to check academic progress without being forced to wear face mask. No more morning assembly due COVID-19 pandemic restrictions emanating from nationwide lockdown (Awuja, 2021). Hence, Basic school community Health services curriculum delivery in Delta North Senatorial District became difficult.

Basic School

Basic School describes the education given to children aged 6-11+, (FRN, 2014). The rest of the education system is built upon it which determines the success or failure. Acceptably, it is the major tool for promoting socio-economic, political and cultural developments in any nation. Historically, basic or primary education is older than the arrival of the colonial masters as it was the early missionaries who introduced it to evangelize

and engage themselves in different administrative works (Awuja, 2015).

School Community Health Services

School is an institution for educating children especially primary and secondary while community refers to people living together in one place, district or country who share common-interest (Awuja and Samuel, 2021). School Community Health Services (SCHS) relates to cooperative activities of home, school and the community which require cooperation and contribution of many individuals. (Udoh, Fawole, Ajala, Okafor and Nwana, 1987). The focus of school community Health is to protect, promote and maintain the health of the school child optimally by the establishment of understanding and working relationships among the teachers, school personnel, parents and various agencies in the community. It connotes healthcare delivery system that is operational within a school or College targeted at promoting and maintaining the health of school children so as to give them a good start in life (Awuja, 2015). Indeed, all the health activities, services and measures carried out within school community compound to protect, facilitate, preserve and maintain health of students as well as personnel refer to school Health Services. Accordingly, the components of school health programme include healthful school living environment, School Health services, Health Education, and School Community relationships.

Concept of Health

"Health is Wealth" is a popular adage as it is the condition of being well and free from diseases. The overall condition of individuals' body and mind is referred to as health. The World Health Organization

(WHO) defines health as a complete state of physical, mental, social, emotional well being and not merely absence of disease and infirmity. Consequently, the determinants of a healthy individual include freedom from illness, injury and other general conditions of the body that extends to happiness, peace and feeling good about oneself. One's health is basically determined by the background, lifestyle, economic factors, social conditions and spirituality. Ordinarily, the determinants of health of any individual are heredity, nutrition, environment, life styles, health services, education, sports, income, social status, industrialization, employment and working condition (Udoh, Fawole, Ajala, Okafor and Nwana, 1987). However, the focus of this work is on "Basic School Community Health Services Curriculum Delivery (BSCHSD). School health is a joint responsibility of health personnel appointed by the ministries of Education and health, sanitation, hygienic conditions, maintenance of facilities, health specialists and those employed to take part in curriculum delivery.

Basic Principles of School Health Services

Some of the basic principles of the school health include:

(a) Ultimate objective of school health to promote healthful school living for the school age child/staff,

(b) Take responsibility for the health of school community,

(c) Determines issues of pupils' complex health variables via heredity, environment explain human ecological health,

(d) The way of life,

(e) Direct school health instructions to pupils' natural interests,

(f) Health educators to consciously influence pupils' behaviours in their daily health practices,

(g) Engage in periodic testing of the strengths, weaknesses and improvements needed,

(h) Coordinate, cooperates, communicates and network school health services personnel/pupils.

Scope of School Health Services

School Health Services is "the component of school health programme given by physicians, nurses, dentists, health educators, other allied health personnel, social workers, teachers, and others to appraise, protect and promote the health of students/pupils as well as the school personnel" (Udoh, Fawole, Okafor & Nwana, 1987). Hence, school health services help to protect and improve the health of children thus aiding their growth and development to enable them benefit fully from school experiences. For example, the scope of school health services include health appraisal, health counseling and interpretation, emergency care for injury and sudden illness and finally, communicable disease prevention / control. Suffice to note that this paper may not give detailed analysis of each aspects. An appraisal of health is an evaluation of the current health status of a school child in order to protect and improve his/her health. It seeks to determine the total health status of a pupil by means of:

- Parent, teacher and nurses, observations,
- Screening tests for visual and auditory acuity,
- Physical fitness tests,
- Study pupils' health history,
- Medical and dental examination.

Medical and dental examination: Medical examination needs to be supplemented by mental, emotional/ social evaluations respectively. Screening tests are preliminary assessments of the state of development plus functionality of the various body organs carried out by teachers, nurses, technicians or trained volunteers (parents) within the school to screen out children who need diagnostic examinations.

- Health counseling procedures are conducted by doctors, nurses, counselors, teachers or other qualified personnel in order to interpret to pupils such information about their health status as revealed via health procedures;
- Interpreting to parents the significance of health problems and encourage them to obtain needed care;
- Motivating pupils so that they would accept needed treatment/care.
- Encouraging and promoting each pupil's acceptance of responsibility for his own health in keeping with his maturity level;
- Contributing to the health education of pupils and parent through individual conferences concerning health problems;
- Gaining understanding of the attitudes, problems and needs of pupils which may be dealt with in groups or through changes in the environment;

Health Challenges

School children's health problems are many which range from minor to major discomforts to those that can

endanger life. And so, they may need counseling for the following reasons; diagnostic examination, medical and dental treatment, improving homecare, assisting to make social and emotional adjustments.

School children who suddenly become sick or injured at school or during a school sponsored activity like field trip may require emergency care because it is the responsibility of school and an integral part of the school health services. Where necessary, the school takes immediate responsibility to care in case of accident or sudden illness and notify parents to come and get their child/children back home. From the discussion above, one can see the fundamental roles of basic school community health services on pupils when schools are in full session. Could basic school health services curriculum be delivered during global catastrophic incident of COVID-19 Pandemic between April and August, 2020 lockdown without facing mental, health, financial, social or communal challenges? Was education free during school closures as it is written in the national policy on education?

Challenges of COVID 19 Pandemic during School Closure

Between April and August, 2020, Human Rights Watch conducted 57 remote interviews with teachers, pupils/students, parents and education officials across African countries which are; Nigeria, Burkina Faso, Cameroon, Kenya, Madagascar, Morocco, South Africa, Zambia and Democratic Republic of Congo to learn about the challenges of COVID-19 Pandemic on children's education during school closures. Already, children who were most at risk of being excluded from quality education have been most challenged (Gore, 2020).

Challenges of implementing e-learning in Nigerian educational system in the COVID-19 pandemic era according to Obododike and Okekeosis (2020) was a swift shift from face to face traditional classroom instructions to a romote and online teaching due to unpreparedness of the institutions; lack of infrastructures, paucity of funds, polices and issues in education sector. The necessity of e-learning challenges, opportunities vis-à-vis school health community services curriculum delivery impacts in Delta State in particular and Nigeria in general cannot be overemphasized.

Children at Lower Basic Education Received no Teaching

It is on record that many children received no education after schools have been closed down across the continent of African between April and August, 2020, (UNESCO,2020). Basic school children no longer learn under teacher's guide and they could not access or operate e-learning. Parents were not happy because their children were no longer going to school to study resulting from sudden global school closures and restrictions to stop widespread of Covid-19. Obviously, a lot of children in lower basic education received no teaching, feedback or interactions with their teachers because, there was no face-to-face classroom experiences. Some schools offered no materials or guidance during closure (Awuja, 2021). Radio and television lesson broadcasts cannot replace teacher's direct interactions with children one on one in the classroom experiences. No free education during school closures. Education was not free as many parents were burdened by the costs associated with battling to continue educating their children during school closures to settle bills negotiated with a private teachers' who visit

homes with face masks to teach (Awuja, 2021). Actually, basic education is supposed to be free in Nigeria but the revise is the case. You can imagine how every family member stayed at home from morning till evening for weeks and months due to COVID-19 Pandemic lockdown. Gore (2020) believed that school closures due to COVID-19 have brought significant disruptions to education across Europe. Emerging evidences from certain regions' highest income countries indicate that the pandemic gave rise to learning losses and increases educational inequality.

Conclusion

Covid-19 outbreak was first reported in Wuhan China late December, 2019 and linked to sea Market which gradually spread to several countries of the World including Nigeria. WHO without wasting time declared it as "Public Health emergency on 30th January, 2020 of international concern. The first case of COVI-19 was confirmed on 27th February, 2020 in Lagos-Nigeria and as at 17th December, 2020, NCDC reported 76, 207 cases across 36 states plus Abuja. As a result, curriculum delivery of Basic School Community Health Services in Delta North Senatorial District during lockdown between April and August, 2020 thereby paralyzing all academic activities became difficult. COVID-19 introduced anxiety, fear, stress, hunger, wearing of face mask, social distancing, washing of hands with clean running water, rub your hands with alcohol based sanitizer, travelling restrictions and a swift shifting from normal face to face classroom interactions between the teacher and pupils to a remote and unstructured online curriculum delivery in Nigeria (UNESCO, 2020; Awuja, 2021). This method of curriculum delivery proved to be

difficult because young children in lower classes of basic education could not operate facilities designed for it. Besides, school managers as well as government were unprepared. Poor parents could not afford to buy data required for the lessons which made pupils to receive no teaching.

Actually, Basic School Community Health Services curriculum delivery is aimed at protecting, promoting and maintaining the health of pupils inside or outside school premises via cooperative and contributory activities of school, home and community. The negative effects of COVID-19 pandemic can not easily be for gotten as basic school pupils received no direct instructions, no classroom- interactions and they could not access online lessons due to lack of facilities, finance or unpreparedness on the part of both parents and government.

Recommendations

In life and living, challenges must come; to this end, governments at all levels must be prepared by training and retraining of teachers as well as medical personnel like doctors, nurses and the rest of them to face the challenges.

- Use of ICT should be made compulsory right from basic education level for both teachers and pupils.
- There should be continuous monitoring of COVID-19 Pandemic protocols in Nigeria-school systems to combat further widespread of the virus.
- Issues relating to basic school community health

services should be taken seriously by school managements, parents, community and health personnel as it has to do with cooperative and contributory activities to ensure safety, protection, promotion and maintenance of pupils health.

- There is need for further research to determine extent of effects in many more states of the federation.

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CHAPTER 20.

BRIDGING THE GEOGRAPHICAL DIVIDE IN EDUCATION THROUGH MOBILE LEARNING PEDAGOGY: A STUDY OF LECTURERS IN THE COLLEGE OF EDUCATION, MICHAEL OKPARA UNIVERSITY OF AGRICULTURE, UMUDIKE

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Abstract

This study investigated the use of mobile devices as a ubiquitous teaching and learning pedagogy. The research design used in this work is the descriptive survey design. The area of the study is Michael Okpara University of Agriculture, Umudike. The population of the study is all the lecturers in the college of education. Since it will not be possible to administer to all the lecturers in the area of study, the researchers used a sample of 91 lecturers in the college of Education, Michael Okpara University of Agriculture, Umudike made up of 50 female lecturer and 41 male lecturers drawn from the seven departments in the college.This sample was obtained through the use of purposive

random sampling technique. Findings show that lecturers have manipulative competence and instructional effectiveness using M-learning technologies in Teaching and there are constrains to effective use of m-learning in the classroom such as poor network services and high cost of data. It was recommended thatlecturers in tertiary institutions should be trained on the integration of mobile phone in order to enhance theirmanipulative competence and instructional effectiveness in the use of M-learning technologies in Teaching.Government can introduce customized mobile devices with educational packages uploaded which can be used by teachers in teaching at the tertiary level of education.

Keywords: Innovative pedagogy, M-learning, Mobile technologies

Introduction

The rapid implementation of information and communication technologies in the education sector has greatly enhanced the quality of education and brought about a wide and new methods of teaching and learning. Heiner (2001) pointed out that technology integration in education has brought about a shift from teaching to learning, student-centered approach, enhanced technological competences and collaborative learning.

M-learning or mobile learning is defined as "learning which uses personal electronic devices. Mobile technologies used include handheld computers, MP3 players, notebooks, mobile phones and tablets. M-learning focuses on the mobility of the learner, interacting with portable technologies. Using mobile tools for creating learning aids and materials becomes an important part of informal learning. M-learning is convenient in that it is accessible from virtually anywhere. It is any form of knowledge that is given using hand-held and portable devices. M-learning is a sub-set of e-learning. Mobile learning is the delivery of a wide

range of education through mobile phones, PDAs or tablets. Mobile learning has enhanced upon e-learning by taking it a step further and allowing students to learn virtually anywhere a mobile signal is available (Floro, 2011). The most important aspect of the definition is 'anywhere learning'. This is made possible through portability and mobility.

At the onset, mobile phones were used specifically for making and receiving calls but that has changed. The recent advances in mobile technology are changing the primary purpose of mobile devices from making or receiving calls to retrieving the latest information on any subject. Mobile technologies are hand held electronic devices and gadgets used for educational and instructional purposes. Mobile technologies currently give lecturers and students opportunities to utilize mobile application in supporting learning activities. Access to classroom activities and information on mobile devices provides a continuous learning inside and outside the classroom. M-learning can be used for distance education or with students whose courses require them to be highly mobile. Mobile devices facilitate online interaction between instructor and student, and student to student. Learning can be done while the students are on the move. It can be done in the car, plane, bus, ship provided there is Internet connection. Mobile devices in the classroom can be used to enhance student-centered learning, group learning, group collaboration among students. The application of m-learning in education has the following benefits:

1. It replaces resources such as textbooks, visual aids, and presentation technology such as overhead

projectors and data projectors.

2. M-learning enables teachers to be at different places at the same time.
3. It reduces the burden of teachers being physically present.
4. It provides rich application and resources.
5. It is flexible and self-paced
6. Its portability and mobility makes it to be a convenient mode of learning at any time and any place.
7. M-Learning is not constrained by geographical or physical boundaries.

According to Feser (2010) the proliferation of mobile devices, portability, inbuilt resources and its increasing capabilities and access to internet has given rise to its adaptation in the education sector resulting to the new term m-learning. M-Learning is the use of mobile technology to aid in the learning, reference or search of information useful to an individual.

Adedoja, Botha and Ogunleye (2012) opined that the opportunities presented through mobile technology are rapidly expanding and the focus is on how it can be incorporated to support learning. Mobile learning has the potential to enhance educational environments by providing access to information and communication capacities in a personal and ubiquitous manner. Mobile learning can be defined as any educational activity that allows individuals to interact with, or creating information through portable mobile devices that the individual carries on a regular basis. Mobile devices can

now be used to support learning anywhere and anytime, to support social learning and knowledge sharing. Mobile technologies are used to improve the productivity and efficiency of learners by delivering information and support just-in-time and in context for their immediate priorities. The Mobile platform provides learning activities such as quiz, chats, lessons, news forum through portable mobile devices. Students can use less expensivecustomized mobile phones with programmed courses without purchasing very expensive phones.

Adesola (2013) stated that the University of Ibadan has created wider access to learning through the application of mobile technology to learning. There are estimated to be 1.5 billion mobile phones in the world today and presently, Nigeria alone has over 107.4 million mobile phone subscribers (Prensky, 2004; NCC, 2012). In fact, half of the world's population already has some type of mobile phone, making it the most widely spread and most common electronic device in the world. It is very pertinent to explore this new trend in pedagogical andandragogical shift in the field of education. Mobile phones can indeed help to increase communication and interaction and enhance the quality of learning, particularly in distance education.

According to Osang(2016) Mobile learning has been simply defined as learning that takes place with the help of mobile devices. It is an educational provision where the sole or dominant technologies are handheld or palmtop devices. Mobile learning deals with the use of mobile or wireless devices for the purpose of learning while in motion. Chaka and Govender (2014) asserted that the world has passed through different phases of technology enhanced learning ranging from e- learning

which emphasizes the general integration of ICT in education to specifically mobile learning which is an extension or aspect of e-learning.

According to Ajanaku (2016),the liberalization of the telecommunicationindustry has brought mixed blessings. Barriers erected by distance have been demolished through the application of mobile phones in teaching and learning. Mobile phones have become ubiquitous in Africa and the use of basic phones are most common among youths and adults. Before the mobile phone arrived in Africa, few people had access to landlines. According to the Nigerian Communications Commission (NCC), total subscriber figure as at June 2016 is 107.01 while teledensity has risen to 106.32percent. 'Telephone density or tele-density is the number of telephone connections for every hundred individuals living within an area. Teledensity measured the percentage of a country's population with access to telecommunications services as determined by the subscriber base. Nigeria's teledensity is currently calculated by the NCC on a population of 170 million people. The Nigerian Communications Commission, NCC reported that of the 149,818,906 active lines, the GSM networks (mobile phones) had 149,179,083 active lines (Premium Times, 2016).

Before integrating mobile phones in teaching, lecturers should as much as possible have thorough knowledge of some mobile learning frameworks based on different learning theories. No demographic is immune from this phenomenon. Both young people and adults are increasingly connected and are digitally communicating with each other in ways that would have been impossible only a few years ago. With mobile technology, learning

can take place anytime, anywhere including at home, in a car, in hotels. It is much easier to accommodate several mobile devices in a classroom than several desktop computers. Mobile phones can be used even while on traffic or in the bedroom.

The use of mobile phones engage learners interest. Young people who may have lost interest in education prefer to play around with mobile phones, gadgets, games devices etc. Gaming has become a perversion of the upcoming generation but can be used to advantage by the introduction of Learning Games on the Mobile phones. It also allows for immediate feedback to the Learner, educators and the parents. This encourages prompt correction of lapses and encourages better performance. Stockwell (2012) was of the view that mobile phones enables us to have everything (calendars, train schedules, tablet computers, books) in one place on a device that we typically carry with us anyway. Caudill (2007) Opined that rn-Learning is a new field and research is still in a stage where different categories of m-Learning pedagogy are being developed, identified, and researched. It is a flexibly teaching and learning pedagogy in which any e-Learning application is delivered on-demand via mobile digital device. M-learning can also be regarded as the point at which mobile computing and e-Learning intersect to produce an anytime, anywhere learning experience (Kambourakis, Kontoni, a&Sapounas cited in Caudill, 2007).

Naismith *et al.* (2005)highlights a number of new challenges when adopting mobile technology in learning and teaching:

1. The epileptic and expensive nature of the data

connections in Nigeria would be a major barrier.

2. It might lead to the learners joining negative groups, which might threaten the learners' safety. Reference case is the recently publicized death of a Nigerian student caused by the use of social media vividly underscores grave dangers people are exposed to in the hands of those who abuse the technology.
3. Cost and maintenance of mobile phones can be expensive. Data plan is also very costly. It is one thing for a student to have a smart phone and another for that student to be able to pay for enough time or unlimited data access.
4. Some teachers and learners find it difficult to accept rn-learning as a pedagogical and androgogical medium.
5. The small screen size might affect the eyes
6. The small font size also have adverse effect on the eyes.

Kreutz (2010) stated that Mobile phones have tiny screens and keyboards, and need an agile finger to handle them. The small fonts obtained as a result of the tiny screen is also a problem to those with eye problem. Mobile phones can get lost quickly because of their small size. Caudill (2007) posited that a class website is not helpful if none of the students have Internet access, just as course notes distributed on CD are not helpful if students do not have access to computers to access the CD. Short Message Service (SMS) system is useless if learners do not have access to SMS-capable mobile phones or devices to play

MP3 files. It is very dangerous to assume that all learners will have access to mobile phones, while at the same time mandating the purchase and use of what can be very expensive smart phones can be a challenge as well.

According to IfinedoEloho (2013) the evolution of the mobile phones has further enhanced mobile learning in various ways. Mobile learning is the use of portable wireless device for learning. In 1985, Nigerian Telecommunications Limited (NITEL) was established and enjoyed monopoly of providing the service till 1992 when the sector was deregulated and Nigerian Communications Commission (NCC) was established. Private Telecommunications Operators also emerged and provided telecommunications services though they were interconnected to NITEL. In 2001, as a result of NITEL's inability to meet the ever increasing demand of the telecommunication service, by the populace GSM was introduced. Four wireless licenses were allotted by NCC to MTN, Econet (now Airtel), M-Tel and Globa-com later in 2003. Currently as at April 2013, the subscriber data reflects that there are approximately l65million connected lines comprising of mobile GSM. M-learning is the facilitation of learning and access to educational materials for students using mobile devices via a wireless medium. In these definitions, it can be observed that the availability of the appropriate mobile device, the access to the wireless network and the need to acquire knowledge is what culminates in the m-learning experience. Mobile learning establishes a bridge between the formal and informal learning. Ben Moussa (2003) was of the opinion that m-learning enables learning outside the class-room and even remote places. This implies learning is not location specific.

The collaborative features of the technology such as SMS messaging, digital videos serves as a medium for cooperation, communication and an atmosphere for teamwork between students and instructors (who may be geographically distributed). The mobile device is portable in that, it is light- weighted and easy to carry around. In built resources such as organizers, calendars, maps etc. assist learners plan their time and creates a personalized atmosphere for the individual learning. Mobile learning supports the quick delivery of learning materials that are tailored to meet the individual and collective students' needs or learning goals. These materials are current and up to date. Delivery is in real time and can be in multimedia formats. This learning style offered over the wireless network can be adjusted to suit whatever change in learning goals that may arise. Hence, reflecting the flexibility in the mode of learning. It is learner centered since the learner takes the responsibility of the learning decision and direction (Oyelere, Jarko&Eriki ,2016).

Statement of the Problem

Initially, mobile devices were not designed for use in the education context but as technology permeated all facets of human activities including education, stakeholders in education adopted m-learning as an innovated technique in the field of education. The integration of mobile devices in education was due to the fact that research has shown that it can be effectively integrated in the field of education, enhancing and supporting teaching and learning. The problem of the study can be stated in a question; To what extent do lecturers in the college of education, Michael Okpara University of Agriculture utilize M-leaning in teaching

and learning and what are the challenges in the application of M-learning in the field of education?

Objectives of the Study

The aim of this paper was to investigate the potentials and constraints of integratingm- learning in the classroom. Specifically this study sought to:

1. ascertain the manipulative competence and instructional effectiveness of lecturers using M-learning technologies in Teaching.
2. find out the extent mobile devices are used in teaching and learning in the college of education, Michael Okpara University of Agriculture,Umudike.
3. determine the constraints to the use of mobile devices as a mode of teaching and learning.

Research Questions

The following research questions are posed to guide the study:

- To what extent do lecturers possess manipulative competence and instructional effectiveness in the use of M-learning technologies in Teaching.
- To what extent are mobile devices used in teaching at the tertiary level of education?
- What are the constraints to the use of mobile devices as a mode of teaching?

Methodology

The research design used in this study is the descriptive survey design. The area of the study is Michael Okpara University of Agriculture, Umudike. The population of

the study is all the lecturers in the college of education. Since it will not be possible to administer to all the lecturers in the area of study, the researchers used a sample of 91 lecturers in the college of Education, Michael Okpara University of Agriculture, Umudike made up of 50 female lecturer and 41 male lecturers drawn from the seven departments in the college.This sample was obtained through the use of proportionate random sampling technique. The breakdown of the sample using proportionate random sampling technique was represented in the table below:

Departments	Number of lecturers selected
Department of Agricultural Science Education.	13
Department of Psychology and Counseling	13
Department of Adult and Continuing Education	13
Department of Educational Management	13
Department of Science Education	13
Department of Industrial Technology Education	13
Department of Library and Information Science.	13
	Total 91

Source: Field Survey,2020

The instrument for data collection was the questionnaire. The instrument was developed by the researcher and it was titled" Investigating the extent rn-learning is used in teaching in MOUAU". The instrument was developed bearing in mind the three research questions. It was structured based on a 4-point measuring scale. It contains 28 items. The instrument was validated by 3 experts. Two are educational technology integration specialists. The third validate is an expert in measurement and evaluation in the department of science education, Michael Okpara University of Agriculture, Umudike. The validates went through the items in the instrument and made corrections in respect to face validity, clarity, as

well as the appropriateness of the instructions to the respondents. A mean of 2.5 was used as a criteria for decision making for each item. Therefore, any item with a mean of 2.5 and above was accepted as agree while any item with a mean below 2.5 was disagreed

Findings

The results of this research are presented in line with the research questions. The result was analyzed using mean with standard deviation. The findings are presented in the tables below.

Research question 1: To what extent dolecturers have manipulative competence and instructional effectiveness using M-learning technologies in Teaching at Michael Okpara University of Agriculture, Umudike?

Table 1: Mean Ratings and Standard Deviation of lecturers on the Extent to which they have manipulative competence and instructional effectiveness using M-learning technologies in Teaching

Female Lecturers 50								
S/N	Questionnaire item	VHE 4	HE 3	LE 2	VLE 1	X	SD	
1	I have knowledge of mobile apps technology	40	6	1	3	3.66	0.8	A
2.	I have manipulative skills in the use of mobile app technology	18	18	7	7	2.94	1.04	A
3.	I have the ability of using mobile app technologies for delivery of instruction	42	5	1	2	3.74	0.69	A
4.	I have mastery in using other mobiledevices for academic exercise	20	15	8	7	2.96	1.07	A
5.	I have value for use of mobile technology towards delivery of instruction	29	10	8	3	3.30	0.95	A
6.	M-learning application enhances effective instructional delivery	26	15	4	5	3.24	0.94	A
7.	I have good attitude towards the use of mobile technologies for educational purpose	15	15	8	12	2.66	1.16	A
8.	Possess advance skill in using smart phones for instruction	37	6	3	4	3.52	0.93	A
9.	I have conducted synchronous learning through smart phone	31	10	4	5	3.34	1.00	A
10.	I have engaged in asynchronous learning through mobile device.	35	11	2	2	3.58	0.76	A
Mean for female lecturers =2.92 Grand mean for both female and male lecturers=2.82								

Results in Table 1 show mean ratings of female lecturers and male lecturers on the extent to which they use m-learning in teaching and learning. Out of the 10 items that elicited information on the above, female lecturers had high mean rating of 3.66, 2.94, 2.74, 2.96, 3.30, 3.24, 2.66, 3.52, 3.34 and 3.58 on all the items ranging from numbers 1 – 10. Male lecturers had high mean on all items apart from item 10 with low mean of 2.32.The grand mean for both female lecturers and male lecturers is 2.82. This

indicates that both female lecturers and male lecturers in the college of education, Michael Okpara University of Agriculture, Umudikehave manipulative competence and instructional effectiveness using M-learning technologies in Teaching.

Table 2: Mean Ratings and Standard Deviation of lecturers on the Extent to which M-learning is used in Teaching at Michael Okpara University of Agriculture, Umudike?

Female Lecturers 50							
S/N	Questionnaire item	VHE 4	HE 3	LE 2	VLE 1	X	SD
11.	I have had classroom interactions with students using mobile phones	30	9	7	4	3.3	1.09
12.	I have used Mobile phones to access the internet for academic activities	25	14	6	5	3.18	1.05
13.	I have asked my students to bring their mobile phones to the class for academic activities	12	18	13	7	2.7	0.78
14.	I encourage students to call me on phone for any academic problem	24	12	7	7	3.06	1.16
15.	I have used mobile phones to give and receive short quiz	21	15	6	8	2.98	0.84
16	I encourage my students to send test message to me on any academic issues.	28	13	3	6	3.26	0.74
17.	I reply their test messages immediately to clarify them on areas they don't understand	20	14	9	7	2.94	1.22
18.	I have had video chat with my students for academic matter using mobile phone.	13	10	11	16	2.4	0.98
19.	I call students often to set up class activities	25	12	5	8	3.08	1.03
20.	When I travel, I always keep in touch with my students through the telephone	22	10	10	8	2.92	0.66
Mean for female =2.98 Grand mean for both female and male lecturers= 2.82							

Results in Table 2 show mean ratings of female lecturers and male lecturers on the extent to which they useM-learnin in Teaching at the college of Education, Michael Okpara University of Agriculture, Umudike? Out of the 10 items that elicited information on the above, female had high mean rating of 3.3, 3.18, 2.7, 3.06, 2.98, 3.26, 2.94, 2.4, 3.08 and 2.92 on all items apart from item 18

which recorded low mean rating of 2.4. Male lecturers recorded high mean on 7 items and low mean rating of 2.36, 2.46 and 2.36 on items 13, 16 and 18. The grand mean for both female lecturers and male lecturers is 2.82. This indicates that both female lecturers and male lecturers in the college of education, Michael Okpara University of Agriculture, Umudike utilize M-learning technology to a high extent in teaching and learning.

Research Question 2: What are the constraints to use of M-learning in teaching by lecturers in Michael Okpara University of Agriculture, Umudike?

Table 3: Mean ratings and standard deviation of lecturers on the constraints to the application of M-learning in teaching at Michael Okpara University of Agriculture, Umudike?

Female Lecturers 50						
S/N	**Questionnaire item**	**SA 4**	**A 3**	**D 2**	**SD 1**	**X**
21.	Mobile phones used for m-learning are expensive	38	8	2	2	3.6
22.	Inputting of the text is difficult on the small keypads	35	10	3	2	3.5
23.	The small screen of mobile phones causes eye problem	37	9	3	1	3.6
24.	The small fonts as a result of the small screen makes me strain my eyes	36	7	5	2	3.5
25.	Poor network is a constraint to the use of m-learning	32	11	4	3	3.4
26.	data needed for browsing the internet for academic activities is expensive	32	15	2	1	3.5
27.	Sometimes students send abusive text which is annoying	40	7	2	1	3.7
28.	The unavailability of network is a constrain to the use of mobile phones in teaching	28	14	6	2	3.3
Mean for female lecturers = 3.13 Grand mean for both female and male lecturers= 2.78						

Results in Table 3 show mean ratings of female lecturers and male lecturers on the constrained to the use of m-learning in teaching.. Out of the 10 items that seek

information on the above, female lecturers had high mean rating of 3.64, 3.56, 3.64, 3.44, 3.56, 3.72, 3.72, , on all the items ranging from numbers 21-27 with low mean of 3.36 on item 28. Male lecturers agreed to all the items by recording high mean on all the items. The grand mean for both female lecturers and male lecturers is 2.78. This indicates that both female lecturers and male lecturers in the college of education, Michael Okpara University of Agriculture, Umudike agreed that there are constrains in the use of m-learning in the classroom such as poor network services and high cost of data.

Recommendations

On the basis of the research findings, the following recommendations were made:

1. Lecturers in tertiary institutions should be trained on the integration of mobile phone in order to enhance theirmanipulative competence and instructional effectiveness in the use of M-learning technologies in Teaching.
2. Government can introduce customized mobile devices with educational packages uploaded which can be used by teachers in teaching at the tertiary level of education?
3. The constraints to the use of mobile devices as identified in the study such as poor network services, and expensive data charges can be ameliorated if government can subsidize these charges and introduce low data packages for teachers.

Conclusion

The innovation in the field of education through the

application of M-learning is a welcome development. M-learning has shown to be an effective pedagogy that can be used for knowledge sharing and support learning anywhere and anytime. It has the potential to enhance teaching and learning process by providing access to information and communication capacities in a personal and ubiquitous manner. It allows individuals to interact with, or create information through portable mobile devices that the individual carries on a regular basis. Mobile technologies are used to improve the productivity and efficiency of learners by delivering information and support just-in-time and in context.

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CHAPTER 21.

EVALUATION OF ON-SITE ACCIDENT PREVENTION TRAINING PROGRAMMES IN THE PETROLEUM INDUSTRY IN RIVERS AND BAYELSA STATES

VINCENT WOBODO AKPU; EBI BIO AWOTUA-EFEBO; AND CLARA N. OLELE

ABSTRACT

The study evaluated the On-site accident prevention training programmes in the Petroleum Industry in Rivers and Bayelsa States. The population of the study was 1,400 personnel playing different roles in an integrated Oil field where construction and production activities are carried out simultaneously. The analytic survey was used for the study. A sample size of 446 (32%) was drawn randomly based on availability due to job rotation and schedule. Seven (7) instruments were used for field data collection, the research questions were answered using mean, and standard deviation, while seven hypotheses were tested using one-way ANOVA in six and independent sample t-test statistics in one, all at 0.05 level of significance. The finding showed that participants were highly satisfied with the training as their expectations were met; they acquired new competencies; participants demonstrated

evidence of transfer of new competencies in the workplace; the training produced desired outcomes as incidents/violations were reduced drastically, and all the management sub-groups acknowledged high return on investment (ROI) in the programme evaluated. It was concluded that the on-site accident prevention-training programme is effective and beneficial to stakeholders, and should be sustained while ensuring continuous improvement in view of multiple dynamics in the industry.

Keywords: Accident prevention, On-site Training, Petroleum Industry

1.0 INTRODUCTION

Training is an integral aspect of the entire production and service delivery system in every organization and an essential means of communicating information from more knowledgeable authority to person believed to be less knowledgeable in content, skills and desired behaviour. Sharma (2016) refers to training as the process of planned programs and procedures undertaken for the improvement of employee's performance in terms of skills, knowledge, and behaviour. The ultimate objective is to develop the necessary capabilities required by an individual to carry out present or future jobs in the organization.

In the petroleum industry, activities are generally of high risk and hazardous because of the terrain and complex nature of high-tech equipment involved such as seismic, drilling, construction, production, refining and transportation among others. In each of these activities, there is a high level of hazards, accidents and even death. Hazards resulting from faulty equipment, electricity, confined space entry transport equipment failure, lifting, unguarded and machinery-related, working at height, struck-by/caught-in/caught-between,

fire, radiation, loud noise, temperature, and slips/trips and fall as well as chemicals, flammable, gases and explosive chemicals, are recorded daily in the industry. Drilling Formulas (2017) reported the top 10 world's most disastrous accidents in Oil and Gas sector that consumed the lives of hundreds of people and assets valued over several trillions of dollars with the Piper Alpha Platform of 1988 topping the list with 167 deaths recorded and the Usumacinta Jack-Up (Mexico) of 2006 and C.P. Baker Drilling Barge (USA) of 1964 being the least in the list with 21 deaths and several casualties. RPS Energy (2010) and Chand (2015) also highlighted other accidents that occurred since 1984, to include: Bhopal, Methyl Isocyanate gas leak-Union Carbide plant in 1984 with 4000 deaths; Bombay High, ship collision with platform and riser fire in 2005 with 22 deaths; Chongqing, Sour gas blowout where 243 people died in 2003, Skikda, the explosion on LNG plant resulting to 27 deaths in 2004; Nigeria, pipeline explosion where 100 people died in 2009; Jaipur, the explosion in gasoline storage claimed 12 lives 2009; and the Congo, gasoline road tanker overturned incident in 2010 resulting to the death of 230 people. The International Labour Organization (ILO) reported that over 2.3 million people die annually due to work-related occupational accidents, illnesses, and diseases, and an estimated 313 million work-related accidents resulting in extended absence from duty. The ILO revealed that the global economy suffers a staggering annual loss of about $3 trillion because of work-related accidents and diseases alone (World Economic Forum, 2015). The combined cost of work related deaths, injuries, and diseases in the year was 3.94 percent of worldwide GDP, which is equivalent

to $2.99 trillion (National Safety Council, 2017). These figures are indeed frightening and call for short and long-term intervention to halt the trend.

In Nigeria, The Directorate of Petroleum Resources (DPR) in 2017 raised alarm over increasing cases of accidents, such as; the Apapa jetty fire where four died; the gas skid explosion in Ogun state with six fatalities, the petrol tanker fire that claimed ten fatalities and injured six in the Felele area of Lokoja in Kogi State (Alike, 2017). The 12th July 2012 Okogbe fuel tanker explosion along East-West road that claimed over 100 lives. Anyanwu (2014) also revealed that other major accidents within the last three decades include the Escravos spill in 1978; the Forcados Terminal Tank failure in 1978; Texaco Funiwa-5 blowout 1980, and the Abudu pipeline spill of 1982. Okoli (2018) reported that a pipeline explosion claimed the lives of over 50 people in Abia State on October 12, 2018.

The economic consequences of these accidents on the nation that depends largely on Oil and Gas are immense. The upstream sector also recorded some ugly work-related accidents since the beginning of the 21st century. For instance, the Shell group in Nigeria had 21 out of the 52 fatalities recorded in the year 2000; 22 out of 51 persons that died in 2002; 22 out of a total of 37 work-related deaths in 2006; and also 11 out of 26 fatalities that occurred in 2008, 3 out of the 5 work-related deaths in 2013; 5 died in 2014; 7 deaths in 2015, and 3 fatalities in 2016.

Hence, we cannot under-estimate the relevance of on-site accident prevention training programmes in the petroleum industry. This study, therefore, evaluates the on-site accident prevention

training programmes in the petroleum industry in Rivers and Bayelsa States. The following hypotheses were tested at significant levels to guide the conduct of this study:

1. There is no significant difference in participants' level of satisfaction in the accident prevention training in the three different skill pools.
2. There is no significant difference in the mean achievement of participants in terms of the acquisition of new competencies after attending the general HSE Levels 1-3 training programme.
3. There is no significant difference in the mean achievement of participants in terms of the acquisition of new competencies after attending the Fall Prevention training programme.
4. There is no significant difference in the mean achievement of participants in terms of acquisition of new competencies after attending the Gas Testing and Confined Space Entry training programme.
5. There is no significant difference in participants' ability to apply new competencies gained during the accident prevention training in managing workplace hazards to prevent accidents across the different sectional leadership
6. There is no significant difference in the extent to which the accident prevention training has contributed to the achievement of accident-free operations across three management sub-sections.
7. There is no significant difference in the extent of return on investment in accident prevention

training in terms of cost savings, higher profits, and overall performance in the different management sub-sections

2.0 STATEMENT OF THE PROBLEM

The Oil and Gas sector like other high-risk sectors has consistently provided mandatory and recommended workplace accident prevention training their employees to keep them free from harm, save lives, protect assets and the environment. This training is a legal requirement and employers are duty-bound to comply with the law. Aside from legal push, employers are morally bound to provide necessary training to safeguard the employee, who also has the right to a safe and healthful working environment. There are also the cost-saving benefits of training when the employer makes more money without suffering an undue loss due to an accident. Training is currently in a state of crises around the world especially due to harsh economic climate leading to organizations being pushed to cut down on training budgets among the first line of items in order to reduce cost. This means that the lofty ideas about continuous learning and professional development of employees have to give way to concrete justification with compelling evidence that such training will deliver bottom-line results, and contribute to the accomplishment of organizational objectives (Kirkpatrick & Kirkpatrick, 2016).

The current economic challenges and crises in the training world are yet to deter the petroleum sector significantly, as employers have continued to deploy valuable resources to provide workplace accident prevention training to help employees acquire and

improve requisite competencies on how to carry out assigned tasks without an accident. Sadly, despite huge investment in training intervention to achieve zero incidents there seems to be no end to accidents occurring at the workplace. This recurring accident has put some sorts of doubts on the veracity, relevance, and effectiveness of workplace accident prevention training provided for workers by employers. It is against this backdrop that the researcher would investigate the strength and weaknesses of such training to determine if the critical objectives are achieved, and what can be done to sustain performance or make an improvement to justify the investment to the benefit of the employee, employer, family, and society.

3.0 LITERATURE REVIEW

Unlike several related studies on evaluating training for quality, production, resources management and other programmes, there are only a few reported studies on the Evaluation of On-site Accident prevention training in the Petroleum sector. Vignoli, Punnett and Depolo (2014) in their work, "How to Measure Safety Training Effectiveness? Towards a More Reliable Model to Overcome Evaluation Issues in Safety Training" attempted to develop and promote the new 'mixed-methods' of testing the effectiveness of safety training intervention due to the inadequacies of existing (classical and Realistic evaluation) approaches in Italy, and wider Europe. The paper advocated the adoption of a robust and time-efficient method that combines qualitative and quantitative measures in the collection and analysis of information for a better understanding of a research problem in order to provide possible answers to such a problem. The new way adopted for evaluating safety-

training intervention was demonstrated in a pilot study at pre and post-training phases on safety training intervention course on the use of asbestos.

While examining the concept of training and development, Topno (2012) presented a broad understanding of the concept of evaluation and training evaluation in particular with an in-depth review of definitions of several scholars as he attempted to provide a comprehensive approach to the subject in his work entitled "Evaluation of Training and Development: An Analysis of Various Models". He identified evaluation as the most critical part of training intervention because it concludes the training process, and reveals whether or not learning really occurred, and the extent learners can apply what was learned during task execution. He also unveiled a number of training evaluation models available to practitioners, researchers, and organizations that may wish to test new or existing training programmes be it for long or short terms, including the widely used Donald Kirkpatrick's Four-level training evaluation model; the Context, Input, Process and Product (CIPP) evaluations model developed by Daniel L.Stufflebeam; the CIRO approach developed by Warr, Bird & Rackson in 1970; J Philips Five levels approach that formally introduced Return on Investment to support Kirkpatrick's four levels. Other models include; Training Validation System strategy by Fitz-Enz; Bushnell's Input, Process and Output (IPO) model. The training investment model of Hassett; the Five-levels evaluation model of Kaufman and a host of others. Each of these models has strengths and weaknesses and cannot be applied in all situations but can safely be adapted and combined to achieve targeted results. On the assessment

of employee training and development programme, Borate, Gopalkrishna and Borate (2014) adopted a case study approach to evaluate employee training effectiveness and development program in the quality department at a multinational company in India, using Kirkpatrick's four levels evaluation model. The investigation is predicated upon the fact that most companies have realized that human capital development plays the most critical role in economic competitiveness within and across states. Their main finding was that Training for continuous quality improvement was effective in the multinational company investigated as the acquired mean of all the seven hypotheses were significantly higher than theoretical mean, which suggested general effectiveness of the training implemented for continuous quality improvement.

Grohmann and Kauffeld (2015) focused on the importance of using an evaluation tool that is psychometrically sound with the right properties by organization in testing the effectiveness of their training programmes to save time, cost and other resources and to avoid using inappropriate tools for evaluating training programmes.

4.0 RESEARCH METHODOLOGY

This research adopted a combination of descriptive and analytic surveys. Ex post facto method was adopted to support primary data obtained through questionnaires and interviews to determine the outcome at level 4 of the accident prevention training. Purposive sampling technique was adopted during the administration of instruments due to the dynamic nature of site activities. The researcher developed, validated and administered

instruments used to obtain responses from all levels of participants, and engaged targets respondents in face to face interviews to elicit additional feedback to support earlier responses on Level 3, 4 and 5. A direct observation technique was also used.

The study areas for this research were contractors' worksites in Agbada Oilfield in Rivers State and the Tunu Oilfield, Bayelsa State. The Agbada Oilfield is in Shell Petroleum Development Company (SPDC's) Oil Mining Licence (OML) 17, approximately 16 km North-East of Port Harcourt in Ikwerre Local Government Area of Rivers State. The oilfield on dry land area on latitudinal and longitudinal positioning of 2 7° 0′ 54.468″E and 4° 55′ 54.398″N for Agbada 2, and 6° 58′ 37.529″E and 4° 56′ 4.705″N for Agbada 1 determined through a GARMI Global Positioning System (GPS) on the field.

The population of the study was mainly 1,400 workers belonging to three main contractors who had undergone various accident prevention training in an integrated oil and Gas projects at remote locations for a client under a single management portfolio.

The sample of the study is 446 workers, which represents 32% of the population studied. The sample size was determined with the use of Taro Yamane's formula, which yielded 311 as a minimum number of sample sizes for 1,400 populations.

1,047 questionnaires were retrieved out of 1,080 administered to the two main groups and three sub-groups of respondents by the researcher on a face-to-face basis. This number represents 96% of return rate, with 33 lost representing less than 4% mortality. Aside from

questionnaire, other methods used for data collection include interviews and direct observations.

Data were analyzed using, mean and standard deviation, and Paired Sample t-test at 5% level of significance (α=0.05). Research questions were answered using mean and standard deviation. Hypotheses were analyzed using one-way ANOVA and independent sample t-test.

5.0 DISCUSSION OF FINDINGS

The study shows that those who participated in the accident prevention training had a high level of satisfaction in terms of instructor's expertise, module content, materials, and overall training environment. This finding collaborates Borate et al. (2014) investigation results, which affirmed that continuous quality training intervention contributed immensely to creating a positive response in trainees as their expectations were reasonably met. It also supported Dhliwayo and Nyanumba (2014) study on the related subject, which revealed that most workers who received on- the- job training expressed satisfaction that their expectations from the training were met. It was also revealed that participants' level of satisfaction and their understanding in the accident prevention training in different skill pools differs to an extent. Participants from the Indirect- skilled pool believed that their expectations in the just-concluded and previous on-site accident prevention training were met. This was demonstrated in their varying degrees of interest and participation during the training as the Indirect- skilled asked and answered questions from instructors than the artisans. While the artisans were more active and revealed greater satisfaction than the unskilled workers. Feedback from

interaction confirms clear alignment with the educational qualifications of each of the three groups of participants as Indirect- skilled with university degrees had the greatest satisfaction. Next to the Indirect- skilled were the Direct- skilled that have technical/trade school certificates, and finally, the unskilled workers with or without primary school certificates commonly referred to as helpers. This implies that the satisfaction level in the accident prevention training depends on the level of academic or professional qualifications attained by different categories of participants to an extent. It varies according to the degree of academic or professional achievement, which means the more qualified the more you are satisfied and vice versa. This finding was supported by a tested hypothesis, which confirmed that the level of satisfaction in the training programme among the different skill pools of direct-skilled, unskilled, and Indirect- skilled differed significantly.

The study also indicates that participants who attended the General HSE Levels 1-3 training have a high level of understanding in terms of acquisition of new competencies, module content, and materials. The finding clearly aligned with the researcher's observation and interaction as most of the participants demonstrated that they learned substantial new things from the training which they never knew and that the training was beneficial to them. The outcome also supports findings from research conducted by Borate et al. (2014), Dhliwayo, and Nyanumba (2014) which affirmed that reasonable learning took place in the two different pieces of training. Most of the locals held firm to their hearts, the 12 lifesaving rules, the 3 EP HSE golden rules, the importance of personal protective equipment (PPE) et

cetera, and could list as many as ten hazards and control measures. The researcher concluded that participants in the mandatory general Health, Safety and Environment (HSE) Level 1-3 training acquired new competencies as all of those interviewed were of the view that they will go for refresher training if nominated, and strongly recommend that every new joiner should undergo HSE level 1-3 training.

Findings also indicates that those who participated in Fall prevention training acquired a high level of understanding in terms of acquisition of knowledge, skills and attitude, module content, and materials in the accident prevention and training program. Findings are in line with the outcome of learning achievement by participants that attended the mandatory general Health, Safety and Environment (HSE) Level 1-3 training who confirmed that they acquired new competencies after the training. Findings also agree with the outcome from Borate et al. (2014) and Dhliwayo and Nyanumba (2014) which affirmed that reasonable learnings took place in the two different training. The participants' level of understanding in the Fall Prevention Training in terms of acquisition of new competencies, module content, and materials in the different skill pools differs to an extent as seen from their varying mean scores. Finding confirms varying degrees of understanding but differs in terms of the pattern of achievement as recorded among the different categories where Indirect- skilled acquired most. Direct- skilled followed and unskilled least in HSE Level 1-3 training. Unlike the HSE level 1-3 training, the unskilled workers ranked highest in the acquisition of learning in fall protection and are followed by the Indirect- skilled and finally the Direct- skilled. This

outcome appears somewhat strange. However, interaction and observation confirm that although the unskilled workers cannot authoritatively comprehend learning from fall prevention training more than the Indirect-skilled and Direct-skilled they demonstrated the highest level of compliance with fall prevention requirements, which largely implies the highest level of understanding. Most of those interviewed believed that work at height was perhaps the riskiest activity due to horrific videos of fatally injured or maimed people as a result of fall from height accidents, which they watched during the training, and was not ready to be used as statistics in future. Most of them wore their body harnesses to and from break without removing it. The Indirect-skilled was next in compliance but comprehended learning more. While the Direct-skilled were least in compliance because of the obvious complacency occasioned by overconfidence. However, they demonstrated a greater level of theoretical understanding of fall prevention training next to Indirect- skilled. The tested hypothesis also validated the fact that achievement level in the Fall Prevention training among the three different skill pools of direct-skilled, Unskilled and Indirect-skilled differed significantly.

Findings also indicate that participants who attended Gas testing and Confined Space Entry training have a high level of understanding in terms of acquisition of competencies, module content, and materials. This indicates that participants were able to apply new competencies gained during the accident training programme in managing workplace hazards to prevent accidents to a large extent. The finding supports the outcome of Vignoli, Punnett, Depolo's (2014)

investigation, which affirmed that most people that received safety training averred that what they learned from such training were useful during task execution in the workplace. This finding also agrees with Borate et al (2014), Ruttenberg (2013) and Dhliwayo & Nyanumba (2014), among other studies that confirmed transferred learning as trainee indicated capability to use acquired competencies to solve practical problems at the workplace. However, the percentage of what was really transferred out of quantity acquired was not established. It is believed that a substantial quantity of what was acquired in the training was actually transferred because 90% of the total package addressed knowledge and how to work without being hurt or killed. Transfer of learning was indeed encouraged by individual workers' consciousness to carry out activities at the workplace without being hurt, close supervision, strict compliance to safe work procedures, coaching, daily toolbox meetings, and job hazards analysis. One key finding during the interaction was the worrisome barrier to transfer of learning due to work pressure in order to meet delivery targets. More than 50% of those interviewed confided in the researcher that most times they face the dilemma of willful violation against compliance with safe work practices in order to complete assigned tasks on time because of sack threat if they fail to complete the task as requested by the boss. And, in most cases, they were compelled not to apply known safe work practices as required in order to complete work within the specified timeframe, and therefore created room for normalization of non-compliance as right things were usually jettisoned in such instances.

The participants' ability to apply the new competencies

gained during the training in managing workplace hazards to prevent accidents after training in the different skill pools (LCS, LOS and LSS) differs slightly to an extent. These varying mean scores indicate that participants applied the new competencies gained during the training in managing workplace hazards to prevent accidents after training in the different skill pools differs to an extent. Finding collaborated researcher's interaction and observation as the frontline supervisors and workers (LSS) rendering support services readily complied with safe work practices and procedures learned during training than the construction and operation spread probably because they exert less bodily stress. One of the Logistics officers interviewed revealed that upfront planning was a major key to translating learning from various accident prevention training to daily work execution as it has helped in preventing or reducing 'fire service 'response that would usually inhibit doing what is right. The construction spread (LCS) also demonstrated good use of what they learned from the three training packages evaluated despite the fact that they ranked next to the support spread. However, they faced multiple challenges because they are the key people actually doing the main work and due to other factors, which include: nature of work environment, type and integrity of equipment used, worksite restrictions and interface issues, multiple and divergent instructions, the attitude of supervisors and colleagues as well as other intervening challenges from clients and worksite dynamics. Two of those interviewed confided in the researcher that, at times, multiple and divergent instructions are issued on how best to execute one task against known procedure and that has led to not really

implementing the task in accordance with knowledge gained from training. Finally, the operation spread seemed to view daily tasks more as routine activity and demonstrated more complacent behavior to doing the right thing based on learning from accident prevention training. One of those interviewed informed the researcher that his manager would only get worried if the system is down or there is a fire outbreak, and that transfer of technical knowledge learned is of greater value to him than learning from accident prevention training. The tested hypothesis did not support this finding wholly as it indicated that ability to apply new competencies gained during the training in managing workplace hazards to prevent accidents after training across the different skill pool of LCS, LOS and LSS did not differ significantly.

This indicates that the accident prevention training has contributed to the achievement of accident-free operations to a large extent. This shows a positive result/outcome of the on-site accident prevention training. The finding supported Ruttenberg (2013), Borate, Gopalkrishna and Borate (2014), The South Australian Freight Council (2015), Bianchini, Pellegrini, Peta and Saccani (2014), and Dhliwayo & Nyanumba (2014) earlier positions which revealed that safety training created a positive impact in terms of accident prevention/reduction, improved quality and even boosting production. The main objective of accident prevention training is to ensure the achievement of ZERO ACCIDENT, meaning no incident. Workers from the three companies contributed significantly to the achievement of over 20 million LTI-free man-hours within the last 5 years (2013-2018) on current projects

for the same client. Monthly, Annual and Project-to-date report sighted from secondary data sources (HSE Statistics records) confirms very impressive HSE performance attributable largely to increased on-site HSE awareness resulting from planned accident prevention training.

It also revealed that accident prevention training has contributed to the achievement of accident-free operation to a differing extent as assessed by three different management sub-sections of Operations, Support and Construction as seen from their differing mean scores. Construction activities are high risk with great potential to cause harm, such as: mechanical and manual lifting, excavation, welding, coating, and electrical and instrument installation, radiography, pressure testing and all manners of activities carried out underground, surface, confined space and even at height, both in brown and green fields. It is therefore not surprising to note that construction workers mainly at the cool face of activities are required to undergo series of technical and safety competency training prior to engagement, and sustained refresher sessions throughout the duration of work. All the participants interviewed believed very strongly that they could not engage anyone to do work when such a person has not undergone the mandatory or recommended accident prevention training. For instance, it is mandatory for everyone entering the workplace to undergo site safety orientation programme. Secondly, no worker touches an object if you have not undergone basic HSE levels1-3 training. It is on this premise that those interviewed believed that on-site accident prevention training contributed significantly to the achievement of accident-free operation, drastic

reduction near-misses, unsafe acts and conditions in the workplace. The operation team interviewed also believed in the potency of accident prevention training in the achievement of goal zero or drastic reduction of workplace accidents but argued that facility integrity and health are also key contributors to the achievement of accident-free operations. One of the team leaders interviewed averred that facility health and integrity is critical in this era where most facilities are designed to run virtually unmanned and to burn down and wonder the critical role accident prevention training plays in the achievement of goal zero. For him, health awareness training is a priority for people in control rooms, security, and catering personnel. While, the support category also believed in the contribution of on-site accident prevention training to the achievement of goal zero but reasonably differed from both construction and support team as some of those interviewed stressed that it was a combination of training and luck. A section of those interviewed told the researcher it is God not any kind of training. Again, this accounts for the third-place roll of the support team. Tested hypothesis did not support finding as it indicated that the contribution of on-site accident prevention training in the achievement of accident-free operations across the different management sub-divisions of Operations, Support and Construction did not differ significantly.

This shows that to a large extent, the returns on investment in accident preventing are justifiable in terms of cost savings, higher profits and overall performance. This shows high and justifiable returns of investment of the accident prevention training. Finding from this study supported the outcome of nine companies' case studies

investigations on ROI from different safety, quality and performance improvement training programme conducted in South Australian according to The South Australian Freight Council Inc. (2015). The management investigation team concluded that companies bottom line were generally improved through training as it impacted positively on safety, profitability and productivity, increase in worker's motivation and morale, customer satisfaction, the reputation of companies and profile. Ruttenberg (2013) study on The Economic and Social Benefits of OSHA-10 Training in the Building and Construction Trades also concluded that OSHA-10 training made a great difference as savings due to accidents averted run into millions of dollars. Investigator stated that if safety training could reduce injuries by 2% a year it means that savings could rise to $336 million per year, which will likely triple to $1billion dollars if we achieve 6% reduction of accidents. The position of these two and many other studies on the ROI was collaborated by the entire managers interviewed. Two of the Project managers and one Director recounted huge losses their companies suffered (on a non-SHELL project) due to accidents which occurred because the workers' lacked the basic knowledge, skills and attitude required to manage workplace hazards which would have been acquired through on-site accident prevention training. All those interviewed agreed that recommendations on the urgent need to train or retrain workers were prominent in most (if not all) accident investigations reports.

Also, the returns on investment in accident prevention training are justifiable in terms of cost savings, higher profits and overall performance, and differs to an extent

in the three different management sub-divisions of Operation, Support and Construction as seen from their differing mean scores.

6.0 CONCLUSIONS

Following investigations and findings, it is evident that the implementation of on-site accident prevention training interventions in the Petroleum Industry is in compliance with regulatory and industry requirements. Aside from these, the intervention is seen essentially as an integral part of the entire production and service delivery process, which enhanced cost-saving, higher profit, and overall well-being of organizations. The following conclusions were drawn from each of the indicators measured, as follows;

The study showed high level of participants' satisfaction with the on-site accident prevention training. It also revealed that all the participants acquired new knowledge, skills, and behavior from the training, which means that learning, took place. Also, participants applied new competencies they acquired from the accident prevention training in managing hazards at the workplace to prevent accidents after the training. The result of the study also showed mean score far higher than the criterion mean indicating that the on-site accident prevention training contributed immensely to the achievement of accident-free operations to a large extent. for safety intervention, man-hours and other resources that would have been deployed to investigate accidents and the consequential costs were saved, improved site housekeeping, increased HSE compliance level and higher morale among workers, etc.

The study result showed that Returns on Investment (RoI) in the on-site accident prevention training are

justified to a large extent in terms of cost savings, higher profits and overall performance.

The following recommendations are made:

1. Companies should continue to support every effort to ensure continuous improvement of on-site accident prevention training programme in order to sustain workers interest since the interventions meet their expectations and help in boosting their morale and motivation
2. Companies should continue to review learning experiences and delivery strategies in the three (and other existing) programme in order to sustain participants' interest and make learning relevant in order to enhance greater achievement.
3. Companies should leverage relevant research findings and best practices on the most suitable training environment to enhance the transfer and utilization of acquired competencies at the workplace.
4. Companies are encouraged to develop a robust and sustainable training department to consolidate the gains of reduced incidents, and workforce with vast competencies on effective hazard management in order to bridge gaps as a result of the incursion of new technologies, regulations, standards, procedures and site environmental challenges.
5. Companies should invest more in accident prevention training intervention as an integral aspect of production and service delivery since the intervention has been identified as viable means

to save cost, boost productivity and improve the overall performance of individuals and organizations.

6. Additionally, every organization should launch or sustain an On-site accident prevention training programme due to its indispensability as an essential strategy for cost-saving and overall prosperity of any business organization.

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CHAPTER 22.

ENHANCEMENT AND GLOBALIZATION OF SOCIAL STUDIES EDUCATION THROUGH THE USE OF EDUCATIONAL TECHNOLOGY AND ICT

ARUBAYI PAUL . A AND OKOBIA A.O (PHD)

Abstract

This paper examines globalization and educational technology for quality enhancement, through the use of ICT in social studies education in Nigeria. It views the impact of educational technology in the teaching and learning of Social Studies, on students' achievement and performance in social studies education in Nigeria. It delves into some of the challenges facing the adoption of educational technology in the teaching and learning of Social Studies. It critically examines "the role of Socials Studies for quality enhancement through application of ICT in Socials Studies Education." The paper concluded that through Social Studies education high level of integrity must be demonstrated in the discharge of duties, while the culture of quality must be built into the educational system. According to Materu (2007), tertiary education is central

to economic and political development. It recommends among others that ICT facilities should be made available and accessible in our higher institutions for training and re-training of teachers and students, so as to make them computer literate.

Keywords: *Globalization, Educational Technology and Quality Enhancement*

Introduction

Globalization is a complex and multifaceted concept that has generated controversy from its meaning, its time line, its future as well as whether it is serving the interest of all or it is benefiting just a few countries or individuals in the world. This is due to the fact that it cuts across almost all disciplines each of the disciplines proffers varying definitions and interpretations of the concept. (Acosta and Gonzalez, 2010).

Iyayi (2004) posits that globalization "has been used rather loosely to stand for a variety of things; the shrinking of the world into a global village, the awesome changes brought about or mandated by the revolution in information technology, the collapse of boundaries between different worlds, expanding connectivity of all forms of interaction.

The Association of Educational Communication and Technology (AECT) defines educational technology as "the study and ethical practice of facilitating learning and improving performance by creating, using and managing appropriate technological processes and resources" (Januszewski and Molenda, 2008). Educational Technology can be used by all educators who want to incorporate technology in their teaching (Jaflah, 2012).

Social studies education has continued to undergo various reforms designed to meet up with current global

demands. These demands include those of industry, public service and self actualization. Two major global issues, which are of interest to social studies graduates of tertiary institutions in Nigeria are educational technology and quality enhancement in teaching and learning process of social studies and other disciplines. These are among the challenges facing Nigerian education especially in the realm of globalization that demands some innovation in order to meet up with a dynamic world system. Social studies education in a globalized contemporary Nigerian society has changed in some cases, from the use of non-electronic media such as textbooks, charts, pictures, diagrams, chalkboard, to the use of electronic media such as radio, motion picture films, projectors, to enhance the teaching and learning process, in the tertiary institutions.

In Nigeria, there has been some concern what the quality of higher education and standards of teaching and learning. The basis of this concern is the fact that the old value of handwork, diligence and excellence have disappeared and nowadays, exam malpractice, poor attitude to work and poor policy implementation rank high in our schools. It also heightened the issues of crime and generated high sense of various forms of insecurity. It was the desire for quality in the educational system in higher institutions as earlier mentioned, that made the Federal Government of Nigeria to established the National Universities Commission (NUC). The NUC is to ensure that quality and standards are maintained in all universities across the country (Onu, 2010).

Clarification of Terms

Globalization – Shenkar and Luo (2004) refer to globalization as "the growing economic

interdependencies of countries worldwide through the increasing volume and variety of cross-border transactions in goods and services and of international capital flows as well as through the rapid widespread diffusion of technology and information. Globalization involves economic integration, the transfer of policies across borders, the transformation of knowledge, cultural stability, the reproduction relations and discourses of power; it is a global process, a concept, a revolution and an establishment of the global market free from socio-political control (Jaja, 2010).

Educational Technology – Educational technology according to Abimbode (1997), are hardware and software including television, radio, electronic classroom, instructional devices, skill and motion pictures, projectors, computer-assisted or managed instructional equipment and materials, communications, and other equipment and materials necessary to assist in the process of learning. The purpose of educational technology is to facilitate learning and improve performance. By so doing learning and performance become the bed-rock of the study of educational technology.

Quality Enhancement – Quality enhancement means increase in quality, but when applied to the teaching and learning of Social Studies it signifies an increase in the quality and standard of teaching and learning of Social Studies in tertiary institutions in Nigeria. Quality in higher education is a multidimensional concept which should embrace such activities as teaching and academic programmes, research and scholarship, staffing, students, facilities and academic environment (Van, Gunkel and Rodrigues Doris, 2007).

The Impact of Educational Technology in the Teaching and Learning of Social Studies

Educational technology is considered as the implementation of appropriate tools, techniques or processes that facilitate the application of senses, memory and cognition to enhance teaching practice and improve learning outcome of students in Social Studies (Hap Aziz, 2010). Educational technology improve interactions between students and their instructors in Social Studies teaching and learning process. Students can learn more in less time with technology-based instruction and end up liking classes more because learning is more practically oriented. Students learn more when they see what they are being taught. In addition it enables students develop more positive attitudes and concentrate more in learning Educational technology in the teaching and learning of Social Studies enables students to recall what they have been taught in time, because they have the practical knowledge of what they have been taught; in the class (An & Reigeluth, 2011).

Most educators agree that educational technology can help teachers and students in tertiary institutions, to achieve efficiency, collaboration, communication, virtual experiences an so much more. However, cost, culture and other educational and environmental factors are among the reasons for not adopting educational technology by many educational institutions (Jaflah, 2012).

Finally, educationally technology helps students in Social Studies to use multi-media to address all learning styles, provide more efficient interactivity between them and their teachers. It also enables the students to have well centered activities. On the part of the teachers, technology helps them in organization and efficiency in

doing paperless work. It makes teaching to be more practically oriented.

The Impact of Educational Technology on Social Studies Students' Achievement and Performance

Globalization has brought about the use of educational technology in the teaching and learning of Social Studies in tertiary institutions in Nigeria. Technology is seen by many as essential tool for improving Social Studies learning outcome because it encourages students' participation in the teaching and learning process. A research conducted by Kent State University's Bureau of Research Training and Services to examine growth in students' knowledge indicated that those students who used technology scored higher than those students who did not use it. In addition, the difference in means scores between the two groups grew over time, further suggesting that technology has a positive impact on students' learning in Social Studies, in tertiary institutions in Nigeria; and other parts of the world (Kent State university, 2005).

Educational technology has demonstrated a significant positive effect on achievement. Positive outcomes have been found in all major subject areas in higher institutions (Ellen & Joy, 1996). The use of technology as a learning tool could make a measurable positive difference in Social Studies students' achievement, attitudes and interaction with teachers and other students (Bialo, 1990).

Challenges in the Adoption of Educational Technology in Teaching and Learning of Social Studies

Most tertiary institutions in Africa in general and Nigeria in particular are not to embrace the idea of employing educational technology in the teaching and

learning processes. They barely register on world institutional rankings and produce a tiny percentage of world research output (UNESCO, 2009). Educational technology is still not being applied sufficiently in Social Studies and other disciplines, mostly for the following reasons:

- Lack of school equipment: There is serious lack of school equipment, necessary resources and qualified teachers for the implementation of these technologies (Stosic, 2015)
- Lack of interest: Some teachers in Nigerian higher institutions are showing unwillingness to accept the new technology for educational advancement. They feel satisfied with the age long method of instruction (the traditional method) (Okwuedei, 2011).
- Cost: The cost of integrating educational technologies in teaching and learning can be very expensive. The high cost of the ICT equipment and facilities discourage the schools from trying to enhance educational technology. Some Nigerian tertiary institutions cannot afford to put in place those ICT facilities due to prohibitive cost. However, in some cases, some tertiary institutions do afford them, while others do not see the need to invest such huge amount of money in educational technology just to improve teaching and learning. Thus, inadequate funding becomes the bane of our educational technological development in this regard. Without adequate funding, curriculum innovation in the

model currently being discussed will be a mirage (Okwuedei, 2011).

- Unavailability and inaccessibility of ICT facilities: Many teachers do not have access to ICT facilities in Nigerian tertiary institutions because they are not available in expected quantity or not even in existence at all. Lack of access to ICT resources like computers and internet can seriously impede what teachers can do in the classroom, as regard implementation of its program (Okwuedei, 2011).
- Lack of adequate power supply: Power supply can also be a challenge due to the instability of power supply in Nigeria to power ICT equipments. It is common to discover that most organizations in Nigeria rely on a diesel generators for power supply. Not all tertiary institutions can afford to buy generators, talk less of buying the diesel to power their generators.
- Computer literacy: Lack of adequate computer literacy by students and teachers is also one of the challenges in using educational technology. Some teachers lack adequate skills to use computer and internet. The challenges will make it difficult for the teachers in integrating educational technology in their teaching of Social Studies in tertiary institutions in Nigeria.
- Ethnicity and Godfatherism: Ethnicity and Godfatherism on the part of management is also one of the major problems facing the adoption of ICT in Social Studies education. Management in most tertiary institutions send staff for in house

ICT training based on the factor mentioned above.

The Role of Social Studies for Quality Enhancement through Application of ICT in Social Studies Education

Adaregbe (1980) sees Social Studies as an interdisciplinary field of study, and problem solving discipline. Social Studies as a corrective course help to correct the ills of the society and also the deficiencies of our educational system which is ill-equipped to cope with the demands of social harmony, national unity and national consciousness. Social Studies education help to instill the kind of knowledge, skills, belief, attitudes and values which the Nigerian child should possess. Graduates of Social Studies from the tertiary institutions are the ones to teach the young Nigerians these tenets.

There is the need to employ the use of information and communication technology in Social Studies education, especially in tertiary institutions in Nigeria. Presently, in our contemporary society there is an unprecedented wave of globalization propelled by the use of ICT. Therefore it is important that Nigerians consider tertiary education system in the international context of computer, software, networks, satellite links and related systems that allow people to access, analyze, create, exchange and use data, information and knowledge. These should be used in Social Studies education in the Nigerian tertiary institutions. Social Studies education which is designed as instrument for effecting integrated development and nation building must incorporate ICT into its curriculum. This will go a long way in ensuring the quality of its products as well as achieving the objectives for its introduction into the school system,

under the New Partnership for African Develop (NEPAD).

Conclusion

Through Social Studies education, high level of integrity can be displayed by the people in the discharge of their duties. The culture of quality must be built on technology, and for a tertiary institution, this will help to produce graduates who have the digital requirements for the saturated labour market. According to Materu (2007), tertiary education is central to economic and political development and vital to competitiveness in an increasingly globalizing knowledge society.

International challenges must be addressed in the institutions whereby staff and students must be ICT compliant so as to fit into the global digital process. This will open up access; increase our competitive abilities and better graduates from the institutions.

Social Studies education is one of the vehicles for achieving the above objectives. Our higher institutions can contribute to national development through high level relevant manpower training to develop and inculcate proper values for the survival of the individuals and the society.

Recommendations

- Lecturers and Social studies students should develop competence to make personal use of ICT, competency to master a range of educational paradigms that make use of ICT, sufficient competency to make use of ICT as mind tools, competency to make use of ICT as a tool for teaching as well as competency in understanding the policy dimension of the use of ICT for

teaching and learning.

- Social Studies department in the institutions of higher learning in Nigeria should take deliberate steps to enforce the use of new technologies in teaching and learning analogue lecturers do not have much to offer. Lecturers should not rely on old notes. Dictating of notes should be de-emphasized and internet facilities should be made available and accessible to students at affordable rates, if not free.
- ICT facilities should be made available and accessible in our higher institutions for training and re-training of teachers and students so as to make them computer literate.
- Management of higher institutions should avoid the use of ethnicity and Godfatherism in the training and re-training of Social Studies teachers.
- There should be proper accreditation of all Social Studies programmes offered in Nigerian tertiary institutions to ensure quality.

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CHAPTER 23.

BUSINESS EDUCATORS' UTILIZATION OF INSTRUCTIONAL TECHNOLOGY FOR QUALITY TEACHING OF BUSINESS EDUCATION IN TERTIARY INSTITUTIONS IN ANAMBRA STATE

OKONKWO MARY U. (PHD) AND ODIMMEGA CHINYERE G (PHD)

Abstract

This study determined business educators' utilization of instructional technology for quality teaching of business education in tertiary institutions in Anambra State. Two research questions guided the study and four null hypotheses were tested at 0.05 level of significance. Related literature pertinent to the study were reviewed which exposed the need for the study. Descriptive survey research design was adopted using a population of 119 business educators in tertiary institutions in Anambra State. A structured questionnaire developed by the researcher was used for data collection and was validated by three experts. Cronbach Alpha method was used to establish the reliability of the instrument. The reliability index obtained was r = 0.80. Data

were analyzed using mean, standard deviation and t-test. Mean was used to answer the research questions and standard deviation was used to explain how the responses of the respondents varied. t-test was used to test the hypotheses at 0.05 level of significant using Statistical Package for Social Sciences (SPSS). The results showed that business educators lowly utilized video conferencing and moderately utilized digital game for quality teaching of business education in tertiary institutions in Anambra State. The results also showed that there was no significant difference in the mean responses of business educators on the extent of utilization of video conferencing and digital game on the basis of gender and age. Based on the findings, the researchers recommended, among others, that the National Union of Universities and National Commission for Colleges of Education should frequently organize seminars, workshops and any other in-service courses; to familiarize and sensitize business educators with a wide range of instructional technology tools.

Keywords: Instructional technology, quality teaching and business education.

Introduction

Teaching in any education system depends largely on the quality and competence of the teachers. This is because the teachers are expected to perform the important function of guiding, directing, evaluating, imparting, asking and answering questions, among others; for maximum benefits of the learners. Teaching embraces all human interactive skills employed by the teacher to promote/facilitate learning in the classroom situation; thereby, leading to improved performance on the part of the learner. It is a process in which teachers apply a repertoire of instructional technology to communicate and interact with the learners around academic content, and to support students' engagement for better learning outcome (Onwuagboke, Singh & Fook, 2015). Teaching at any level requires that the students be

exposed to some form of simulation. For several decades now, teaching and learning at all levels have been delivered in the traditional way, with the teacher standing in front of the class talking and demonstrating to enhance content delivery of instructions. Innovation in technology has influenced all facets of human endeavour including education institutions.

Today, technology is widespread among schools. Access to computers has become so ubiquitous that digital devices are replacing the use of pen and paper in many classrooms. While public opinion on the use of technology in schools has been divided, experts have found that technology has the ability to create profound changes in teaching and learning, creating opportunities for unprecedented collaboration, engagement, and support (U S. Department of Education, 2020). This modern technology has launched the world into a knowledge based economy in which ideas and technological principles are used for better output (Mbah, 2016). Thus, advancement in technology according to Muhammad, Asua and Munnaza (2015) has compelled teachers and educators to utilize its benefits for the delivery of instruction and hence promote learning through instructional technology.

Instructional technology is the theory and practice of using technology for education. Instructional technology is one of the many tools that can enhance the presentation of the content and convey information to students. According to Venkataiah in Qaiser (2011), instructional technology is defined as a means to make use of different techniques and procedures to design a learning experience systematically. Instructional technology includes practical techniques of teaching that

systematically aim at effective learning, whether or not they involve the use of media (Gagne, 2013). Examples of instructional technology devices include interactive white board, digital calculator, electronic instructional materials such as radio, tape recorder, television, computer (desktop and laptop size), multi-media projectors, teleconferencing devices, all which contribute much in making learning more interesting (Atkinson, 2010).

The increasing prevalence of technology in the classroom reflects a broader cultural shift. As the modern world becomes more digitized, tech literacy is becoming increasingly important. Teachers who use technology to support learning in meaningful ways can help prepare students for success in the digital era. It is the way teachers utilize technology that has the potential to bring changes in education. Utilization is a noun form of the adverb 'utility' which means the act or process of using a particular thing, idea or method for the actualization of a purpose. Utilization of resources refers to and connotes the equitable use of resources accruable to an enterprise especially in the education industry for effective implementation of school curriculum (Fan in Xia, 2014). Utilization of instructional technology at the tertiary level requires teachers' knowledge in the subject area, as well as an understanding of how students learn using varied instructional resources, and a good level of technical expertise among the teachers. At present, the use of instructional technology may be of great help to teachers in delivering up-to-date and complete information in teaching a subject (Omariba, Gitau & Ayot, 2016).

According to the U.S. Department of Education (2020),

schools can use educational technology to support both teaching and learning by infusing the classroom with valuable digital tools, expanding course offerings, increasing student engagement, and accelerating learning. Instructional technologies offer learners control over content, learning sequence, pace of learning, time often media and allow them tailor their experiences to meet their personal learning objectives. Educators use instructional technologies to improve the efficiency and effectiveness of educational interventions in the face of social, scientific and pedagogical challenges (Olojo, Adewunmi and Ajisola, 2012). As a computer assisted learning and pedagogy for students centered and collaborative learning, it could be used to enhance skills and knowledge acquisition in business education.

Business education programme according to Aliyu (2016) is education for the acquisition and development of skills and competencies, attitudes which are necessary for efficiency of the economic system. It is also designed to develop special emphasis on marketable business skills and distributive occupations (Etuk, 2015). Business Education which is offered at the universities and colleges of education is concerned mainly with the development of relevant and saleable skills and knowledge that would enable an individual to function effectively in the world of work (Onojetah, 2012). It is pertinent to state that the development of business skills and knowledge in contemporary society could be achieved better through the use of instructional technology. The use of instructional technology in the teaching of business education can help reduce the length of time required for instruction leaving more time for practice of skills. Most instructional technology devices

are effective in the teaching of content and also help sustain learners' interest. The use of using video conferencing technology can allow students to travel the world from their classrooms, speak with virtual guest lecturers, and make friends and interact with others in different countries (Wainwright, 2012). Inviting experts to visit classrooms via video allows for an interactive experience for students with people skilled in the field being discussed. Specialists often have busy schedules, and video conferencing can reduce the time and expense of travel and simplify a visit from a subject-matter expert by projecting the expert directly into the classroom from anywhere.

Video conferencing in today's schools and classrooms is becoming widespread for global collaboration. Using video conferencing allows teachers to bring real world teaching experiences into the classroom of social interaction, collaboration, and literacy learning (Klenke, 2014). There are many different forms of literacy that teachers need to incorporate into their instruction, and technology to have a positive impact utilizing video conferencing. Literacy is not only reading, writing, and listening and speaking; it is many other things as well as technology and how one navigates through it. Students may be expected to use technology to reach out and connect with students in other classrooms using blogging, skyping, and emailing. To best prepare students for this type of connected learning, research showed video conferencing can benefit the students' learning (Certo, Moxley, Reffitt & Miller, 2010; Bowers-Campbell, 2011). Video conferencing can be used as a collaboration tool to involve critical thinking and problem-solving skills among students who partner with schools to learn

through creative, relevant curriculum projects. Using effective teaching models, teachers can take existing curriculum, develop project guidelines, set learning objectives and timelines to interact with a classroom in a distant location. Interactive videoconferencing can be used to connect one school to another, regardless of location.

Digital games refer to using actual digital video games as learning tools. The basic idea behind digital games in the classroom is that, as opposed to isolated tasks such as memorization, quizzing and drilling, digital games helps students learn subject matter in context, as part of an interactive system (Brian, 2016). Digital games are effective teaching tools because the learning takes place within a meaningful (to the game) context. What one must learn is directly related to the environment in which one learns and demonstrates it. Thus, the learning is not only relevant but applied and practiced within that context. Digital games create a virtual world that promotes necessary social and community skills and can create real-life simulations for learning (Johnson, Smith, Willis, Levine, and Haywood, 2011). It provides many benefits to learners such as active engagement, information-based skills, decision-making skills, innovation, problem-solving skills, knowledge construction, and discovery learning.

Digital games are user-centered; they promote challenges, co-operation, engagement, and the development of problem-solving strategies (Gros in Ferguson, 2014). Digital video games not only promote student engagement and motivation but also can be used in various other educational ways to promote student learning. Such games benefit learners in other ways such

as introducing computer literacy, science and technology preparation, improved spatial skills, verbal and iconic skills, increased visual skills, increased attention span, and increased response time. The perception of teachers towards digital game is important in the implementation of its techniques in learning. Several studies have been conducted to investigate teachers' attitude and perception of game-based learning. Noraddin (2015) examined the opinion of teachers concerning the use of digital games in learning. Using university teachers in Malaysia, Noraddin found that teachers have a positive perception towards the use of digital games in learning. Games apply to Jean Piaget's theories about children and learning. The concepts of assimilation and accommodation are relevant to digital games, where cognitive disequilibrium is at play for the learner. In other words, students learn from failures and successes they encounter during digital games (Neese, 2016). Digital games create environments for students that are immersive and actively engaging.

Despite the use of instructional technology at all levels of education, students still find it difficult to cope with the study of business education in colleges and universities. One of the reasons why students sometime find it difficult to comprehend immediately what is being taught by the teacher is non-utilization of instructional technology, which has made teachers handle subjects in abstract manner, portraying it as dry and non-exciting (Eshiwani in Tety, 2016). Orji in Effiong and Igiri (2015) stated that instructional aid is the guidance of learning activities that a teacher uses to motivate and arouse students to learn. It provides opportunities for students to work collaboratively with teachers, discussing ideas or

asking questions outside of the physical classroom. For instance, teachers could hold digital office hours, making themselves available via instant messaging or video chat to support students as they tackle the day's assignment and eliminating constraints such as standard classroom hours or geographic location.

The influencing factors on the utilization of instructional technologies by business educators in tertiary institutions could be age and gender. Academic literatures suggest that age is a factor that might moderate teachers' use of technology. Hamari and Nousaien (2015) found that older teachers perceive new technologies as a threat and cause of anxiety than younger teachers. Young teachers are more enthusiastic and more energetic than older ones. Similarly, Sanchez-Mena, Marti-Parreno and Aldas-Manzano (2017) observed that age affected teachers' perceived value on the use of educational video games in teaching. The effect of perceived ease of use on perceived usefulness in younger teachers might rely on their familiarity with video games compared to older teachers.

Another factor that comes into play is the gender of business educators regarding their utilization of instructional technologies for quality instructional delivery. Gender in this study means the physical attributes of a person as a male and female. It is possible that male and female business educators may differ in their utilization of instructional technologies in tertiary institutions in the area of the study. For instance, Daramola (2013) stated that male teachers visit the virtual library more frequently than female teachers. Daramola also noted that low intensity of virtual library visits among females might be as a result of their perception

of the virtual library and the difficulty in combining academic work with home chores. Furthermore, Mahdi and Al-Dera (2013) submitted that male teachers had access to the internet in their offices more than female teachers. The gender factor might be an essential factor that affects the use of instructional technology in teaching.

Instructional technology devices are of no value to business education students if they are not adequately utilized by their teachers. Researchers in education (Brown, Lewis & Harcleroad, in Omariba, Gitau & Ayot, 2016) have shown that with present inadequate infrastructure, large class sizes, obsolete equipment, shortage of personnel, lack of technologically skilled teachers, gross underfunding and general neglect in public secondary schools in Nigeria, it is difficult to intensively achieve the goals and objectives of quality education and training. This could also account for why there are high rate of failures in students academic performance. It is upon this background that this study sought to ascertain the business educators' utilization of instructional technology for quality instructional delivery of business education programme in tertiary institutions in Anambra State.

Statement of the Problem

Current developments in ICTs have increased the level of interactivity and collaborations among learners and tutors. With advancement in web technology in the 21st century, instructional technology has become an invaluable technology for teaching, learning and research in education. Instructional technology has so many advantages on teaching and learning. However, despite these numerous advantages, some teachers still find it

challenging in transiting from the analogue to the digital in teaching and learning of business education and it has been seriously affecting the students' academic performance as regards to the acquisition of appropriate skills. This is because teachers adopt theoretical methods as a way of teaching and learning the subject, mainly due to underutilization of instructional technology in schools. Majority of teachers who were trained early 1990's and backward do not have skills in the field of Information and Communication Technology. Where there are skilled teachers, other problems naturally include problem of installation, maintenance, operation, network administration and local technicians to service or repair these equipment's and the other facilities. As a result, the morale and interest of students in business education is low. Thus, this study is imperative as it will x-ray the actual situation on the utilization of instructional technology for quality instructional delivery of business education in tertiary institutions in Anambra State.

Purpose of the Study

The main purpose of this study was to examine business educators' utilization of instructional technology for quality teaching of business education in tertiary institutions in Anambra State. In specific terms, the study examined business educators' utilization of:

- video conferencing for quality teaching of business education in tertiary institutions in Anambra State.
- digital games for quality teaching of business education in tertiary institutions in Anambra State.

Research Questions

- The following research questions guided the study:
- To what extent do business educators utilize video conferencing for quality teaching of business education in tertiary institutions in Anambra State?
- To what extent do business educators utilize digital games for quality teaching of business education in tertiary institutions in Anambra State?

Hypotheses

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

- Male and female business educators do not differ significantly in their mean responses on the extent of utilization of video conferencing for quality teaching of business education in tertiary institutions in Anambra State.
- There is no significant difference in the mean ratings of business educators on the extent of utilization of video conferencing for quality teaching of business education in tertiary institutions in Anambra State on the basis of age (22-40 years and 41-60 years).
- Male and female business educators do not differ significantly in their mean responses on the extent of utilization of digital games for quality teaching of business education in tertiary institutions in

Anambra State.

- There is no significant difference in the mean ratings of business educators' on the extent of utilization of digital games for quality teaching of business education in tertiary institutions in Anambra State on the basis of age (22-40 years and 41-60 years).

Method

The descriptive survey research design was adopted for the study. According to Nworgu (2015), a survey design involves the collection of extensive data from the population for the purpose of describing and interpreting an existing situation under study using a questionnaire. The study was carried out in tertiary institutions in Anambra State in the South-East geopolitical zone in Nigeria. The population of the study consisted of 119 business educators from the five tertiary institutions that offer business education programme in Anambra State. The entire population was used as the sample size since the population is of a manageable size and the respondents were adequately reached. The instrument for data collection for this study was a structured questionnaire developed by the researcher based on the review of related literature and in relation to the research questions guiding the study. The face validity of the instrument was established using three experts. The questionnaire was structured on a 5- point rating scale of Very Highly Utilized (VHU), Highly Utilized (HU), Moderately Utilized (MU), Lowly Utilized (LU) and Not Utilized (NU). Cronbach Alpha was used to establish the reliability of the instrument. The reliability index obtained was r = 0.80. The researchers and three research

assistants administered the questionnaire to the respondents. Out of the 119 copies of the questionnaire administered, 16 were not usable and 10 were not returned. Thus, 93 copies of the questionnaire represented 78.15% return rate, were used for data analysis. Data were analyzed using mean, standard deviation and t-test. Mean was used to answer the research questions and standard deviation was used to explain how the responses of the respondents varied. t-test was used to test the hypotheses at 0.05 level of significant. In testing the null hypotheses, when the p-value is less than or equal to 0.05 ($P \leq 0.05$), the null hypothesis is rejected. On the other hand, when the p-value is greater than 0.05 ($p > 0.05$), the null hypothesis is accepted.

Results

Research Question 1 – To what extent do business educators utilize video conferencing for quality teaching of business education in tertiary institutions in Anambra State?

Analysis of data relating to this research question is presented in Table 1

Table 1

Respondents' mean ratings on the extent business educators utilize video conferencing for quality teaching N =93

S/No Video conferencing	Mean	SD	Decision
• Using recording tools to playback a lesson	2.22	0.66	Lowly utilized
• Using blogs to connect with teachers in other locations	2.34	0.66	Lowly utilized
• Using Skype to connect with experts	2.15	0.65	Lowly utilized
• Using video conferencing to save lessons	2.44	0.76	Lowly utilized
• Using models to develop project guidelines	2.17	0.63	Lowly utilized
• Using video conferencing for revision of lesson	2.00	0.72	Lowly utilized
• Using online conferencing to encode text	2.17	0.72	Lowly utilized
• Retrieving information through video conferencing	2.20	0.69	Low ly utilized
• Interacting face-to-face with the experts during presentation	2.17	0.68	Lowly utilized
Cluster Mean	**2.21**		**Lowly utilized**

Table 1 shows a cluster mean of 2.21 which indicates that business educators' lowly utilized video conferencing for

quality teaching in tertiary institutions in Anambra State. The standard deviations of 0.63 to 0.76 are within the same range showing homogeneity in responses.

Research Question 2 – To what extent do business educators' teachers utilize digital games for quality teaching of business education in tertiary institutions in Anambra State?

Analysis of data relating to this research question is presented in Table 2

Table 2

Respondents' mean ratings on the extent business educators' utilize digital games for quality teaching N =93

S/No Digital Games	Mean	SD	Decision
• Using digital games to reinforce skills	2.15	0.70	Lowly utilized
• Using PC computer to access digital games	2.23	0.61	Lowly utilized
• Using games to engage students in diverse activities	3.36	0.59	Moderately utilized
• Using interactive whiteboard to access digital games	2.11	0.65	Lowly utilized
• Providing knowledge that students can apply in real life	3.50	0.50	Highly utilized
• Developing high order cognitive skills	3.34	0.56	Moderately utilized
• Using digital games to conduct formative assessment	1.52	0.50	Lowly utilized
• Developing students interest in the course content and process	3.41	0.49	Moderately utilized
• Using digital games to provide immediate and frequent feedback during lesson presentation	1.87	0.55	Lowly utilized

• Assigning game play for homework	2.93	0.66	Moderately utilized
Cluster Mean	**2.64**		**Moderately utilized**

Data analysis in Table 2 shows a cluster mean of 2.64 which indicates that business educators' moderately utilized digital games for quality teaching in tertiary institutions in Anambra State. The standard deviations of 0.49 to 0.70 are within the same range showing that the respondents were not wide apart in their ratings.

Hypothesis 1

Male and female business educators do not differ significantly in their mean responses on the extent of utilization of video conferencing for quality teaching of business education in tertiary institutions in Anambra State.

Analysis of data relating to this hypothesis is presented in Table 3

Table 3

Summary of t-test result of male and female business educators on the extent of utilization of video conferencing for quality teaching

Video conferencing	N	$\bar{X}$	SD	df	P-value	Decision
Male	26	2.21	0.20	91	.33	Not significant
Female	67	2.20	0.22			

As shown in Table 3, male and female business educators do not differ significantly in their mean responses on the extent of utilization of interactive

whiteboard for quality teaching in tertiary institutions in Anambra State. This is shown by the p-value of .33, which is greater than the significant level of 0.05. Therefore, the null hypothesis is accepted.

Hypothesis 2

There is no significant difference in the mean ratings of business educators on the extent of utilization of video conferencing for quality teaching of business education in tertiary institutions in Anambra State on the basis of age.

Analysis of data relating to this hypothesis is presented in Table 4

Table 4

t-test analysis on mean ratings of business educators on the extent of utilization of video conferencing for quality teaching of business education on the basis of age

Video conferencing	N	$\bar{X}$	SD	df	P-value	Decision
22-40 years	39	2.17	0.21	91	.84	Not significant
41-60 years	54	2.22	0.22			

Table 4 shows that the p-value of 0.84 is greater than the significance level of 0.05. This implies that there is no significant difference in the mean ratings of business educators' on the extent of utilization of video conferencing for quality teaching in tertiary institutions in Anambra State on the basis of age. Therefore, the null hypothesis is accepted.

Hypothesis 3

Male and female business educators do not differ significantly in their mean responses on the extent of

utilization of digital games for quality teaching in tertiary institutions in Anambra State.

Analysis of data relating to this hypothesis is presented in Table 5

Table 5

Summary of t-test result of male and female business educators on the extent of utilization of digital games for quality teaching

Digital games	N	$\bar{X}$	SD	df	P-value	Decision
Male	26	2.60	0.17	91	.28	Not significant
Female	67	2.65	0.18			

Data analysis in Table 5 shows that male and female business educators do not differ significantly in their mean responses on the extent of utilization of digital games for quality teaching in tertiary institutions in Anambra State. This is shown by the p-value of .28, which is greater than the significant level of 0.05. The null hypothesis of no significant difference between the two groups is therefore accepted.

Hypothesis 4

There is no significant difference in the mean ratings of business educators on the extent of utilization of digital games for quality teaching of business education in tertiary institutions in Anambra State on the basis of age.

Analysis of data relating to this hypothesis is presented in Table 6

Table 6

t-test analysis on mean ratings of business educators on the extent of utilization of digital games for quality teaching of business education on the basis of age

Digital games	N	$\bar{X}$	SD	df	P-value	Decision
22-40 years	39	2.63	0.19	91	.64	Not significant
41-60 years	54	2.65	0.18			

Data in Table 6 show that there is no significant difference in the mean ratings of business educators on the extent of utilization of digital games for quality teaching in tertiary institutions in Anambra State on the basis of age. This is shown by the p-value of 0.64, which is greater than the significance level of 0.05. The null hypothesis of no significant difference between the two groups is therefore, accepted.

Discussion

The findings of the study indicated that business educators lowly utilized video conferencing for quality teaching of business education in tertiary institutions in Anambra State. The findings of the study corroborate that of Kiarie (2014) who stated that 62.5% of teachers do not use computers for instructional purposes. Using videoconferencing in the classroom can transform students who normally are not motivated learners into motivated learners. Many students have different learning styles and fortunately videoconferencing can incorporate many of those learning styles when effective teaching models are applied. Utilizing videoconferencing in the classroom can be visual, interactive and informational, which can benefit a broad range of learning styles. In support of this Al-Ahdal and Al-Hattami (2014) affirmed that videoconferencing technology helps students to interact with international participants using social media like Facebook and chatting rooms which improves communication and understanding. Testing of the first and second hypotheses

revealed that male and female business educators did not differ significantly in their mean ratings on the extent of utilization of video conferencing for quality teaching of business education in tertiary institutions in Anambra State. There was also no significant difference in the mean ratings of business educators' on the extent of utilization of video conferencing on the basis of age. It followed therefore, that the null hypothesis was accepted.

The findings of the study also indicated that business educators moderately utilized digital games for quality teaching of business education in tertiary institutions in Anambra State. The findings of the study are similar with that of Aja and Eze (2016) who found that ICT devices are not adequately used in teaching and learning in secondary schools. In support of this, Sanchez-Mena, Marti-Parreno and Aldas-Manzano (2017) stated that teachers' utilization of digital games in teaching and learning is a means of motivating students to learn in a more entertaining way and also to increase students' engagement with the learning activities. Similarly, Noraddin (2015) found that teachers have a positive perception towards the use of digital games in learning. Digital games can boost students motivation because they provide fun elements, richer learning experiences and sustain students' attention to lessons. Digital games help students to better understand subjects taught. The test of the third and fourth hypotheses indicated that male and female business educators' did not differ significantly in their mean ratings on the extent of utilization of digital games for quality teaching of business education in tertiary institutions in Anambra State. There was also no significant difference in the mean ratings of business educators on the extent of utilization of digital games

on the basis of age. Therefore, the null hypothesis of no significant difference is accepted. This agrees with the findings of Noraddin (2015) who stated that gender or age had no influence on teachers' point of view towards using digital games as a motivational, instructional and collaboration tools with teaching and learning in higher education.

Conclusion

Instructional technology is necessary ingredient for the attainment of business education objectives, but this study found out that some business educators in tertiary institutions lowly utilized this technology for quality teaching of business education, while others moderately utilized it in teaching. Utilization of video conferencing and digital games by business educators is essential for acquiring timely, current and up-to-date information necessary for academic excellence. On the basis of these findings therefore, it could be concluded that the utilization of instructional technology by business educators may help business education students acquire entrepreneurial skills that will help them to be self-sufficient in the competitive world of work.

Recommendations

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

- National Union of Universities (NUC) and National Commission for Colleges of Education (NCCE) should organize seminars, workshops and any other in-service courses frequently to familiarize and sensitize teachers with a wide range of instructional technology and their potentials. This could trigger teachers' creativity

and innovation in the use of instructional technology in the teaching and learning process.

- All institutions must scramble different options of online pedagogical approaches and try to use technology more aptly. This will help in creating a collaborative and interactive learning environment where students can give their immediate feedback, ask queries, and learn interestingly.
- Tertiary institutions should endeavor to establish ICT centers and provide necessary facilities like computers, web-connectivity and constant electricity supply in the institutions to enhance students' access to e-learning facilities.

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CHAPTER 24.

DEVELOPMENT OF A WEB-BASED E-EXTENSION MEDIATED COMMUNICATION INSTRUMENT FOR FARMER EDUCATION AMIDST COVID-19 PANDEMIC IN DELTA STATE NIGERIA

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Abstract

Agricultural extension stands in the gap between government agricultural policies, programmes and projects and the farmers who need ideas, advice and information to effectively carry on agricultural activities across the value chains. E-extension is the deployment of information and communication technology (ICT) tools used in carrying out extension service delivery. Previously in Delta State, extension use to comprise mainly of face-to-face contact between extension agents/advisors and farmers, but the emergence of COVID-]9 pandemic made this practice unsafe, occasioning lockdown and social distancing. E-extension was adopted by Delta Agricultural and Rural Development Authority (DARDA previously ADP) by using electronic and internet tools,

such as radio and television broadcasts, social media applications and web-based data gathering tools. (www.darda.org.ng; www.darda.org.ng/portal/login.asyx). These required the deployment of devices such as computers, mobile phones, internet, video cameras, personal digital assistants (PDA'S) etc. While e-extension has the potentials of ensuring agricultural information gathering and dissemination to and from farmers, it was confronted by several challenges such as poor receptivity of radio and television broadcasts in rural areas, poor internet connectivity, lack of mobile phones, ICT illiteracy amongst extension agents and farmers, and poor installed capacity of e-extension devices in the extension zone blocks and cells. Suggestions on enhancing farmer education include training and retraining of extension agents and farmers, improving receptivity of broadcasts, and network connectivity, issuance of mobile devices as loans to agents and farmers and adhering to COVID-19 protocols.

Keywords: e-extension, farmer education, Covid-19 pandemic, radio and television broadcast, social media, web-based, mediated tools.

Introduction

The success of agricultural ventures in any nation is predicated on the commitment shown by the government and the farmers. While government generates policies, programmes and regulations that guide agriculture as a critical sector that enhances the economy of the nation, the farmers (agriculturists) are the persons that carry on farming and associated activities that make it contribute to economic development of that society. In this mileu, agricultural extension stands in the gap between government and the farmers by bringing developments in agricultural policies, programmes and projects to the people (farmers) while transmitting the challenges of farmers to agencies of government for resolution and communicating same to the farmers to promote

agriculture. In the words of Goldberg (2009) education must lead to empowerment enabling individuals to be capable of making decisions, and meeting the changing needs of people and the society. This view extends to farmer education which is needed for enhanced agricultural productivity.

In Delta State, extension service delivery is the responsibility of the Agricultural Development Programme (ADP). It is the extension arm of the ministry of Agriculture and National Resources (MANR). It was initiated in the State from 1999 and till date ADP (Now Delta Agricultural & Rural Development Authority, DARDA) has implemented programmes such as extension services, women in agriculture (WIA), seed multiplication, crop adaptive research, agro forestry, land management, livestock production, fisheries production, farm road rehabilitation, rural water schemes and Fadama farming, (MANR, 2019). ADP also collaborates with the Federal Government and other international agencies to implement intervention programmes and projects such as root and tuber expansion programme (RTEP), National Programme on Food Security (NPFS). Livelihood Improvement for Family Enterprises in the Niger Delta (LIFE-ND). All these programmes and projects are targeted interventions directed towards rural, small holder farmers, aimed at making their agricultural enterprises profitable and sustainable. Usually, they are managed by the extension arm of the Ministry of Agriculture and Natural Resources, whose agents are competent, trained and retrained periodically to transfer information, technologies and techniques to the farmers for success in farming.

In this extension service delivery, it involves physical

contacts and interactions among extension advisors, farmers, researchers, and programme donors and/or other government officials. With the advent of COVID-19 pandemic and the attendant restrictions on person-to-person contact that it threw up across the world, it became really challenging for extension agents/advisors to effectively participate in training programmes and information dissemination to farmers or retrieval of information on farming challenges from farmers, for onward transmission to researchers, input providers customers, markets, distribution outlets etc. Tibi and Ugboh (2007) revealed that ICT is a veritable tool and a requirement for agricultural and rural transformation in Delta State and Nigeria, though it is not widely accessed yet by farmers in rural communities.

The availability of digital technology was perceived as a possible route through which the extension service activities would be conducted while sticking to the protocols enunciated by authorities as ways and means of curbing the spread of COVID-19 pandemic among persons involved in agriculture, especially between extension agents and farmers who need continuous farmer education to remain active, successful and progressive in sustainable agriculture. The utilization of ICT in facilitating knowledge acquisition and dissemination within and between various disciplines had been such that human input is reduced to the barest minimum with supersonic speed, (Ejiofor, 2009). Here lies the advantage of using ICT under the coronavirus challenge imposed on farming.

Statement of the Problem

In the face of the challenges posed by COVID-19 pandemic, especially in hampering the activities of

extension personnel to deliver on their farmer education mandate due to restrictions on physical contact between critical stakeholders in agriculture, it became necessary to find innovative ways of delivering on extension services. Salami (2015) stated that education for the 21st Century is that which prepares individuals to survive today's world of relentless advancement towards uncertain future scenarios. Atajeromavwo et al (2007) studied the problems associated with classification, storage and retrieval of information on soil data, and recommended the use of algorithms for generating various soil classifications, storage and retrieval techniques on soil data and other agricultural mass data. As a way of confronting the problems facing farmer education in Nigeria, occasioned by the COVID-19 scourge, the need to innovate extension delivery in Delta State became critical. Thus, e-extension had to be considered as a way of surmounting this challenge. According to The Victoria State Government (2013), innovation is all about looking beyond what we currently do well, identifying the great ideas of tomorrow and putting them into practice. It is therefore critically important that when changes occur in our environment, the needs of learners change alongside, new data become available and so innovative responses need to be provided to ensure sustainability of life and livelihood. This innovation came by way of introduction of information and communication technology (ICT) into extension delivery, known as e-extension.

How E-Extension Works in Agriculture.

E-extension is the deployment of ICT tools in carrying out extension service delivery to farmers such as use of zoom, Whatsapp message, Whatsapp voice as well as video communications. It also involves the creation of

data-base that would enable interactions between stakeholders in the agricultural value chain. According to Akudolu (2002), ICT consists of all kinds of electronic systems that are used for broadcasting, telecommunications and all forms of computer-mediated communications. ICT is simply digital convergence which is facilitated by using digital gadgets such as computers, internet, pager, personal digital assistants (PDAs), radio television communication satellite, digital video camera, fax machine, mobile TV, blackberry, ipads and social media like Twitter, Instant Messenger, Myspace, Facebook, Flicker, 2go, Chatting, Skype, Podcasting, Blogging, Voice over internet protocol (VOIP), Whatsapp etc (Akpan, Ebieme and Ekaenang, 2014).

The purpose of this study was to examine how to use ICT in carrying out extension service delivery to farmers in Delta State in the form of e-extension, that is intended to bridge the gap inadvertently created between extension service providers and farmers by the COVID-19 pandemic whose spread is fueled by physical contact and proximity amongst persons. E-extension, also known as cyber-extension in agricultural practice means the use of information and communications technology in the dissemination of agricultural information concerning technologies, inputs, outputs challenges, processes etc that enhance agriculture. It involves the use of online networks and multimedia in transmitting information between extension practitioners and farmers virtually. Azonuche (2015) stated that ICT facilitates teaching and learning processes since individuals can access information from any part of the world without changing location. This is at the core

of extension in agriculture because information on new developments in agriculture can be effectively exchanged between stakeholders including extension agents, researchers, farmers, processors, marketers and even consumers, across the whole agricultural value chain, without person-to-person contacts.

The general objective of using ICT as a means of deploying e-extension was to ensure that farmers in Delta State remained in food and other agricultural production even as COVID-19 continued to ravage the world, leading to partial to total lockdown, to stave off its devastating spread, which occurs with human contacts. Specifically the objectives of e-extension include the following:

- to transfer competencies of agriculture (knowledge, attitudes and skills/practices) from extension practitioners an experts to farmers by using web-based technologies
- to effectively collect agricultural data and information from farmers by using mobile applications, in solving farmers' problems
- to enable extension advisors and farmers take appropriate and precise decisions on agricultural issues.
- to build an efficient and effective database of farmers, to guide government, intervention agencies and community development partners in taking decisions through data that are verifiable.
- to improve on the marketing, pricing, distribution, processing and consumption/use of agricultural inputs and outputs.

- to support the processes of environmental protection, impact assessment and sustainability in agricultural value chains.

Ordinarily, the specific objectives stated above would have been realized mostly through physical contacts, amongst stakeholders in agriculture such as the extension service personnel, the farmers, input suppliers, researchers, teachers of agriculture at the various educational levels etc. These contacts would include training sessions, visits to farms, several meetings as listed below:

- Research Extension Farmer Input Linkage System (REFILS) held annually and at zonal levels by researchers from Nigerian Institute for Oil Palm Research (NIFOR) for the South-South Zone especially for On-farm Adaptive Research (OFAR)
- Steering Committee Meeting of REFILS which rotates from state to state in the South-South zone on a quarterly basis (4 times a year)
- Monthly technology review meeting (MTRM) where farmers submit their farm challenges to researchers for resolution.
- Fort-nightly meetings (FNT) between extension advisors and farmers at the state zonal levels in Agbor, Efurun and Warri.
- Block Level Meeting (BLM) which holds at block (i.e Local government levels) between Block Extension Supervisors and Extension Advisors.

As stated earlier the services provided during these meetings and training sessions consist of the following:

- Agricultural extension services delivery
- Research extension services delivery
- Research extension farmer input linkage services (REFILS)
- Monitoring and evaluation of projects
- Facilitating the provision of improved seeds, seedlings, fish fingerlings, chicks, piglets/weaners etc.
- Farmers education and induction services and
- Advice to farmers on credit facilities (DARDA Service Charter, 2019). All these services were adversely affected by the COVID-19 pandemic and this necessitated finding other ways of ADP (DARDA) continuing to interface with farmers and other stakeholders through the deployment of digital technology in form of ICTs.

Use of ICT in Disseminating Extension Information

Having recognized that extension agents/advisors, farmers and other stakeholders may not have the capacity to use sophisticated applications in information gathering or dissemination, under the COVID-19 pandemic situation it became necessary to look at basic electronic tools for e-extension. The identified ones included the following:

- Radio and television broadcasts
- Social media applications

- Web-based data gathering tools

Communication, which is the sharing of ideas and information forms a large part of the extension agent's job, because in the course of passing ideas, advice and information, farmers decisions are influenced (www.fao.org). As noted further by FAO, (retrieved), the major strength of extension services are the extension workers who personally work through various methods to transfer the technologies to farmers and get them adopted for increased production using the complementary and supplementary tools for extension systems such as radio, television, mobile phones, internet, results and methods demonstrations.

a) Radio and Television Broadcasts in E-extension: As a way of continuing information dissemination to farmers while trapped at home or in rural farms due to the COVID-19 challenge, extension agents resorted to the development and deployment of radio and television jingles, advertisements, audio and video marketing, pricing, technological and agro-chemical broadcasts to farmers in rural communities. Wahab (2015) stated that as opposed to traditional agricultural extension, radio and television stations have a great potential of being able to reach more people at a given time, because broadcasting is made possible through satellites and antennas. In this context, radio or television channels are tuned to, at specified times, dates and days when the agricultural messages are aired in order to benefit from the knowledge, attitudes and skills of agriculture without meeting face-to-face with the agents. Since such messages are planned, produced and recorded, chances are that they are hardly subjected to distortions, as would

happen if they were being passed from person-to-person. Besides, repetition of such messages on radio and television guarantees that farmers have many opportunities to access the undiluted information and effectively put them to use. However, as noted by Mubofu & Elia, (2017) despite the great potential which radio and TV broadcast have for knowledge dissemination and accessibility to formers, studies have shown that in Tanzania that the level of usage of these media facilitates for farmer education is still very low on the other hand, Tiamuyi et al (2011) reported that the more farmers own ICT tools, the higher the frequency of using such tools for agricultural purpose.

b) Social Media Applications in E-extension: Social media applications have been introduced into agricultural extension delivery, especially since it became unsafe to have physical contacts amongst stakeholders in carious agricultural activities due to coronavirus pandemic This has become a veritable tool to use in mitigating the challenges posed by the traditional agricultural extension delivery of face-to-face contact between stakeholders. Social media have been described as web based tools of electronic communication that allow users to personally and informally interact, create, share, retrieve and exchange information and ideas in any form that can be discussed, archived and used by anyone in the virtual communities and networks (Suchiradpta and Saravanan 2016). Several electronic tools that support the delivery of information between extension agents and farmers like voice, image, motion, instant messages and application such as Whatsapp, text messages, myspace, etc Of all these social media applications, the easily available ones used in extension

are short message service (sms), whatsapp message, whatsapp voice message, zoom (especially for trainings and retrainings), facebook, twitter and video message. Information are exchanged between extension agents and farmers using ordinary, android or i-phones, as well as tablets, i-pads, computer etc.

c) Web-based Data Gathering Tools: Communication between extension agents and farmers would not be possible if there was no point of contact between them. Since COVID-19 impeded person-to-person interaction as found in traditional extension delivery, it became expedient that data on farmers had to be gathered online. This led to the development of the world-wide web data gathering tools. The use of social media applications is also dependent on concrete data of farmers using phones, email, facebook, messaging platforms which need to be linked to the database of the extension agency (DARDA, 2020).

Tim Berners-Lee, A British scientist invented the world wide web (www) in 1989, while working at the European Council for Nuclear Research (CERN). www was originally designed to meet the demand for automated information sharing between scientists in universities and institutes around the world. It was meant to merge the evolving technologies of computers, data networks and hypertext into a powerful and easy-to-use global information system, based on texts, clear picture displays, videos and audio. The tools describe the design, development and implementation of web based agricultural extension in Delta State, also known as e-farming information from DARDA to farmers researchers, investors, importers, exporters, manufacturers, marketers, distributors etc. Introducing

farming information system on the www allows potential users to query and obtain desired information, since the data in this system are stored in a central database which is maintained by experts. The product output is an operational mobile application known as DARDA Farmers Data Collection Tool Kit which has a total of twelve (123) thematic areas of agriculture as follows:

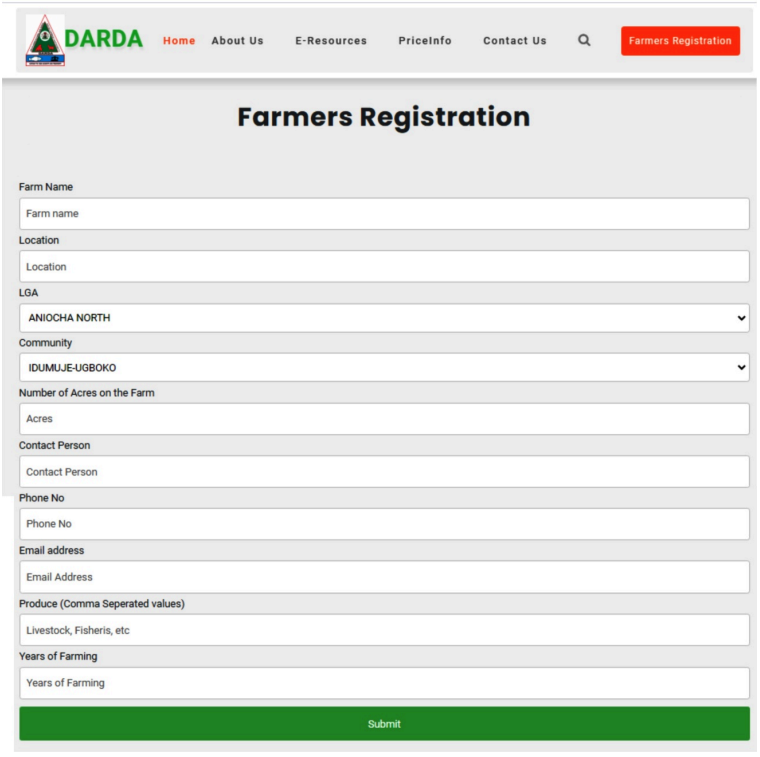
- Land and related agricultural issues e.g. tenure etc.
- Agricultural practices
- Crops
- Livestock
- Services for agriculture
- Demographic and social characteristics
- Irrigation for off-season agriculture
- Work on the Holdings
- Gender issues/women in agriculture
- Aquaculture
- Artisanal Fishing/fisheries

In order to achieve this, an operational interactive and easily navigable e-extension mediated communication (e-EMC) platform was developed. This was backed by an operational Uniform Result Location (URL) of backend application purely for DARDA staff i.e. www.darda.org.ng. Equally, a frontend output view for all i.e. DARDA staff, farmers, researchers, investors, marketers and other stakeholders etc as well as for farmer registration i.e. www.darda.org.ng/portal/logion.aspx.

The choice of the software used to design the forms and

the database was based on simplicity, robustness, and ease of coding. To successfully implement this information system the following files were paramount: Login.php, signup.php, profile.php, welcome.php and style.css.

Creating a user based signup site seemed a daunting task in the past but today we can import/acquire the data of already existing users on the DARDA database. The whole process consists of two parts. User registration or (sign-up) and user authentication (sign-in). The form below shows this:



Challenges in Extension Development

Several challenging issues emerged while developing and implementing e-extension during the COVID-19

outbreak. These included many of the underlisted but not exhaustive encounters:

- Poor receptivity of radio and television broadcasts in rural farming communities due to limited ranges of the radio and telecast antennas and masts as well as the qualities of radio and television receivers owned by the farmers.
- Coupled with above, was the issue of poor internet connectivity and low installed capacity of ICT tools in rural areas. Situations were made worse with non-availability of regular electricity supply in these areas.
- Lack of ICT enabled tools such as mobile phones, tablets, ipads, laptops, computers etc, in addition to training deficiency on usage amongst agents and farmers
- High level of ICT illiteracy amongst extension agents and farmers, resulting in poor capacity to develop skill-based training materials for farmers
- Resistance to change amongst extension agents and farmers who had been used to person-to-person contacts of traditional extension delivery.
- Restrictions that were placed on stakeholders such that the bare essentials needed to implement e-extension were not even available, due to the intensity of the coronavirus spread, thus limiting the level of success of the programme.

Suggestions of Implementing E-Extension

As ways of improving the effectiveness of e-extension

delivery during the coronavirus scourge, the following suggestions were made:

- There should be virtual/digital training and retraining of extension agents, farmers and other stakeholders in the agricultural sector on the use of ICT.
- There should be enhanced installed capacity of electronic broadcast facilities to improve receptivity of radio and television extension programmes on farming communities, markets and distribution facilities.
- ICT and internet connectivity should be extended to all the rural and urban communities for stakeholders' use.
- Mobile devices such as android phones, tablets, I-pads, laptops, desktop computers as well as internet kiosks for community based farmers' Data Collection tool kits should be provided for trained and periodically retrained farmers to upload and/or download data, while adhering to stipulated COVID-19 protocols.

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CHAPTER 25.

THE BORDERLESS WORLD-INFORMATION AND COMMUNICATION TECHNOLOGY (GREEN); BRIDGING DIGITAL GAP IN EDUCATION.

AGHWARE F. O (PHD); MALASOWE B. O (PHD); AND OJIE D. V

Abstract

A colossal causatum of the COVID-19 sudden happening is the radical global embrace of Information and Communication Technology (ICT) in all spheres of the education sector especially in developed economies regardless the preparedness. Going by the new normal kind of, irrespective of the imminent challenges of its prior ubiquitous adoption, there is now a swift resultant ICT inclusion in which the economy is wholly driven by ICT. Notably in education, the COVID -19 disruption scaled up ICT as an instantaneous apparatus to subsist the teaching and learning sector during the universal lockdown which ravaged the whole world between 2019 through 2020 of which the impact still evident. Again, the out break of the Pandemic revealed to many world leaders in many developing countries that they had no choice than to embrace an ICT instrument propelling the

development of national knowledge-base. Regardless the superficial hitches in ICT integration in teaching and learning, the effects of the COVID-19 pandemic fast tracked ICT penetration hence today, teachers and students in Nigeria and in deed worldwide had no choice than to work online notwithstanding their preparedness in terms of knowledge, skills and resources for the implemetation ICT in teaching and learning. In as much as ICT has come to stay in bridging the gaps in the education sector to in today bortherless world, the place of Green Information Technology must be acknowledged. This research paper addresed how ICT instantaneously bridged the educational gaps in a pandemic inclusive lockdown; and addressing Green IT as it affects our ecosystem. The research has provided the necessary information and details why there should be compulsory implementation of ICT in education to truely bridge the digital gap that existed in the education sector in our today botherless world thus proffering how best to deploy the ICT tools in securing the ecosystem.

Keywords: ICT, Covid -19 Pandemic, Green IT.

Introduction

As it stands in today borderless world, everybody even in the interior villages have come to the realization, the important need to embrace the use of ICT in our everyday life especially in teaching and learning endeavor. Masssive open online classes that can house over ten thousands learners simultanously and the DO It Yourself (DIY) has been a hot topic of discussion in recent time in the world of education. And from the foregoing, the inclusion of Green Information Technology aspects of the use of Information and Communication Technology in the education sector is expedient considering the fact that use of ICT is contributory to the ozone layer depletion. Information and Communications Technology (ICT) typically refers to all forms of computing, the internet, telecommunications, digital

media and mobile phones. It is on that account the technology is widely used in schools for teaching and learning as an irresistible resource.

Although impacts of Information and Communication Technology (ICT) in the education sector overwhelming, none or improper deployments of the infrastructure invalidates the fundamental benefits expected thereof. ICT tools needs to be deployed efficiently first by having environmental sustainability in mind to ensure requisite protection of our planet Earth. The momentous climate changes in recent years is a pointer that the planet Earth is not healthy. To this end, the Green or sustainable ICT practices must be desirably assented to by everyone for future sustainability. Imperatively, every individual in the field of ICT is required to be a trendsetter for ultimate sustainability. Today, many countries seek to create a society in which all citizens can reach and share information by trying to form supportive policies that narrow the digital gap unlike in developing economies like Nigeria where the case is completely different. Individuals in Nigeria struggle themselves to survive in virtually every sphere of the global ICT infrastructure.

Green Information Technology (IT) – Carbon footprint of the global ICT industry

Green IT in consonance with Patricia (2012), is the systematic application of practices that enables the minimisation of the environmental impart of IT and the reduction of emmission based on technological interventions. By a survey by Global consultants, ICTs by and by account for approximately 0.86 metric gigatonnes of carbon emissions annually, or just about 2% of global carbon emissions (Gartner, 2009). The International Telecommunication Union (ITU) has approximated the

beneficence of ICTs (except the broadcasting sector) to climate change at between 2% and 2.5% of total global carbon emissions (ITU, 2009). The predominant sectors within the ICT megacorps are Personal Computers (PCs) and monitors (40%), data centres, which accrue a further 23%, while fixed and mobile telecommunications with 24% of the total emissions. Boccaletti, Löffler and Oppenheim (2008) in a research, put forward a concerned prediction perceiving that emissions from the manufacturing and utilization of PCs alone will double over the next 12 years as middle-class buyers in emerging economies go digital. In the same vain, worldwide growth in the use of mobile phones is predicted to triple their carbon footprint by 2020, in large proportion as a result of their consumption of silicon and rare metals. By and large, the velocious subscriber to carbon emissions will be attributed to the increasing number and size of data centers, whose carbon track aggrandizement is more than fivefold between 2002 and 2020 as the number of servers in organizations are increased to brace up with increasing demands even with the bid of companies and governments' anticipation to enhanced energy efficiency. (Boccaletti, 2008).

ICT theory

This research work is anchored on Technological Determinism theory. According to Lievrouw and Livingstone (2006), the technological determinism theory accedes ICT's devastating potentials to energize human actions economically, productivity, socially, and development. The salient points in this research paper are specific considerations for the education sector. It is projected that the proper deployment of ICTs will bridge the digital gap created by the same ICTs bringing about

changes that would enhance teaching and learning experiences in our education system in the recent information superhighway. The knowledge of this theory equip the authors and implementers of education policies to effectively bridge the digital divide.

Conceptualising Development of Information and Communication Technology (ICT)

Four conceptual assumptions are evident in the development of ICTs. (Heeks 1999; Heeks 2002; Fuchs 2008; Heeks & Stanforth 2015). They are:

Technology and Society. There is an affiliation between technology and society with each connected to and affects each other. It can then be concluded that ICT sstructures the society; society shapes ICT.

Technology. As there exist an interdependence between technology and society, ICTs then cannot just be thought of as just hardware and software. They are always socio-technical systems which comprise a network, software, hardware, processes, people, institutions among others involved in design, use and governance of the ICTs.

Society. This can be thought of as operating in three forms, interlocked systems – economic, political, social. Each of these shapes and is shaped by ICTs.

People. The ICT systems also house people. The inter-relation between agency and structure can also be seen hence, human actions shape the organisations and institutions.

This conceptualisation has shown that ICT has a great effect in the society. Apparently today, since the right avenues were not embraced and implemented, digital divide has become all-inclusive especially in developing countries. Since ICT conceived the digital divide

particularly in education, it is the same tool that must be deployed in bridging the global digital divide in securing the ecosystem. This paper therefore presents a model for possible adoption.

Objective

This paper propose a Generic Green ICT Model to be deployed in bridging the digital gap created by the haphazard deployment of ICT considering the Carbon Emission from the ICT sector.

Methodology

Due to to the nature of this research, digital divide is difficult to confine to any specific disciplines knowing fully well that teaching and learning takes place every minute in our daily lives. However, the research methodology is based on the frameworks of Norris (2001) and Van & Hacker (2003) works on the digital divide can be found in different journals. Additionally, the following online journal databases were searched to provide the digital divide literature. They include ABI/ INFORM database, the ACM Digital Library, the Emerald Library and Science Direct.

Literature review

Inadequacy ICT implements such as internet, telephony, and personal computers, are rapidly demeaning economic advancement. By today, a social dichotomy exist between the group who have access to relevant information communication technology infrastructure in the society and those lacking. This contrast is what is now mostly so-called the digital divide. (Sunday & Emmanuel, 2014). Social and economic development arising from research and unrestricted development are as well traceable advent of ICTs. However, the fact remains of the uncertainties associated

with their deployment owing to their latencies on new normal in the society, creating social networks, business reorientation as well as service delivery patterns in the say in the education sector.

Van (2000), X-ray digital divide as a phenomenom which became popular in the 1990. National Telecommunication and Information Administration (NTIA 1999), threw light on digital divide as the cleave between a group that had entree to the ICTs and and others to whom ICTs is impervious. World Economic Forum, (2000), conceived the ICT dichotomies as digital divide. Similarly, an irregular array of ICT penetration and dispersal between technologically advanced nations and developing economies exist. (Campbell, 2001). In terms of nomenclature, (Rice, 2001) refered the the overall digital gap as "technological divide". In another perspective, Smith & Marx (1996) considers technology as a major surrogate factor in a society. In spite availability of ICTs, empirical reviews by (Lentz & Oden, 2001; Chowdary, 2002; Hartviksen, Akselson & Eidsvik, 2002; James, 2002, 2003; Lim, 2002; Ming & Li, 2002; Moss, 2002 among others, were engrossed on the wide-ranging access to ICTs in terms of exclusive access of available infrastructure, using technological determinism theory in their hypotheses and deductions. Norris (2001), put forward the impression of gap in access to ICTs as a portent with three divergent: global divide (ICT disparities between countries), social divide (that is gap in access to ICT between among sections in a particular nation) and a democratic divide (the access based on disparity between the social class).

With regards to education, nations worldwide strive on ways to provide the younger generation equal access

to ICTs, and services within the education (Mazurek, Winzer, & Majorek, 2000). However, there are visible technological gaps amongst advanced and underdeveloped economies. Whereas developed countries are strive to purge visible digital gap, in the developing countries the gap gets amplified as a consequence of negligence and failed policies on the part of the ruling class.

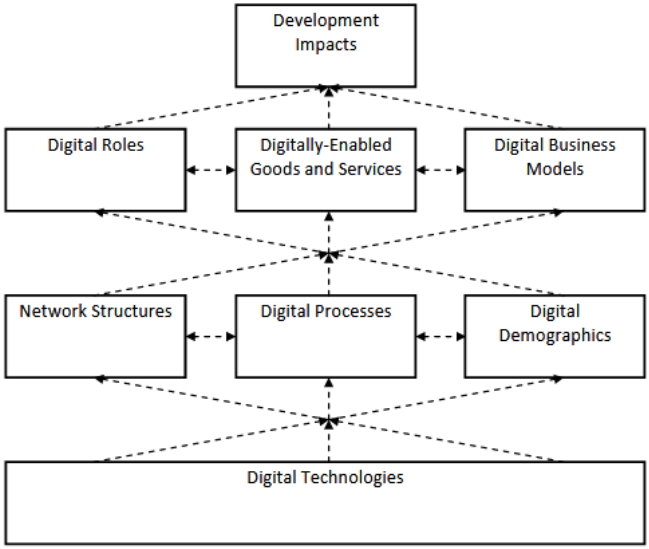

Figure 1: An overview of the digital development paradigm (Richard Heeks, 2016)

Heeks (2016), in his research paper gave an overview of digital development (figure 1). He detailed all the modules in the digital development paradigm and showed how they communicate to each other. A close study of Richard Heeks overview revealed that develoment of he didnt conisider environmental sustanabilty as it concerns Green ICT. Digital development has taken a new direction, this research will propose a generic Model for

possible adoption in the education sector and other institution.

The digital divide in Education

The ACT-Center for Equity in learning (2021), sufficiently described Digital divide in teaching and learning as the dichotomy in those with ample knowhow and right to use Information and Communication Technology and the group with little or no opportunity. Presently, both educators and leaners are required to be heavy dependents of digital technology. Incidentally, the result of this mandate is evident in developed nations of the world while in developing, the reality is barely in sight. It must be put record that the divide has come to limelight in the developing countries occasioned by recent pandemic owing to no prior integration of ICT in the education sector. As a consequence of the lapse, both educators and the students were struggling to use a system they were not familiar with. To examine the divide requires looking at who can connect to what and how they do. For example, a student who has multiple laptops in their home and has access to high-speed broadband is likely to have better educational success than someone who has one computer to share with their entire family and only has dial-up internet access. As educators use more technology to make research and teach, this divide increases and continues to perpetuate socio–economic disparities for underserved populations.

Records in another research at the ACT Center for Equity in Learning (ACT 2017), the percentage of students in developed economy who were handicapped and had incomplete take home assignments due to restricted access to the internet is put at 17%. The ACT's Center for Equity in Learning projects on ultimate

elimination of gaps in opportunity, achievement and equity with regard to underserved populations.

Causes of Digital Divide in Nigeria

The degree of digital divide in Nigeria became alarming in face COVID 19 era. Sunday (2014), opined seven fundamental causes of digital divide. They include:

Bad leadership. It is very unfortunate to say that Nigeria endowed with much natural rich resouces has been bedeviled with bad leaders. The nation has been characterized with evil vices including insecurity, misappropriation of funds, embezzlement of the nation's funds and negligence in implementation of policies and tools of national development, Kamba, (2009)

Manpower capacity not adequate. Coupled with the danger of inadequate ICT infrastructure, the nation is equally plagued with the essential skilled manpower to manage available ones.

Urban – Rural Inequality. Most rural villages in Nigeria lack access to electricity supply a major driver for ICT tools. Although almost good enough network signals for personal use and commercial internet cafeteria in cities, such facilities are scanty or completely absent in the locales. (Gulati, 2008).

Lack of interest in the affairs of the disabled members of its society. Nigeria is a country that is careless about policy or law that concerns the disabled members of its society. Everything about the disabled is done on charity bases. According to Solomon, Allen and Resta (2003), Digital equity in education must mean that every student has equal access to technology and the opportunity to be full participants in the digital age.

High rate of technology change and Poverty. Most of the resources that would have been used to improve computer and internet use are geared towards poverty reduction efforts. Moreover due to poverty, Nigerian government and its citizens cannot keep pace with the rate of technology change.

Extremely Poor power supply. Regular electricity supply is a strong driver in the education sector today. Incidentally, electricity supply has been a major constraint facing Nigeria in accomplishing her developmental goals especially as it concerns ICT is one.

Non challant attitude of educators to embrace the new technology. Technophobia is a critical bug that must be eliminated from the Nigeria state. Subsequent upon deployment of scanty policies even in ICT, attitude is herculean task to takle in Nigeria.

How Smartphones are heating up the Planet

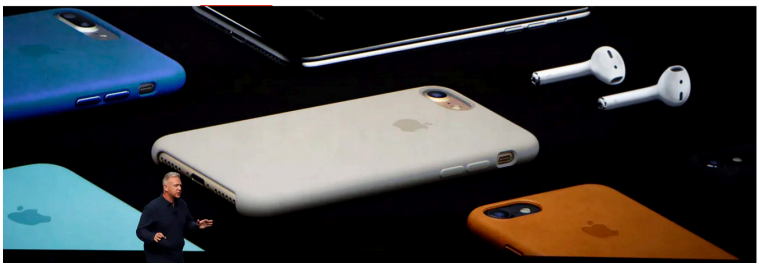

Figure 2. Massive use of Smarthphones

There is often the pointer to hydrocarbons, mining and transportation as the chief culprit in the global carbon emission. Scarcely do men cogitate in the emission emanating from the ICT sector.

Researcher perceive the cyber-world of Information and Computer Technologies (ICT) as global conservator

replacing many of our physical activities with a lower-carbon virtual alternative (Figure 1).

In a recent research review, Jabulani (2021) projected a gradual rise in the total global contribution of ICT infrastructures from 1% in 2007 to 3.5% in 2020 and most likely 14% by 2040. The research showed infinite values for emissions associated with smartphones which may likely rise from 17 to 125 megatons of CO2 an equivalent Mt-CO2e/yr in that time span, or a 730 per cent growth. A bulk of this contribution (85 to 95 per cent) by projection is likely to be a consequence of the manufacture of the ICT devices and energy involved in the production process.

In the same vain, the research posited that the excessive carbon emission is the projection of phone users to frequently change phones for newer models. This is encouraged by the frequent software and hardware upgrades by vendors which user are addicted to hence, must adapt. The phone plans that encourage users to get a new smartphone every two years. In the same vain, data centres and communications networks by projection are seen as rising from 215 megatons of C02 equivalent a year (Mt-CO2e/yr) in 2007 to 764 MtCO2-e/yr by 2021, and with data centres giving rise to about two thirds of the total contribution (Jabulani, 2021).

The Digital Divide

Impact of Digital Divide on Education in Nigeria?

The impact of the digital divide on individual or group of students in the same school across the country has threaten the academic outcomes of low income, underserved students.

School Impact on Students

Individual students also indicate varying degree of

digital disproportions in different institution of learning. The origin being that even if ICT lessons are expressed to the students in their various places of studies, practice is most times not feasible since they lack such tools back home. Therefore, learners who originate from underprivileged societies get undeservedly digitally impacted and lag behind in assignments which require the Software, Internet and other ICT tools. As a therapy therefore, students with the ample resources relocate to more digitally enabled environments to remedy technological inadequacies.

Education and Technology in the Pandemic age

Truth be said, the 2019 contagion (COVID 19) conveyed a mammoth Intervention of information and Communication Technology in all segments of the nation economy especially in education. The interposition empowered fantastic educational transformations including the sole dependence on ICT dependent for teaching and learning. This boosted the influxes of large number of computers – laptops, and other internet enabled mobile devices fitted with software to accomplish educational goals. There is no wonder, the internet presence and enormous data usage went greater ever than before.

Major Impact of the Digital Divide in the 21st Century

The digital dichotomy in the 21st century impacted otherwise across the nation and the education system not left out. The following are evident:

Information paucity in society with low access to ICT tools.

Unhealthy competitiveness among students.

Enriched awareness in students having access to ubiquitous ICT devices.

Disproportion learning capability amongst students depending on their socioeconomic status.

Educators perspectives on the use of ICT

Several responses have become manifest from the review of educators' ICT collaboration. Some of which are:

That Software are too expensive for them to afford and because authorities careless.

That there is shortage of computers and ICT facilities in learning institutions.

Epileptic power and lack of alternative power supply in the schools.

Inadequate ICT capacity training for teachers.

Insufficient time to put up lecture material with the of ICT tools.

That erudition of technology consume time.

Acquired computers in some institutions are archaic.

Inconsistences between ICT Technologies, curriculum and appraisal structures.

PROPOSED GENERIC MODEL FOR POSSIBLE ADOPTION

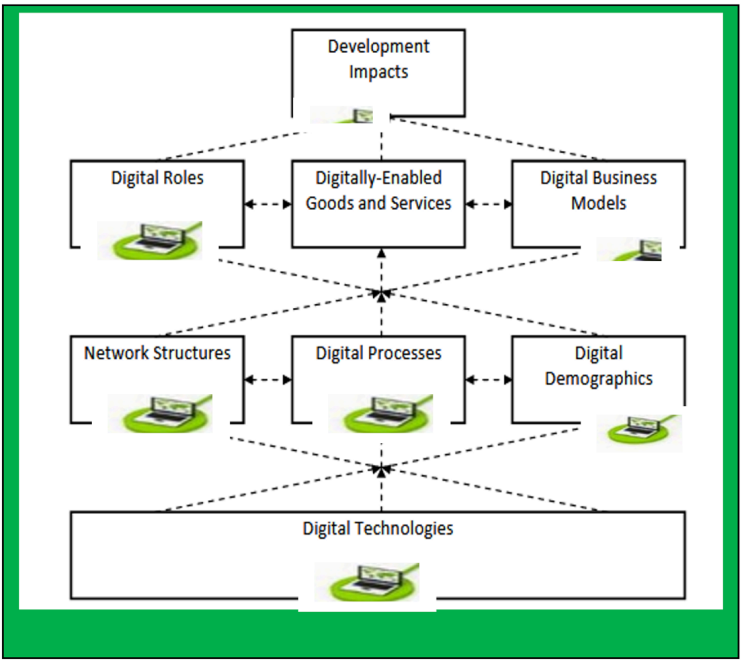

Figure 3. Propsed Generic Model

In any digital technologies to be adopted for implementation in any sector, Green IT must be well-thought-out for the fact that all must be cognizant of environmental sustainability. Thus, the proposed Model in figure 3.

Discussions

Today, there is the realization that lives rotate around digital platforms. We live, unlearn, relearn, and learn, work and play technologically. It is inevitable that computer must be integrated in our teaching and learning going foward. Thus, it's very glaring to even the untaught that the way forward in our lives is deployment of ICT

apparatuses and there is the urgent need for us all at all levels to embrase the ICT. It is very correct to say and conclude that the mediation of ICT in our society has truely caused the digital divide, and the corresponding ICT deployment can bridge the gap if the government of the day is ready to accept the fact that ICT has come to stay in national development and environmental sustaining via Green Computing.

Recommendations

Recommended Green ICT Startegy

ICT users must think Green always.

All equipments must be Green IT compliance.

Ensure equipments are turned off when not in use.

Reduce the amount of energy consumed by ICT equipments.

Work with the change Programmes to identify the impact of the changes they propose.

Reduce paper consumption.

Digital Divide Projects to Bridge the Gap in a Botherless World

Based on the divides that exist in the digital borderless world today. Various projects are being implemented to build on the knowledge gap and bridge the digital divide gap among societies. They include but not limited to:

Wireless-Fidelity (Wi-Fi) Partnerships: Wi-Fi partnerships aim to bridge the internet usage gap. Developed countries are having district partnership with providers to create free quality Wi-Fi directory for students. In such areas students can easily have access to Wi-Fi away from school. With this learning can take place anywhere and anytime.

Internet.org by Facebook: Internet.org is the brainchild of Facebook to provide a solution to access

free material on the internet. Through facebook app, people can access rich information on the web

Linux4Africa: Linux4Africa works to bridge the digital divide between developed and developing nations with a focus on Africa. This is by ensuring access to information technology. Linux4Africa collects used and discarded computers in Germany, Ubuntu software and Terminal Server Project which is open sourced and supports schools and essential institutions such as hospitals with the necessary facilities.

One Laptop per Child Project (OLPC): OLPC was introduced in Massachusetts Institute of Technology (MIT) in 2005 and rolled out as a nationwide policy in 2007. The aim was to fund every public school student from grade 1-6 with a laptop or "green machine" operating on Linux based OS.

According to digital council, by 2010 this project was extended to high school students and has dramatically reduced lack of access to learning material by students. This can be said of in developed countries, its still a mirage in the developing countries.

Furthermore, organisations should ensure that the following are taken care of :

educators have adequate technical support

ensure that educators have the adequate hardware and software needed for instructional technology.

Focused training on how to integrate technology into instruction not just on the technology only.

There should be training on ICT tools for language development and problem solving

Training on how to use ICT tools

Educators should be trained also on how to select, fine and evaluate softwares

Educators should be inspired to engage in telecolaborative research and projects using Webner, Video conferencing, emails as well as the web.

There should be ICT follow up training.

While the prognosis on the ICT industry own future contribution to climate change is worrying, there is still the overriding positive prospect that ICTs themselves can facilitate innovations in the aspect of social and economic restructuring globally to help reduce overall global carbon emissions. The creation of greener and more energy-efficient industrial plants and the greater use of renewable energy in such areas as electricity generation and equipment production. ICT firms should be directed to take measures to recalibrate their production plants and manufacturing systems, as well as to include technical innovations in their internal systems to make them more energy efficient and environmentally friendly.

Conclusions

Research have shown that one of the critical challenges of our era is to balance the competing demands for more widespread use of ICT tools with efficiency in their energy use as well as a safer E-waste at the end of their useful life. All sectord must also face the challenges of using ICT tools to help other insustries realise greener objectives, whether ist externally regulated or self imposed.

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CHAPTER 26.

DIGITIZATION OF EDUCATION IN NIGERIA: A PATH TO TECHNOLOGICAL ADVANCEMENT

ONYIA, MARY N. (PH.D.)

Abstract

Today, more than ever, the role of educational technology in teaching and learning is of great importance because of the use of information and communication technology. With the help of various applications for distance education, the internet, teachers and students themselves, they see the advantage technology in education. Aware of this, the Federal Government in its statement on the National Policy on Information and Communication Technology (ICT) in education identified the critical role of ICT, towards the attainment of the National Vision within the context of the constitution of the Federal Republic of Nigeria, the National Policy on Education, Ministerial Strategic Plan: Education for Change and Sustainable Development Goals (SDGs). But since independence, Nigeria has had an encompassing quantitative

education with minimal or no impact on technological advancement. Despite the constant previous reforms in the sector to make it more impactful, problems persisted, just as panaceas abound, but the questions remained, hence the clamour for digitization of education in Nigeria for technological advancement.

Keywords: Digitization, Education and Technological Advancement

PREAMBLE

Modern teaching materials are very crucial and most preferred in the digitalize world. A modern education system uses technology to impart knowledge. Digitization of education system is an opportunity to develop a cognitive resource-based mechanism in learners and improve the skills, lifelong learning and continuous education. Digitization produces information that can be conveyed in many different methods. It brings about democracy of knowledge where education becomes a collaborative and self-driven enterprise. Nowadays, there are tools available to transform learning from an academic exercise to an engaging experience gratification and technological gains.

Digitization is the trending term, describing the 21st century in the most precise manner as possible. We are in the era where unprecedented ideas are unfolding in our education sector and creating the advancement that can't be matched by lagging behind in terms of technology.

CONCEPT OF DIGITIZATION

Witten and David (2003) defines digitization as the process of taking traditional learning materials that are in book form and papers and converting them to the electronic form where they can be stored and manipulated by a computer. Kannappanava; Rajamkanta

and Tandur (2010) stated that digitization refers to the conversion of materials created in another format into an electronic form; this definition excludes materials that were initially created digitally, such as email communication. Similarly, Jagboro, Omotayo and Aboyade (2012) defined digitization as all the steps involved in the process of making collections of historical and other materials available online. Pandey and Misra (2014) describe digitization as the course of converting analog information to a digital format.

Digitization implies the creation of digital surrogates for an original copy or physical object. Digitization encourages open access to resources such as electronic theses. Ding, (2000) highlights the advantages of digitization as follows:

- Digitization means no new buildings are required; improvement in information sharing and redundancy of collections reduced.
- Digitization leads to the development of Internet in digitalized based institutions
- Digital materials can be transmitted, sorted and retrieved easily and quickly.
- It is cheaper to access electronic information than its print counterpart when storing files in an electronic device with compatible facilities and equipment.
- Digital texts can be linked, made interactively; and improves the retrieval of more information.

Also, clients do not have to travel to libraries that have the hard copies of library resources before they can access

and use such materials (Fabunmi, Paris, and Fabunmi, 2009). Pandey and Misra (2014) mention that digital projects allow users to search for groups rapidly and comprehensively from anywhere at any time; several users can access the same material the same time without a barrier. In contributing to this, Urhiewhu and Daniel (2015), opines that in digitizing library resources, everyone will have access to information instead of to a group of researchers. The authors also stated that digitization makes the invisible to be visible.

Other benefits as summarized by Akpan-Atata and Enyene (2014) are as follows:

- Universal Access – people from all over the world, gained access to the same information as long as an internet connection is available.
- Capacity – in the traditional libraries, there are limited storage spaces while digital books have the possibilities to reserve much more information, simply because digital information requires very little physical space to contain them.
- Cost – the cost of sustaining a digital learning is lower than that of running a traditional learning.
- Enhanced searching methods through different search engines and manipulation of information.
- Improved facilities for information sharing.
- Access to information is made possible in a short time.
- Improved collaboration with other information institutions and centers, chances to form consortia where they can pull their resources

together and get a real bargain of scale to acquire learning software.

The benefits of digitization cannot be over emphasized. Digitization has transformed scholarship and brought with it tremendous changes and easy access to resources which were formerly restricted. Carr (2000), observed that in academic institutions, digital institutional resources such as theses, research papers, manuscripts, images or specialized monographs are of very high value. To retain the original copies of rare publications emanating from institutions, digitization becomes the best option. Academic institutions are leveraging the benefits of digitization to preserve their original publications while promoting surrogate copies.

Concept of Technological Advancement

Technological advancement is the generation of information or the discovery of knowledge that advances the understanding of technology. In other words, a technological advancement advances the understanding of technology. (Johnson, 2012).

It is also an attempt at extending or further understanding the underlying science used to develop current materials, devices, products or processes.

Digitization of Education and Technological Advancement: An Overview

It is very worthy to note that we're living in a technology-driven world. Since the internet exploded onto the scene in the '80s and '90s, became accessible to the average Nigerian student in the past decade, and eventually began to fit into our pocket with the development of smart phones, it is safe to say technology

is on an upward trajectory, and it shows no sign of slowing down anytime soon.

Today, the internet dominates many aspects of our life. We're so used to it that we don't even think about all the areas it touches. It helps us communicate effectively in the academic institutions. We access our entertainment online. Whenever we have any question, from the most mundane to the most complicated, we ask the internet. (Asogwa, B.E. 2011).

There's one facet of our life, however, where we might not often think about the effects of technology, and that's the realm of education. This study examines how technology has found its way into the halls of schools across the country and around the globe, and all the ways technology has impacted in Nigerian Education system.

In many ways, education has not eminently improved in Nigeria. The traditional system of education is still in invoke. A teacher instructs a student or a group of students, who use their studies to learn to become members of society. A few will then go on to become teachers themselves, and pass their knowledge along to the next generation. Technology has come a long way in helping students conduct research, participate in debates and projects, and even gain hands-on experience that will help them better understand and navigate the world and their future careers. Some of the major advantages of digitizing of education by Ding, C.M (2000), include;

Greater Accessibility

According to Pandy, P, and Misra, R.(2014), students and teachers needed to be physically present in the same location for learning to take place. But recently with the introduction of technology in education, it allows for instant and convenient communication over great

distances at the click of a button. Technology has impacted on education to the extent that there is a possibility of **online degrees**. Established traditional schools in Nigeria now offer some of their courses online, while other schools have sprung up that operate entirely online, with students and teachers never once meeting face to face. In primary and secondary schools, this same technology allows for cyber-schooling, where children can complete their work from the comfort and convenience of home.

Online schooling such as these examples has helped immensely in **breaking down geographic barriers** that have long prevented many students from reaching certain educational institutions. And this has in turn contributed significantly in the general advancement of technology in Nigeria.

INCREASED FLEXIBILITY

The idea of flexibility due to the internet goes hand in hand with improved accessibility. Online classes have freed students from having to attend school at specified times, something that is often impossible due to work or family responsibilities. Instead, course materials are available online, and students have the freedom to study and complete classwork whenever their schedule permits.

Technology has opened the doors of education to many who might otherwise be unable to attend a traditional school. Anyone working full-time, for instance, will now be able to continue their job while getting an education. Parents with young children can also find opportunities to attend school (Unsworth, J. 2004).

DIFFERING INTERACTIONS BETWEEN TEACHERS AND STUDENTS

With the development of online educational programs, the interactions between teachers and students have undergone a fundamental shift. There are advocates on both sides of this matter, with some saying this change is for the better and others saying it is for the worse. Perhaps the most helpful position to take is that this change is neither wholly negative nor entirely positive, and instead has both merit and demerit.

For example, because this interaction is online, class time is no longer students' only opportunity to ask their teachers questions and request information. Instead, they can take advantage of emails, instant messaging, and texting to ask their teachers questions anytime, rather than having to wait for the next class, when the question is no longer fresh in their mind.

ADVENT OF ONLINE TESTING

Along with online education comes the advent of online testing, which is hugely beneficial for a whole host of reasons. Foremost among those reasons is the fact that online testing is impartial and entirely fair. If a machine is grading the test and automatically correcting wrong answers, it's impossible to show any signs of bias. Additionally, online testing can be an excellent solution for those who suffer from test anxiety and are distressed by taking tests in a room with a group of other people. Finally, it's also much better for those with busy schedules, who may struggle to be at a testing center at a particular time.

Online testing isn't without drawbacks, however. Most

notably, it is only effective for multiple-choice tests, not for essay or short answer questions. Students can still take essay-based tests online, but a human teacher will need to evaluate.

IMPROVED ABILITY TO MEET SPECIAL NEEDS

In the past, a rigid classroom structure defined the world of academia. Each student had the same experience, no matter their differing needs or abilities. While some students could function well in this environment, others had unmet needs.

Technology improves a school's abilities to meet the needs of all types of students. Now, students with hearing, speaking or seeing impairments, or those who are largely housebound, can still receive a quality education. Technological advancements can also meet the needs of students with intellectual, social, or developmental disabilities. No matter what a student's unique needs may be, technology affects education for the better by improving our ability to create learning environments that work for all.

AVAILABILITY OF ONLINE LEARNING CONTENT

Learning used to take place exclusively in a classroom setting. Educational tools were either books or officially produced videos. One of the ways the Internet has changed education is by allowing anyone to share their knowledge with the world by publishing an educational blog post, e-book, or YouTube video.

The far-reaching benefit that comes out of this is that it makes it easier for anyone to learn.

ADAPTABILITY AND PERSONALIZATION

Educational spaces are becoming increasingly aware of the fact that what helps one student learn may be virtually useless to someone else, and what makes no sense to one student may be the only thing that clicks with another. Everyone's brain works differently, and everyone has a unique learning style — yet, for many years, all those students read from the same textbook. With the introduction of technology in education, students can benefit from having a range of tools and learning technologies at their fingertips.

Challenges

Digitization of education is a laudable project that encompasses the application of a wide spectrum of practices, including blended and virtual learning. Nevertheless, some hurdles impede its smooth operations especially in Nigeria; According to Asogwa, B.E. (2011), some of the challenges include;

Inadequate funding. Funding for the purchase and maintenance of modern and state-of–the–art digital equipment by the government remains a major constraint.

Erratic power supply

It is very unrealizable for computerization and digitization to take effect in an environment of epileptic power supply. The issue of power has become a national calamity. Thus it has to be given priority by any library aspiring to attain global visibility. Hence, all the institutions in Nigeria only depend on a generator for its power supply, and most often there is no light due to lack of diesel or generator breakdown which often hinders the digitization process.

Lack of Modern Infrastructure

Infrastructural facilities in most Nigerian academic institution are in a state of disrepair. Yaya and Adeeko (2016) observed that ICT department in these institutions lack modern computer systems; even the few available systems are being infected with a virus which makes them unfit for the digitization project.

Lack of skilled staff

Many academic staff lacks the basic computer training, not to mention specialized training required for digitization (Jagboro, Omotayo, and Aboyade, 2012). There is a need for continuous training to build academic staff capacity in equipment maintenance and software management. Also, digitization is a complex process which requires specialized skills. However, a good number of staff who may be involved in the digitization process in Nigerian academic institutions may not skilled as they do not possess adequate knowledge or competence in the handling of digitization equipment.

Conclusion

Digitization has no doubt changed our education system, but we cannot say that it has diminished the value of our old time classroom learning. Neither do we want something so priceless to turn into dust. The best part about the digitization of education in the 21st century is that it is combined with the aspects of both; classroom learning and online learning methods. Walking hand in hand both acts as a support system to each other, this gives a stronghold to our modern students. Digitization in education has also proved to be the right method for saving resources. Online examination platforms have restricted the frivolous usage of paper, directly confining the cutting down of trees. This way the digitization of

education industry in the 21st century proves to be a boom to our societal technological advancement.

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CHAPTER 27.

THE ROLE OF INFORMATION AND COMMUNICATION TECHNOLOGY IN NATURAL LANGUAGE PROCESSING

ASABOR MARY BIVWIERE, PH.D AND MARSHALL CHIME OPONE

Abstract

This paper focuses on the role of Information and Communication Technology (ICT)in Natural Language Processing. The authors present ban introduction as well the motivation factors to their choice of the topic. In a step by step approach they discussed concisely the components of the concept of ICT, the Natural Language Processing (NLP) along side its frame work and some related concepts such as speech translation and problems associated with it. They equally cleared the coast of their major focus as they presented some devices useful in Natural Language Processing. Summary and conclusion of their discussion were equally presented.

Introduction

It is quite established that people convey their thoughts,

ideas and experiences through very many ways, the best of which is through speech. For this reason, it is required that all necessary efforts should be made not to deprive those with problems in conceptualizing spoken words from the positioning of their lives. The problems with acquiring literacy skills are casually entailed by low-level auditory and/ or speech perception processes.

Numerous Nigerian children fall into the condition where English Language is used as the official language for delivering learning experiences. This, of a truth, has its negative effects. One of the negative effects is the creation of educational divides. To overcome these negative effects, the policy of the Universal Basic Education (UBE) which demands that Nigerian Local Language should be used in delivering learning experiences, particularly in the Nursery and Primary levels of education in Nigeria should be applauded. Adherence to this declaration will require that all teachers in these levels ought to speak and understand the pupils' native language. This is a high mountain of task to achieve bearing in mind that Nigeria is a multi-lingual country. It is very difficult to find a teacher that can speak and understand two or more Nigerian native languages. It is against this backdrop that the need for a machine-based language translation system is required to provide the need of Nigerians: the natural language translation system, a subset of Natural Language Processing. Learners learn better when taught using their mother tongue. United Nations Educational, Scientific and Cultural Organization (UNESO) has encouraged mother tongue instruction in primary education since 1953 (UNESO, 1953; UNESO, 2008), and equally highlights the advantages of mother tongue education right from

the start: children are more likely to enroll and succeed in school (Kosonen, 2005); parents are more likely to communicate with teachers and participate in their children's learning (Benson, 2002). Some educators argue that only those countries where the student's first language is the language of instruction are likely to achieve the goals of education for All. (Benson and Kosonen, 2013). Under the 6-3-3-4 system of education, teaching and learning of local languages have become mandatory (Uti and Iloh, 1989).Translation of study books, device manuals, newspapers, journals, etc. has always posed barriers to learning. Some of the barriers translation might pose to learners include the fact that translation teaches learners about languages, but not how to use it; it does not help learners develop their communication skills. (Duff, 1990; Deller and Rinvolucri, 2002) Some advanced countries such as United States of America maintain useful online corpuses through support of their government agencies to help reduce translation problems. As at the time of this study, Nigeria has not achieved such laudable feat.

Motivation of the Study

This paper was motivated by the strong desire and recommendation of the policy that established the Universal Basic Education (UBE), that is, that the pupils' native language should be the language of preparation and delivery of learning experiences to the pupils. The National Commission of Colleges of Education (NCCE) categorically declared her preference and strong support for the use of native language in teaching pupils in nursery and primary stages of education in Nigeria. (Emenanjor, 2004). The huge successes recorded in pupils performances in some foreign countries, particularly in

Asia countries of Japan and China, where comparatively higher performances have been proven to be due to the use of native language in their educational system, were added motivational factors. (Adjarho, 2014).

The difficulties in human translation of natural languages (Anya 2012; Ehiwuogu, 2008); efforts so far in Artificial Intelligence ("Artificial Intelligence", 2008; Barker, et al, 2000); achievements in Natural Language Processing (Black et. al, 2000); the works of Ukwuani language development committee (Uti and Iloh, 1989) and Computer-Assisted-Instruction (Hontonyan et al, 2008) have created the feasibility assurance for this paper. Serious efforts must be made to bridge up the seemingly wide educational divide due to language of instruction in the early stages of the learners in Nigeria.

The Concept of Information and Communication Technology (ICT): Information refers to data that has particular meaning within a specific context. It is output of a processing activity. Communication refers to the transmission of information from one point to another. On the other hand, Technology is the application of science to accomplish desired objectives. The Concept of Information and Communication Technology (ICT), therefore, is a computer-based technology used to process, manage, store and transmit data.

Kinds of Information and Communication Technologies: Okeh and Opone (2010) vividly discussed some ICT technologies as follows:

Sensing Technology: These are ICT devices that will help in gathering information from the environment and transfer such information into a form that can be understood by the computer. Examples include keyboard, mouse, touch screen, etc.

Communication Technology: These are technologies that tie together and communicate information between the various kinds of technologies. Examples include land and cellular telephones, computer network, telecommunication network, television, radio, etc.

Analyzing Technologies: The computer hardware and software come within this category. Computer accepts data from sensing and communication devices and then store or process the information. These may include small, medium, and large computers.

Display Technologies: These technologies are essentially output devices. They make processed data available to human for use, either through sight or sound. Examples include display screens, printers, audio output devices such as loud speakers, etc.

Storage Technologies: These help to store large quantities of information in a form that can be easily accessed. This is made up of secondary memory of the computer known as secondary storage devices such as magnetic tapes, magnetic disc, read only memory (ROM),Video Compact Disc (VCD),etc.

The Concept of Natural Language Processing (NLP): This is a form of Artificial Intelligence (AI) that extracts meaning from human language to make decisions based on the information. This technology is still evolving, but there are already many incredible ways natural language processing is being used today. It is a technology used to aid computer understand the human's natural language. It's not an easy task teaching machine to understand how we communicate.

By "natural language" we refer to a language used for daily communication by human beings; languages like English, Hindi, Ika, Ukwuani or Portuguese. Natural

Language contrasts to artificial languages such as programming languages and mathematical notations and it has evolved from generation to generation. It is not an easy task to pin down with explicit rules. The way we, humans, communicate with each other is Natural Language. Think about how much text you see each day: Signs, Menus, Email, SMS, Web Pages and the list is endless. Automated manipulation of natural language, like speech and text, by software is Natural Language Processing (NLP). It helps machines learn to communicate with each other and with humans in a meaningful way. Several decades of research resulted in development of NLP, however, the current word2vec technology has brought in path breaking results. In medicine, SNOMED-CT aids the development of NLP by use of indices and their relationships. Classification of digital documents in a uniform fashion is made easy and possible by this method.

Natural Language Processing (NLP) combines Artificial Intelligence (AI) and computational linguistics so that computers and humans can talk seamlessly. NLP endeavors to bridge the divide between machines and people by enabling a computer to analyze what a user *said* (input speech recognition) and process what the user *meant. This task has proven quite complex.*

To converse with humans, a program must understand syntax (grammar), semantics (word meaning), morphology (tense), pragmatics (conversation). The number of rules to track can seem overwhelming and explains why earlier attempts at NLP initially led to disappointing results.

Adjarhor, (2014) states that natural language processing is posed with the challenges of representing

grammar, syntax, semantic, morphology, synonymy, thesaurus, phonemes, idioms, phrases, clauses, speeches, lexicons or dictionaries and solving problems of ambiguity with computational models.

Technologies Based On NLP: Technologies constructed on NLP are becoming increasingly wide spread. For example, our phones that has the feature of predictive text and handwriting recognition; web search engines retrieves information locked up in unstructured text; machine translation reads and understands texts written in Chinese and re-read them in Spanish; text analysis assists us to detect sentiment in tweets and blogs. By providing a bridge between human and machine, accessing stored information, natural language processing plays a vital role in the multilingual society.

Categories of NLP: Modules of the natural language processing include: speech-to-text, text-to-text and text-to-speech. With the above three, the Speech-to-Speech Natural language processing system can be achieved. This shows that with the natural language processing systems, computers can read text, hear speeches, interpret it, measure sentiments and determine which parts are important.

Natural Language Processing Standard Architecture

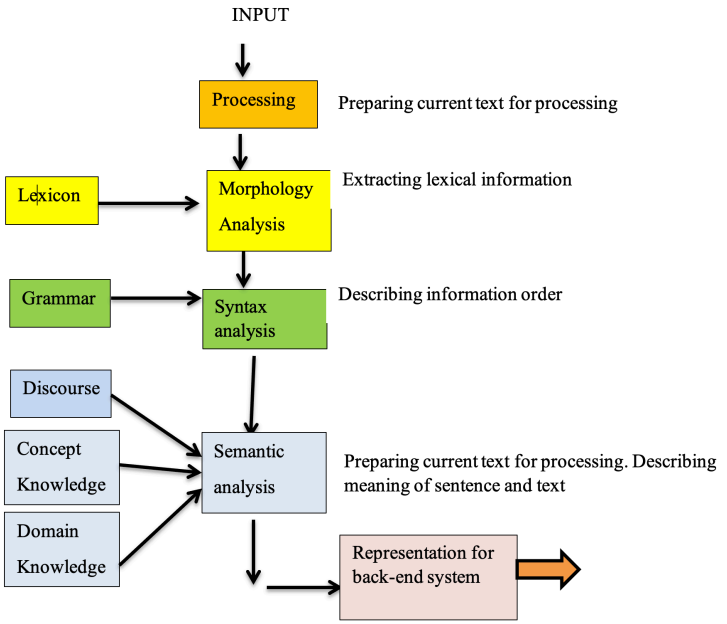

Figure 1. Standard Natural Language Processing Architecture

Problems Associated with Natural Language Processing:

The following problems are identified in this study.

- Computers will take a huge lot of time to carry out a perfect natural language processing.
- The general challenges possed by the various information and communication technologies which include failures of different forms can equally stand against natural language processing.
- The variability of natural languages makes natural language processing a difficult task to execute.
- A total adherence to the use of native language in

teaching pupils in nursery and primary levels is not presently carried out in all places. Some teachers cannot speak neither do they understand the pupils native language. Above all pupils in are not taught with their native language.

- Machine translation facilities that can be used to develop speech-to-speech learning experiences in Nigerian native languages are not presently in existence.
- Some teachers in the Nursery and Primary levels of education in Nigeria cannot speak nor understand their pupils' native language. This means they will always use the foreign English Language to prepare and deliver all learning experiences to the detriment of the pupils. They cannot also reinforce salient facts of learning experiences with pupils' native language.
- Pupils of the nursery and primary education age in Nigeria are not proficient in reading or writing text materials yet the speech-to-speech module of natural language processing is not easy to achieve.

Speech Translation System: An Aspect of NLP: This is the process by which conversational spoken phrases are instantly translated and spoken aloud in a second language. This differs from phrase translation, which is where the system only translates a fixed and finite set of phrases that have been manually entered into the system. Speech translation technology enables speakers of different languages to communicate. It, thus, is tremendous value for human kind in terms of science,

cross-cultural exchange and global business (https://en.m.wikipedia.org/…/speech.).

Problems of Speech Translation System: Apart from the problems involve in the text translation, it also has to deal with special problems that occur in speech-to-speech translation, incorporating incoherence of spoken language, fewer grammar constraint of spoken language, unclear word boundary of spoken language, the correction of speech recognition, errors and multiple optional inputs.

Spoken Language Technology Historical Account: Spoken language technology started long ago. In 1791, Wolfgan von Kempelen constructed and demonstrated a more elaborate machine for generating connected utterances. Apparently, Von Kempelen's efforts antedate Kratzenstein's since Von Kempelen purportedly began work on his device in 1769. It used a bellows to supply air to a need which, in turn, excited a single, hand-varied resonator for producing voiced sounds (Flanagan et al, 1965).

In 1920s, a commercial toy named Radio Rex was developed. However, Radio Rex has its lapses as it was regarded as crudest possible voice recognition. It was discovered that Radio Rex will not be able to respond to women or children since the technology of 500Hz vowel sound spectrogram was used. (David and Selfridge, 1962).

In 1769, Wolfgan became popular with his work on a fraudulent chess- playing Turn automation. Late in 1791 he came up with speech synthesizer. Following what is called "vox human" Christian Gottlieb was able to demonstrate the artificial vowel sounds of letters a, e, i, o, u, dictating their differences.

Kempelen classifies the vowels according to the width

of the lip channel giving a ranking of A>E>I>O>U and the width of the so called tongue position. He goes on to remark that although he tried to produce the different vowels at the same pitch the vowel with a smaller tongue channel seem to be higher in pitch. It is a mechanical machine (Wolfgan, 2006).

Radio Rex: The first machine that recognized speech was probably a commercial toy named "Radio Rex" which was sold in the 1920's. Rex was a celluloid dog than moved (by means of a spring) when the spring was released by 500Hz acoustic energy. Since 5ooHz is roughly the first format of the vowel (eh) in "Rex", the dog seemed to come when he was called (David and Selfridge, 1962). The challenge of Radio Rex is the differences that exist between pronunciations of adult-male, adult-female, young-male and young-girl of course the toy dog mechanism described here is nowhere near automatic speech recognition that we are used to see nowadays, it goes not recognizes specifically anyone's voice or converts speech to text that can be processed, but rather simply reacts to a frequently interval regardless of the person who can produce it (BL's Voder, 1936).

DARPA SUR: Defense Advanced Research Project Agency (DARPA) established the Speech Understanding Research (SUR) program to develop a computer system that could carry out speech conversion (https://books.google.com.ng/books.).

The achievements of Hidden Markov Models (Dictation System developed in 1975) gave worthy of note to the development of spoken language technology. Below are some examples of spoken language trends.

Illustration of Trends of Spoken Language Technology

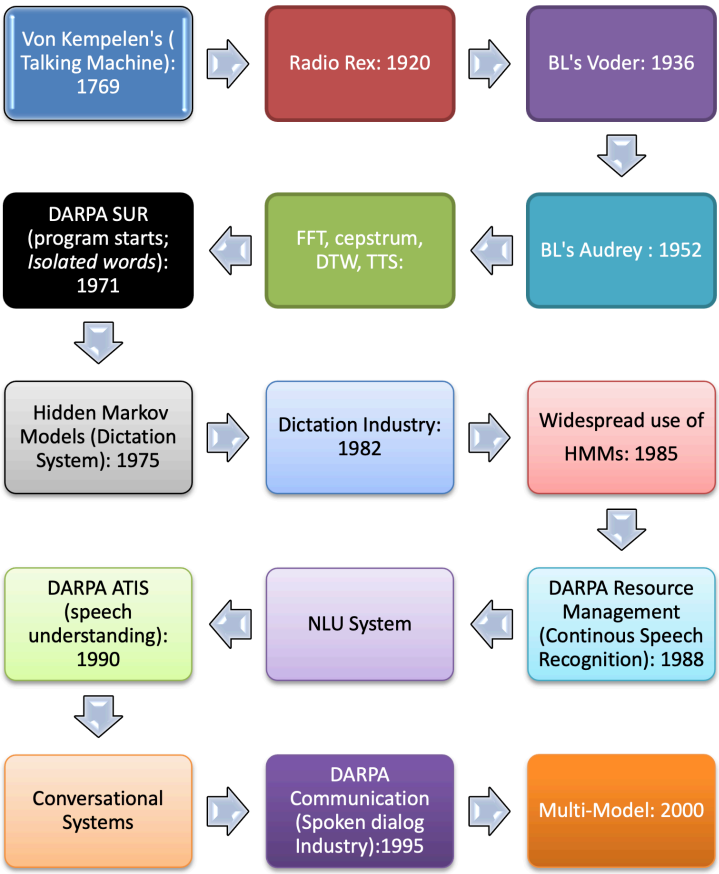

Figure 2. Spoken Language Technology Developmental Stages

Tools Useful in Natural Language Processing: For any Natural Language Translation System to be developed, maintained and used for efficient and effective result, appropriate devices and technologies must be brought into their rightful positions.

ICT is an umbrella term that includes any communication device, encompassing radio, television, cell phones, computer and network hardware, satellite

systems and so on, as well as the various services and appliances with them such as video conferencing and distance learning. Others include applications and system software such as operating systems; web-based information and applications such as distance learning; telephones and other telecommunications products; video equipment and multimedia products that may be distributed on videotapes, CDs, DVDs, email, or the World Wide Web; office products etc. A few prominent examples include Email filters, Smart assistants, Search results, Predictive text, Language translation, Digital phone calls, Data analysis, and Text analytics. Computer is capable of exhibiting many patterns of human senses and as such has the capability of presenting information in varied forms with varied devices.

There are similarities between natural language processing and computer language processing particularly when the phases of compilation of high-level computer languages and phases of natural language translation are compared. The computer language processing and natural language processing involve Lexical Analysis, Syntax Analysis and Semantic Analysis. The major difference is that no single type of grammar has been found sufficient to generate an entire Natural Language. Moreover, Lexicons or dictionary or corpora are not used as tools in computer language processing. Computer language has finite list of reserved words and infinite list of user-defined words. On the other hand, natural language word belong to classes called part of speech and words increase in number from time to time and some are even borrowed from other native languages.

Lexical Analysis – It involves identifying and analyzing the structure of words.

Syntactic Analysis (Parsing) – It involves analysis of words in the sentence for grammar and arranging words in a manner that shows the relationship among the words, to explain but just two out of the numerous components. It is evidently clear that without ICT there can be no NLP.

The role of NLP in Bridging Educational Divide: Natural language processing helps computer communicate with humans in their own language and scales other language-related tasks. For example, NLP makes it possible for computers to read text, hear speech, interpret it, measure sentiment and determine which parts are important. It is therefore useful presenting learning materials at grassroots level to the early learners. Those who dread foreign language can through NLP find themselves at home in their search for knowledge.

Natural Language Processing (NLP) has entered the mainstream and integrates with Big Data. Take the business traveler. Today, when he or she stays at a hotel, like Wynn Las Vegas, the customer can bypass the front desk when getting extra towels or ordering room service. Thanks to Amazon's Echo and its use of NLP, a hotel concierge may no longer be necessary. In this new world, Big Data flows in the form of speech, a loop between hotel guest and computer. All the guests have access to this technology. Wynn Las Vegas has already added Amazon Echo devices to each of its 4,748 hotel rooms. As consumers become more familiar with NLP and its time savings benefits, they will be more likely to adopt Natural Language Processing in the home and office, for other

tasks. NLP will change everything, from Business Reporting and Data Analytics/Synthesis to Security and Data Governance. The future has arrived.

Question answering technology built on 200 million text pages, encyclopedias, dictionaries, thesauri, taxonomies, ontologies, and other databases has gained traction. AI has helped data-rich companies such as America's West-Coast tech giants organize much of the world's information into interactive databases such as Google's Knowledge Graph.

Additionally, speech-to-speech translation also has its advantages compared with text translation, including less complex structure of spoken language and less vocabulary in spoken language.

1- **Mental Illness Analysis**: Measure how countless linguistic features of conversations are connected with conversation outcomes. By applying models that are associated with better conversation outcomes as sequence-based conversation models, language model comparisons, message clustering, and psycholinguistics-inspired word frequency analyses, to discover actionable conversation strategies.

2- **Mining Electronic Health Records for Mammography Research —** associating mammographic and pathologic results in clinical decision support using natural language processing and data mining methods.

3- **NLP Algorithm and Asthma Ascertainment —** Application of a Natural Language Processing Algorithm to Asthma Ascertainment through an Automated Chart Review

4 **– Natural Language Processing for On-Site Search:** If you have or use an e-commerce site, you must be very familiar with natural language processing (NLP)

being used in Site Search. More than just another path, NLP has been identified as a powerhouse in the realm of on-site search and has brought in vast number of advantages packaged up only for those who focus on improving their business by improvising their site search capabilities.

Even though the development stage is little complex, using NLP in the applications has lots of advantages which also include:

Automatic Summarization: It produces a readable summary of a part of the text.

Coreference Resolution: It determines which words refer to the same objects, out of the given sentence or larger portion of text.

Discourse Analysis: This includes several related tasks such as identifying the discourse structure of connected text.

Better Results All the Way Around: It is beyond keyword matching or text-oriented search; meaning-to-meaning search provides results that are correct according to the form of the input text, whereas NLP delivers applicable results as soon as your customer hits "search." Understanding the intension of the customer.

Search Processing Translates the Intention of Your Customer: Your customers are human beings, which means they're not 100 percent accurate in communication. They make spell errors; they may confuse brands with products and forget product or service details—It depends on how robust your on-site search is to fill the gap when these errors happen. NLP connects the dots to keep search unified, even in the scenarios like typos or abrupt information.

More Data Extracted Means More Data for

Growth: Measuring what your customers intend to search is key in improving your business. Through NLP, you can learn about customer habits, preferences, and tendencies across your entire consumer base. This data can be re-applied across several phases of your business, from marketing to SEO, doing campaigns to sales and promotions and a lot more.

Complex Search Options Affects Results: The ability to handle numerous variables in a single search means providing a collective result that's suggestive of your customer's end needs. Natural language processing looks at a broader picture, not just the user input keywords in a search, providing results that are the summation of their parts. Results that might be wrongly recognized by text-based searches or accidentally misplaced or missed out from keyword queries.

Contextual Understanding Delivers Answers: Today's search engines are confining to Q&A boxes—customers ask questions and expect answers. In addition to the complicated search options afforded by NLP, your customers can raise questions freely and get to products they're looking for. Question based searches calls out a huge challenge in your skill-set to serve customers who might not be using the technical keywords or main phrases in their search for a specific product.

The above variables embedded in your search website contribute to fast hit of your e-commerce websites looking for to better serve their customers—and they can all be credited to natural language processing, which is as simple as human language!

Su (2015) presented some objectives of his Speech-To-Text systems to include the human computer interface

developed to communicate or interact conveniently for one who is suffering from some kind of disabilities. Speech–To–Text (STT) systems have a lot of benefits for the deaf or dumb people and find their applications in our daily lives. The aim of his system is to convert the input speech signals into the text output for the deaf or dumb students in the educational fields..

Summary: For an effective implementation of Natural Language Processing, very many useful tools and technologies will be involved. These fall under the general name called ICT. It is evidently clear that without ICT there can be no NLP.

Conclusion: Natural Language Processing (NLP) combines Artificial Intelligence (AI) and computational linguistics so that computers and humans can talk seamlessly. For any Natural Language Translation System to be developed, maintained and used for efficient and effective result, appropriate devices and technologies must be brought into their rightful positions. Natural language processing is posed with the challenges of representing grammar, syntax, semantic, morphology, synonymy, thesaurus, phonemes, idioms, phrases, clauses, speeches, lexicons or dictionaries and solving problems of ambiguity with computational models.

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CHAPTER 28.

TERTIARY STUDENTS PERCEPTION OF THE USE OF MOBILE DEVICES IN TEACHING AND LEARNING IN DELTA NORTH SENATORIAL ZONE

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Abstract

Students in tertiary institutions all over the world especially in Nigeria view learning from different perspectives using different modes and means. These perceptions are often influenced by the environment and resources available for learning. These resources may be both human, machine, technological tools/devices and physical facilities available. In this decade teaching and learning are undergoing revolutionary changes as a result of technological changes and influences altering the pattern of learning in the twenty first century. Mobile learning or m-learning is flexible education via the internet or network using personal mobile devices allowing students access to education anywhere, anytime. (webopedia.com 2018). A very high performance level is needed

from members of academic staff for teaching and learning to be effective and efficient especially in this digital age. The study examined the Tertiary Students perception of the use of mobile learning in teaching and learning in Delta North Senatorial District. The descriptive survey research design was adopted for the study. Two research questions guided the study. The population of the study comprised of 112 undergraduate students of Delta state University in affiliation with College of Education, Agbor final year students. A purposive sampling technique was used to select the number of students. A structured questionnaire, interview and focus group discussion are instruments for data collection. Data from the questionnaire were analyzed using spss statical package to find the mean rating scores and standard deviation, while the interview and focus group discussion were analyzed qualitatively. The result of the findings revealed that students perceived that lecturers who combine face to face i.e traditional and online method of teaching/learning are more efficient with a mean score of 3.31 and standard deviation of .771.

Key words: Tertiary students' perception, mobile devices and mobile learning

Introduction

Students in tertiary institutions all over the world especially in Nigeria view learning from different perspectives using different modes and means. These perceptions are often influenced by the environment and resources available for learning. These resources may be both human, machine, technological tools/devices and physical facilities available. In this decade teaching and learning are undergoing revolutionary changes as a result of technological changes and influences altering the pattern of learning in the twenty first century. Mobile learning or m-learning is flexible education via the internet or network using personal mobile devices allowing students access to education anywhere, anytime. (webopedia.com 2018). Vangie Beal (2020) defined

Mobile learning as the education received via the internet or network using personal mobile devices, such as tablets and smartphones to obtain learning materials through mobile apps, social interactions and online educational hubs. Mobile learning is education anywhere, any time and at one's convenience. It is a flexible form of learning. A very high performance level is needed from members of academic staff for teaching and learning to be effective and efficient especially in this digital age.

Scope of Study

The study was anchored on two research questions. The population of the study is made of first year undergraduate students of Delta State University, Agbor campus and Final Year National Certificate in Education (NCE) students of College of Education, Agbor, Delta State

The scope of the study covers the students' perception and effective of use of mobile teaching and learning devices in their institution.

Research Questions

The following research questions were posed to guide the study:

- Do students and lecturers possess mobile devices for teaching and learning?
- What are the factors that militate against the effective use of mobile devices for teaching and learning?

Method of Data analysis

This is a descriptive survey. A sample population of 112 students purposively selected from first year undergraduate students and final year N.C.E from Delta

State University, Agbor Campus and College of Education, Agbor for the study.

A four -point Likert scale structured questionnaire was constructed and distributed to th selected students. Data was analyzed using mean and standard deviation.

In using the mean and standard deviation to answer the research question, any item with mean value ranging thus: 3.50 -4.49 = will be considered as strongly agreed (SA); 2.50-3.49 = Agree (A); 1.50 -2-49 =Disagree (D); 0.50 – 1.49 = strongly disagree (SD)

Results

S/N	ITEM STATEMENT	MEAN X	STANDARD DEVIATION	DECISION
1.	Most lecturers do not practice online teaching/ learning for students	3.18	.808	Agreed
2	Most students possess mobile devices (android phones, iphones, ipad,laptops etc) for teaching/learning.	3.38	.784	Agreed
3	Most lecturers possess mobile devices used for online teaching/learning.	2.72	.932	Agreed
4	Lecturers use online assessment for students often.	2.46	.848	Disagreed
5	Lecturers lack the competence to the use of online platforms for teaching/learning.	2.54	.900	Agreed
6	Students are willing to learn online & traditionally if given the opportunity.	3.71	3.924	Strongly Agreed
7	Students lack the competence to use the platform for learning.	2.46	1.039	Disagreed
8	Lecturers do not possess the devices for online teaching/ learning.	2.48	.920	Disagreed
9	Students do not possess the devices for online learning.	2.27	1.022	Disagreed
10	Male lecturers are more likely to utilize online teaching/learning platforms/ devices than females.	2.18	.997	Disagreed
11	Lecturers lack the knowledge for designing online teaching/learning instruments.	2.60	.925	Agreed

12	Students lack digital knowledge hence lecturers do not practice online assessment of learning outcomes.	2.27	1.004	Disagreed
13	The system permits only traditional teaching/learning strategies.	2.19	.991	Disagreed
14	Most students are lazy to try new technologies.	2.36	1.064	Disagreed
15	Most lecturers are reluctant /lazy to try new technologies.	2.42	1.071	Disagreed
16	No lecturer uses online assessment in my department.	2.43	.993	Disagreed
17	Lecturers who use blended teaching/learning i.e that combine traditional & online methods are more efficient.	3.31	.771	Agreed
18	Utilizing mobile devices for teaching/learning is too expensive.	2.72	1.050	Agreed

Discussion of Finding

The result from the structured questionnaire revealed that both students' and lecturers possess mobile devices that can be used for mobile teaching and learning in the institutions under study with a mean rating score of 3.38(student) and 2.72 for (lecturer) and standard deviation of .784 and .932 but students perceived that lecturers lack the competence & willingness to use online assessment for students often with a significant mean score of 2.54 and standard deviation .900, even when students are willing to learn online and traditionally if given the opportunity with a very significant mean score of 3.71. Students' perceived that lecturers who combine face to face i.e traditional and online method of teaching/

learning are more efficient with a mean score of 3.31 and standard deviation of .771 this is in line with Ejiofor and Osinem (2010) and Egboka (2012) who also suggested that students and teachers must have sufficient access to digital technologies and internet in their classrooms, teachers must have the knowledge and skills to use the new digital tools and resources to help all students achieve high academic standards and management of tertiary institutions should build links with external stakeholders to assist them in providing ICT facilities in their institutions and proper implementation of ICT policies in schools.

There is no gender bias on who is more likely to utilize online teaching/learning platforms devices. While students disagree the system of teaching and learning only permit traditional /face to face teaching strategies. They do not agree that students lack the digital knowledge with mean score of 2.27 and standard deviation of 1.004 but agree that lecturers the knowledge for designing online teaching/learning instrument with a mean score of 2.60 and standard deviation .923 that hinder lecturers from using mobile devices to teach.

However, students' perceived that lecturers who use blended teaching and learning i.e that combine traditional & online methods are most efficient, even if they agreed that utilizing mobile devices for teaching and learning is too expensive with a mean score of 2.72 ad standard deviation of 1.050.

Educational Implications and Prospect

This study has far reaching educational implications especially for teachers and learners particularly during and after covid – 19 pandemic challenges which has made

the need for utilizing mobile devices in teaching and learning more obvious and relevant than ever.

- Utilizing mobile devices will likely impact positively on students by improving access to education because students' learning is not confined only to the classroom and learning outcomes are more efficient because they have more access to open educational resources which guarantees positive learners' conceptual perception of end users and provides unrestricted learning timetable.
- It provides supplement information to support traditional teaching and learning.
- It ensures group /learning collaboration .
- Teacher/student ratio has no limit.

Conclusion and Recommendations

The evidence derived from the mean and standard deviation result of the study as well as the qualitative analysis of the focus group discussion of students, revealed that both lecturers and students possess personal mobile devices that can be used for both teaching and learning as well as for social interaction. This will make education more accessible and 0n-the-go. The teacher/ student ratio will be expanded and the dream classroom beyond limit realized.

From the above conclusion, it is recommended that teachers should be more innovative and creatively utilize the mobile devices for teaching and learning effectiveness and enhancement.

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CHAPTER 29.

AN INVESTIGATION INTO ECONOMICS PRE-SERVICE TEACHERS' PREPAREDNESS TO TECHNOLOGICAL PEDAGOGICAL CONTENT KNOWLEDGE (TPACK) FOR EFFECTIVE ECONOMICS INSTRUCTION

EJIMONYE JOVITA CHINELO PH.D

Abstract

Technology in education systems has changed the education curriculum in such a way that Economics pre-service teachers should be acquainted with technological skills in teaching and learning. The purpose of this study is to investigate Economics pre-service teachers' preparedness in technological and pedagogical content knowledge for effective Economics instruction. Descriptive statistics was adopted. 137 pre-service Economics teachers were sampled using stratified simple random sampling. A questionnaire was used for data collection. The data were analysed using mean, percentages and charts. The study reveals that Economics pre-service teachers lack technological skills. Thus, there is no statistically significant difference between male and female Economics pre-service teachers and their

TPACK preparedness. The study recommends that lecturers should frequently apply technological innovative pedagogical skills during instruction in higher institutions to enable the Economics pre-service teachers to be updated with the current trend in the education system in order to improve borderless learning.

Keywords: Economics, technology knowledge, pedagogy knowledge, content knowledge, pre-service teachers

Introduction

The invention of technology in the education system requires Economics pre-service teachers to be acquainted with the methods and skills of its utilization in teaching and learning for effective delivery of instruction. Therefore, Economics pre-service teachers should know how to integrate technological pedagogical content knowledge in their teaching and learning for a positive outcome. The study of Economics educates students on how to deal with economic problems that face individuals in a society and policies needed to find possible solutions to these economic problems.

Teaching and learning seems to be difficult to some teachers since the introduction of technology in the education industry. The skills involved in teaching and learning at this present time when compared with that of ten years ago are not the same due to the availability of technologies and computer gadgets (Khalid, Karim & Husnin, 2018). Some of these technological devices are supplied by the State Government in some secondary schools but the problem could be the utilization of it. Khalid, Karim, and Husnin (2018, p.1467) further stated that "this led to a more competitive, knowledgeable, creative and innovative workforce, leading to increased

investment in education, training and research and development."

Teachers are the source of different kinds of strategies, technologies, methods, and materials employed in teaching and learning (Simsek, 2020). There is a need for them to have the knowledge of technology for effective classroom instruction. Apau (2017, p.167) emphatically said that "classroom instruction is not only dependent on the extent and pedagogical knowledge of the teacher but also on the technological knowledge of the teacher and his or her ability to use technologies such as wikis, blogs, and YouTube videos for instructional related purposes in and out of the classroom".

Furthermore, some of the teacher education programmes are concern more with the development of pedagogical content knowledge than technological skills. Tantrarungroj and Suwannatthachote (2012) observed that teacher education programmes dwelt on equipping student-teachers with the pedagogical content knowledge, skills, and attitude needed for the teaching and learning process. In line with the above statement, Clark (2013) stated that educators in this technological era should design their educational changes both academically and technologically to move along with the trend.

Economics pre-service teachers are students' teachers preparing themselves to be professional teachers that inculcate knowledge to the learners by integrating technological skills, content knowledge, and pedagogical knowledge into the teaching and learning process. Khalid, Karim, and Husnin (2018) observed that the introduction of technology in the education system has resulted in a more competitive, knowledgeable, creative,

and innovative workforce which leads to increase investment in education, training, and research and development. This implies that Economics pre-service teachers should shift from a conventional way of teaching to an approach involving the integration of technology with content and pedagogical knowledge. This corroborates with Reigeluth (2013) who maintained that "teachers do not only lack knowledge about learner-centered instructions but also lack knowledge about ways to integrate technology into learner-centered instruction" (p.59). In line with this view, Zhao Zhang and Li (2011) observed that pre-service teachers including Economics students' teachers are not well trained by their teachers' education programme on how to use technology in the teaching and learning process. Moreover, Garba and Alademerin (2014) found that pre-service teachers in Nigeria are not well prepared in their Universities and Colleges of Education to teach with technology notwithstanding that there are many policies and funds set up by the government.

Technological pedagogical content knowledge is a form of knowledge required by Economics pre-service teachers to acquire in this technological age for effective delivery of instruction. Schmidt, Baran, Thompson, Mishra, Koehler, and Shin (2009) defined technological pedagogical content knowledge (TPACK) as the knowledge teachers imbibe for proper integration of technology and content during instruction. It is a kind of knowledge that consists of technological knowledge, technological content knowledge, and technological pedagogical knowledge (Apau, 2017). This implies that Economics pre-service teachers should acquire the following knowledge before the end of his or her

programme as explained in the TPACK framework by Koehler and Mishra (2006) as below:

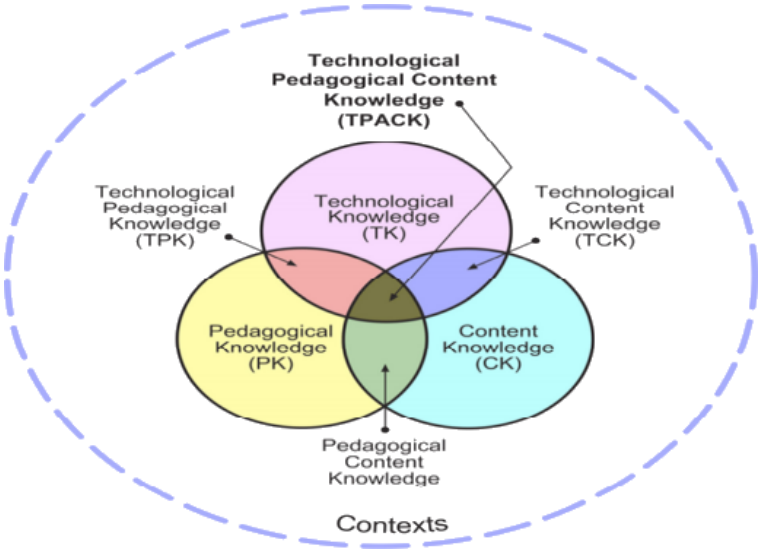

Figure 1: TPACK framework by Koehler and Mishra (2006)

To explain the diagram above, Content knowledge in this study is about Economics concepts learned or taught. In the sight of this, Pfundt and Duit (2000) warned that lack of a comprehensive base of content knowledge can be discouraging on the side of pre-service teachers. Pedagogical content knowledge (PCK) is the combination of pedagogical knowledge and content knowledge in teaching and learning Economics. It consists of all educational activities like teaching, learning, curriculum, assessment, and reporting. It deals with different ways of presenting the subject matter to the learners. Given this, Abbitt (2011) stated that PCK embraces knowledge of pedagogies and the planning procedures that are suitable and applicable to the teaching of a given content at any specific time. Technological knowledge is a form of

knowledge that deals with smorgasbord technologies like picture books, the internet, blogs, e-mails, and more advanced technologies (Koehler, Mishra, Hershey & Peruski, 2004). This implies that Economics pre-service teachers should learn how to utilize the knowledge they acquired in a word processor, spreadsheets, browsers, blogs, e-mails among others in their educational activities.

Technological pedagogical knowledge (TPK) is a form of knowledge in which teachers utilize technological skills together with pedagogical knowledge in teaching and learning. Mishra and Koehler (2006) defined technological pedagogical knowledge (TPK) as the knowledge that deals with the effect of assorted technological skills in the teaching and learning environment. In collaboration with this view, Graham, Cox, and Velasquez (2009) perceive TPK as the knowledge of overall pedagogical activities in which a teacher can use emerging technologies in teaching. TPK is the knowledge of applying technology in different teaching methods (Owusu, 2014). Technological content knowledge is characterized by flexibility, creativity, and adaptability to allow teachers to manage, direct and employ technology in a unique manner (Clark, 2013). Male and female Economics pre-service teachers have different perceptions on the use of technology with content knowledge in the teaching and learning process.

Gender is a significant variable in this study because male and female students perceive technology in different ways. Ugwuanyi, Okeke, and Mokhele-Makgalwa (2021) reported that male academics have high interest in using information technology tools than female academics. In line with this, Yuksel and Yasin (2014) asseverated that

male teachers are highly interested in using new technological devices in learning than female students in Turkey.

The problem of this study emanated from the fact that despite the fast-growing of technology in this computer era, Economics pre-service teachers are still using the conventional way of teaching without employing technological aided devices in the classroom instruction during their fieldwork experiences. This could discourage borderless learning and lead to lack of motivation and low achievement among Economics Senior Secondary school students in the internal and external examination. Moreover, some of the Economics pre-service teachers' lack the skills involve in integrating technology, content, and pedagogy in classroom instruction. Since researches have proved effective use of technology during the teaching and learning process. There is a need for Economics pre-service teachers to be knowledgeable and updated in a proper way for effective application of technology, pedagogy, and content in the learning process. The use of technology virtually connect students and make them more creative in planning their lesson note. None has been done to the knowledge of the research on Economics pre-service teachers' technological pedagogical content knowledge (TPACK). Against this backdrop, there is a need to investigate Economics pre-service teachers' preparedness to TPACK for effective Economics Instruction.

Research Questions

- What is the technological knowledge preparedness of Economics pre-service teachers of UNN

- What is the technological pedagogical knowledge preparedness of Economics pre-service teachers of UNN
- What is the technological content knowledge preparedness of Economics pre-service teachers of UNN
- What are the factors that may hinder the preparedness of Economics pre-service teachers to acquire technological pedagogical content knowledge (TPCK)

Hypotheses

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

Ho_1: There is no significance difference in the mean rating scores of male and female Economics pre-service teachers on technological knowledge preparedness at University of Nigeria, Nsukka

Ho_2:There is no significance difference in the mean rating scores of male and female Economics pre-service teachers on technological pedagogical knowledge preparedness at the University of Nigeria, Nsukka

Ho3:There is no significance difference in the mean rating scores of male and female Economics pre-service teachers on technological content knowledge preparedness at the University of Nigeria, Nsukka

Ho_4:There is no significance difference in the mean rating of the factors that may hinder the preparedness of Economics pre-service teachers

and technological pedagogical content knowledge.

The study has both theoretical and practical significance. Theoretically, the study anchored on Social constructivism theory propounded by Lev Vygotsky in the year 1978, which believes that students should construct their ideas in such a way that it will be meaningful to them for active participation and easy understanding of the concepts. The tenet of this theory is that knowledge is constructed based on social interaction and experience. The relationship between this theory and this study is that the interaction of pre-service Economics teachers and the students in the classroom is very important. Students learn a lot from their teachers' knowledge and their behaviours because they are models in the school setting. A teacher endowed with technological pedagogical content in his/her field such as Economics will effectively deliver instructions because the style of teaching will be different from those that lack technological pedagogical content.

Methodology

The study adopted a descriptive survey design because it describes the characteristics of a particular individual or a group. The entire population of the study was all the pre-service Economics teachers in The University of Nigeria, Nsukka in the 2019/2020 academic year which comprises 486 students. The target population was the final year Education/Economics students. The final year Education/Economics students were chosen because they have spent more years in the school and they have done courses that should prepare them to be effective teachers in this technological age. Stratified simple random sampling was used to sample 137 pre-service

Economics teachers. Firstly, the population was stratified into 4 strata and simple random sampling was used to select 34 pre-service Economics teachers from 3 strata while one stratum comprised 35 pre-service Economics teachers to make 137 in all.

The questionnaire called "Questionnaire on Economics Pre-Service Teachers' Preparedness to Technological Pedagogical Content Knowledge" was used to collect the data from the respondents and it was developed by the researchers. It comprised sections A and B. Section A contained personal data of the respondents while section B contained 4 clustered with 36 items in all. The items in the questionnaire were constructed on a four-point Likert type scale of "Strongly Agree" (SA) =4, "Agree" (A) =3, "Disagree" (D) = 2, "Strongly disagree" (SD) = 1. The instrument was validated by three experts, one from measurement and evaluation, Department of Science Education while the other two are from the Department of Social Science Education all from Faculty of Education, University of Nigeria, Nsukka, Enugu State Nigeria. The reliability of the instrument was done using Cronchach's Alpha and an overall coefficient of 0.85 was obtained which shows that the instrument is reliable. One hundred and thirty-nine copies of the questionnaire were administered with the help of the research assistants by hand to the respondents and 100% of it was recovered. The data collected were analysed using mean and standard deviation. The benchmark for the response was based on a mean of 2.50 above was indicated agreement while the mean of 2.50 below was indicated disagreement.

Results

Research Question 1: What is the technological

knowledge preparedness of Economics pre-service teachers?

Table 1: Mean scores of Economics pre-service teachers on the preparedness of technological knowledge at UNN

S/N	Items Statement	Group	N	Mean	SD	Dec
1	I can use technical skills like PowerPoint in presentations.	Male Female	686 69	1.3824 1.68	.67 .85	Disagree Disagree
2	I have learned to use different social media applications in learning Economics	Male Female	686 69	1.7206 1.95	.71 .76	Disagree Disagree
3	I can use email effectively to send and receive information	Male Female	686 69	1.6176 1.75	.69 .76	Disagree Disagree
4	I know how to create a website	Male Female	686 69	1.9706 2.20	.88 .93	Disagree Disagree
5	I use blog frequently in academic discussion	Male Female	686 69	1.9265 2.10	.83 .97	Disagree Disagree
6	I can create Economics text and graphs often with word processing	Male Female	686 69	1.8088 1.88	.74 .76	Disagree Disagree
7	I always type my assignment with word processing software	Male Female	686 69	1.7206 1.81	.79 .79	Disagree Disagree
8	I can create PowerPoint for representation	Male Female	686 69	1.6765 1.94	.85 .95	Disagree Disagree
9	I know how to install a new programme at any time I need it	Male Female	686 69	1.6471 2.00	.84 1.06	Disagree Disagree
10	I can effectively source materials online	Male Female	686 69	1.6912 1.78	.70 .87	Disagree Disagree
11	I am acquainted with computer-assisted instructions	Male Female	686 69	1.7794 1.82	.69 .82	Disagree Disagree

The result in table1 shows that the mean rating scores of male and female Economics pre-service teachers on items 1 to 11 are below the benchmark mean of 2.50. This

implies that both male and female Economics pre-service teachers disagreed with the statements of items 1 to 11.

Ho_1: There is no significance difference in the mean rating scores of male and female Economics pre-service teachers on technological knowledge preparedness at University of Nigeria, Nsukka

Table 2: t-test of analysis of the difference in the mean rating scores of male and female Economics pre-service teachers on technological knowledge preparedness at UNN

Group	n	Mean	Std. Deviation	df	t-cal	p-value
Male	68	1.7219	.59	135	-1.720	.044
Female	69	1.9038	.65			

Results in table 2 reveal that there is significance difference in the mean ratings of male and female Economics pre-service teachers on technological knowledge preparedness at the University of Nigeria, Nsukka, t(135)=-1.720, p= .044. This is because that the p-value of 0.44 is lower than the 0.05 level of significance. Thus, the null hypothesis is rejected.

Research Question 2: What is the technological pedagogical knowledge preparedness of Economics pre-service teachers of UNN?

Table 3: Mean scores of Economics pre-service teachers on the preparedness of technological pedagogical knowledge at UNN

S/N	Items Statement	Group	N	Mean	SD	Dec
1	I can use PowerPoint in teaching to enhance students learning	Male Female	686 69	1.6324 1.7536	.90 .97	Disagree Disagree
2	I can use the Facebook application for economic discussion.	Male Female	686 69	1.8676 2.0290	.86 .89	Disagree Disagree
3	What I learned in educational technology in my training has equipped me with the skill of using visual and audio applications in teaching.	Male Female	686 69	1.8382 2.0725	.75 .88	Disagree Disagree
4	I can help my students to effectively use technological applications like a coral draw to draw economics graphs and tables	Male Female	686 69	1.7794 2.0145	.75 .76	Disagree Disagree
5	I can use social media applications to teach my students both far and near	Male Female	686 69	1.7206 2.1159	.73 .76	Disagree Disagree
6	I can refer my students to internet sites where they can source Economics related information.	Male Female	686 69	1.8382 1.8841	.77 .72	Disagree Disagree
7	Through the use of animation in teaching, I can motivate students	Male Female	686 69	1.6176 1.9420	.81 .84	Disagree Disagree
8	I can enhance cooperative learning through group online discussions on social network sites	Male Female	686 69	1.9118 1.8261	.79 .79	Disagree Disagree
9	I can administer the test, assess the assignment through online applications like Facebook	Male Female	686 69	1.6765 2.0000	.82 .86	Disagree Disagree
10	I have learned how to give feedback to students online	Male Female	686 69	1.8529 1.8406	.76 .74	Disagree Disagree
11	I can use a computer to design a concept map for teaching Economics	Male Female	686 69	1.7206 1.9710	.75 .73	Disagree Disagree

The result in table 3 shows that the mean rating scores of male and female Economics pre-service teachers on items 1 to 11 are below the benchmark mean of 2.50. This implies that both male and female Economics pre-service teachers disagreed with the statements of items 1 to 11.

Ho_2: There is no significance difference in the mean rating scores of male and female Economics pre-service teachers on technological pedagogical knowledge preparedness at the University of Nigeria, Nsukka

Table 4: t-test of analysis of the difference in the mean rating scores of male and female Economics pre-service teachers on technological pedagogical knowledge preparedness at UNN

Group	n	Mean	Std. Deviation	df	t-cal	p-value
Male	68	1.7687	.59	135	-1.734	.479
Female	69	1.9499	.63			

Results in table 4 reveal that there is no significance difference in the mean ratings of male and female Economics pre-service teachers on technological pedagogical knowledge preparedness at the University of Nigeria, Nsukka, t(135)= -1.734, p= .479. This is because that the p-value of .479 is greater than the 0.05 level of significance. Thus, the null hypothesis is accepted.

Research Question 3: What is the technological content knowledge preparedness of Economics pre-service teachers of UNN?

Table 5: Mean scores of Economics pre-service

teachers on the preparedness of technological content knowledge at UNN

S/N	Items Statement	Group	N	Mean	SD	Dec
1	I have learned how to help students comprehend abstract economics concepts through internet materials	Male Female	68 69	1.4706 1.7101	.66 .81	Disagree Disagree
2	I can apply technological applications like Stata to solve some economics analysis	Male Female	68 69	1.8088 1.9565	.82 .83	Disagree Disagree
3	I know using a computer to solve mathematical Economics topics	Male Female	68 69	1.5882 1.7536	.76 .81	Disagree Disagree
4	I know using a computer to exhibit images and graphics to my students during teaching for more understanding	Male Female	68 69	1.8529 2.0000	.74 .77	Disagree Disagree
5	I can use the internet to source for topics, not in the Economics text.	Male Female	68 69	1.7059 1.8986	.73 .79	Disagree Disagree
6	I can now understand Economics theories that are abstract through online discussions	Male Female	68 69	1.8382 2.0145	.80 .81	Disagree Disagree
7	Through online resources, I can now relate and compare the economics of the Nigerian situation to that of the Asian Tigers	Male Female	68 69	1.7941 1.8986	.82 .91	Disagree Disagree

The result in table 5 shows that the mean rating scores of male and female Economics pre-service teachers on items 1 to 7 are below the benchmark mean of 2.50. This implies that both male and female Economics pre-service teachers disagreed with the statements of items 1 to 7.

Ho3:There is no significance difference in the mean

rating scores of male and female Economics pre-service teachers on technological content knowledge preparedness at the University of Nigeria, Nsukka

Table 6: t-test of analysis of the difference in the mean rating scores of male and female Economics pre-service teachers on technological content knowledge preparedness at UNN

Group	n	Mean	Std. Deviation	df	t-cal	p-value
Male	68	1.7227	.60	135	-1.545	.187
Female	69	1.8903	.67			

Results in table 6 reveal that there is no significance difference in the mean ratings of male and female Economics pre-service teachers on technological content knowledge preparedness at the University of Nigeria, Nsukka, t(135)= -1.545, p= .187. This is because that the p-value of .187 is greater than the 0.05 level of significance. Thus, the null hypothesis is accepted.

Research Question 4: What are the factors that may hinder the preparedness of Economics pre-service teachers in technological pedagogical content knowledge (TPCK)

Table 7: Mean analysis of the ratings of factors that may hinder preparedness of pre-service Economics teachers to acquire technological pedagogical content knowledge (TPCK)

S/N	ITEMS	Group	N	Mean	SD	Dec
1	Lack of technological facilities in training schools	Male Female	686 69	2.5294 2.5942	.70 .58	Agree Agree
2	Non-use of technological gadgets for instruction by the learners	Male Female	686 69	2.5441 2.5217	.68 .59	Agree Agree
3	Inadequate fund to procure necessary technological facilities that may enhance learning	Male Female	686 69	2.5147 2.5797	.70 .60	Agree Agree
4	Inadequate knowledge of their teachers on technological applications that can be used to simplify abstract concepts	Male Female	686 69	2.5294 2.6087	.68 .62	Agree Agree
5	Noncoverage of Economics content due to lack of knowledge on internet sources that students can be referred to	Male Female	686 69	2.5735 2.6812	.55 .63	Agree Agree
6	Epileptic power supply	Male Female	686 69	2.5588 2.6667	.66 .56	Agree Agree
7	Poor maintenance culture of the available technological gadgets used for instruction	Male Female	686 69	2.5588 2.6522	.63 .66	Agree Agree

The result in table 7 shows that the mean rating scores of factors that may hinder the preparedness of pre-service Economics teachers to technological pedagogical content knowledge (TPCK) on items 1 to 7 are above the benchmark mean of 2.50. This implies that both male and female Economics pre-service teachers agreed to the statements of items 1 to 7.

Ho_4:There is no significance difference in the mean rating of the factors that may hinder the preparedness of Economics pre-service teachers

and technological pedagogical content knowledge.

Table 8: t-test of analysis of the difference in the mean rating scores of the factors that may hinder preparedness of pre-service Economics teachers in technological pedagogical content knowledge (TPCK)

Group	n	Mean	Std. Deviation	df	t-cal	p-value
Male	68	1.5441	.50	135	-.863	.963
Female	69	1.6149	.46			

Results in table 8 reveal that there is no significance difference in the mean ratings of the factors that may hinder the preparedness of Economics pre-service teachers and technological pedagogical content knowledge, t(135)= -.863 p= .963. This is because that the p-value of .963 is greater than the 0.05 level of significance. Thus, the null hypothesis is accepted.

Discussions of the findings

The study sought to investigate Economics pre-service teachers' preparedness to technological pedagogical content knowledge (TPACK) for effective Economics instruction. The findings of research question one revealed that Economics pre-service teachers lack technological knowledge for effective teaching and learning. This implies that they cannot use social media like blogs, power points, and websites among others in teaching and learning Economics. In contrast with this, Santos and Castro (2021) observed that pre-service teachers have strong knowledge of technology. Also, Sharma (2018) found that university students are conversant with computer skills in this technological era.

The study also revealed in the hypotheses one that female use more of social media than their counterpart in teaching and learning of Economics. Hence, there is significance difference in the mean ratings of male and female Economics pre-service teachers on technological knowledge preparedness at the University of Nigeria, Nsukka.

The result of the research question two also revealed that Economics pre-service teachers lack technological pedagogical knowledge for effective teaching and learning of Economics. This shows that they are ineffective in using social media in transferring Economics concepts to the learners. Pre-service teachers' performance in handling the lessons by using strategies and classroom management is very important. This study disagrees with the findings of Santos and Castro (2021) who discovered that pre-service teachers have strong technological pedagogical knowledge. Although, technology has come to stay in the education industry, yet, some pre-service teachers are still lacking behind on how to incorporate technological pedagogy in teaching and learning. The study also revealed that there is no significance difference in the mean ratings of male and female Economics pre-service teachers on technological pedagogical knowledge preparedness at the University of Nigeria, Nsukka.

Moreover, the result of the research question three revealed that Economics pre-service teachers disagreed that they can use computer devices and social media effectively in teaching and learning Economics. This suggests that they lack technological content knowledge and their stay in the university did not help them to acquire the skills needed to integrate the content

knowledge with technology. The findings disagree with Kasim and Singh (2017), who states that students' teachers should acquire the knowledge and technology skills and know-how to use technology in the classroom for effective teaching and learning. The study also revealed that there is no significance difference in the mean ratings of male and female Economics pre-service teachers on technological content knowledge preparedness at the University of Nigeria, Nsukka.

The result of the research question four revealed that Economics pre-service teachers agreed that factors hindering the preparedness of pre-service Economics teachers to acquire technological pedagogical content knowledge are Lack of technological facilities in training schools, Non-use of technological gadgets for instruction by the learners, inadequate fund to procure necessary technological facilities that may enhance learning, inadequate knowledge of teachers on technological applications that can be used to simplify abstract concepts, non-coverage of Economics content due to lack of knowledge on internet sources, Epileptic power supply, and poor maintenance culture. This study corroborates with the findings of Dotong, De Castro, Dolot, and Prenda (2015) who found that inadequate financial support and infrastructure, human capital, and management support are factors affecting the integration of technological knowledge in the classroom in developing countries. Hence, there is no significance difference in the mean ratings of the factors that may hinder the preparedness of Economics pre-service teachers and technological pedagogical content knowledge.

Conclusion and Recommendations

The study investigated Economics pre-service teachers' preparedness to technological pedagogical content knowledge (TPACK) for effective Economics instruction. The findings showed that Economics pre-service teachers did not receive adequate technological pedagogical content knowledge needed for effective teaching and learning of Economics. Hence, there is a need to educate and train Economics pre-service teachers to acquire technological skills suitable for classroom instructions because of the country's situation, especially in this Covid-19 era. The study also found that factors that hinder the acquisition of this technological pedagogical content knowledge are epileptic power supply, poor maintenance culture, non-use of technological gadgets, and lack of funds among others. The study found that Universities should make these technological gadgets available for pre-service Economics teachers to use to revolutionize teaching and make them effective thinkers and creative in handling their classroom. Based on these findings, the researcher make the following recommendations that Universities should provide continuous training for both lecturers and students on the integration of technological skills in teaching and learning. The government in collaboration with the Universities should provide more technological gadgets and finance to maintain information communication technology (ICT) devices for the professional development of teachers in the 21st century. The school library should be furnished with books about technology, pedagogy, and content and should be made available to lecturers and students who are interested to upgrade themselves. Curriculum planners should incorporate a course in the Economics curriculum with

in-depth technological pedagogical content knowledge and make it compulsory for Economics pre-service teachers since ICT in teaching and learning has come to stay.

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CHAPTER 30.

COMBINATION OF DIGITAL AND STENCIL PHOTOGRAPHIC PRINT TO ENHANCE COMMUNICATION AND COUNSELLING

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Abstract

This exploratory study, examined the combination of digital and stencil photographic print to enhance communication and counseling in a borderless world. This study is a creative medium of expression using social life as case study. Digital photographic print is used to describe all print processes of transferring a document (images or text) on a personal computer or order storage device to be printed by device that accepts text and graphic output. Stencil photographic prints is the act of cutting open drawn/ snaps images or text on any flat surface or material like paper to be registered on another permanent surface. The photographic illustrations that were created using the stencil and digital photographic technique separately for communication and

counseling were not quite beautiful and presentable as an artwork. People appreciate printings that are manually produced for communicationand modeling counselling. This study therefore showcases the creative strength of photography as an art form. The study as well studied man and his environment as well as his challenges as he goes about his daily activities thesewere used to create the photographic illustrations. The images that were printed digitally were separated from the images that were printed with stencil printing process. The digital parts were printed first while the stencil parts were later processed and printed on space created for it on the digital hard copy to create the complete illustration.The study has proved the combination of stencil and digital photographic print process as a new character which will inspire a new wave of scholarship in picture communication and counselling in a borderless world.

INTRODUCTION

Background Of The Study/ Works Cited

Man in his nature has always strived for new and a better way of doing things in unique style and technique to improve his living and comfort since the creation of the earth. Chukueggu (2000) noted that "man has always been in need of comfort. Since the creation of man, he has never rested in the quest to seek easier ways of doing things to improve his living condition"(Obonyano, 2003). Man expresses his ideas in the form of words and images in diverse ways. Whichever method or style employed could persuade his audience. Consequently, every creative artist creates his or her work in a unique way, so as to be appreciated and possibly stand out of the crowd.

Photography

The word photography is derived from the Greek word,"photos" (light) and "graphos" (writing) which means drawing with light (Adewummi and Onuora,

2006:1). Photography as previously defined, is essentially the production of a permanent record of an image by the combined action of light and chemical processing (Encyclopedia Americana International, 1995:306). Photography has been defined by different scholars in different ways. The fundamental issue is the use of light and chemical action in image recording and printing.

Photography started in the ancient times with the artist as the photographer. This photographic work he does by way of sketching/drawing when he is called upon to record an event or ceremony. Later, it evolved into the Pin-hole camera, which is the earliest known camera. The pin- hole camera is a light-tight box fitted with a pin-hole at one end. The pin-hole camera was followed by the Camera obscura- a dark chamber or room with a hole at one end of the wall through which images of object outside the room were projected on the opposite wall. This principle was described in the manuscript of Leonardo da Vinci (1452-1519) over one thousand years(Irivwieri, 2010).

Digital Photography Print

Dontigney (2014) stated that Digital printing is a relatively recent phenomenon in the century-old printing tradition. It's rise has come about largely as a result of the rapid improvement in computer technology and explosion in the use of personal computer. Thus, digital printing involves taking digital images and printing them onto a surface.

Freeman (2014) stated that digital photography needs a very large number of units so that it can appear as a continuous tone image to the eye. When it is displayed, these are in the form of pixels. Digital photographic printings are all the printed works that are printed

directly from the computer and other devices that accept data in a digital format like the memory card, flash drive, hard disc, scanner and DVD to the printer. These digital printed works include home pictures, calendars and printed works on cans, plastics and billboards.

Digital photographic print consequently is used to describe all photographic prints that pass through the computer and other digital images/text accepting devices like flash drive, memory cards, compound disc directly to the printer.

Stencil Print

The Free Encyclopedia(2011) defined **stencil** as a thin sheet of material, such as paper, plastic, wood or metal, with letters or a design cut from it, used to produce the letters or design on an underlying surface by applying pigment through the cut-out holes in the material. The key advantage of a stencil is that it can be reused repeatedly and rapidly to produce the same letter or design. **A stencil** is used to reproduce design or letter cut into a thin sheet of material, such as paper, plastic, wood or metal. Ink or pigment is forced through the cut space and registered on the surface beneath.

Modelling counselling

Modelling is a method used in certain cognitive behavioural techniques of Psychotherapy whereby the client learns by imitation alone, without any specific verbal direction by the therapist. It is a general process in which persons serve as models for others exhibiting the behaviour to be initiated by the others. This process is most commonly discussed with respect to children in developmental Psychology. (Modelling P. 2021). It is on this note that the researchers tend to use images as a

model to enhance counseling and visual communication in the borderless world.

Counselling is a form of 'talk therapy' it is a process where an individual meet with a trained professional counsellor to talk about issues and problems that they are facing in their live. Counselling helps people to gain clarity surrounding issues. Vision C. (2021).

Counseling is the process that occurs when a client and counsellor set aside time to explore difficulties which may include the stressful or emotionally feelings of the client. Skillsyouneed.com (2021).

Statement Of The Problem

There are various printing processes by which an artist can reproduce his illustrations. The processes vary from manual or traditional print to digital print. The traditional processes include stencil print, silk screen printing and photomontage while the digital process includes prints that pass through the computer to the printer and scanner.The photographic prints produced using Stencil do not show good appeal and the digital photography print are good but do not show artistic appeal as well. In the other hand, most student don't understand counselling by mere speech. This study thereby combines the Digital and Stencil Photographic printing techniques and use images as a model to create a better and beautiful photographic print using social life for communication and counseling.

The Objective Of The Study

This study intends to:

1. Produce a combined Stencil and Digital photography print to create a better and beautiful

picture for communication and counseling.

2. Create a unique style in photography using social life for counseling and communication in a borderless world.
3. Produce a good image from social life style that will be used as an art form and model for visual communication and modelling counselling.

Research Questions

1. How can the combination of Stencil and Digital Photographic Print be used to create a better picture for communication and counselling?
2. What social life style should be used to make the style or technique stand out?
3. What image should be used as art form for communication and modelling counselling.

The Scope Of The Study

This study is essentially exploratory using a combination of digital and Stencil photographic printing processes for visual communication and modelling counselling. Three different works were used for this studies exploration.

Significance Of The Study

This study provides a unique template in photographic illustration and modelling counselling. it also promotes the combination of digital andstencil photographic print for communication and modelling counselling as well as showcasing social life style that are vile to the society in the borderless world.

Research Method

This is a studio-based exploratory research involving threeexperimentations, integrating stencil and digital media of photographic production. Library research was conducted whereby a number of books, journal articles among others were reviewed to elicit information on the subject matter under investigation. The works were analysed from the technical and conceptual / thematic point of view.

Creating Photographic Illustration.

The researcher studied, analyzed man and his environment as well as his challenges as he goes about his daily activities. These were used to create the photographic illustrations for this study. The researcher moved round the town/village to capture scene that depict his illustrations as seen in the picture. The researcher then positioned the models in different poses and snapped. The researcher also looked for animals that project his creative illustration and snapped. The researcher then made some sketches and merged the images with the snapped background and foreground to create the pictorial composition. The images were transferred from the digital camera to Corel Draw window environment in the computer and this was used to edit the images. The images that were printed digitally were printed first in A3 size of paper and the images printed in stencil were later processed and printed on the space created for it to complete the combination of stencil and digital printing process for visual communication and modelling counselling in the borderless world.

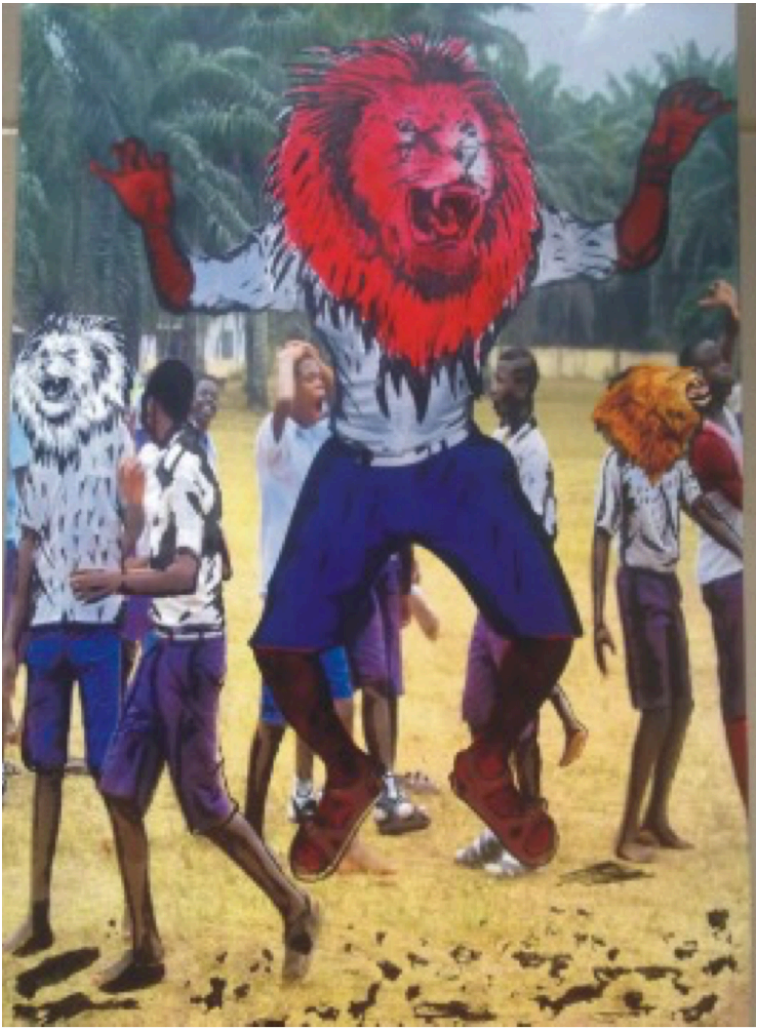

Fig. 1 Ebewebirue O. Solomon. Bullying, Stencil/digital Print (40.5cm x 28.6cm) 2021.

Bullying is a photographic print of students playing on the field. The student at the foreground with a lion's head and legs and hands raised up in the air as if he wants bounced on somebody. The next to him on the foreground looks at the other students at the background having a lion's head.

On the left hand side of the print is another student at the foreground with a lion head roaring while other students at the background are shouting.

Bullying is used for artistic communication and modeling counseling to showcase the wild character of some students in the school system. Most of the students have this wild character. They bully the weak junior students with no regards for the teachers and the school authority. In modeling counseling this image is marked bad (X) enlightening student pictorial representation of their character as well as informing them the implication thereof.

The researcher posed the models in action, snapped and downloaded the images into the computer. The lion image was drawn, CorelDraw was used to compose and edit the images. The images that were printed digitally were separated from the images that were printed traditionally Stencil. The images that were printed traditionally were then traced into a brown paper and stenciled. The stencil was placed on the digitally printed part and ink was forced to register on the digital hardcopy through the stencil on the space created for it to complete the combination of digital and Stencil Photographic Printing process to be framed and used in counselling.

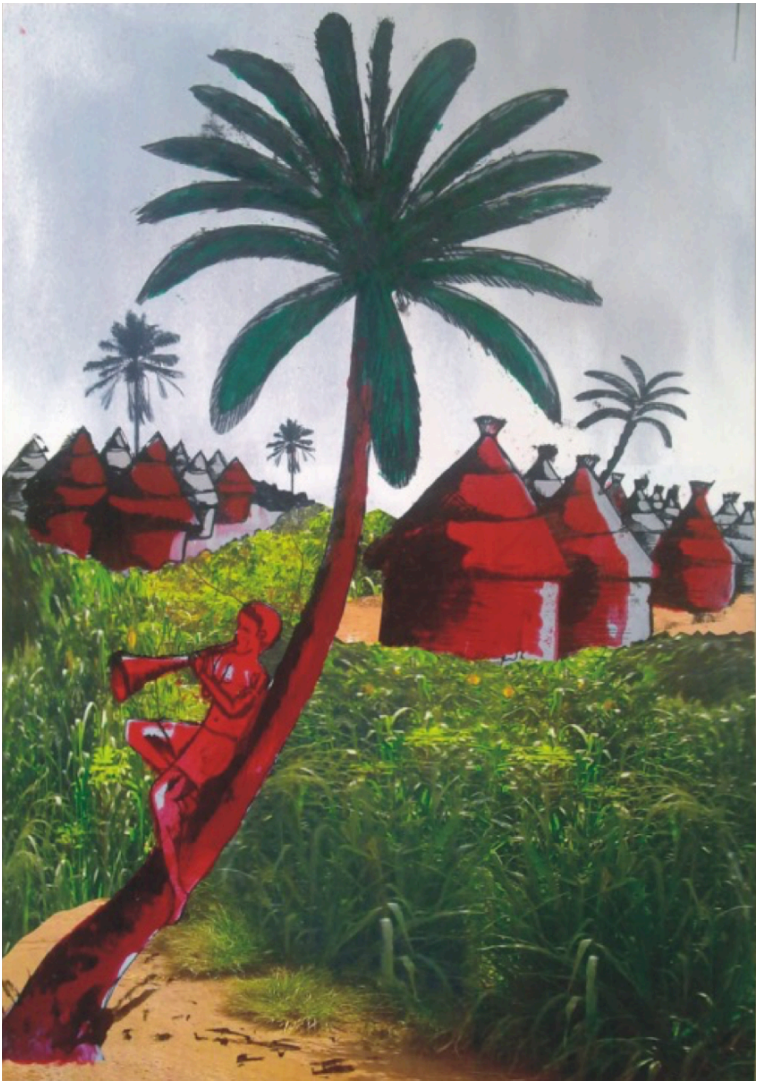

Fig. 2 Ebewebirue S. O. The Trumpeter on Top of the World, Stencil/digital Print (40.5 x 28.4cm) 2021.

The trumpeter on top of the world is a photographic print that denotes a trumpeter at the center of the coconut tree blowing a trumpet with his hand on his mouth. From the

level he is on the trunk, two other neighboring villages were seen on the background.

The trumpeter on top of the world is used by the researcher to connote the joyous feelings in music. Music is one of the limited activities that constrain one's sorrow at a particular moment. When singing or playing the musical instrument, you feel on top of the world and above all your challenges.

The Counsellor uses this as a modelling counseling tool informing the student to engage in positive and moral activities in their leisure time. The researcher drew the models in action, snapped the bush/ the sky and downloaded the images onto the computer. CorelDraw was used to compose and edit the images. The images that were printed digitally were separated from the images that were printed traditionally. The images that were printed with Stencil were then traced into a brown paper and cut into stencil. The stencil was placed on the digitally printed part and ink is forced to register it on the digital hardcopy through the stencil on the space created for it. This process completes the combination of digital and Stencil Photographic Printing.

Fig.3 Ebewebirue O. Solomon. Teach Us the Way. Stencil/digital Print (40.4 x 28.6cm) 2021

This is a photographic print that shows a man and a woman kissing on the street in semi-nude. On the

background are two other kissing by the fence of a building.

Teach us the way is a social commentary used for communication and a modeling counseling tool that highlights the source of sexual immorality in our society today. Most youths and some parents go naked and commit adultery and fornication in the presence of their children. The media presents obscene events on air. As a result, the children practice what they see their parents and elderly ones do. It is also used to alert the parents to stop some of the acts in the presence of their children that their children are copying what they see them do.

The researcher used the CorelDraw software to draw the images in the computer. The researcher posed the models in actions and snapped the images. The background and the foreground were also snapped. The images were downloaded into the computer, composed and edited with the CorelDraw. The composition was printed out in digital format. The parts that were printed traditionally (Stencil) were traced into a brown paper and stenciled. The traditional parts were then forced to register on the digital hardcopy through the opening of the stencil to create the complete combination of Stencil and digital photographic print to be framed and used as a decorative piece in a counseling room.

FINDING AND CONCLUSION

Findings

From the works produced in the studio, it is clearly observed that good photographic prints can be produced from the combination of digital and Stencil photographic printing process. It also proven that images could be used for communication and counseling in the borderless world.

Conclusion

The study had proved the combination of digital and Stencil photographic print process as a new character which will inspire a new wave scholarship in picture communication and counseling in a borderless world.

From the works using this photographic print Fig 1, Bulling has been used as a social life style and had made the combination of Stencil and Digital Photographic Prints to stand out as an art form for communication and a model for modelling counseling.

Digital photographic print and Stencil photographic prints were successfully combined in this study and had proven a new photography print style. From the work produced it was found out that digital parts of the work are to be printed first before the Stencil parts, making it look like super imposition on the digital parts. This is because the Stencil parts when printed first will damage the printer's cartridge while passing through the printer.

CONTRIBUTION TO KNOWLEDGE

The combination of Digital and Stencil PhotographicPrint stand out as a unique style and technique in photographic communication arising from its high beautiful outlook.

This study has in no small measure added to the volume of literature in photographic practice and communication. The combination of Digital and Stencil photographic print has proven that images could be used in communication and counseling in the borderless world.

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CHAPTER 31.

WORKING ONLINE AND BUILDING LEARNING COMMUNITIES IN HIGHER EDUCATION IN AFRICA: A PRACTICAL GUIDE AND JOURNEY SO FAR

FELICIA OFUMA MORMAH PH.D

Abstract

Working online and building learning communities in higher education in Africa and beyond cannot enjoy a better sphere of discussion than now owing to the unprecedented trauma, calamity and difficulties it has brought teaching, learning and living generally since the onset of the Covid-19 pandemic in the universe. This paper is hinged on two theories. The Technology Acceptance Model (TAM) and theory of Constraints (TOC) which will explain the course of action taken in the project. The research also spelt out a practical guide to leading institutions online and Engaging Strategies. Tracks on how the methods were used were outline. The reasons why the methods used were chosen were also enumerated. Several challenges were encountered amongst others: firstly, the fear of change and resistance to move online and teach remotely, initially by the institution, next by the stakeholder involved in teaching and learning. Secondly, the challenge of

gender issue and discrimination of the initiator of the idea, who being a woman was not easy to be assimilated by many. The Journey so far and the success story were also outlined.

KEYWORDS: Working online, Building learning communities, higher education in Africa

Introduction

When the COVID-19 hit the shores of the universe, higher education institutions especially in Africa and beyond were thrown aback, swallowed in shock and bewilderment. Many institutions were at a loss about how education should continue without teachers and students, meeting face -to- face. The sudden emergence of the Covid-19 and the lockdown of schools with the resultant effects of education moving home, revealed the digital unpreparedness of the higher education sector especially in Africa. Most institutions as evidenced from the result of the virtual survey of the July and September, 2020 ADECT- AECT Virtual International conferences on Telegram and zoom revealed that 66% of higher institutions only depended on public cloud computing for online learning and interactions because of its economic/low cost benefit, accessibility and connectivity advantage without institutions' having to undergo institutionalized programmed and dedicated cloud computing sites. This survey result is in line with the study conducted by Achimugu, Oluwagbemi and Oluwaranti (2010) on the evaluation of the impact of ICT diffusion in Nigerian Higher Educational institutions which revealed that tertiary institutions in Nigeria lack adequate ICT infrastructure with a student low computer ration which is averagely put at about 1 to 40 to effectively use the opportunities offered by the cyber

space. The 21st Century scene is dominated by technological developments which have ushered in new dimensions and challenges in teaching and learning throughout the world especially the developing world. The effects of the pressure of the rapid changes in technology has exposed the scenario of teachers, students, educational planner and policy makers evidently caught in the Covid-19 pandemic web of teaching and learning while striving to adjust to demands of the technological age. The quality of education that our learners acquire bears direct relevance on the integration of communication technology in teaching and learning.

Theoretical Framework

This paper is hinged on two theories. The Technology Acceptance Model (TAM) and theory of Constraints (TOC) which will explain the course of action taken in the project.

Technology Acceptance Model

The technology Acceptance Model propounded by Davis, 1989 is an information systems theory that models how users come to accept and use a technology. This model suggests that when users (Higher Institution leaders/Heads/Administrator/Lecturers) are presented with technology, several factors influence their decision about how and when they will use it. The factors involves an interplay of perceived usefulness of the particular technology, perceived ease -of- use of technology that is free from stress and the external variables that has to do with the actual features and capabilities of the technology involved.

Figure 1. photos of participants during coaching before moving online May, 2020.

When higher education institutions and their government understand the gains of accepting and utilizing the new technologies, more effort will be made to budget for them, train, integrate and desire to utilize it. In this study, the heads of institutions, Deans, heads of department, lecturer/faculties were stimulated through series of lectures, demonstrations and motivational speeches to key into the idea integrating and utilizing the available technologies undermining the operating constraints and enhancing the positive factors.

Figure 1. photos of participants during coaching before moving online May, 2020.

Theory of Constraints (TOC)

The theory of constraint propounded by Dr Eliyahu Goldratt focuses on identifying the most important limiting factor that stands in the way of achieving a goal and then systematically improving that constraint until it is no longer the limiting factor. Some major constraints like the high cost setting up ICT infrastructure/provision of Computers facilities, irregular power supply, internet connectivity, lack ICT/technical skill for integrating and launching online learning and interaction were gradually minimized and in some cases completely eliminated through the use of the set tools which includes the:

- five focusing steps (a methodology for identifying and eliminating constraint)
- The thinking process (tools for analyzing and resolving problems)
- Throughput accounting (a method for measuring performance and guiding management decision).

A practical guide to leading institutions online and Engaging Strategies

Bridging digital gaps and training both teachers and students with skills to adjust and fit into the new normal. Students were encouraged to bring and use their devices because there is no institutional and government provision of computers for students and teachers who do not have any.

Tracks on how the methods were used?

1. The first step to leading the institutions online was to identify the state of our infrastructure in term ICT facilities, technical skill level of staff and students. The slogan was "use what you have already have to get what you want" to discourage staff from only concentrating on the challenges but proffering likely innovative solutions.
2. The Step, having identified the constraints was to carry out a sensitization session and training to equip the top management staff, starting from the chief executive, principal officers, then down the ladder.
3. The next step was using what we already have like computers and laptops in laboratories, personal android phone, iPhone, iPads and the purchase/

subscription of data for the laboratory for the training sessions.

4. The next step was the practical application of online tools. The staff were taught how to both use the synchronous and asynchronous online tools especially the Zoom app because it has a free version of it. They were coached on how to break their classes into groups to enable them use the free facilities. There was also the heavy use of WhatsApp by students, teacher, and management to support themselves. The WhatsApp was already popular as social media tool used among staff and students but an improved mode of usage for academic interactions. Emails were used also, and Telegram app was seldom used by the students.
5. The was a massive use of video and audio recording of lessons for students. This method proved to be loved by students with challenges of internet connectivity in their geographical locations and for others who depend on the use of parents or neighbors' digital devices for lessons.
6. The monitoring and evaluation stage: This were very critical stages that required diligence, passion, dialogue, strength of purpose, rewards, and punishments for breaking institution policy on implementation of remote teaching and learning.

Why I chose the above methods

These tracts/steps were chosen although not earlier tested but worth trying out which eventually proved to be ideal and served the purpose. I chose the methods because

l discovered that the problem of technology integration into teaching and learning in institutions in Nigeria and Africa as a whole, were not just because of lack of infrastructural facilities but the skillfulness to actually utilize the available facilities within the limited conducive environmental and the courage accept and to make changes hence the journey started with persuading the heads and leaders of institutions together with other stakeholders who after they were convinced to at least see the possibilities, decided to key into the idea.

Challenges and Prospects

Many challenges were encountered

First major challenge was the fear of change and resistance to move online and teach remotely, initially by the institution, next by the stakeholder involved in teaching and learning.

The challenge of the gender issue of who was suggesting the idea which being a woman was not easy to be assimilated by many until they proven wrong when they were compelled to key into exercise.

Hands on experience – No proper policies to guide institutions, teachers, staff, and students because the situation was novel.

No access of funds/grants by institutions, teachers & students. It was sacrificial and private funding.

Most students or end users were geographically isolated from network connectivity and some do not even have the devices to use.

The Journey so far and the success story

Helping institutions move online during the lockdown was a personal decision motivate and support bewildered institutions, teachers, and students in the COVID-19 emergency and to contribute the survival and sustenance

of education system. It was a dream that was pursued with determination and a drive to succeed in the venture.

- These were steps/methods taken to achieve the transition
- Dispelling faculties/lecturers' fears and worries
- The first stage was Persuading faculty members to consider moving online
- Meeting with union leaders who were initially agitating against the use of digital tools to create a smooth sail of the e-learning.
- Create a central recording/the ICT centre where lecturer can take unit in their teaching and forward to students.
- It requires commitment on the part of management and students
- There is now great compliance.

Recommendation

Integration solution – integrate and connect with people that know what you don't know and with people that don't know what you know.

Institutions should be encouraged to look inwards for solutions, brainstorm for ideas and make use of what they have intellectually, technically, socially, and collaboratively.

Ideal solutions should be welcomed no matter who is proffering weather a junior or a high-ranking officer.

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CHAPTER 32.

USING ICT AS A PEDAGOGY IN ANALYSING ESL CLASSROOM CONVERSATION DISCOURSE

FLORENCE ETUWE OGHIATOR, PHD

Abstract

This paper discusses how ICT could be used as a pedagogy in the analysis of conversation in a classroom discourse. The paper employs speech acts theory as a modelfor its analysis, using data from classroom conversation.The main thrust of speech act theory is that utterances do not only express a state of being, but also perform an action. We do not merely say something with words, but we do something with them. What we should note is that statements by speakers are both expressions of meaning and attitude. Some items related to the paper are extensively explained, which include: ICT; pedagogy; discourse; discourse analysis(DA) ; conversation and conversation analysis Consequently, the paper delves into the benefits of ICT in a classroom conversational

discourse(CD), and discourse structure in ESL classroom.

KEYWORDS: Conversation discourse (CD); discourse analysis (DA); discourse; ICT; pedagogy.

1.0**Introduction**

The paper provides the analyses of discourse in the ESL classroom conversational discourse, using data from the classroom for its analysis.ESL means, English as a second language. Since ICT is an effective method of Englishlanguagediscourse in the ESL class, this paper explicates the use of ICT in a ESL classroom discourse. Consequently, the analysis is done using speech act theory as the linguistic model.

Speech acts theory was propanded by John Austin(1962), in his search for ways to cope with language as a form of action which could not accept meaning outsidethe domain of truth or falsity. First, he made a distinction between constative and performative utterances. In this distinction , such as " The faculty Dean is a very young lady" , is anutterance which is close to truth. A performative utterance is an utterance such as" I promise to buy you a phone". In this case, something is done, which could not be determined to be true or false, butwhichcould be elevated towards the aspect of felicity. Austin further extended constative and performative utterances to locutionary, illocutionary , and perlocutionary acts.

According to Austin, a locutionary act is the act of saying , and producing meaningful utterances with certain reference. An illocutionary act issaid to be a non – linguistic act performed through a linguistic or locutionary act This act could be affected by performative sentences. The speaker might be asserting, denying or

apologising to the hearer . A perlocutionary act is when an utterance is made by a speaker X, to hearer Y, this produces a consequential effect upon the feelings , thought and actions of the speaker. Perlocutionary act is achieved through verbal and non- verbal means All these acts are conversational discourse in Discourse Analysis.

1.1**ICT**

Information and Communication Technology. ICT simply means any technology that has todo with information and communication.Today,ICT has further expanded to encompass computers and computer related devices, emails mms, zoom, WhatsApp, telegram and other forms of communication. ICT is generally accepted to mean all devices, networking components, applications and systems that allow people and organisations to interact in the digital world.

1.2 **Pedagogy:** Pedagogy is a type of study which involves students – teacher activity In a pedagogical class, teacher and students do it together, the teacher gets some good knowledge and information from the students through, questions, term paper, seminarand research. IN an ICT pedagogical discourse class, the students and the teacher participate in the conversation ,using the devices for learning collectively. The teacher teaches the students how to use their devices. We should also note that some students are more acquainted with such devices as nowadays, children are more exposed to ICT. In this case the teacher could also learn some ideas from the students.

1.3 **Discourse**:

Discourse originated from Latin word, "discourses", which means conversation or speech (Kamit Wisniewski 1). Discourse refers to a wide area of human life. But our discussion on discourse here is based only

on the vantage point of linguistic; which include the linguistic analysis of the levels of language. Linguists notion about discourse differ. Some linguists claim that discourse is used in reference to texts, while others claim that discourse denotes speech.

Within linguistics, discourse is often described as "language in use or socially situated text and talk". Other disciplines such as history, sociology, philosophy, anthropology and political science have their own interpretation of discourse. To the foregoing disciplines, discourse could be speech or thought in a topic.

Michel Foucault views discourse as practices that systematically form the objects with which they deal (84). Discourse is seen with its relation with language as follows, discourse as any form of language above the sentence level (Stubbs 1), discourse as any form of language in use (Brown and Yule 1). The term discourse applies to both spoken and written language used for any purpose especially for communication (Uhunmwangho 92). To Coulthard, what is structurally important is the linguistic function and that it is the evidence of this kind that points to the existence of discourse (Uhunmwangho 93).

Crystal states that discourse is "a continuous stretch of (especially spoken) language larger than a sentence, often constituting argument, joke or narrative" (25). Discourse is seen by Schifrin as "any unit of language beyond the sentence which includes both dialogue and non dialogue forms in their spoken or written forms" (167). To Widdowson discourse "is not simply patchwork of preordained sentential meanings, but as a dynamic process of meaning creation" (107). From all the definitions of discourse by linguists and other language

specialists, we may summit that discourse refers to both spoken and written language used especially for the purpose of communication.

1.2**Discourse Analysis**

The linguistic analysis of discourse is discourse analysis. Discourse Analysis (D.A) is a general term for approaches used to analyse written, oral or sign language use, or any significant semiotic event. Semiotics is a branch of discipline that is concerned with the investigation of symbolic and communicative behaviour. In modern linguistics, discourse analysts not only study language used beyond the sentence boundary, but also prefer to analyses 'naturally occurring' language use. A natural language in either in its spoken and written form, is a language that has a finite number of letters in it (and a finite number of letters in its alphabet – on the assumption that it has an alphabetical writing system); although there may be infinitely many distinct sentences in the language, each sentence can be represented as a finite sequence of those sounds (or letters) (Lyons 7).

Discourse analysis is defined as the analyses of connected speech and writing, and their relations in which they are used. It is the examination of language use by language form and language function and includes the study of both spoken interaction and written texts. To Teun Van Dijk, discourse analysis is the study of language to the explication of the structure and meaning of texts (20).

Discourse analysis identifies linguistic features that characterise different genres as well as social and cultural factors that help in the interpretation and understanding of different texts and types of talk. Uhunmwangho states that "discourse analysis is the study of functional use of

language, can perform for us the useful role of interpreting not only spoken but written texts"(92). To Osisanwo the study of organizational structure of discourse is known as discourse analysis (5).

In analysing discourse behaviour, two methods usually occur, one method is to analyse how people manage their discourse behaviour with respect to their cultural background, and their interactive goals at the time of talk. While the second method involves how to discover explicit rules for management of conversational problems, such as turn taking (Schiffrin 96; Grimshaw 28; Labov 130; Omo-Ojugo 40). The two methods can be used in an approach in discourse analysis, and this depends on the linguistic – discourse involved in the analysis. These two methods can be applied to religious language discourse. Brown and Yule state that "the analysis of discourse is necessarily the analysis of language in use. As such, it cannot be restricted to the service in human affair" (42).

Consequently, Osisanwo in the opinion of Stubbs posits that discourse analysis refers mainly to the linguistic analysis as an attempt to study "the organisation of language above the sentence or above the clause, and therefore to study larger linguistic units, such as conversational exchanges or written texts" (8).

2.0 **Conversation**

Conversation is a discussion or talk between two or more persons For it to be a conversation, each person must talk one after the other. There shoukd be a string of at least two turns. Even wgen the second person does not talk, there should be an evidence of at least having heard ghe utterance, by carrying out an action such as : nodding with the head; gaping or staring at the person.

Conversation is an instance in that it brings together the world of objects and the human interlocutors.

2.1 **Conversation Analysis**

Conversation analysis (CA) studies social order in speech. There are different types of conversation.But our concern in this paper is the classroom conversational discourse analysis. The classroom Conversation is the interactions between student and student, and interactions between teacher and studentin the classroom. It could be an argument, a debate, a seminar presentation, or an ordinary class discussion.The components of conversation discourse, i include: discourse participants; discourse opening and closing, and turn taking.

Discourse participants are two or more people taking part in a conversation. They are also known as speakers and addressees, or interlocutors or co-interactants. Discourse opening is the preliminary exchange that begins a conversation. It is that prelude in exchange, no matter how brief, it is designed to begin a conversation. Whether formal or informal, a conversation must have an opening exchange, which could come in form of summing, or greeting. Moreso, conversation could be terminated with a closing exchange, which involves paired utterances, such as a question and an answer. Conversation closing, simply means the end of conversation. Turn taking is the time an interlocutor takes to participate in a conversation(in speaking). Therefore, the process by which a speaker talk when the floor is opened termed turn-taking Turn- taking in conversation discourse begins from childhood, and it is also influenced by some factors, which include; culture, personality, age, sex and professional variables

2.2**Benefits of ICT in ESL Class discourse**

There are several benefits of ICT to different disciplines and most importantly in an ESL class discourse But first and foremost, teachers should explore their attitudes to pride and embrace pedagogy learning This will actually benefit their professional practices as well as improve their students' learning.

The benefits of using ICT as apedagogy in an ESL classroom discourse are stipulated below:

- ICT encourages teachers to analyse difficult areas or new trends in the classroom, since the teacher and students are working as a team. Thus, will encourage them go for different teaching alternatives, such as language drills, and other classroom conversational discourse .
- ICT in pedagogy teaching promote teachers' competence. As teachers work on difficult areas, or providing a way for new trends in using ICT in language discourse, they are invariably improving on themselves which create competence in them.
- New methods are discovered in the different levels of language teaching. As different devices are used in course of conversational discourse. Teachers and students discover different methods and strategies for the use of ICT devices in various levels of language, such as; phonology, syntax, morphology and semantics. These levels facilitate the use of ICT in Discourse Analysis in the ESL class.
- Students acquire adequate knowledge. As teachers are improving on their areas of using ICT in

teaching, students are acquainted with new and broad knowledge. Gaining sufficient knowledge by students enhance the overall teaching method in education in general, English language and discourse analysis in ESL class discourse in particular.

3.0**Discourse Structure in ESL Classroom**

Discourse analysis has attracted the attention of schools in modern times and several researches have emerged from this interest. As mentioned earlier, Discourse Analysis covers a wide range of other disciplines, such as Sociology, Psychology, Philosophy and Linguistics. The relevance of Discourse Analysis to language has also been given attention (Sinclair and Coulthard) in M.A. Oluteju ix).

Analysing discourse structure in ESL classroom examines how teachers interact with their students and how students also interact with one another in ESL class. Although, works have been done on the English Language (for example in Nigeria), there is still need for more efforts to examine the English Language use in the classroom. This paper uses Nigerian teachers teaching English as a second language (ESL) as a case study. This will improve ICT pedagogy classroom discourse in ESL class .Here are examples of students – student interaction and teacher – student discourse.

2.1**Text 1**

Student – student conversation.

A: Are you going to campus 1?

B: Not yet. Are you going there too? Or is there anything you would want ….… to do for you?

C: It's good I met two of you in the class. I'm

going to campus 1 to buy a textbook for an English course, ELS 211.

A: How much is the book sold?

B and C: I think it'sN800.

A: Okay, maybe you could get me a copy too.

B: I'm not buying that now.

A: But what I wanted you to do is to check the exam timetable, please.

B: Ah! Is the timetable out?

A: So I heard.

A: Please, you will assist me to get the date for ELS 102 which I couldn't write last session.

C: What happened?

A: It's a long story.

C: Eeh!

A: Take the money for the book. Thanks.

The above conversation is a discourse between three students of the same level in an institution. The participants changed the topic without anyone of them getting angry or offended. In the above text, speaker A' asked a question to speaker B', may be wanting a favour from him (speaker B). The response from speaker B portrays that the interlocutors are school mates and are of the same level. Speaker C, intrudes by announcing his arrival to the class and his going to campus 1, which facilitated the request of speaker A made earlier to speaker B. The discourse comprises different subjects made by the interlocutors. Consequently, the random speech made displays closeness and agreement among the three speakers also suggests randomness of speech in conversational discourse.

2.2**Text II**

Teacher – student conversation

The text below is a discourse between a teacher and her students in ESL class.

T: Joy

S: Yes ma.

T: What do you understand by the word discourse?

SI: (stares at the teacher).

T: What is discourse? Joy.

SI: (afraid) Aah! It is eeh …...

T: Please who can define 'discourse'?

SII: Raises her right hand up.

T: (Teacher calls the student's name. Ona.

SII: (answers). Discourse means conversation.

T: Does anyone have another explanation to give on 'Discourse'?

Class: (No one answered).

T: The teacher explains 'Discourse' in details as it relates to 'Discourse Analysis' as a discipline in language study.

SIII: Ah! What is discourse?

T: (angrily) Where were you?

Are you sure you've been in this class?

SIII: I'm sorry ma.

SIV: (in a low voice to him)

She was busy discussing in the phone. (the teacher heard him).

T: What! In my class! When I'm teaching, you're busy discussing, making phone call?

SIII: I'm sorry ma.

T: Leave my class now.

SIII: I'm really sorry ma.

Class: (plead with the teacher). Please pardon her, forgive her ma.

T: Do you know that you all have actually engaged in the discussion?

Despite the fact that Julie disrupted the class? You have contributed in giving different interpretation to the discourse today. Like I said before, Discourse Analysis is the analysis of connected speech and writing. The teacher continues …

In the discourse in an ESL class above, the conversation shows different levels of interlocutors (speakers). At the beginning of the discourse, the teacher did not go angry, the class was calm. But as soon as the student who was on phone when the teacher was teaching asked a question, in the process the teacher discovered that the student was making a call while she was teaching. Thus, the teacher grew angry but the other students in the class pleaded for forgiveness on behalf of the student.

The graphological features in the text, such as the punctuation marks which include the full stop (.), ellipses (…), commas (,) and parentheses (c ɔ) are all attribute of conversational discourse. In conclusion, the contractions used in the two texts such as 'it's', 'I'm', are indication of the language used in informal conversational discourse. Although, the second text is a discourse between the teacher and the students, it is also an interaction which is a conversational discourse. The conversational discourse in the two texts enhances ICT and pedagogy in ESL class discourse.

3.1**Conclusion**

ICT has been defined to mean all devices, networking, components, applications, and systems thatallowpeople and organisations to interact in the digital world. This paper has discussed some areas that are directly connected to teaching in the ESL classroom , using ICT.

In so doing, the paper delved into explaining related topics, giving the benefits in ESL class and analysing discourse structure in the classroom, by using two samples (texts). One of the sample is student – student conversation in the class and the other, is the teacher – student conversation in the classroom.

Furthermore, ICT in the class room discourse will go a long way to improve the learning process in the classroom discourse analysis in the ESL class. This is made possible through the teaching of morphology, syntax, phonology and semantics – the four major levels of language. Consequently, this method of discourse, enhances not just the teachers' competence but also improves the knowledge acquisition of the students.

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CHAPTER 33.

EFFECTS OF MATH TEACHERS' ATTITUDES TOWARD COMPUTER USE ON THEIR PERCEIVED USEFULNESS OF COMPUTER-BASED READING SCAFFOLDS IN STUDENTS' MATH ACHIEVEMENT

SEOYEON PARK

Abstract

The purpose of this study is to examine how math teachers' attitudes toward computer use can affect their perceived usefulness of computer-based scaffolds for reading in mathematics (RIMS). We applied the Technology Acceptance Model (Davis, 1989) to develop measures in terms of three aspects: perceived ease of using RIMS, perceived usefulness of RIMS for teachers, and perceived usefulness of RIMS for students. In addition to TAM, we added teachers' attitudes toward computer use in their daily teaching practices in this evaluation model. The structural equation modeling was used to test the relationships among four factors. One hundred and forty-eight middle or high school math teachers in the United States participated in the tool evaluation to assess the preliminary usability and usefulness

of RIMS. Most teachers who participated in the tool evaluation responded that using RIMS will help them teach math and improve students' mathematical knowledge. When considering teachers' attitudes toward computer use (CA), we found that CA directly or indirectly influences perceived ease of use and usefulness of the tool. This implies that teachers tend to predetermine the usefulness of the technology for their teaching and students' learning based on their preferences on computer use. This finding can expand the TAM model by explaining how users' attitudes toward computer use can affect their use of the target technology. Furthermore, this finding suggested that it is important to support teachers to have positive attitudes toward computer use so that they can integrate technology into their curriculum and instruction.

Literature Background

Disciplinary Reading in Math

While many consider reading and math to be separate, reading is enormously influential in students' learning in mathematics (Halliday, 1978; Pimm, 1987; Adams, 2003; Shanahan & Misischia, 2011). This is because of unique features of reading in math in which students need to interpret words and symbols in abstract forms, differentiate words with multiple definitions (e.g., square, degree, volume), and cross-check words, images, tables, or graphs (Adams, 2003; Fang & Schleppegrell, 2010). Thus, supporting reading development can allow students to understand how math concepts are constructed and extend their mathematical knowledge in context-rich scenarios (Galasso, 2019). Several studies suggested strategies to address the reading problem in mathematics. Many of those studies emphasized multiple exposures to math vocabulary (Bowers et al., 2010; Scammacca et al., 2016), interactive read-alouds for digesting informational texts (Bortnem, 2008), active

engagement in reading mathematical texts by summarizing the content, and letting students discuss about key terms with peers (Carlisle, 2010). However, most of the suggestions are highly dependent on teachers' experience and skills, and there are very few studies verifying the effects of these suggestions on improving students' knowledge in mathematics. Thus, we developed RIMS (Reading In Math Scaffolds), which is a web-based learning environment with computer-based reading scaffolds that can promote students' reading literacy and learning in math. The description of RIMS is articulated in the Methods Section.

The relationship among teachers' perceived ease of use, perceived usefulness, and attitudes toward computer use

We applied the Technology Acceptance Model (Davis, 1989) to develop measures for teachers to evaluate RIMS in terms of three aspects: perceived ease of using RIMS, perceived usefulness of RIMS for teachers, and perceived usefulness of RIMS for students. TAM is a model explaining how users come to accept and use a target technology. In TAM, perceived usefulness and perceived ease of use are two crucial factors that impact users' decisions about whether they use the technology or not.

Perceived ease of use refers to the degree to which a person perceives that using a target technology will be free of mental and physical effort (Davis et al., 1989). The technology can have better chance to get accepted by users when it has a high level of perceived ease of use (Davis, 1989). In the tool evaluation, teachers were asked to evaluate how easy RIMS were for them to use. Perceived usefulness is defined as the degree to which a person perceives that using a particular technology will

improve his or her work performance (Davis, 1993). People tend to use the technology more often when they believe it can make them more effective in their work (Davis et al., 1989). Since RIMS has been invented to support teachers' instruction for disciplinary literacy and improve students' math knowledge by assisting their reading in math, the tool evaluation includes how useful RIMS will be in accomplishing these purposes. Perceived usefulness for teachers includes decreasing the time for class preparation and teaching math concepts and problem-solving more efficiently. Perceived usefulness for students' learning includes enhancing students' conceptual and procedural knowledge in math with RIMS from teachers' perspectives.

In addition to two factors of TAM, we added teachers' attitudes toward computer use in their daily teaching practices in this evaluation model. Many studies suggested that teachers attitudes toward computer use are deeply related to teachers' perception of the usefulness of the educational technology and computer-based learning environments (Askar & Umay, 2001; Teo, 2006). Thus, how teachers view computer use can affect their beliefs regarding the effectiveness of RIMS for teaching and learning activities. Teachers' attitudes toward using computers can also influence the level of teachers' perceived ease of use directly since those who like to use computers are highly likely to be more competent and interested in using computers for their work and daily lives (Ngai et al., 2007; Phillips, Calantone & Lee, 1994).

The purpose of this study is to evaluate RIMS from teachers' perspectives and examine how teachers' attitudes toward computer use affect their perceived

usefulness of RIMS. According to the literature reviewed above, we hypothesized the relationship among teachers' attitudes toward computer use (CA), teachers' perceived ease of using RIMS (PE), perceived usefulness of RIMS for teachers (PUT), and perceived usefulness of RIMS for students' learning (PUS) as follows (Figure 1).

H1. CA is positively related to PE, PUT, and PUS.

H2. PE is positively related to PUT and PUS.

H3. PUT is positively related to PUS.

H4. The relationship between CA and PUT is mediated by PE.

H5. The relationship between CA and PUS is mediated by PE and PUT.

Methods

Tool development

RIMS was developed to assist students' learning in math with computer-based reading scaffolds. The content of RIMS includes an Algebra 1 coordinate geometry section skill set. Each chapter has text paragraphs, images, a problem set, and several reading scaffolds. We embedded diverse learning strategies in RIMS. First, students can see the resources with images of the mathematical word when they hover their cursor. Because many studies emphasized increasing the familiarity with math vocabulary, students can comprehend the math concept better with this vocabulary help. Moreover, we highlighted key terms in the text so that students can recognize the important concepts. Second, students can use self-summary boxes for summarizing the content before they solve the questions. Summary writing is regarded as an effective method to improve reading comprehension since it makes students engage in reading actively and also helps

them to recall what they read (Meyer & Ray, 2017). Hagen et al. (2014) also stated that self-summary during reading can be a great tool for meaningful and transformative digestion of the material. Lastly, we added 'why' questions that encourage students to connect the cause-and-effect relationships among math concepts. Each 'why' question has hints that students can use. Students should fill the self-summary box and work on 'why' questions for each chapter before they solve the question set.

Procedures

In this study, 148 middle or high school math teachers in the United States (129 middle school, 19 high school) participated in the tool evaluation to assess the preliminary usability and usefulness of RIMS. Participants were asked to examine RIMS and respond to the evaluation survey. All evaluation was conducted online. The measures for the tool evaluation survey are created by modifying the TAM questionnaire (Davis, 1989; Teo & Van Schalk, 2009). It includes four questions about PE, five questions for PUT, and three questions about PUS. In addition to TAM, we also adopt a scale for the CA from Thompsonet et al (1991) to check teachers' attitudes toward computer use in daily teaching practices and how this characteristic influences the web-based tool evaluation. Participants gave their opinions on each survey item on a 5-point Likert scale, ranging from 1 (strongly disagree) to 5 (strongly agree). Table 1 specifies the survey questions and the reliability of each construct in the measures. The statistical analysis was comprised of two stages. The first stage analyzed the descriptive statistics of the measurement items to figure out teachers' evaluation on RIMS. The second stage tested the

relationships among four factors (CA, PE, PUT, and PUS) with the structural-equation modeling (SEM) approach.

Results

The descriptive statistics for each survey item are shown in Table 2. All means were greater than 3.5, ranging from 3.71 to 4.26. This indicates an overall positive response across four constructs in the measurement. Table 3 shows the frequency and percentage of responses for each item. Around 85% of teachers responded that it was easy to understand how to interact with RIMS. 80-85% of teachers agreed that RIMS will help them teach the content more efficiently and improve students' learning in math concepts and problem-solving.

Before conducting SEM to verify research hypotheses, we did confirmatory factor analysis to ensure the construct validity of factors. As Table 4 shows, all four factors have a reasonable fit to the data. Figure 2 illustrates the path diagram of the model with standardized coefficients and standard errors of each estimated coefficient. The overall model showed good fit considering several fit indices:

x2

(98) =122.168, CFI = 0.965, TLI = 0.957, SRMR = 0.049, and RMSEA = 0.041. In Table 5, path coefficients of direct effects and indirect effects were reported.

As predicted in Hypothesis 1, CA has a positive medium effect on PE (0.436) and PUT (0.432). Both effects were statistically significant ($p<0.001$). However, the direct effect of CA on PUS was not statistically significant (0.223, $p=0.091$). PE showed a significant and positive moderate effect on PUT (0.452, $p<0.001$), but had non-significant effect on PUS (0.157, $p=0.275$). PUT

showed a significantly positive medium-large effect on PUS (0.631, $p<0.001$). Even though CA did not have a significant direct effect on PUS, it affects PUS indirectly by influencing PE and PUT. Regarding the mediating role of PE and PUT, while PUT had a significant indirect effect on the relationship between CA and PUS (0.272, $p=0.006$), the indirect effect of PE alone was non-significant (0.076, $p=0.284$). However, the indirect effect mediated through PE and PUT jointly was statistically significant (0.139, $p=0.013$).

Discussion

This study investigated how teachers evaluate RIMS, which is a computer-based reading scaffolds for math learning. Most teachers who participated in the tool evaluation responded that using RIMS will help them teach math and improve students' mathematical knowledge. When considering teachers' attitudes toward computer use (CA), we found that CA directly or indirectly influences perceived ease of use and usefulness of the tool. This implies that teachers tend to predetermine the usefulness of the technology for their teaching and students' learning based on their preferences on computer use. This finding can expand the TAM model by explaining how users' attitudes toward computer use can affect their use of the target technology.

Furthermore, this finding suggested that it is important to support teachers to have positive attitudes toward computer use so that they can integrate technology in their curriculum and instruction. However, even though teachers are aware of the value of adopting technology regardless of their years of teaching experience (Pierce & Ball, 2009; Baek et al., 2008), many of them feel reluctant

to use new technology due to lack of resources, professional development opporutnity, competence in technology use, expense and time (Pelgrum, 2001; Pierce & Ball, 2009). In future studies, we need more research about how we can improve teachers' positive attitudes toward computer use and new technology as well. Moreover, there should be more exploration on technology integration in teaching practices and students' learning outcomes.

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Appendix A (Figures)

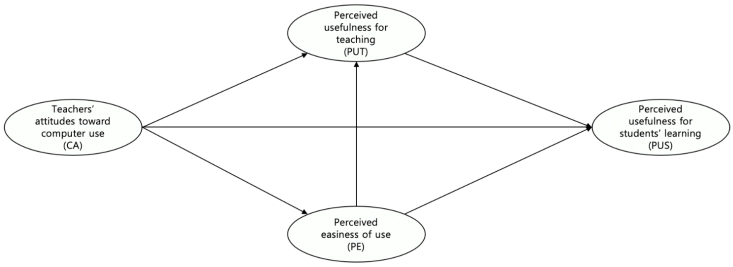
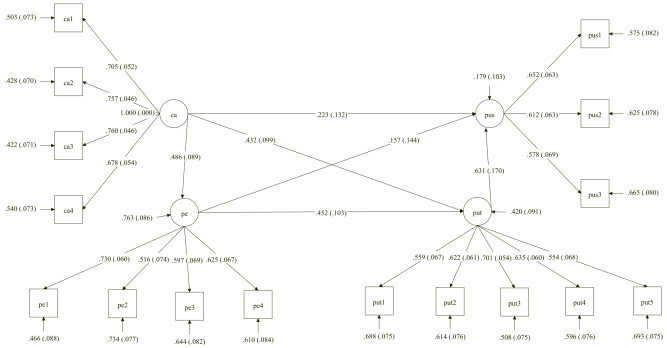


Fig 1. The relationship among CA, PE, PUT, and PUS



CAPEPUTPUS

Fig 2. The SEM model

Appendix B (Tables).

Table 1

Survey questions and the reliability of the tool evaluation survey

Category	Cronbach alpha	Statement
Affect toward Computer use (CA)	0.81	CA1. Computers make my teaching work more interesting. CA2. Working with computers is fun. CA3. I like using computers. CA4. I look forward to those aspects of my job that require me to use computers.
Perceived ease of use (PE)	0.73	PE1. My interaction with this tool is clear and understandable. PE2. I find it easy to get this tool to do what I want it to do. PE3. Interacting with this tool does not require a lot of mental effort. PE4. I find this tool easy to use.
Perceived usefulness for teaching (PUT)	0.75	PUT1. Using this tool will improve my overall teaching practices. PUT2. Using this tool will help me deliver the given content effectively. PUT3. Using this tool will help me prepare to teach the given content before the class. PUT4. Using this tool will help me teach mathematical concepts effectively. PUT5. Using this tool will help me teach how to solve math problems effectively.
Perceived usefulness for students' learning (PUS)	0.71	PUS1. Using this tool will improve students' learning outcomes. PUS2. Using this tool will help students learn mathematical concepts effectively. PUS3. Using this tool will help students learn effectively how to solve math problems related to the given content.

Table 2.

Descriptive statistics of survey items

Category	Variable	Mean	SD	Min	Max
Affect toward computer use (CA)	CA1	3.79	1.01	1	5
	CA2	3.71	0.99	1	5
	CA3	3.75	1.02	1	5
	CA4	3.89	0.90	1	5
Perceived ease of use (PE)	PE1	4.22	0.77	2	5
	PE2	4.20	0.81	1	5
	PE3	4.24	0.73	2	5
	PE4	4.26	0.74	1	5
Perceived usefulness for teaching (PUT)	PUT1	4.03	0.84	2	5
	PUT2	4.06	0.83	1	5
	PUT3	3.99	0.82	2	5
	PUT4	3.98	0.83	2	5
	PUT5	3.99	0.81	1	5
Perceived usefulness for students (PUS)	PUS1	4.16	0.76	1	5
	PUS2	4.24	0.82	2	5
	PUS3	4.12	0.79	1	5

Table 3

Frequency and percentage of responses for each survey item

Variable	Strongly Disagree	Disagree	Neither disagree nor agree	
	n (%)	n (%)	n (%)	
CA	16 (2.66)	49 (8.15)	112 (18.64)	2
CA1	6 (4.05)	11 (7.43)	25 (16.89)	7
CA2	3 (2.03)	14 (9.46)	40 (27.03)	5
CA3	5 (3.38)	13 (8.78)	31(20.95)	6
CA4	2 (1.35)	11 (7.43)	16 (10.81)	7
PE	2 (0.34)	10 (1.69)	78 (13.18)	2
PE1		4 (2.70)	19 (12.84)	6
PE2	1 (0.68)	2 (1.35)	25 (16.89)	5
PE3		2 (1.35)	20 (13.51)	6
PE4	1 (0.68)	2 (1.35)	14 (9.46)	7
PUT	2 (0.27)	39 (5.27)	119 (16.08)	3
PUT1		10 (6.76)	19 (12.84)	7
PUT2	1 (0.68)	6 (4.05)	23 (15.54)	7
PUT3		10 (6.76)	20 (13.51)	7
PUT4		7 (4.73)	31 (20.95)	6
PUT5	1 (0.68)	6 (4.05)	26 (17.57)	7
PUS	3 (0.68)	15 (3.38)	45 (10.14)	2
PUS1	2 (1.35)	3 (2.03)	12 (8.11)	8
PUS2		5 (3.38)	21 (14.19)	5
PUS3	1 (0.68)	7 (4.73)	12 (8.11)	8

Table 4

Fit indices for Factors

Factors	x2 (df)	RMSEA	CFI	TLI	SRMR
CA	192.825 (6)	0.01	0.99	0.98	0.03
PE	121.723(6)	0.051	0.98	0.97	0.028
PUT	151.083 (10)	0.018	0.90	0.90	0.03
PUS	82.802(3)	0.045	0.92	0.93	0.02

Table 5

Path Coefficients of Direct and Indirect effects of the Model

	Path Coefficients			
	Direct effects			Indirect effects
	To PE	To PUT	To PUS	
CA	0.486***	0.432***	0.223	
PE		0.452***	0.157	
PUT			0.631***	
CAPEPUS				0.076
CAPUTPUS				0.272**
CAPEPUTPUS				0.139**

*** p≤0.001, **p≤0.01, *p≤ 0.05

CHAPTER 34.

INFLUENCE OF ICT ON TEACHING AND LEARNING IN TERTIARY INSTITUTION DURING CORONA VIRUS PANDEMIC IN SOUTH SOUTH OF NIGERIA

MR. ICHAZU KINGSLEY AND MRS. BRIGHT IRENE EWERE

ABSTRACT

Information and Communication Technology (ICT) has numerous potentials to spur education development in tertiary institutions in Nigeria. It impacts positively on the educational process, unlike the physical chalkboard in the classrooms. The outbreak and fast spread of the Coronavirus led to the closed down of schools. Efforts to revamp education due to prolong lockdown made the government enforce e-learning in tertiary institutions across the country. Hence, this study investigated influence of ICT in teaching and learning in tertiary institution during corona virus pandemic lockdown by the instructors in the tertiary institutions in Nigeria vis-a-vis their socio-economic factors and limitations encountered. A systematic sampling technique was adopted to select 180 respondents from

the staff list. A validated questionnaire was used to collect data on socio-economic variables (SEV), compliance (ϒ) to e-learning, and limitations (Ls) while multiple linear regression model (R) was used to test the interaction between the compliance and limitations. Results show that age (β¼ 0.351), educational qualification (β¼ 0.843) and teaching experience (β¼ 0.169) influence ICT used in teaching and learning compliance at p < 0.05. It was also found that 67.3% adoption of ICT for teaching and learning took place in the Universities compared to 59.1% in the Polytechnics and 52.8% in the Colleges of Education. Regression shows that constraints affected the level of compliance (R^2 ¼ 0.73). The study concludes that constraints are major obstacles to the Use of ICT facilities on teaching and learning in Tertiary Institutions in south south during Corona Virus pandemic.

Keywords: *Teaching and learning; Lockdown, Coronavirus Pandemic Tertiary institutions, Influence*

Introduction

There is a pervasive crisis in Sub-Saharan Africa's teaching and learning development systems. The current Coronavirus Disease of 2019 (COVID-19) compounded the trouble and has taken tolls on all socio-economic sectors without exception to the educational system in Nigeria. During the lockdown, many female students have come to be victims of rape which have led to undesirable pregnancies, and instances of death additionally reported. For instance, a female undergraduate student of Laboratory Technology Department, Federal College of Animal and Production Technology, Moor Plantation Ibadan, Oyo State was raped to death (Ajayi, 2020); equally incident of gang-raped and demise of a female undergraduate student, University of Benin, Benin City, Edo State was also

reported (Adejumo, 2020); and some other rape and homicide case of a postgraduate student of University of Ibadan happened in the course of the pandemic (Omonobi *et al.,* 2020).

Universities closed their premises and nations shut down their borders in response to lockdown measures. Findings from 200 nations in the mid-April 2020 confirmed that 94 percentage of learners were affected due to the pandemic around the world, which represents 1.58 billion learners (United Nations, 2020). Additionally, UNESCO (2020) stated that the closure of higher institutions has affected over 91 percent of the students' population in the world and that 23.8 million college students might also drop out or no longer be in a position to secure admission to schools in the 2021 academic calendar.

Remote learning grew to become a lifeline for training during the pandemic but, the opportunities that ICT offer go beyond a stop-gap solution at some stage in a crisis (Andreas, 2020). According to Eze *et al.,* (2018), e-learning training is the all-inclusive blending of ICT facilities and present todays telecommunication tools into the educational system. Andreas (2020) and Eze *et al.,* (2018) maintained that e-learning is a hallmark of distance learning. Digital technological know-how provides entirely new solutions to the query of what human beings learn, how they learn, and where and when they learn.

Andreas (2020) in addition asserts that technology permits teachers and students to get admission to specialized materials beyond textbooks, in multiple formats, and in ways that bridge time and space. Meanwhile, Eduard and Lucian (2020) hinted that e-

learning is a modern platform for transmitting understanding and skills to the learners; it is cheap, saves time, and has a wider coverage, and as well promoting team learning and collaboration. Andreas (2020) reiterated that technological know-how promotes deep learning, and permits schools to respond higher to the varying demands of the students.

In a bid to keep away from brain-drain and prevent the whole collapse of the schooling areas in the country, Nigeria joined different leagues of developed international countries and include e-learning in the schooling system during lockdown. Although Nigeria Open University operates e-learning to deliver lectures and supply assignments to the university students this digitization has no longer been sufficiently harnessed in many tertiary institutions across the country. It is either the lecturers are not ICT-compliance or the college students are disadvantaged. In some tertiary institutions, the adoption of ICT facilities are limited to students' registration and examination. Much effort has not been geared in the direction of high quality teaching and learning for students' academic overall performance via the use of ICT facilities.

While Coronavirus pandemic has compelled Nigeria to embrace ICT in teaching and Learning to hold tempo with rapid improvement in the area of technology, the implementation is at a very low pace. In advanced countries, the adjustments are eminent in the academic area as traditional teaching methods have been transformed into cutting-edge methods.

For instance, the Chinese Ministry of Education introduced a virtual Classes Without Stopping Learning coverage to make certain that teaching and learning are

not compromised at any time at some point of the Coronavirus pandemic lockdown (Zhang *et al.,*, 2020), and furnish bendy on-line studying to thousands of students from their houses (Huang *et al.,*, 2020). The instructional equipment are designed in such a way that students could discover educational content material at will while teachers delivered the instructions the use of virtual assembly structures (Andreas, 2020).

In Sweden, post-secondary colleges have switched to broadly speaking distance mastering from the onset of the pandemic (UNESCO, 2020). Online evaluation carried out by way of Chaka (2020) in South Africa and the United State of America, it was also found that at some point of the Coronavirus lockdown 17 of the 21 South African universities and sixty three of the sixty four U.S. universities migrated to e-learning and utilized Zoom, Canvas, and Blackboard as the topmost on line tools and resources.

In March 2020, the Italian authorities equipped schools with digital platforms, educated faculty instructors on techniques for ICT teaching and learning, and gave digital devices to needy university students to cushion the effects of the Coronavirus pandemic (The Republic of Italy, 2020). In the same March 2020, Pakistan's Higher Education Commission (PHEC) compelled greater institutions to commence e-Teaching and Learning. Also, teachers in Greece performed virtual real-time classes in conjunction with other online studying tools (Ministry of Education and Religious Affairs, 2020; Schleicher and Reimers, 2020). Australia swiftly switched to online learning in the wake of the pandemic (Ali, 2020). This would prevent compromising education in a pandemic state of affairs (The News, 2020).

In Nigerian context, the variety of higher institution students attending tertiary institutions outnumbered the schools' infrastructure. The excessive price of ICT accessories and inadequate aid people are among the troubles limiting e-learning in Nigeria (Adeoye *et al.,* 2020). In Nigeria, many establishments discover it hard to conceptualize and enforce ICT Technology initiatives locally.

Research Objectives

In order to answer these questions therefore, the following objectives will be treated. The precise targets of this paper therefore are to:

- Evaluate the influence of ICT in teaching and learning in tertiary institutions during Coronavirus pandemic and
- Identify the barriers to the use of ICT in teaching and learning in tertiary institutions during Coronavirus pandemic

Research Questions

- Does ICT influences teaching and learning during coronavirus pandemic?

Ii What are the factors facing the implementation of online teaching and learning?

Research Hypotheses

HO_1: There is no significant relationship between Information and Communication Technology and teaching and learning in tertiary institutions during Coronavirus pandemic.

HO_2: There is no significant relationship between identifiable factors affecting the use of ICT and teaching

and learning in tertiary institutions during Coronavirus pandemic

Assumptions

This hypothesis is premised on the assumption that constraints ought to have an effect on the optimization of e-learning in Nigerian tertiary institutions. According to the United Nations (2020) report, some tertiary institutions jettisoned ICT technology on impacting teaching and learning for the duration of school closure due to the lack of indicators of technological know-how (IT) infrastructure.

Justification for this Study

Going with the aid of the speedy rising cases of Coronavirus in the country, the Federal Government of Nigeria at the beginning locked down two states (Lagos and Ogun) while other affected states joined as the Coronavirus spreads. Federal Ministry of Education enforces digital learning in the tertiary establishments as a way to ensure the school education is not in total collapsed. Beyond the authorities' pronouncement and swift shift to e-learning throughout the world, researchers have not empirically examined the impact of ICT technology adoption for teaching and learning all through the Coronavirus pandemic. More so, the World Bank (2020b) is of the view that few researches have been carried out on the scale of e-learning provision, compliance, and limitations in the higher institutions. Many studies centered on necessity of e-learning all through lockdown (Ali, 2020), instructional techniques for online (Mahmood, 2020), stage of preparedness for e-learning (Eduard and Lucian, 2020; EiEWG, 2020), e-learning and tertiary training trip (Adeoye *et al.*,, 2020), and use of on-line instruction, equipment and sources

during Coronavirus (Chaka, 2020). It is hereby fundamental to look into the impact on ICT technology for teaching and learning and pros and cons of e-learning approach to strengthening Nigeria's educational system.

Instructional Science Theory

The major objective of Instructional Science is to foster a deeper understanding of the nature theory and training of the instructional methods and of the learning to which it results. E-learning supports information and performance management (Mahmood, 2020; The World Bank, 2020a). According to Eduard and Lucian (2020), instructional science as a field of schooling or new terminology has been like instructional aids or apparatus. E-learning has offered excellent possibilities for teaching through digital ability (Kacerauskas and Kusaityte, 2020; The World Bank, 2020a). Students that undertake electronic research typically carried out better performance than those in face-to-face courses. Andreas (2020) opined that the academic performance of newcomers that used the digital approach supersedes these who studied the ordinary approach. E-learning is a new learning tool in Nigeria, with all its potentialities.

Research Method

This study was carried out in the Southern Nigeria. The south south geo-political zone comprises of six states which are Delta, Edo, Bayelsa, Cross Rivers, Akwa Ibom, and Rivers States. Kothari (2004) sample size determination formula was used to estimate the sample size to be selected for this study, the formula is:

$$n = \frac{z^2pq}{c^2}$$

At the confidence interval (c) of 5% and confidence

level (z) of 1.96 for 95%, a 69% proportion of an attribute of the population (p), and 17 % desired level of precision (q), the estimated sample size is 180.2. For ease of distribution, the sample size was approximated to 180. A multi-stage sampling method was used for the selection of a representative sample. This sampling method is chosen because it is an advance of the principle of cluster sampling.

The method is recommended for a big inquires extending to a considerable large geographical area (Kothari, 2004), like the case under study, tertiary institutions in Nigeria. The merits of this method are that it is easier to administer than most single-stage designs, and a large number of units can be sampled for a given cost because of sequential clustering, whereas this is not possible in most of the simple designs. The three states randomly selected out of six states in the first stage are Delta, Edo and Bayelsa. Universities, Polytechnics, and Colleges of Education in Delta, Edo and Bayelsa State, Nigeria were chosen for this study.

In the second stage, one University, one Polytechnic, and one College of Education were selected from each state; these gave rise to 3-Colleges of Education, 3-Polytechnics, and 3-Universities selected. In the third stage, a systematic sampling technique was adopted to select every 13^{th} name on the staff lists to arrive at twenty instructors per institution. Systematic sampling is spread more evenly over the entire population; it is an easier method of sampling and can be conveniently used even in the case of large populations (Kothari, 2004). Thus, 180 instructors were selected from the nine tertiary institutions. Government-owned

institutions particularly Universities were used in conducting this research.

The authors highly considered the issues of validity and reliability in the study. To ensure the validity of the study, the content validity of the instrument was carried out by experts in ICT and Education. Content validity according to (Dave, 2012; Wilson *et al.,*, 2012) is the extent to which a measure represents all facets of a given social construct. It is the most critical criterion and indicates the degree to which an instrument measures what it is supposed to measure. Similarly, the reliability of the instrument was carried out by the test re-test method. The coefficient of reliability was 0.79, an indication that the instrument is reliable.

This study adopted a survey method for the primary data collection on socio-economic variables, ICT technology for teaching and learning in the tertiary institutions. Respondents showed a willingness to provide answers to the questions contained in the questionnaire. This is a quite popular method of data collection. It does not give room for the interviewer's bias; answers are in respondents' own words hence the results can be made more dependable and reliable (Kothari, 2004).

In the course of conducting this study, authors strictly adhered to all standards of ethical principles to safeguard the rights of respondents in terms of the respondents' autonomy, privacy, anonymity, and confidentiality. All procedures adopted in the conduct of this study followed ethical standards of the institution approved by the Institution Committee on Research (ICR) and Joint Technical Task Team on Coronavirus

(JTTT), Delta State, Nigeria on May 23rd, 2020 for the period of 3–5 months.

Analytical Methods

Age and years of experience were measured at ratio level and converted to an interval level for presentation. Educational qualification was measured as the number of years spent in the schools to obtain various qualifications by the respondents. Adoption of ICT (ϒ) in teaching and learning was conceptualized as Complete (3), Partial (2), and Not at all (1) for descriptive statistics and Analysis of variance.

Model Specification:

$n_1(t.q_1)þn_2(t.q_2)þn_3(t.q_3)\ldots þn_i(t.q_i)$ ¼ϒ ……..(1)

where; t is the time taken to deliver the course online, q is the course taken, and n is the number of the times the course was taken.

fnxn ¼ Ln……..(2)

f ¼ frequency, x ¼ score and L_n's referred to the problems confronting the adoption of ICT for teaching and learning such as poor electricity supply, high cost of e-learning facilities, and poor internet connectivity. Multiple linear regression models determine the extent of differences to adoption of ICT for teaching and learning compliance among the instructors in the selected private institutions (See Table 1).

According to Kothari (2004), the primary function of regression analysis is to determine the various factors which cause differences of the dependent variable. The functional form gives the best fit in terms of the high value of the R^2, the low value of Durbin-Watson, the sign of coefficients, as well as better F-ratio (see Table 2).

ϒ¼ f(L_s)
……(3
)

ϒ¼ f ($f_n x_n$)

Thus the explicit model is:

ϒ¼$^{\alpha}$þβ1L1 þβ2L2 þβ3L3 þβ4L4 þβ5L5 ……þβnLn þ ei ……(4)

ϒ¼$^{\alpha}$þβ1(f1x1) þβ2(f2x2) þβ3(f3x3) þβ4(f4x4) þβ5(f5x5) ……þβn(fnxn) þ ei……(5)

where ϒ is adoption of ICT for teaching and learning and β_n's referred to the parameter to be estimated.

Findings

Influence of selected socio-economic variables on adoption of ICT for teaching and learning

Figure 1 portrays age categories of the respondents with seventy-five percent fell within 35–39 years while 12.5% were older than 40 years. The estimated average age was 36.8 years for the respondents.

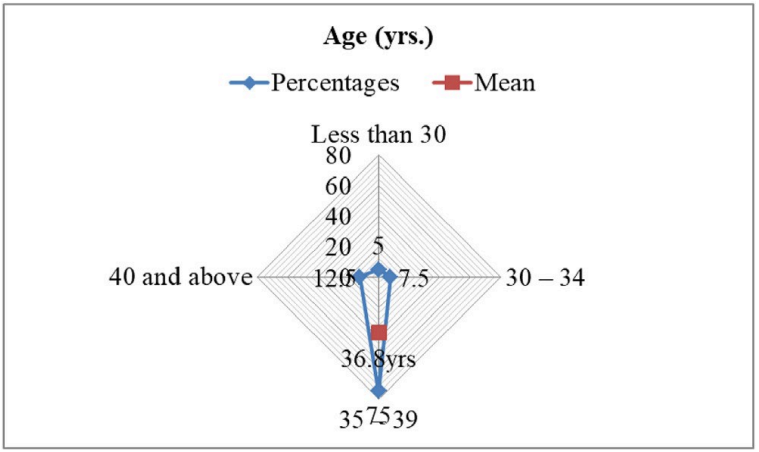


Figure 1. Radar showing the age distribution of the respondents. Source: Field Survey (2020).

Table 2 shows the regression results of the age of

the respondents as a predictor of adoption of ICT for teaching and learning. The result indicates that there is a positive but weak correlation between the age of the respondents and adoption of ICT for teaching and learning (R ¼ 0.351[a] < 0.51 for 180 degrees of freedom). The significant of F-statistics (F ¼ 25.034, p ¼ 0.024[c]) indicates a linear relationship between the age and adoption of ICT for teaching and learning. The regression model explains that 12.3% difference in adoption of ICT for teaching and learning was due to age (R^2 ¼ 0.123[b]) while 87.7% is due to the residual factors excluded from the model. A significant relationship was found between the age of the respondents (β ¼ 0.351[d]) and adoption of ICT for teaching and learning at p < 0.05 which is 35.1%. Therefore, age is a determinant of adoption of ICT for teaching and learning in the Nigerian Tertiary Institutions. The implication is that younger instructors should be the target of adoption of ICT for teaching and learning coupled with training and skills acquisition because they are easy to train and have a high tendency to adapt to ICT technological environment.

The result of the regression in Table 3 indicates a strong correlation between the educational qualification of the respondents and adoption of ICT for teaching and learning (R ¼ 0.853[a] > 0.51 for 180 degrees of freedom). The F-statistics (F ¼ 475.356, p ¼ 0.000[c]) is high and significant which indicates a strong influence of education on adoption of ICT for teaching and learning.

The coefficient of R^2 (0.728[b]) shows that 72.8% difference in adoption of ICT for teaching and learning which is caused by the educational qualification while the remaining 27.2% is attributed to the residual factors excluded from the regression model. Educational

qualification (β¼ 0.843[d]) is positively significant at $p < 0.05$, that is, it has 84.3% influence on adoption of ICT for teaching and learning. Hence, the educational qualification of the respondents is a strong predictor of adoption of ICT for teaching and learning in Nigerian Tertiary Institutions. This implies that the educational qualification of the respondents could be harnessed and properly channeled towards adoption of ICT for teaching and learning and sustainability.

Table 1. Variable Choice and definition for adoption of ICT for teaching and learning.

Variables		Description	Variable type	Expected relationship
Dependent variable				
ϒ	Adoption of ICT for teaching and learning	Scores	Continuous	Positive
Independent variables				
ϒ	**adoption of ICT for teaching and learning**	Description	Variable type	Expected relationship
L_1	Poor electricity supply	Scores	Continuous	Negative
L_2	High cost and poor quality of e-learning facilities	Scores	Continuous	Negative
L_3	The poor technical know-how of e-learning	Scores	Continuous	Negative
L_4	Poor internet connectivity	Scores	Continuous	Negative
L_5	Lack of telecommunication infrastructure	Scores	Continuous	Negative
L_6	Lack of training support by the institutions	Scores	Continuous	Negative

$^{\alpha}$¼ Constant; and ei ¼ error term

Table 2. Correlation between age of the respondents and adoption of ICT for teaching and learning

ModelR	R2	Adjusted R^2	Std. Error of the Estimate	Durbin-Watson
1 0.351[a]	0.123	0.118	5103.326	1.458
ANOVA[b]				

	Sum of squares	df	Mean Square	F-Statistics	Sig.
Regression	6.520E8	1	6.520E8	25.034	0.024[c]
Residual	4.636E9	178	2.604E7		
Total	5.288E9	179			

Coefficient

Model	Unstandardized coefficient	Standardized Coefficient		Sig.
	βStd. Error	Beta	T	
(constant)	4999.115	2159.177	2.315	0.022
				d
Age	253.196	50.605 0.351	5.003	0.000

Source: Field Survey (20 20).
a Predictor: (Constant), age.
b Dependent variable: adoption of ICT for teaching and learning.
c Predictor: (Constant), age.
d Predictor: (Constant), age.

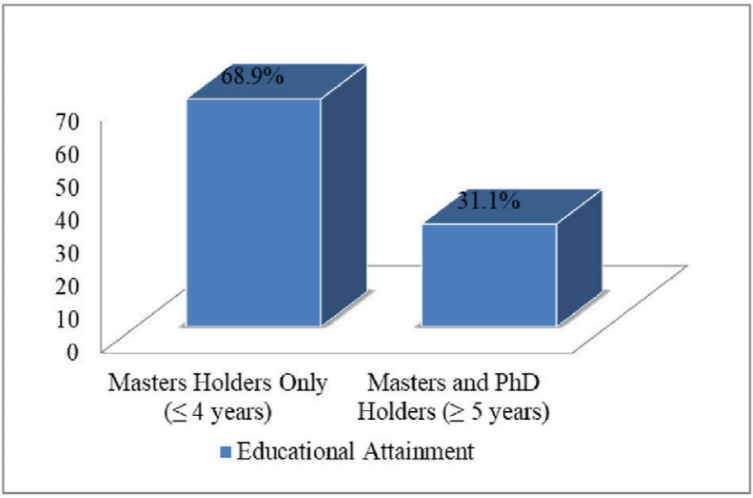


Figure 2. Bar Chart showing the educational qualification of the respondents.
Source: Field Survey (2020).

A positive and weak correlation was revealed for years of experience in teaching and adoption of ICT for teaching and learning as (R ¼ 0.169[a] < 0.51 for 180 degrees of freedom). The F-statistics (F ¼ 5.211, p ¼ 0.024[c]) is significant but very low which further affirms that the relationship between years of experience in teaching and adoption of ICT for teaching and learning is weak. The coefficient of R^2 (0.028[b]) shows that teaching experience is responsible for a 2.8% difference in adoption of ICT for teaching and learning while the remaining 97.2% is attributed to the lasting factors excluded from the regression model.

There is a significant and positive relationship between teaching experience (β¼ 0.169[d]) and adoption of ICT for teaching and learning at $p < 0.05$, this means that a 1% increase in the teaching experience would result in 16.9% adoption of ICT for teaching and learning. Hence,

the teaching experience of the respondents influences adoption of ICT for teaching and learning in Nigerian Tertiary Institutions. The implication for this study is that the instructors' experience would be advantageous for capacity building and training on ICT adoption as little effort and lesser cost would be required to transmit the pedagogy and contents of ICT use to the instructors.

Variance in adoption of ICT for teaching and learning during Coronavirus lockdown in the Nigerian tertiary institutions

Table 3. Correlation between respondents' educational qualification and adoption of ICT for teaching and learning.

	R	R2	Adjusted R^2	Std. Error of the Estimate	Durbin-Watson
1	0.853[a]	0.728	0.726	2844.871	1.47
ANOVA[b]					

.

	Sum of squares	df	Mean Square	F-Statistics	Sig.
Regression	3.847E9	1	3.847E9	475.356	0.000[c]
Residual	1.441E9	178	8093293.014		
Total	5.288E9	179			

Coefficients

Unstandardized coefficient		Standardized coefficient			Sig.
	β	Std. Error	BetaT		Sig
(constant)	3134.401		611.235	5.128	0.000 d
		103.293	0.843	21.803	0.000

Education Attainment2252.060. Source: Field Survey (2020).
a Predictor: (Constant), Education Attainment.
B Dependent variable: adoption of ICT for teaching and learning.
C Predictor: (Constant), Education Attainment. d Predictor: (Constant), Education Attainment.

Table 4. Correlation between teaching experience of the respondents and adoption of ICT for teaching and learning.

R		R2	Adjusted R^2	Std. Error of the Estimate	Durbin-Watson
1	0.169[a]	0.028	0.023	5372.322	1.472
ANOVA[b]					Sig.

	Sum of squares	df	Mean Square	F-Statistics	Sig.
Regression	1.504E8	1	1.504E8	5.211	0.024[c]
Residual	5.137E9	178	2.886E7		
Total	5.288E9	179			

Coefficients

	Unstandardized coefficient		Standardized coefficient			Sig.
Model	**B**	Std. Error	Beta	T		Sig.
(constant)	13685.305	942.663		14.518		0.000 d
		47.091	0.169	2.283		0.024
	Teaching Experience107.494; Source: Field Survey (2020) a Predictor: (Constant), Teaching Experience. B Dependent variable: adoption of ICT for teaching and learning. C Predictor: (Constant), Teaching Experience. d Predictor: (Constant), Teaching Experience.					

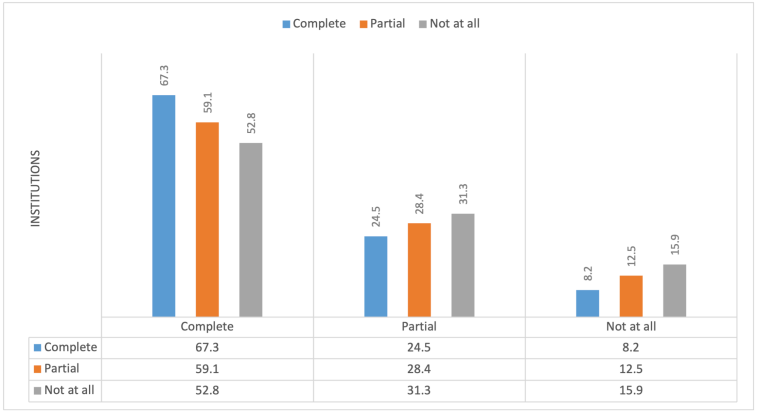


Figure 3. Bar Chart showing adoption of ICT for teaching and learning. Source: Field Survey (2020).

Figure 3 provides descriptive of adoption of ICT for teaching and learning. The chart indicated that full adoption of ICT for teaching and learning was highest among the instructors in the private universities (67.3%), followed by the polytechnics (59.1%) and Colleges of Education (52.8%).

Relationship between the limitations and adoption of ICT for teaching and learning

The linear regression in Table 5 has a coefficient of R^2 of 0.73 indicating a 73% difference in the dependent

is as a result of explanatory variables. Results in Table 6 indicated that challenges are strong determinants of adoption of ICT for teaching and learning. Significant relationships are found for poor power supply (β¼ -0.65), high cost and poor quality of ICT facilities (β¼ -0.43), and poor technical know-how of e-learning (β¼ -0.62) at $p < 0.05$ level of significance. This is an indication that the power supply, e-learning facilities, and technical know-how of the instructors affected compliance by 65%, 43%, and 62% respectively. Also, there are significant but inverse relationships for poor internet connectivity (β¼ -0.78), lack of telecommunication infrastructure (β¼ -0.74), and lack of training support by the government (β ¼ -0.83). It can be inferred that the limitations caused 71–83% non-adoption of ICT in teaching and learning in the selected private tertiary institutions.

So also, the significance of the F-value (F ¼ 8.92) is a pointer to the fact that the relationship existed between the constraints and adoption of ICT for teaching and learning. It could be inferred that constraints retard ICT adoption practices in the country and no tangible progress could be achieved in the education sector until these problems are addressed.

Linear: $\Upsilon¼^{\alpha}$þ (-0.65)L_1 þ (-0.43)L_2 þ (-0.62)L_3 þ (-0.78)L_4þ (-0.74)L_5þ (-0.83)L_6 þ ei

Discussion

Socio-economic variables influencing adoption of ICT for teaching and learning.

The age of the respondents has a significant relationship with adoption of ICT for teaching and learning. The instructors are below forty years (mean ¼ age of 36.8 years), which indicates the respondents are within the working-age population according to Hannah

and Max (2019). Nigeria currently has 53.57% of her population in this bracket (Plecher, 2020) and they can learn new technology very fast, and adjust to electronic teaching. At this tender age, people are innovative and have a keen interest to learn new skills compared to people at old age.

According to the Teaching and Learning International Survey (TALIS), younger teachers use technology more frequently in the classroom (Schleicher and Reimers, 2020). Plecher (2020) reported that the bracket would have an important impact on Nigeria's Educational Development. Also, experience counts in adaptation to new techniques of teachings. The correlation of teaching experience with adoption of ICT for teaching and learning was positive and significant at $p < 0.05$.

From the three selected socio-economic variables, the test of significance revealed that the educational qualification of the respondents has the greatest influence, a strong correlation and significantly predicts adoption of ICT for teaching and learning. Advanced education and ICT skills are particularly important given the radical shift towards online teaching during the Coronavirus lockdown (Andreas, 2020).

Adoption of ICT for teaching and learning is high in the Nigerian universities when it compares to the situation in Polytechnics and Colleges, that is, adoption in the universities is encouraging. For the last two decades, universities have outnumbered the polytechnics and Colleges of Education. Both individuals and religious organizations invested much in universities. Although the school fees at these universities are exorbitant they have good facilities for ICT and stable academic calendar. The

Universities take into cognizance the importance of ICT so, they are more proactive than the Polytechnics and Colleges. Eze *et al.,* (2018), Mahmood (2020) and Ali (2020) opined that new inventions and technology give better ways of communication and interactions and it has tremendously increased knowledge.

However, there exist limitations in the ICT adoption in the selected tertiary institutions. The problems have resulted in partial adoption of ICT for teaching and learning in the Polytechnics and Colleges of Education; the structural buildings and facilities in the Colleges and Polytechnics are very scanty compared to that of Universities –Libraries, Laboratories and ICT centers are well equipped. The shortage of electricity supply is persistent in Nigerian tertiary institutions and it usually distorts researches and studies.

In a report of Thisday (2016), investment in power supply does not commensurate with the megawatt generated for use and it cannot go round. Likewise, Oyediran and Dick (2018) explained that the power supply to the public is diminishing and getting worst. Instructors that are Computer incline are very limited in many of these schools. Eze *et al.,* (2018) argued that a lack of experts in ICT affects its use in Nigeria. In this technology age, e-learning is an essential mechanism of transferring knowledge and to fast-track academics transformation from traditional teaching to modern teaching in the Nigerian educational system.

Table 5. Limitations and adoption of ICT for teaching and learning.

Limitations	Beta	Std. Error	T	Significant
Constant	4.16	0.30	13.87	0.00
Poor power supply	-0.65	0.14	-4.64	0.01*
High cost and poor quality of ICT facilities	-0.43	0.05	-8.60	0.00*
The poor technical know-how of ICT	-0.62	0.17	-3.65	0.01*
Poor internet connectivity	-0.78	0.22	-3.55	0.01*
Lack of telecommunication infrastructure	-0.74	0.23	-3.22	0.02*
Lack of training support by the government	-0.83	0.12	-6.92	0.00*
F – statistics	8.92			
R2	73.41			
Adjusted R	70.95			
Durbin-Watson	26.01			

Prob (F-Statistics)0.00 * – significant at p 0.05.
Source: Field Survey (2020).

Conclusion

This study established that socio-economic variables are significantly correlated with adoption of ICT for teaching and learning with educational qualification as a major determinant. It was also found that difference existed in adoption of ICT for teaching and learning across the selected private tertiary institutions, a pointer to the fact that e-learning has not been effectively incorporated into tertiary education in Nigeria; the private universities have the highest level of adoption of ICT for teaching and learning during the Coronavirus pandemic.

The limitations obstruct adoption of ICT for

teaching and learning particularly in the Polytechnics and Colleges of Education in South South, Nigeria and it would have multiply effect on the academic progress of the institutions and could further create a socio-economic skills gap for the nation. Regression analysis affirmed the significance and negative influence of constraints on the instructors' adoption of ICT for teaching and learning in the selected tertiary institutions at $p < 0.05$.

The implication for this study is that instructors' SEV and limitations could undermine adoption of ICT for teaching and learning during and after the pandemic in Nigeria. Globally, e-learning has been identified as an indispensable intervention to cushion the impact of the Coronavirus pandemic and as well for rapid growth and development in the education sector of any nation. The advantages of ICT adoption include wide coverage, cost-effectiveness, uniformity, fast teaching and learning process, and rapid economic development through e-commerce. It is hereby recommended that adoption of ICT for teaching and learning in the tertiary institutions should go beyond the Coronavirus lockdown period while staff training and capacity building on ICT should be put in place by the institutions' authority.

The government should address challenges limiting ICT adoption in the tertiary institutions through the provision of stable power supply, and local industries should be encouraged to manufacture some ICT accessories to lessen the cost of acquisition arising from a high tariff. These recommendations become very important going by the rapidly changing world of basic education through digitization.

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EPILOGUE

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This open access proceeding, made possible by the support of the Oklahoma State University Library, contains papers presented at the Association for Digital Education and Communications Technology (ADECT) Conference held in collaboration with the Association for Educational Communication Technology (AECT). The conference took place in Abuja Nigeria from 18th to 20th May 2021 under the conference theme "The Innovative Educator – Bridging Digital, Technological and Education Divides in a Borderless World."

We hope that this publication not only serve as a way to disseminate the work of Afrikan scholars, but should also enhance knowledge and encourage conversations on technologies used in education. Such conversation should also stimulate growth in the educational sector that are to the benefit of society at large.

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