The Innovation and Challenges of Information and Communication Technology (ICT) in the Management of Education

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Abstract
Innovation has to do with investing new ideas, software or hardware materials and its usage at facilitating needed solutions to tasks. Information and communication technology in education management has proved to be a watershed development. This paper, therefore, highlights among others its contributions in the realm of academic research, and programme instructions such as – Tutorial mode, Drill and practice mode, discovery mode, simulation mode, gaming mode, management information system (MIS), etc., which has benefited the management of education, but has inherent challenges. Such challenges are highlighted coupled with recommendations on how best to tackle them which includes adequate funding for procurement, installation and maintenance of ICT facilities, exercise of government needed political and legal will among others. If this challenges are well addressed, ICT will further enthrone blended – learning and improve the quality of education management.

Keywords: Innovation, Information and Communication Technology, education management

Introduction

Information and Communication Technology (ICT) application in schools covers a wider scope. This, according to **Stephen, Nwali and Ugah (2019),** includes the comprehensive approach to innovate education systems, methods, and management through Information Communications Technology, restructuring education system, diversifying teaching-learning methods and practices, engaging

all stakeholders of education and adapting rapid to changes in society and the environment and enhancing education efficiency, effectiveness, and productivity. In the administration of the school, ICT can also be applicable in the administering of human, physical and financial resources. Application of ICT offers a wonderful potential for increasing school accountability, transparency and participation among various stakeholders. ICT has been successfully used in various activities ranging from monitoring campaign finance spending to reporting election fraud in through SMS messages. The development in Information and Communication Technology (ICT) has been so rapid that Okey (1998) in Salau (2009) emphasised that ICT revolution has been so rapid that it is even difficult, if not almost impossible, to keep abreast of the happening in the ICT world on daily basis. In fact, ICT has turned the whole world into a global village he concluded. The marriage between computer technology and electronics has changed the world socially, morally and technologically. The development in ICT, the hard and software that accomplished it can be imagined as linked to a room filled with many spiders each with its own web that are interconnected. In it, the spider can travel undisturbed within its net. Bate (2000) said, it is a collection of libraries with virtually all appealing documents. Isiaka (2010) said, ICT can be seen as the integration of telecommunications, data communication and mass communications in a single medium. It does not only comprise of hard and software, but also incorporate the network and communication structures, that structure and information together with control and access level for different users, user interface, operating procedures and organisation arrangement and policies for their uses.

Scholars and researchers such as Stephen, Nwali, and Ugah (2019) and Tagalou, Massourou, Kuriakopoulou and Efthimiopoulos (2016) have expressed their opinions on the use of Information and Communication Technologies (ICT) in education. ICT is considered to be a teaching and learning tool, but also an important means of administrative organisation. However, a difficulty is observed in the functional integration of ICT in schools, both on a teaching and an administrative level. The crux of the present study is examining the innovation and challenges of information and communication technology (ICT) in the management of education in Nigeria.

Issues of Concern

It is noteworthy that the innovation of ICT had introduced some changes in the management of education all over the world and in Nigeria. Thus, it is expected that ICT be used, in synergy with other measures, to tackle the challenges militating against the achievement of the aims and objectives of Nigerian education system. This is in line with how ICT has been helping other countries of the world to improve their education process. One then wonders, as Tagalou, Massourou, Kuriakopoulou and Efthimiopoulos (2016) lamented, that there has been a sufficient amount of studies, based on Greek data, which are focused on the introduction of ICT in

teaching practice, but there is no equivalent number of studies which examine the support of ICT in the organisational and administrative practice in schools. It therefore becomes necessary to examine how the innovation of ICT has been of help to the management of education in Nigeria; and the challenges confronting the use of ICT in the management of education in Nigeria.

This is the gap in literature that this study tends to bridge by examining innovation and challenges of information and communication technology (ICT) in the management of education in Nigeria.

Conceptual Clarification

Innovation of ICT

According Tatnall (2020), innovation is the process of putting these ideas or technologies into commercial or organizational practice. New technologies are appearing all the time in education. Some are adopted and used in the form in which they were offered; in some cases only certain aspects of the technology are adopted, while in others the technology is rejected entirely. This problem with innovation adoption is true of all new ideas or technologies. The process of innovation involves getting new ideas accepted or new technologies adopted and used (Tatnall, 2020). After the discovery of a new idea or the invention and development of a new technology, it does not automatically follow that this will be adopted by its potential users.

Information and Communication Technology (ICT) innovation in an enterprise involves using technology in new ways to create a more efficient organization and improve alignment between technology initiatives and organizational goals. ICT innovations can take many forms. According to Chumo, Muumbo and Korir (2011), innovation and adoption within organizations often occur in two stages; first at the primary level called organisational level. Here, the decision to adopt the innovation is made before the actual implementation which is the secondary stage. The secondary stage includes individual users and organisations. However, the moment the primary adoption has occurred, the usage either at pilot or broad implementation may commence.

The trend and innovation in the usage of ICT is unparallel when compare with other technologies before it. These range from academic and research to library services, management and administration, teaching and learning, business, hospitals, engineering, manufacturing, etc.

ICT in Academic and Research

Most academic programmes in our institutions today centres on ICT ranging from online registration to Computer Based Test popularly know as CBT. Most universities in Nigeria, particularly University of Ilorin, is striving to be the foremost university in the country and among the best in the world in the development of ICT. University of Ilorin in the quest to achieve this objective, it has acquired many

hardware and most transactions in the university are ICT based. The National Open University of Nigeria has successfully removed the world distance from what we normally called distant learning education with the introduction of e-learning system. Students are learning online through an ICT platform and lecturers now tutor students online and offline.

In the research and teaching area, both lecturers and students now use the power of internet to source for and obtain current information on their research interest. Jegede (2004) in Oyedeji and Salau (2011) said that the traditional face-to-face instructional delivery system will not be adequate if not impossible for a nation to provide education for all her citizens without the use of ICT. The population explosion and the demand for education all over the world has increased and inadequate vacancies at the nation's higher institutions has denied many qualified citizens the chance and opportunities of admission to read their desired courses hence the adoption of ICT. Also, Information and Communication Technology, according to Carswell (1999) in Oyedeji and Salau (2011) said ICT are being used in the developed countries for course leverage and instructional delivery. Computers now perform the functions of teaching and learning, pupils now used computers to learn reading, Mathematics, Social Studies, Arts, Music games, simulation and health practices. Shavinine (1997) in Oyedeji and Salau (2011) posited that today learning has gone beyond the traditional face-to-face and blackboard concentration. Learning contents are domain-specific that are directed technologically to knowledge acquisition skills development in the languages, arts, history, physics, literature, biology, etc. Oyedeji, Salau and Oluwalola (2008) in Oyedeji and Salau (2011) have said that ICT has been used to narrow distances between teachers and learners. It has impacted a quite revolution on the quality of teaching, learning and research in the traditional and distance education institutions through its dynamic, interactive and engaging content and has provided real opportunities for individualised instruction.

Robert, Michael and James (1984) in Oyedeji and Salau (2011) have said ICT is generally a tool for enhancing teaching and learning. In the domain of instruction, two classes of computer applications are available. These are Computer Assisted Instructions (CAI), and Computer Managed Instruction (CMI). CAI enables instructions to be delivered to students directly by allowing students to interact with the lessons programmed into the system without the teacher intervening.

Information and Communication Technology (ICT) in academic is used in various ways. This, according Salau (2009), include, tutorial, drill and practice, discovery, simulation, and gaming modes.

Tutorial Mode: In this mode, information is presented in small units followed by a question. The students response is analysed by the computer (compare with the responses plugged in by the author) and an appropriate feedback is given.

Drill and Practice Mode: This mode assumes that a concept, rule or procedure has already been taught to the students the programme lead the learners through a series of

examples. Drill and practice is promptly used for Maths drills, foreign language translation, practice, vocabulary building exercises, and the likes.

Discovery Mode: Discovery is a general term to describe activities using inductive approach to learning; that is presenting problems which the student solves through trial and error. The aim of discovery approach is the deeper understanding that results from grappling with a puzzling problem. This is positively useful in teaching Mathematics, Social Sciences and other science related areas.

Simulation Mode: In this mode, the learner confronts a scale-down approximation of a real life situation. It allows realistic practice without the expense or risks otherwise involved. In modern realm of aeronautics, airline companies engage the use of sophisticated computerised simulations of airplane performance as an integral part of flight crew training. It is also useful in business and other management trainings.

Gaming Mode: This can be highly motivating when applied to instructional tasks. This is particularly useful for repetition drills. Another common instructional game application is in management training. Participants from management teams making decisions regarding a mythical corporation. The wining team is the one reaping the highest corporate profits. p 311

ICT in Management and Administration

Management Information System (MIS) is one area that ICT has benefited the management and administration of organisations. Information is now readily stored and retrieved either in batches, real time and online. It depends on the desire and the need of the organisation. Chuono, Muumbo and Korir (2011) have said that Higher Education Institutions (HEI) have benefited greatly from MIS since the information can be used for forecasting, thereby enabling staff to plan and support decision making.

Significant progresses have been made in the ICT innovation across the globe. The progress in the use of ICT innovation, according to Chuono *et al* (2011), includes online registration, assessment of examination results, school placement, communication and fee management among others.

Online Registration:

The online registration for secondary and private candidates for WAEC, GCE, JAMB and NECO is now being aided and efficient through ICT. The innovation has helped the administrators of these examinations body to be more efficient and effective. Since the introduction of electronic registration (e-registration), West African Examination Council (WAEC) and Joint Admission Matriculation Board (JAMB) have recorded success in financial effectiveness because ICT has cut-off the huge expenses incurred on the purchase of paper and

other materials for registration. In addition, e-registration has afforded the prospective candidates to render self-services at low cost.

Assessment of Examination Results on the Internet:

According to Tatnall (2020), one of the usefulness of ICT to education managers is students' access to examination results on internet. This, according to him, has not only reduced the bulk of works saddled with the department of exams and records of various institutions, but also curbed human interference with results. Through the innovation of ICT, students can now, at their own sweet will, assess results on internet.

Effective Communication among Management, Staff and Students:

ICT has reduced the challenges of communication in education environment. Through the application of ICT, the management can now conveniently communication with the staff and students within the institution with low coast. There are portals designed in the internet whereby staff (academic and non-academic) can interact, communicate and share ideas. So also, student portals give access to students to assess information at any time and place where there is internet facility.

Computerised School Placement Systems and Fee Management:

In the report of Stephen, Nwali and Ugah (2019), ICT application in the placement systems and fee management has brought improvement to Nigerian education system. Situation in virtually all levels of education in Nigeria, and especially the tertiary level, has been changed since the adoption of ICT in the placement systems and fee management. ICT has helped the management of education institutions in Nigeria to avoid unnecessary rancor that could emerge from fee management.

The other areas where ICT innovation has helped school management, according to Oguunu (2012), include marking of examinations e.g. JAMB making and release of results of over one million candidates within one week (a good example is 2011 JAMB results in Nigeria), introduction of automated teller machine (ATM), the GSM revolution, e-learning technology and online learning, e-mail, organizer, teleconferencing, voice-message system (VMS), and open and distance learning.

Amadi (2011) said innovation in ICT covers the following: E-banking is about the latest ICT use, usage of ICT for developing and enhancing human capacity building, usage of ICT for mapping and graphics software, Geography Information System (GIS) and Global Positing System (GPS), for universities/high schools portals on communication and information for students, ICT for sustainable development through education, ICT is a platform for educators to exchange knowledge, read, publish articles and lesson plans, Electronic Cash Transfer (ECT), Electronic Card, Stock Control, Computer Aided Design (CAD), School

administration and management, Admission and registration in schools, personnel and record keeping, medical, library automation, Computer Managed Instruction (CMI), Computer Assisted Instruction (CAI), Computer Based Test (CBT)

Challenges Confronting ICT in the Management of Education

The National ICT Policy seemingly focused on teaching and learning and not administration. According to Ezekiel and Jackson (2019), the challenges confronting ICT application in Nigerian education system range from dearth of hardware and software to ineffective ICT training and staff development.

Scarcity of Hardware and Software

Scarcity of hardware and software serves as a challenge to ICT application in Nigeria, especially in the management of education. Many researchers have confirmed the scarcity of hardware and software in Nigeria. According to Aworanti (2016), lack of an overall technology plan, coupled with the short-term funding model and the absence of a clear acquisition and replacement plan, has led to 'an inconsistent and unproductive approach to IT acquisition and implementation'. Laaria (2013) argues that the cost of possession of ICT including hardware, software, upgrading and maintenance remains high. The cost of acquisition and maintenance of ICT infrastructure is a challenge and has continued to hamper adoption and implementation of ICT in schools. Laaria (2013) further observes that standard software to use for teaching, learning, administration and support of curriculum delivery are not widely available.

Inadequate Basic Facilities and Technology Planning:

This refers to the basic facilities and the mechanical and electrical installations found in schools. Many schools in Nigeria are faced with this grave challenge such as electricity, which is essential for utilization of ICT, hence hindering the planning and implementation of effective technology use (Stephen, Nwali & Ugah, 2019). These form the foundation for proposed technology upgrades, wiring of the physical plant, networking and telecommunication systems. This being a very complicated and technical aspect, administrators should come up with defined project parameters that will involve all stakeholders for the realisation of an effective technology plan. It is evident that some schools in Nigeria is faced with inability to properly finance a successful technology infrastructure to bring computers into the desk of every administrative official, inability to provide line and internet services due to the distance from Internet service providers, poor networking capabilities, and cost of fibre-optic cables. This is complicated with leadership barrier to technology infrastructure development, lack of maintenance and service capability, and traditional focus for technology toward school computer labs (Aworanti, 2016).

The Cost of ICT Equipment:

The cost of computers has been an invariably challenging aspect in various schools. This is due to different background, environment, economic status and accessibility. In Nigeria, fall in currency as compared to others countries and the fact that most of ICT equipment items are imported make the equipment unaffordable to some ICT users (Aworanti, 2016). The instability in the exchange rate obviously results to instability in the prices of ICT equipment in Nigeria.

ICT Training/Staff Development:

Effective Staff Development in Technology is -Not Necessarily an Oxymoron; Oguunu (2012), online, said that creating effective staff development, especially in the area of technology integration, is an extremely complex and challenging task. Yet, the potential returns of a successful program and the importance of technology to the learning process mandate that such events must be carefully planned for, implemented, and evaluated. In some of Nigerian schools and other developing countries, staff development is not given a priority.

The above and many others are the challenges confronting ICT innovation in Nigeria. Although, ICT within a very short time has become an house hold name all over the world. It is now common to attach job placement with knowledge of ICT in fact mastering the skills and not just the knowledge is a compulsion for my employment. In fact, many countries of the world according to Amadi (2011) regard understanding of ICT and mastering of its basic skills and concepts as a part of core education along side other form of education. It is pertinent to say at this juncture that ICT is beyond computer and computing as many people have erroneously believe, although computer and computing forms the fundamental basis of ICT. It is a combination of computer and other technology.

Advancement in ICT has no doubt changed the world perception and has, in the word of Amadi (2011), enabled us to overcome inherent and historical disabilities in the economy, education and other challenges that have been hindering the technological development of developing countries like Nigeria and other countries of the world and Sub-Saharan Africa in particular.

Despite considerable progress of ICT in the world, deprivation in ICT usage persists in Nigeria when compare with other advanced countries of the world. For example, Ajayi (2001) and Osuji (2004) in Oyedeji and Salau (2011) have said that access to internet is still limited to the major cities and most times through dial-up connection from bigger to smaller cities, they are very expensive and with very unstable services.

Oyedepo et al. (2008) said internet is facing lots of constraints in Nigeria ranging from poor basic social amenities, poor power supply and the fact that majority of Nigeria populace reside in rural areas. To compound their problems, Farell (2001) in Oyedeji and Salau (2001) said, many rural people live below poverty line and do not have computing and literacy skills to access internet and its attendant

consequence called ICT. Bates (2000) also maintained that generally in Africa, the level of technology is low when compared with the western world.

Another problem facing the development of ICT in Nigeria is the high cost of hardware and software, poor connection system, poor road network and erratic power supply.

Financial and human resources is among other challenges facing ICT. The human resources to manage and even transmit instructions to would be learners in ICT is lacking and many institution of higher learning due to financial constraints do not even have standard laboratory and where they have, instructional strategies and policies are lacking.

Resistance to change is another problem. Naturally, people resist change, people that are already used to the traditional ways of doing things have been seen ICT as a problem and believed that it is invented to replace them rather than to consider it as a helper. Cases of resistance to change when ICT based system are introduced are common particularly in the public sector of Nigerian economy.

Suggested Solutions to the Challenges Confronting ICT in the Management of Education

It is clear that ICT application, especially in the management of education, in Nigeria is faced with numerous challenges. Thus, the following suggested solutions will go a long way in helping the nation overcome the challenges:

Availability of Hardware and Software:

Availability of hardware and software will make ICT application in the management of education in Nigeria more effective. This could be done through tax waivers for hardware and software, lowering of licencing costs and having local assembly points for computers in Nigeria.

Provision of Adequate Basic Facilities and Technology Planning:

Basic facilities and the mechanical and electrical installations necessary for functional ICT should be made available in schools. On the part of the government, constant electricity should be given the high priority it deserves. Since ICT equipment items cannot function well without electricity, constant electricity supply will enhance the functionality of ICT in Nigerian schools, and especially for the purpose of managing education system.

Reduction in the Cost of ICT Equipment:

Encouragement of local production of ICT equipment will help in reducing the cost of ICT equipment. Generally, in line with the assertion of Aworanti (2016), there is a great need for the federal government of Nigeria to empower Nigeria currency (naira) to compete with other currency in the world. This will make the ICT equipment imported from other countries affordable in Nigeria.

ICT Training/Staff Development:

ICT training and staff development is a sure way of solving some challenges confronting ICT application in the management of education. Effective training will go a long way in improving ICT maintenance culture and thereby make it effective.

Conclusion

From the literature reviewed, it is revealed that information and communication technologies are useful to the management of education. More so, challenges such as scarcity of hardware and software, inadequate basic facilities and technology planning, high cost of ICT equipment, and ICT training/staff development are confronting ICT application in the management of education in Nigeria.

Recommendations

On the basis of the identified challenges, the following recommendations are made to foster utilization of ICT in the management of education in Nigeria:

i. The government (federal, state and local) and proprietors of educational institutions should make adequate funding available for provision of ICT equipment.
ii. Government should improve the basic facilities, especially the electricity supply in the country, so as to encourage the utilisation of ICT in the management of education.
iii. Non-governmental organisations such as telecommunication companies (MTN Nigeria, Global Com, etc.) and others should support the government in the provision of ICT facilities.
iv. The school management should create appropriate environment for ICT use for the purpose of managing education.
v. The government should backup the ICT policy with required political and legal will power . This will serve to remove bottle-neck bureaucracy that has bedeviled ICT policy implementation in Nigeria.

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