



## TECHNOLOGICAL INNOVATION FOR THE ENHANCEMENT OF PERFORMANCE OF TERTIARY INSTITUTIONS IN RIVERS STATE

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### ABSTRACT

This paper discussed technological innovation for the enhancement of performance of tertiary institutions in Rivers State. The paper examined technological innovation in the aspects of asynchronous technology, asynchronous technology and learning content. The paper anchored its theory on diffusion theory. The paper suggested that higher education practitioners should make adequate Information and Communication Technology (ICT) facilities in their lecture halls as well as other learning facilities in the campus. Parents should also make available cheap smart-phones and other related facilities.

**Keywords:** Technological, Innovation, Performance, Tertiary institution, Enhancement

### INTRODUCTION

It is unarguable and a known fact that the "vehicle" that transports a nation, people or a community from the status of third world to that of first or second is technology. The city of Dubai in today's 21<sup>st</sup> century was brought to limelight through technological advancements that pushed the frontiers in Architecture and the Engineering profession. Nigeria wants to surpass this feat and has taken the right steps by expanding its tertiary institutional base from 53 in 1999 to over 200 in 2019 with private sector accounting for more than 100 of such citadels of learning (Oputa, 2019). Every year in Nigeria, about a million students apply for admission into various universities of higher education in the country and only about 10% of them get admitted through Joint Admission and Matriculation Board (JAMB). The alternative to regular university schooling is technology. Technology refers to the use of information and communication technology to enhance and support teaching and learning process. It can also be defined as the use and application of information and technology (ICT) as web sites, personal computer (PC), tablets, cell phones, learning management system (LMS), television (TV), radio and other means to improve teaching and learning process (Gupta, 2017). Technology can also be described as the acquisition of knowledge and skill using electronic technologies such as computer and internet based on Local and Wide Area Networks. It is a new form of teaching device by which students, most

especially the distant learners are provided access to the learning materials. Technology is usually associated with the use of computers but generally, it is a form of instructional delivery which can be provided through any appropriate electronic media such as mobile phone, television, radio etc.

According to Aboderin and Kumuyi (2013) there are two major forms of technology. One is called synchronous and other is called asynchronous. The former is so called because of its comprehensive features that allow for interactivity between the learning content and the learners. It has in-built features like the forum chatting and audio-effect. In distance learning, students are separated from the teacher; therefore, synchronous form of technology aims at providing multi-outlet opportunities to meaningfully engage students. On the other hand, is the direct opposite of the synchronous form. Whereas, the later by design has multifarious features, the former does not. It only presents the learning content for students to read, internalize and download if need be. Also, whereas synchronous technology allows for immediate feedback as much as possible, asynchronous may not necessarily allow for immediate feedback. Technology in education is the wholesome integration of modern telecommunications equipment and ICT resources, particularly the internet into the educational system. These have had a deep impact on the education sector.

Barineme (2014), defines computer as an electronic device that accepts data as input, process the data in the processing unit, saves the processed data as Read Access Memory or Read Only Memory or gives out result of the processed data as information through an output device like screen or printer. Education today, particularly, higher education performance is largely dependent upon technology facilities such as synchronous, asynchronous learning management system, learning content management system, etc. Synchronous learning can be defined as a learning in which a group of students are engaging in learning at the same time. Asynchronous learning on the other hand can be referred to as student-centered method that uses online learning resources to facilitate information sharing outside the constraints of time and place. These learning facilities are used in education during learning to enhance learning and are internet friendly.

Another technology facility in higher education is called learning management system. Learning management system is a software application for the



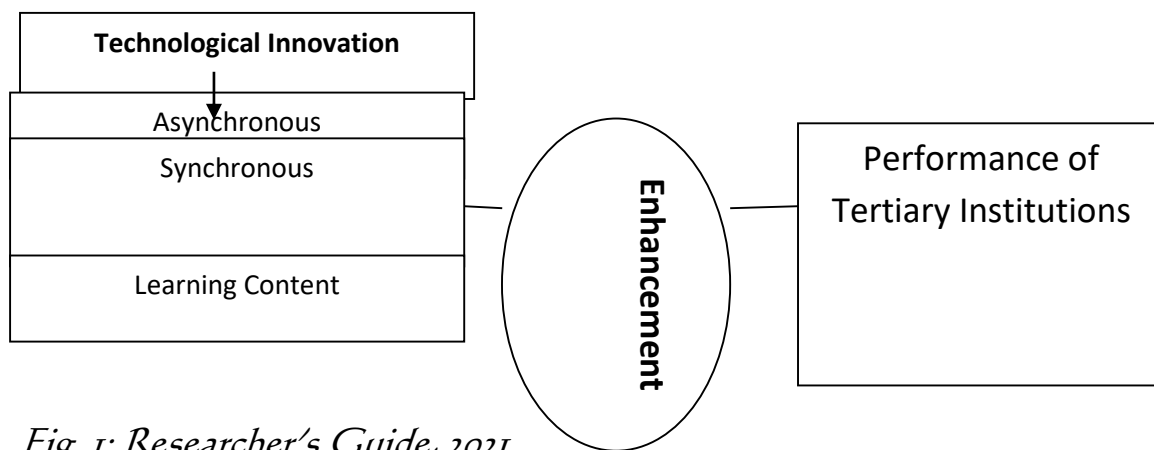
administration, documentation, tracking, reporting and delivery of educational courses, while learning content system is an integrated multi-user administrative, authoring and delivery platform that allows administrators to host, schedule and manage. However, technology in Nigeria has not developed due to a number of factors which ranges from mass unawareness, low computer literacy level and cost which are critical in affecting the acceptability of technology by students and lecturers of Nigerian higher education. For instance, in Rivers State, there are about five (5) higher education or institutions (University of Port Harcourt, Rivers State University, Ken Poly, Elechi-Amadi Poly and Ignatius Ajuru University of Education).

The researcher observed that only one institution (Ignatius Ajuru) has an electronic board in few of their classrooms. Also, it is only this institution that has a conducive virtual learning environment in their graduate school when majority of the undergraduates are in session. It was also noted that University of Port Harcourt is the only institution that has near complete and world standard information and communication technology unit but not in their class or lecture room. It is sad to note that this trend is peculiar to almost all the higher institutions in Nigeria. Students and lecturers find it very difficult to access technology facilities; the few that have do not have trained ICT facilitators or operators. Power is also a big problem. This is not to say that the traditional process of teaching and learning is not increasing but it has been devised by the anomalies around the adoption and utilization of technology channels in teaching and learning process.

Lots of scholars have exemplified technology channels or platform in higher education. For instance, Anene, Imam and Odumuh (2014) investigated technology in Nigeria. Two hundred and twenty-eight students constituted the sample while percentage was used for the analysis. The findings revealed that a formidable obstacle to the use of information and communication technology is infrastructure. Olatokunbo, Ejiga and Ademola (2014) also examined challenges and effect of technology in the development of architecture and engineering in Nigeria. Likewise, Aboderin and Kumuyi (2013), investigated the problems and prospect of technology in secondary schools in Owo LGA, Ondo State, Nigeria. Three hundred (300) teachers in public secondary schools were used as the sample for the study. A self-structured questionnaire on the availability and use of technology tools was

used for data collection. The data collected were analyzed using frequency distribution mean and charts. The findings revealed that there is shortage of technology tools such as internet, computers, e-mails facilities, multimedia, scanner, printer, VCD player, digital camera etc. However, these studies worked on different technology channels and institutions; hence, a gap exists. Therefore, the focus of this study is to investigate trends and challenges of technology in higher education in Rivers State.

### Conceptual Clarification



*Fig. 1: Researcher's Guide, 2021*

### LITERATURE REVIEW

The paper is anchored on diffusion theory. Diffusion theory was chosen because of its link to technology in workplace. This theory was propounded by Rogers (1977). It states that technological innovation is communicated through channels among members in a social system. Innovation implies any idea, practice or project perceived as being a new comer in any social system even if such concept had been in use long time ago. Innovation talks primarily about change, a shift from the norms and everyday practice. It corroborates any invention and or re-invention process that the people perceived as being entirely new. Innovation brings about change in behaviour as to enable man cope with the demand of new concept(s). The relevance of these theories to the study is that Information Communication Technology (ICT) is new innovation and the adoption and its utilization in our educational sector, particular higher education, will enhance learning and boost students' academic achievement as well as their performance.

### TECHNOLOGICAL INNOVATION



Information Communication Technology (ICT) has become an important source of innovation and improvement of efficiency for many sectors access the globe. In the education sector in particular, the application of Information Communication Technology (ICT) has become a critical part of the learning process for University students both outside and inside the classroom settings. The government and other stakeholders in the education sector such as University management and researchers have invested millions of dollars to adopt Information Communication Technology (ICT) in the education system during the last two decades. Ikwuka and Junco (2017) assert that Information and Communication Technology provides productive learning in order to increase learners' creative and intellectual resources Jones (2010) has it that technology travels with people. Information and Communication Technology (ICT) can be defined as a diverse set of electronic technologies, technological tools and resources used to communicate, create, store, disseminate and manage information Vavis (2007) sees it as the combination of technologies for collating, storing, processing, communicating and delivering information. It is regarded as an engine for growth and the tool for empowerment with profound implication for education, change and socio-economic development. ICT tools such as videos, televisions, multimedia and computer software which combines text, sound and colorful moving images can be used to provide challenging and authentic content that will engage students in the learning process (Akude & Ajuzu, 2011).

World Bank (2003) opines that, ICT is a set of activities which is facilitated by electronic means through the processing, transmission and display of information. According to United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP, 2001), ICT refers to technologies people use to share, distribute, gather information and to communicate through computers and computer network. It is also seen as a set of tools which can be applied to process, avail and access information and communication services or products. Such services and products may include hardware and software, internet, telephones/mobile phone, telefax, type writer, calculators, radios, televisions, hydraulic machines used in industries, etc. Bakkabulindi (2007) observes that, ICT is of two major types: ICT for converting or processing data into information such as adding machines, calculators, typewriter and ICT for communication of data and or information from one place to another. These include telegraph, telephone, telefax and computer network. These gadgets offer the possibility for an interactive approach.

## Learning Content and Performance of Tertiary Institutions

Education is a key factor for sustainable development. The significance of education, especially in developing countries is increasing because of progressing pressure to catch up with the developed world in terms of global competitiveness (Hawkins, 2002). Predictably, educational settings are different in developing countries than developed countries, such as low quality of education and narrow possibilities in attending schools in rural areas because of far distance and high opportunity cost (House, 2005). It is on this premise that electronic learning becomes very important. Electronic learning therefore, denotes the use of information and communication technology by teachers and learners. Schmudt (2005), holds that technology consists of conventional training, such as course, ad-hoc training, selected learning objects, formalization through document collections and community formation which can be achieved via social software. Nair and Pat (2012), describe technology as the use of new technologies in the service of learning and or learner support. It includes the delivery of content via the internet, intranet, audio-and videotape, satellite broadcast, interactive TV and CD- Rom (Baom, Rusman, Vanderklink & Tattersal, 2005).

These scholars further explained that technology technologies can be used in three main ways in universities and colleges: technology enhanced classroom teaching, distance education and distributed learning. Technology can help to encourage learner centeredness. Technology strategies requires a realization of the change in both demand and supply of resources. Developing a technology strategy is essential in setting a course that will enable a university, faculty or department to achieve predetermined goals (Engelbrecht, 2003). Technology is about providing a solution; a return on expectation; enabling learning and driving performance; motivating learners and encouraging organizations; and ensuring that it becomes interwoven into the fabric of the entire institution (Dublin, 2004). It is simply regarded as the use of Information and Communication Technology e.g. internet, mobile phone, computer, learning management system (LMS), televisions, radios and others to enhance teaching and learning activities.

Technology is a unifying term used to describe the fields of online learning, web based learning and technology delivered instruction (Oye, Selleh & Lahad, 2010), Technology approach has become an increasingly popular



learning approach in higher education, due to vast growth of internet technology. Today, technology is a tool used to remove geographical barriers and facilitates everybody to learn anytime and anywhere without the presence of lecturer. The main purpose of technology is to increase accessibility of education and reduce costs and time as well as improve students' academic performance. This approach of learning facilitates different students at different continents to attend the same classes almost at the same time.

### Benefits of Electronic Learning

- **Saves time and money:** The use of technology platforms to create, manage and carry out educational and training programmes saves business hours when compared to traditional methods.
- **Efficient management:** Learning platforms allow effective, complete and overall control of administration, atomization, communication with users, teachers and trainers and content management. They allow efficient management of registration sign ups and creation of groups and courses.
- **Easy access to information:** All information in technology platform is structured and organized in a way it can be accessible to all users. Courses, calendars, multimedia, content, archives and evaluation are accessible in just one click.
- **Personalization:** Learning platform also allows each institution or organization complete personalization. The corporate image and brand can be incorporated into the platform and different elements and features can be tailored to the company or organization's state.
- **Multimedia learning:** The system allows business and educational institutions to create multimedia learning content which is comprehensive and practical, using video, images, audio and text which all serve as great tools in learning new skills and information.
- **Improved communication:** Technology facilitates communication and collaboration between people, whether it be students and teachers or administrators and employees or among all users of a platform with a permanently open channel of communication.

### Synchronous Learning and Performance of Tertiary Institutions

The traditional face to face approach to teaching is regarded as one-way communication, since the teacher takes up the role of the subject matter

master. The quality of instruction depends on the teacher's knowledge and the time allocated to a period in the school setting. The learners are passive receivers of information and depend on the teacher through the entire learning process. This scenario results in learners, even after having completed a practical topic like word processing in class, not having a firm grip on the subject matter and associated activities. The weaknesses associated with the traditional teaching approach led to a paradigm shift towards learner-centered teaching. However, effective teaching occurs using the learner-centred approach especially when technology is integrated (Akinleye, 2001). The fundamental function of any technology used in education should be to deliver supplementary approaches that can be used to address challenges faced by educators and students (Jaffer, N' gambit & Czemuwicz, 2007). Consequently, interactive automated learner-centered methods like technology have been introduced and adopted. Technology applies electronic media and technologies in education. It uses modern technology, such as computers, digital technology, networked digital levies and associated software and courseware to facilitate the learning process.

Therefore, synchronous learning involves the exchange of ideas and information with one or more participants during the same period. It facilitates efficient education and provides both students and teachers with various ways of networking and sharing and collaborating in real time (Higley, 2013). In technology environments, example of synchronous communication includes online real time, live teacher instruction and feedback, skype conversations, chat rooms and virtual classrooms where everyone is Online and working collaboratively at the same time (FAO,2011). This study described synchronous learning as learning event in which a group of students are engaged in learning at the same time. Before learning technology allowed for synchronous learning environments, most online education took place through a synchronous learning method.

### **Advantages of Synchronous Learning**

- Students can ask question in real time.
- Students feel a great sense of community and connection to their peers when they all learn together.
- Students become more engaged in their learning.
- Students feel a stronger sense of collaboration.





## **Asynchronous Learning and Performance of Tertiary Institutions**

The increasing sophistication and affordability of technology has fostered the rapid growth of distance education at the post-secondary level. Online distance education began to spread from 1995 along with the increased accessibility to the internet. Through its historic expansion, the current and most prevalent delivery format of distance education is online distance education otherwise called asynchronous learning. Asynchronous learning is self-paced and allows participants to engage in the exchanges of ideas or information without depending on their participants' simultaneous involvement (Bouman, 2004). In asynchronous learning, one may use application such as email, blogs, wikis, discussion boards, web-supported textbooks, hypertext documents, audios or video courses and social networking using web 2.0. Learners complete work, discussion, Questions are asked in their own time (Smith 2009). Instructors provide materials lecturers, tests, and assignments that can be accessed at any time. Students may be given a timeframe, usually a one-week window, during which they need to connect at least once or twice.

However, students are free to contribute whenever they chose. In asynchronous learning, students proceed at their own pace, if they need to listen to a lecture a second time or think about a question for a while, they may do so without fear of holding back the rest of the class (Hrastinski, 2008). Furthermore, through technology, education is taken out of the classroom. It is therefore, necessary to determine the best technology methods for teaching in other to obtain the desired result. Many higher education or learning center have adopted asynchronous learning method to gather students far and near. Also, many students have benefited from the adoption and utilization of asynchronous learning. Thus, the importance of asynchronous learning cannot be underscored.

## **Performance of Tertiary Institutions**

For teachers and their students, the availability of modern computers, peripherals networking and resources within an increasingly diver of technologies is an essential part of learning and teaching in the 21<sup>st</sup> Century. ICT resources can enhance learning by making education less dependent on different teacher quality and by making education available at home throughout the day (Mbvesa, 2002).

Bonnet (1997), argues that the use of ICT can positively transmit knowledge to students. Furthermore, ICT's availability and use can help students explore enormous possibilities for acquiring information for schooling purposes and can increase learning through communication. According to the Swedish National Agency for School Improvement (2008), information and communication technology ICT provides a positive impact on learning and students' performance when it becomes an integrated element in the classroom and teaching. Bonnet (1997) argued that the availability of visual digital technology such as animation simulation and moving images; involves students and reinforces conceptual understanding. The use of ICT use also encourages development from a teacher focused or teacher – led model to a more students' focused model where students work together, fashion their own decisions and take an active role in learning. Davis (2000) asserted that increased availability of information and communication technology ICT is especially useful for students who suffer from learning disabilities since ICT allows teachers to prepare suitable tasks for individual needs and each individual more effective. However, Cox (1999), argued that allowing certain students to use computer distracts them from focusing on the task at hand. Central to the argument of availability are the issues of whether or not the teachers and students have sufficient and convenient access to computers and their accessories, how much more the software that is necessitated in the context of their daily research collaboration, teaching and students' evaluation.

Also, students and teachers should have confidence in these facilities, which is in turn reliant on the facilities reliability or degree to which the teachers and students are sure that they will have access to them at all times and utilize them predictably to the betterment of their work, in issues in which consensus is enormous as is clear from ICT in education. Effective integration of ICT in schools would call for a whole institution to be networked to ensure access to multimedia and learning. This means reaching resources via the schools' intranet and internet wherever students and teachers are, in or out of school. The computer labs and classroom computers need to be sufficient in number to allow ready access by students and staff in most subjects across the school. A wide range of peripheral and remote working devices, including video-conferencing, should be provided and integrated into the curriculum.



Despite the above desired situation, most institutions in Africa face barriers to effective integration of information and communication technology (ICT) in the teaching and learning process such as limited infrastructure in terms of satisfactory physical conditions of laboratories and the subsequent accessibility of the resources (ICT) to the learner (Singh, 1993). Many commercial and academic developers of educational multimedia have focused essentially on information access and presentation. However, it is easy to see that multimedia has tremendous potential to enhance the vividness with which information can be presented and ease with which it can be accessed. Accessibility and the use of ICT allow students to investigate more thoroughly the real world. They can more readily access information sources outside the classroom and use tools to analyze and interpret such information. Information may be accessed through online systems or through data logging system (RUI, 1998). The technologies allow them to receive feedback, refine their understanding, build new knowledge and transfer from school to non-school settings. In the past this has been difficult to provide in schools due to logistical constraints and the amount of material to be conversed all of which can now be addressed with information and communication technology.

## CONCLUSION

Based on the discussion above, the following conclusions were made: Synchronous learning has positive influence on higher education in Rivers State. The paper also concluded that asynchronous learning influences higher education in Rivers State. It was equally discovered that learning management system influences higher education in Rivers State. Finally, learning content management also discovered to influence higher education in Rivers State.

## SUGGESTIONS

Based on the discussion of the paper, the following suggestions were made.

1. To ensure academic performance of student, school authorities should create a conducive environment for students that are ICT compliant.
2. Government should come up with laws that would compel higher institutions to provide ICT facilities before establishing or registering higher education in the country.
3. Educational Stakeholders should periodically review current learning tools in other to meet up with rest of the world.

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