Impact of Information and Communication Technology (ICT) Literacy in Teaching and Learning Among Undergraduate Students in South-East Nigerian Universities

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Abstract: This study investigates the impact of Information and Communication Technology (ICT) literacy in teaching and learning among undergraduate students in South-East Nigerian universities. Three research questions were posed for the study. The study adopted a descriptive survey designed. The population of the study was 540 respondents from selected 5 universities in South-East Nigeria, consisting of 335 males and 205 females with a reliability index of 0.78 using Cronbach alpha method. The instrument for data collection was a structured questionnaire. The instrument was validated by three experts, one from the Faculty of Engineering, one from the Faculty of Education and one from the Faculty of Social Sciences, all from the five selected universities. The data collected was analyzed using mean and standard deviation. The findings of the study revealed that computer, mobile-phone and internet were the three ICT mostly used by undergraduate students, although, more on an occasional basis. The findings of the study also revealed that some of the challenges faced by undergraduate students in Nigerian universities include: lack of skills to use the ICT facilities, non-reliability of public electricity supply, limited duration for the use of ICT and frequent computer breakdown. Based on the findings of the study, it was recommended among others that Nigerian universities should make available more ICT equipment and facilities to enhance student's skills and performance towards the use of ICT in teaching and learning, since, they have an average ICT literacy level. Also, universities authority should introduce courses on ICT proficiency to all students and encourage lecturers to make use the ICT facilitiesin teaching and learning.

Key words: ICT, ICT literacy, teaching, learning, undergraduate students

INTRODUCTION

The acceptance of Information and Communication Technology (ICT) in teaching and learning among undergraduate students in Nigerian universities is becoming progressively more important and a global trend which South-EastNigerian universities are not excluded among others. Also, Information and Communications Technology (ICT) can impact undergraduate studentsteaching and learning when lecturers are digitally literate and ability to understand how to integrate it into their courses or programmes of study. Presently, almost all the undergraduate universities students across the world has engaged in a serious search for information for various reasons, among which are to harmonize what has been taught in their various courses and lecture notes to complete their assignments, term papers, projects and other write up such seminar papers,proposals andexaminations, etc. Oliver (2002)

stated that one of the goals ofeducational institutions is to ensure that undergraduate students are information literate and can identify, locate and evaluate relevant information to satisfy their information needs. This implies that undergraduate students demonstrate not only skills and knowledge in their subject domains but also general attributes and basic skills (Adetimirin, 2012).

However, the adoption of ICT according to Adetimirin (2012) and Oliver (2002) in universities was necessitated by the continual review of the curriculum which invariably requires access to a variety of information sourcesby students and teachers. Research by Ogwu *et al.* on fresh undergraduate students in University of Botswana was to determine their computerproficiency level in order to restructure the computer curriculum under General Education Courses (GEC) for effective learning was carried out and found outthat their computer proficiency was low. Also, East Tennessee State University in USA, for instance revised its curriculum by

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introducing a programme for first yearstudents to acquire ICT literacy which included computer literacy course, word processing, electronic communication (e-mail and internet) and other online searches (Oliver, 2002) to ensure that when undergraduate students would be able tomeet several proficiencies related to writing, speaking and using information technology.

Several definitions have been provided for information and communication technology. ICT can be defined as aprocess by which information can be disseminated all the way through the use of electronic computers. According to Ifueko ICT comprises of the storage, retrieval, conversion and transmission of information from computer to another. Is it also a technology that provides access to information through telecommunications? Tinio defined ICT as a diverse set of technological tools and resources used to communicate and to create, disseminate, store and manage information. These technologies include computers, electronic data processing, broadcasting technologies, telephony, telecommunications, audiovisual equipments, the internet and related services. Becta (2008) referred ICT as a term that covers all forms of computer and communication equipment and software used to create, store, transmit, interpret and manipulate information in its various formats. UNESCO. (2003) defined Information and Communication Technology (ICT) as a major tool for building knowledge societies. According to Owhotu (2006), ICT is a term used to describe the tools and the processes to access, retrieve, store, organize, manipulate, produce, present and exchange information by electronic and other automated means. These means include hardware, software and telecommunication in the form of personal computers, scanners, digital cameras, phones, faxes, modems, CD and DVD (digital view disc), players and records, digitalized video, radio and TV programmes and multimedia programs.

Information and Communication Technology (ICT) according to Onodugo (2016) has been proven to be a very important aspect of teaching and learning process in Nigerian universities. It plays a significant role in development efforts as they open up new opportunities for progress, the exchange of knowledge, education and training and for the promotion of creativity and intercultural dialogue. These technologies according to Onodugo (2016) also help to strengthen social cohesion and reinforce the capacity development for humanities education. Research by Adewara and Lawal (2015) position that learning in information age requires new teacher role be cause teachers cannot depend only on the traditional tools such as chalk, textbooks, overhead video projectors and other types of traditional instructional materials to teach students the skills required for survival in the information age. The further stated that teachers required to use technologies of the day such as computers, interactive video, CD-ROM, satellite communications and develop new teacher roles (Adewara and Lawal, 2015). The development and use of these Information and Communications Technology (ICT) devices and ideas to promote human learning is the hall-mark of an ICT-driven curriculum. Effective implementation of this type ofcurriculum also requires new lecturers roles regarding the and how of instruction (Onodugo, 2016). For this reason, there is need to incorporate the acquisition of ICT literacy into the curriculum of teaching and learning among undergraduate students in Nigerian universities.

ICT literacy can be defined as the ability to understand the computer features, capabilities, applications and as well as ability to put into practice the acquired knowledge in productive use of computer applications suitable to person roles in society. According to Oliver *et al*. (2000), defined ICT literacy as a capacity for purposeful and effective use of ICT technologies in one's own setting which creates different needs for different people. They further described ICT literacy as a range of personal competencies that are in many cases distinct from ICT components specific to the needs of individual subject disciplines and domains. Ghasempour *et al*. (2014) perceived ICT literacy technology that is used to denote one's knowledge about and ability to use computer and technology effectively. In addition, to the above definitions, Report of the International ICT Literacy Panel (2002), further defined ICT literacy as the use of digital technology, communication tools and or networks to access, manage, integrate, evaluate and create information in order to function in a knowledge society. From the definition cited above by International ICT Literacy Panel (2002) cited the term access as the ability to know about and how to collect and or retrieve information while management is the application of an existing organizational or classification scheme. Integration, here, relates to interpreting and representing information and which involves summarizing, comparing and contrasting. On the other hand, evaluation is the ability to make judgments about the quality, relevance, usefulness or efficiency of information while creation is the generation of information by adapting, applying, designing, inventing or authoring information (Adetimirin, 2012). The term ICT literacy according to Daramola *et al*. (2015) is a root in the need to involve the acquiring and advantageous use of information through the use of technology.

Impact of ICT literacy in teaching and learning among undergraduate students in Nigerian universities: Information and communication technology have impacted greatly on teaching and learning of undergraduate students in Nigerian universities in all

aspect of their human endeavours such as electronic technologies used for accessing, processing, gathering, manipulating and presenting or communicating information. It encompasses software, hardware and even the internet connectivity (Anderson and Baskin, 2002). When ICT facilities are employed in education system given the right condition, they can accelerate, enrich and deepen basic skills in reading, writing, motivate and engage students to learn as they become more independent and responsible for their learning (Onodugo, 2016). Furthermore, the used of ICTs help to relate in academics practices of today's activities. Also, information and communication technologies, especially, network technologies have been found to encourage active learning, support innovative teaching, reduce the isolation of teachers and encourage teachers and students to become active researchers and learners. Moreso, they strengthen teaching through the provision of powerful tools to teachers (Cradler and Bridgforth, 2004). Other derivable impact of ICT integration in education is enumerated as follows. First, ICTs can assist in reducing teacher's workloads through its use for lesson preparation and worksheet, writing student's report and individual education plan, collating and analysing student's attainment information for target setting; recording and analysing attendance and disciplinary information and maintaining link between the school and parent to ensure parental involvement in school activities (British Educational Communications and Technology Agency (Jones, 2004). Second, it can be used in getting necessary instructional content of subjects and collaboration which can be ensured with teachers globally. In addition, lecturers can also have up to date knowledge of a subject area. Third, ICTs can assist in lecturers' development, for instance, the internet. In the context of lecturer's development e-learning can be used for both initial and continuing development through courses, workshops and other activities where students and teachers learn about integrating ICTs across curriculum to support learning (Anderson, 2005).

In addition, it can also serve as a multi-media means for instructional delivery in the classroom through textual, audio, visual and audio-visual forms. Thus, equity can be ensured for all categories of learners (Maldonado, 2001). However, from the foregoing, it can be deduced that the impact of ICT in teaching and learning are essential for today's modern educational development across the globe. Nigeria as a nation, recognizes the fundamental roles of ICT in the revival and improvement of the Nigeria system of education. However, this recognition brought about the progress of precise ICT related policies, so that, the Nigerian education system may perhaps enhance the potentials of ICT.

Other ways in which ICT can be relevant in teaching and learning undergraduate students as stated by Ikelegbe (2006) and Okeh and Opone (2007) include: supporting conventional classroom work; the teacher could ask his/her students to use ICT approach; helping in the design and development of learning materials. A lot of materials can be downloaded from the internet. Such materials must however be adapted to suit the specific instructional objectives; accessing electronic teaching materials such as books, journals. These can be accessed, stored and analyzed by the use of ICT; accessing virtual library "stocks" electronic versions of book's journals; giving or providing access to the world of resources, especially in electronic form; playing a key role in educational administration (Onodugo, 2016).

To this end, Okeh and Opone (2007) further stated that the use of new information technology can serve three main functions in the national educational growth. These are: deliver all or part of the learning experiences to learners; supplement and extend content provided in different forms other than printed (hard copy) and provide a two-way channel of communication for exchange between tutors and students with their peers for feedback or for learning, problem solving, advice, debate and reports.

Challenges of ICT literacy in teaching and learning among undergraduate students in Nigerian universities: Research by Adetimirin (2012) identified 5 factors that hindered the ICT literacy in teaching and learning of the undergraduate students, namely: inaccessibility to ICT facilities, lack of skills to use ICT facilities, irregular power supply, limited duration for the use of ICT and frequent computerbreakdown. Others challenges and obstacles that affect the use of ICT literacy in teaching and learning among undergraduate students in Nigerian universities according to Association of African University (2000) classified challenges into technical, non-technical, human and organizational and financial. Technical obstacles identified include the poor telecommunication infrastructure, absence of national information communication infrastructure, lack of university coherent plan for ICT, problems of connectivity, lack of or limited bandwidth for ICT for learning, teaching and research, non-reliability of public electricity supply, thus, necessitating extra cost for standby generators. The non-technical deals with lack of professional development for faculty; human and organizational aspect relates to inadequate planning for ICT integration in regular activities of universities and inadequate human resource base while financial challenges relates to inadequate funding of ICT infrastructure, maintenance of available facilities and staff development (Onodugo, 2016).

Research findings on challenges to ICT application in other levels of education have provided similar results. Some of the findings of these studies are enumerated as

follow. First, is the lack of teacher's confidence and teacher's computer anxiety (Jones, 2004). Second is lack of teacher's competency due to lack of time for training, lack of pedagogical training, lack of skills training and lack of ICTs focus in initial teacher training (Jones, 2004; Yusuf, 2005). Third is lack of access to resources due to lack of hardware, poor organization of resources, poor quality hardware, inappropriate software and lack of personal access for teachers. Fourth is lack of time to use ICTs as a result of school time table (Jones, 2004). Fifth include technical problems which encompass lack of technical support, fear of things going wrong, lack of telecommunication and other infrastructure and unreliability of electricity (Jones, 2004). Others include lack of or ineffective technological leadership in schools, lack of clear vision, lack of incentives for teachers, lack of teacher's participation in planning for ICT integration. Since, these challenges are known, it is important to device strategies for effective implementation of ICT literacy in teaching and learning among undergraduate studentsthat will provide enabling environment for ICTs use in Nigerian universities.

Strategies for effective implementation of ICT literacy in teaching and learning among undergraduate students: To put into practice all necessary strategies for effective implementation of ICT among undergraduate students can become a major tool to improve effective teaching and learning in Nigeria universities. To specify the right condition, the potentials of ICT can be implemented by university administrators, lecturers, curriculum developers and researchers. The following initiatives as cited by Nigerian policy of education for information technology should be taken to encourage the implementation of ICTs in Nigerian universities. First, the Nigerian policy for information technology (FRN, 2001) should be reviewed to give specific sectoral allowancefor education. The document should not only be market drivenin orientation but should also give detailed direction on the integration of ICTs in instruction. In this direction, relevants take holders should be part of the process to review the document. Furthermore, ICT policy for education to be developed at all levels of Education in Nigeria. Compulsory ICT straining to be enforce for all teachers in Nigerian universities. In addition, regular workshops and seminars to be organize for serving lecturers to keep them a breast developments in the field of ICT as they relate to education (Onodugo, 2016).

ICT has the capability to enhance teaching and learning through improved interaction across cultures, between students, academics and between both but some factors in developing countries could impact otherwise (Mlitwa, 2005). ICT use by undergraduates, therefore, becomes inevitable for academic excellence in their various disciplines. They use ICT to complement print resources available in their various libraries to retrieve relevant information for their achievement of academic goals. Student's use of technology in education is expected to improve educational outcomes, increase skills in the use of technology and decrease inequalities between groups as employers expect graduates who will be prospective employees to possess some ICT skills. Therefore, to remain relevant in the current information age, university lecturers and students have to adopt ICT toenhance their teaching, learning and research activities. The use of such technologies by the students is however, dependent on accessibility, skills and ease of use to such technologies.

Since, ICT literacy has found its way to enhance teaching and learning among undergraduate students the classroom, it is expected that lecturers who are to use this technology ought to be competent in its use for better productivity. Also, their ability to use this technology will depend on the extent to which they are literate in its use. Hence, this study sought to determine the impact of information and communication technology literacy teaching and learning among undergraduate students in South-East Nigerian universities.

Purpose of the study: Ascertain the impact of ICT literacy in teaching and learning among undergraduate students in South-East Nigerian Universities. Examine the challenges that affect the use of ICT literacy in teaching and learning among undergraduate students? Determine strategies for effective implementation of ICT literacy in teaching and learning among undergraduate students?

Research questions: What are the impact of ICT literacy in teaching and learning among undergraduate students in South-East Nigerian universities? What are challenges that affect the use of ICT literacy in teaching and learning among undergraduate students? What are the strategies for effective implementation of ICT literacy in teaching and learning among undergraduate students?

MATERIALS AND METHODS

The descriptive survey design was adopted for the study and five universities from the south-east Nigeria were selected: two federal, two states and one privately owned university. The selected universities were: University of Nigeria, Nsukka; Nnamdi Azikiwe University, Awka; Ebonyi State University, Abakaliki; Imo State University, Owerri and Godfrey Okoye University, Uturu all from the South East Nigerian universities.

Within these selected universities, three faculties were purposively selected on the basis of being available

Table 1: Demographics of respondents by universities in South-East Nigeria

| | | | | Respondents | | | | | |
| | | | | Engineering | | Education | | Social sciences | |
Selected universities	F/540	Males	Females	Males	Females	Male	Female	Male	Female
University of Nigeria, Nsukka	150	88 (58.67%)	62 (41.33%)	35	22	32	14	21	26
Nnamdi Azikiwe University, Awka	125	78 (62.4%)	47 (37.6%)	29	18	30	12	19	17
Ebonyi State University, Abakaliki	98	59 (60.2%)	39 (39.80%)	20	17	23	10	16	12
Imo State University, Owerri	88	60 (68.18%)	28 (31.81%)	22	12	13	7	25	9
Godfrey Okoye University, Uturu, Abia State	79	50 (62.04%)	29 (36.71%)	15	10	18	6	17	13
Total		335	205	121 (x = 24.2)	79 (x = 15.8)	116 (x = 23.2)	49 (x = 9.8)	98 (x = 19.6)	77 (x = 15.4)
Grand total	540	(62.04%)	(37.96%)	200		165		175	

in all the selected universities in South-East Nigeria. The faculties were engineering, education and science. The population of the study was 540 respondents from selected 5 selected universities in South-East Nigeria, comprising of 335 males and 205 females with a reliability index of 0.78 using Cronbach alpha method. These coefficient values were considered adequate by the researchers to attest the overall reliability of the instrument. The instrument for data collection was a structured questionnaire. The instrument was validated by three experts, one from the Faculty of Engineering, one from the Faculty of Education and one from the Faculty of Social Sciences. The data collected was analyzed using mean and standard deviation. The researchers developed the questionnaire items through information gotten from the respondents. The questionnaire consists of two sections: Section "A" and "B". Section A was used to obtain personal information of the respondent's background. Section B of the questionnaire was generated in line with the research questions which were used to build four clusters. The response format for all the clusters was four-point responses scale. All the clusters A, B, C and D have response options of Strongly Agree (SA), Agree (A), Disagree (D) and Strongly Disagree (SD). In other words, the higher the aggregate scores in the rating scale, the more positive the response of the subjects are the lower the score the more negative the responses of the subjects (Table 1).

The total number of respondents in the University of Nigeria, Nsukka was 150 out of which 88 were males while 62 were females. In Nnamdi Azikiwe University, the total number of respondents was 125 out of which 78 were males while 47 were females. In the Ebonyi State University, 98 respondents returned their questionnaire. Out of this number, 59 were males while the remaining 39 were females. In Imo State University, the total number of respondents was 88 out of which 60 were males while 28 were females. Also, from Godfrey Okoye University, 79 respondents returned their questionnaire, out of this

number, 50 were males while 29 were females. Altogether, 200 of the respondents were studying engineering, 165 were in the education while 175 were in the social sciences.

RESULTS AND DISCUSSION

Research question one: What are the impact of ICT literacy in teaching and learning among undergraduate students in South-East Nigerian Universities?

Result in Table 2 revealed that item 7 had a mean value of 3.67 with the standard deviation of 0.47 which indicate the impact of ICT literacy in providing a two-way channel of communication for exchange between lecturers and students in South-East Nigerian Universities. However, items 1-6 had their mean values ranged from 3.32-3.57. This indicates that impact of ICT literacy in teaching and learning among undergraduate students in South-East Nigerian Universities is high. Notwithstanding, the cluster mean of 3.47 which is within the real limit of 2.50-3.49 indicates the impact of ICT literacy in teaching and learning among undergraduate students. The standard deviation of the 7 items ranged from 0.05-0.51; indicate that the respondents were homogenous in their responses.

Research question two: What are challenges that affect the use of ICT literacy in teaching. Table 3 shows the mean scores and standard deviation of challenges that affect the use of ICT literacy in teaching and learning among undergraduate students. The result shows that the respondents accepted the fact that all the items listed in Table 3 challenges that affect the use of ICT literacy in teaching and learning among undergraduate students. This is because; each of the items has its mean score between 3.32-3.67 which is above the agreed criterion mean of 2.5. Equally, the overall mean score show a cluster mean of 3.51. This shows a decision level of strongly agree. This is an indication that the respondents strongly agree that all

Table 2: Mean and standard deviation of respondents on impact of ICT literacy in teaching and learning among undergraduate students in South-East Nigerian universities

Item statement	Mean	SD	Decision
It is used to access, process, manipulate and present information	3.52	0.05	A
ICT help to relate in academics practices of today's activities	3.37	0.48	A
It encourages active learning and support innovative teaching of teachers and students to become active researchers and learners	3.57	0.49	A
ICT assist in reducing teacher's workloads through its use for lesson preparation and writing student's report	3.50	0.51	A
It is used in getting necessary instructional content of subjects	3.32	0.46	A
It serves as a multi-media means for instructional delivery in the classroom through textual, audio, visual and audio-visual forms	3.37	0.48	A
It provides a two-way channel of communication for exchange between lecturers and students	3.67	0.47	A
Cluster mean	3.47	0.48	SA

Table 3: Mean and standard deviation of respondents on challenges that affect the use of ICT literacy in teaching and learning among undergraduate students

Item statement	Mean	SD	Decision
Inaccessibility to ICT facilities	3.48	0.5	A
Inadequate planning for ICT integration in regular activities of universities	3.54	0.5	A
Lack of skills to use these facilities	3.67	0.47	SA
Limited duration for the use of ICT and frequent computer breakdown	3.32	0.46	A
Non-reliability of public electricity supply	3.43	0.49	A
Lack of university coherent plan for ICT	3.63	0.48	SA
Cluster mean	3.51	0.48	SA

Table 4: Mean and standard deviation of respondents on strategies for effective implementation of ICT literacy in teaching and learning among undergraduate students?

Item statement	Mean	SD	Decision
Nigerian policy for IT give specific allowance for education	3.36	0.48	Agree
Relevant stakeholders should give detailed direction on the integration of ICTs in instruction	3.63	0.48	Agree
ICT policy for education to be developed at all levels of Education in Nigeria	3.54	0.05	Agree
Compulsory ICTs training to be enforce for all teachers in Nigerian universities	3.43	0.49	Agree
Regular workshops and seminars to be organize for serving lecturers to keep them abreast developments in the field of ICT	3.67	0.47	Agree
University lecturers and students have to adopt ICT to enhance their teaching, learning and research activities	3.56	0.05	Agree
Cluster mean	3.53	0.49	SA

the items in the table are challenges that affect the use of ICT literacy in teaching and learning among undergraduate students.

Research question three: What are the strategies for effective implementation of ICT literacy in teaching and learning among undergraduate students?

The data in Table 4 shows the mean scores and standard deviation onstragies for effective implementation of ICT literacy in teaching and learning among undergraduate students. From the result, the respondents acknowledged that all the items in Table 4 are strategies for effective implementation of ICT literacy in teaching and learning among undergraduate students. The items had mean scores ranging between 3.36-3.67 with the corresponding standard deviation of 0.05-0.49 which is above the agreed criterion mean of 2.5. The overall mean score show a cluster mean of 3.53 with the corresponding standard deviation of 0.49. This indicates a decision level of strongly agree. Consequently, the table

shows that all the items in the table are strategies for effective implementation of ICT literacy in teaching and learning among undergraduate students.

The findings of the study revealed impact of ICT literacy in teaching and learning which include accessibility and manipulation of information; active learning and support innovative teaching of teachers and students to become active researchers and learners and the ability to reduce the teacher's workloads through its use or lesson preparation and writing student's report. The finding of the study is in line with the study carried out by Anderson and Baskin (2002) that stated that information and communication technology have impacted greatly on teaching and learning of undergraduate students in Nigerian universities in all aspect of human endeavours such as electronic technologies used for accessing, processing, gathering, manipulating and presenting or communicating information. The finding of the study is also in agreement with the study of Onodugo (2016) that noted that when ICT facilities are employed in education

system given the right condition, they can accelerate, enrich and deepen basic skills in reading, writing, motivate and engage students to learn as they become more independent and responsible for their learning.

The findings of the study identifies challenges that affect the use of ICT literacy in teaching and learning among undergraduate students such as: inaccessibility to ICT facilities, inadequate planning for ICT integration in regular activities of universities, lack of skills to use these facilities and limited duration for the use of ICT and frequent computer breakdown. The findings of this study is consistent with Adetimirin (2012) that identified 5 factors that hindered the ICT literacy in teaching and learning of the undergraduate students, namely: inaccessibility to ICT facilities, lack of skills to use ICT facilities, irregular power supply, limited duration for the use of ICT and frequent computer breakdown.

The findings of the study revealed strategies for effective implementation of ICT literacy in teaching and learning among undergraduate students among others are to organize a compulsory ICTs training for all teachers in Nigerian universities and also organize a regular workshops and seminars to be for serving lecturers to keep them abreast developments in the field of ICT. The finding of this study corroborates the results of Onodugo (2016) that compulsory ICTs training to be enforce for all teachers in Nigerian universities. In addition, regular workshops and seminars to be organize for serving lecturers to keep them abreast developments in the field of ICT as they relate to education. The findings of the is also in collaboration with Mlitwa (2005) who stated that ICT has the capability to enhance teaching and learning through improved interaction across cultures, between students, academics and between both but some factors in developing countries could impact otherwise.

CONCLUSION

The use of ICT is of great value in today's education for the processing and accessing of information by undergraduate students in Nigerian universities. Nigerian universities are providing ICT to complement the available print resources in the library to meet the information needs of its users. The university libraries due to their underfunding could not offer all the appropriate information to convene the information needs of their students. As a result, the option adopted has been the introduction of ICT literacy to offer the needed information to its users which are made up of students, staff and the university community at large. The federaland private universities were found to take more ICT facilities to be use by their undergraduate students than the state universities. The challenges faced by the undergraduate students in their passion to use the accessible ICT facilities in the universities were irregular

power supply and limited time of access to available ICT. For that reason, these defy must be addressed by the university authority to enlarged ICT literacy skills among the undergraduate students.

RECOMMENDATIONS

Based on the findings of this study, the following recommendations are put forward: Nigerian universities should make available more ICT equipment and facilities to enhance student's skills and performance towards the use of ICT in teaching and learning.

Universities authority should introduce courses on ICT proficiency to all students and encourage lecturers to make use ICT in teaching and learning. The federal, state and private university administrators should introduce courses for ICT competency to all first year undergraduate students and encourage lecturers to use ICT facilities in teaching and learning. This will further enhance the use of ICT by the undergraduate students and eventually increase their ICT literacy.

The approaches to the use of ICTs in education should be pursued holistically. The investments in ICTs should not only be used to promote the development of basic ICT skills but also to enable the development of broader set of critical thinking, problem-solving and communication skills. The use of ICTs should be monitored and evaluated regularly and closely to meet a variety of educational objectives.

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