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Assessment of information and communication technology (ICT) competence and literacy skills among undergraduates as a determinant factor of academic achievement

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Almost every human endeavor is supported or driven by Information and Communication Technology (ICT) including education. Teaching, learning, assessment, course registration, payment among other things are now ICT-based. Humans have attempted to use technology to improve their life span and quality, and education is not excempted in this great paradigm shift. This paper focuses on the Information and Communication Technology competence and literacy skills of undergraduate students in Ogun State, using their information literacy skills/competence as determinants of their academic achievement. A descriptive survey design was adopted for this study. The population of the study consists of 10,713 students from Tai Solarin University of Education (TASUED) comprising 4 colleges and 10,000 students of Babcock University comprising 9 colleges. Simple random sampling was used for the selection of a sample of 170 respondents from Babcock University and 130 respondents from TASUED. Three hundred stdents (from 100-500 levels) were the sample of the study. Well-structured questionnaire was the main instrument used for the collection of primary data. The findings of this study show that 80% of the undergraduate students of TASUED and BU have basic ICT literacy skills which entail the ability to source for and access information resources for their research. Furthermore, this study has proved that the use of ICT has improved students' academic performance. Recommendations were made based on the findings from the study.

Key words: Information literacy, academic achievement, undergraduates, higher education, Information and Communication Technology (ICT).

INTRODUCTION

In the last decades, with fast improving computing technology, there has been a change in the way we live.

This tremendous technological change is now affecting all manufacturing and service firms, including teaching and learning. Higher education plays a very important role through its graduates who occupy leadership positions in education as researchers, teachers, consultants and managers. Graduates of higher education are saddled with the responsibility to create and apply new knowledge and innovations. They also provide analytical perspectives on the problems of development and services rendered to the public and private sectors.

Ebo (2013) explains that the term, Information and Communication Technology (ICT) is the system used for handling information; it includes multi- media, the internet, other devices like video, cameras and mobile telephones. Quadri and Abomoge (2013) define a university undergraduate as "a university student who has not yet received a first degree or the body member of a university or a college who has not received a first degree; a student in any school yet to complete his or her course". In an attempt to clarify the concept of "competence", Weinert (2001) relates the term to the Greek notion of *arête*, meaning excellence or being the best. Also, it is compared to the Latin term, *virtus*, a kind of moral excellence generally understood as what people can do rather than what they know.

Competence is synonymous to ability, aptitude, capability, effectiveness and skills. It connotes discrete skills and activities that individuals can perform (Allan, 2011). Kyoshaba (2009) in Cambridge University Reporter (2003) states that academic achievement is frequently defined in terms of performance in examination, academic achievement, performance in tests, and course work.

STATEMENT OF THE PROBLEM

Due to the convergence of ICT, and so many different information resources, students are faced with information overload. They need certain special skills like information literacy skills to search for information, understand, evaluate, and apply what they find. Ilogho and Nkiko (2014) observed that most undergraduates contract their research projects and assignments because of their embryonic information literacy competence in ICT to source for information. Undergraduates in Nigerian higher institutions have always considered their academic achievements and performance as a vital part of their educational success. Therefore, low academic performances might lead to their expulsion, probation, and they might be asked to change their current course of study. This has made students to embrace ICT in order to improve their academic performance. However, they are still faced with the challenges of not having the right ICT competence and literacy skills to adequately use these available ICT- based tools. This is the reason why this research tends to examine the Information and Communication Technology Competence and Literacy skills of undergraduate students in selected universities in Ogun State, Nigeria.

OBJECTIVES OF THE STUDY

The general purpose of the study is to assess ICT competency among undergraduate students. The specific objectives of the study are to examine:

(i) The level of ICT competence among university undergraduates
(i) The level of information literacy among university undergraduates
(i) How ICT competence among undergraduate students is obtained
(i) The effect of ICT usage on undergraduate students' academic performance
(i) The challenges that may cause ICT incompetence among undergraduate students.

RESEARCH QUESTIONS

The following research questions were proposed in this study:

(i) What is the level of ICT competence among university undergraduates?
(ii) What is the level of Information Literacy among university undergraduates?
(iii) How is ICT competence among undergraduate students obtained?
(iv) What is the effect of ICT usage on undergraduate students' academic performance?
(v) What are the challenges that may cause ICT incompetence among undergraduate students?

LITERATURE REVIEW

The use of ICT among students in higher learning

Due to information explosion, students are being taught how to critically think about what they are searching for

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on the internet and to determine the right key words that would be useful for their search. ICT is therefore the combination of networks, hardware and software as well as the means of communication, collaboration and engagement that enable the processing, management and exchange of data, information, idea and knowledge. Thus, ICT includes the use of mobile phones, personal computer (PC) and internets, the main central tools that gave impetus to the most radical changes known today. These technologies are fast and automated, interactive and multimodal, and provide avenues for students to control how and when they learn (ACARA, 2010). Undergraduates of higher institutions are being prepared to become knowledge workers in the society; they are expected to acquire knowledge, skill, and attitude using information and communication technology in their academic pursuit, to enable them to improve their academic performance and careers in future.

ICT can enhance instructional delivery through its dynamic, interactive, and engaging content. It can as well provide real opportunities for individualized instructions. ICT has the potential to accelerate, enrich and deepen skills; motivate and engage students in learning (Eze and Nwangbo, 2013). Students can play important roles in technologically infused literacy classrooms. They have the responsibilities to use technology as an effective tool in their pursuit of learning; they are to use technology wisely and ethically, and help others become experts in technology. They feel empowered by this opportunity and think they add value to knowledge when they present a set of materials in a unique way that has never be done. Information and communication technology does not only have the potential to introduce new teaching and learning practices, but can also act as a catalyst to revolutionize the education system. It can empower teachers and learners and promote the growth of skills necessary for the 21st century work place.

Academic achievements among university undergraduates

Students' academic achievement has always been an area of great concern for teachers, parents and the entire university administration; it is the determinant factor of outcome of learning, teaching and curriculum development. At the end of every school year (which varies for almost every university in the country), students' academic achievements are reviewed. Some of these students are celebrated, especially through giving of prizes and awards, while some are immediately employed as academic and non- academic staff. They are recongnized as leaders by their colleagues. However, for those with poor performance the aftermath may include expulsion, academic probation, changing of current course of study, academic insecurity during their course of study and low self-esteem.

Amasuomo (2015) quoting Universities Admission Center reported that "tertiary institutions in Austria have found that all the academic achievements of an undergraduate are the best single predictors of tertiary success for most tertiary courses" p.195. The most widely used term for undergraduates' academic achievement is their Grade Points Average (GPA) or Cumulative Grade Points Average (CGPA); it is also the "yardstick" used to measure the academic achievements and output of students, teachers, and the university. To improve in their academic performance, undergraduates are now being charged to advance their existing knowledge by using the best sources and resources to support their academic functions. The use of ICT is regarded as the best medium for handling information; it includes multimedia, the internet, and devices such as video, cameras and mobile telephones, personal computer (PC) or laptop, smart phones. These gadgets, when connected to the internet, can provide access to large volume of information (Ebo, 2013).

ICT competence and literacy among undergraduates

Technology has now become the most preferable means of generating and disseminating information, hence the society is increasingly conscious of technology literacy. It is seen as a continuum of knowledge, skills and strategies that individuals acquire in the course of their lives through interactions with peers and communities around them (Panel, 2002). The 21st century, also called ICT literacy or new literacy, is not only the traditional literacy concept of being able to read and write fluently, but is also the ability to judiciously utilize and incorporate the new technologies in order to communicate with others (21st Century Skills, 2006).

Quoting Oye et al. (2012: 125), *"the term ICT literacy or technological literacy can be considered as the ability to know and use technology skillfully. ICT literacy refers to the application of technology effectively as a tool to research, organize, evaluate and communicate information. It also includes the use of digital technologies (computers, PDAs, media players, GPS, etc.), communication/networking tools and social networks appropriately to access, manage, integrate, evaluate and create information to successful function in a knowledge economy."* In higher institutions of learning, information literacy and ICT competence are necessary skills for students to recognize when information is needed and have the ability to locate, evaluate, and use such information to enable them improve their academic performance. ICT literacy may be grouped into three classes: class one is knowledge of technology; the second class is skill relevant to using technology, and the third is attitudes accrued from critical reflection of

Table 1. Showing the summary of respondents' demographic data.

Demographic Information	Response	Percentage
Level		
100L	46	15.3
200l	63	21
300L	66	22%
400L	114	38.0%
500L	11	3.7%
Gender		
Male	162	53.3
Female	138	46.7
Age		
15-20	138	46.0
21-25	92	30.6
26-30	65	21.7
31-45	5	1.7

technology use. Ogunlana et al. (2013) explained that information literacy augments students' competence in evaluating, managing and using information. It is now considered as a vital competency for all university students to have. ICT competency is now of high priority in every aspect of life to fit into the digital world. Ofoegbu and Uche (2013) indicated that the potentials of ICT to improve instruction can help to present information in many forms, make learners to be more confident in the learning process, communicate effectively in any process, become independent learners and good beginners, improve their writing skills, give rise to greater problem solving and critical thinking skills.

Quoting Rao (2009: 201), the "*use of technology helps to facilitate students' research project, helps students develop a hypermedia program for learning a particular topic, and helps them to maximum their instructional time. Such a blend of students' research and technology can enable them to work on self-paced and meaningful projects while avoiding the typically unproductive time of waiting for help or waiting to be told what to do next*".

METHODOLOGY

The study investigates the ICT competence and literacy among undergraduates as a determinant factor of academic achievement in Tai Solarin University of Education (TASUED), Ijagun, and Babcock University, both in Ogun State. Nigeria. Descriptive survey design was adopted for this study. The population studied consisted of 10,713 students from TASUED comprising 4 colleges (COSIT, COHUM, COSMAS and COAEVOT).

The university population consists of 10,000 students comprising 9 colleges: School of Agriculture and Industrial Technology, Babcock Business School, College of Health and Medical Sciences, School of Science and Technology, School of Computing and Engineering Sciences, School of Education and Humanities, School of Law and Security Studies, School of Nursing, School of Public and Allied Health. Simple random sampling was used to select a sample of 170 respondents from Babcock University and 130 respondents from TASUED. There was a total of 300 respondents (from 100-400 level). A structured questionnaire was used to collect the primary data. The questionnaires were distributed to the students to and collected immediately for analysis.

RESULTS

In the questionnaire, the percentage of students who correctly answered every question was analyzed descriptively, using Statistical Package and Service Solution (SPSS).From Table 1, it is gathered that 46 (15.3%) of the respondents are 100L students; 63(21%), 200L; 66(22%), 300L; 114(38%), 400L, while, 11(3.7%), 500L students. Also, the age range of 15-20 was 138(46%); 21-25, 92 (30.6%); 26-30, 65(21.7%), while 31-45, 5(1.7%).

Research Question One: What is the level of ICT competence among university undergraduates?

Table 2 shows that 80% of the respondents had ICT-competency in computers/smart phones operations, word processing, spreadsheet, PowerPoint presentation, and internet operation. 66.3% of the students can install antivirus in their computers and phones while 33.7% cannot do it. These findings show that most of the respondents' level of ICT-competency is very high. However, 29% of the respondents cannot make cell

Table 2. showing the level of ICT- competence among undergraduate students.

ICT Competence	Yes(%)	No(%)
Computer /Smart Phone Operation		
Ability to install and uninstall applications on their devices	289(96.3)	11(3.7)
Create and manage files and folders in my computer	277(92.3)	23(7.7)
Save files into my Google drive, sky drive, ICloud, flash drive or CDs.	268(89.3)	32 (10.7)
Print documents	279(93.0)	21(7.0)
Protect my computer from virus	199(66.3)	101 (33.7)
Download and view documents and files	285(95.0)	15(5.0)
Word Processing (Microsoft Word), Spreadsheet (Microsoft Excel) and Presentation (Microsoft PowerPoint)		
Create, Save and exit documents	284(94.7)	16(5.3)
Ability to edit a document (Bold, italicize and underline, change font color, Cut, copy and paste text or graphics)	251(83.7)	49 (16.3)
Use shortcut icons	264 (88.0)	36 (12.0)
Make a cell active	211 (70.3)	89 (29.7)
Change slide design	238 (79.3)	62 (20.7)
Ability to create and add a new slide	250 (83.3)	50 (16.7)
Use PowerPoint for my presentations	253 (84.3)	47 (15.7)
Internet Operation		
Open internet explorer and other web browsers	292 (97.3)	8(2.7)
Ability to search for information using different search engines	275 (91.7)	25(8.3)
Ability to compose, attach file to email and send e-mail messages	272 (90.7)	28(9.3)
Access my Emails	285 (95.0)	15(5.0)
Download and save files online	292 (97.3)	8(2.7)
I use the social media to get updates on my academic field of study	252 (84.7)	48 (16.0)

Table 3. Showing the level of Information Literacy among undergraduate students.

Information literacy Level	Yes(%)	No(%)
Can you limit search strategies by subject, language and date?	195(65.0)	105(35.0)
Can you decide where and how to find your information for your research and assignments?	201(67.0)	99 (33.0)
Can you determine the authoritativeness, correctness and reliability of the information sources?	188(62.7)	112(37.3)
Can you select information most appropriate to the information you need/want for your assignment and research?	122(40.7)	178(59.3)
I have learned from my information problem solving experience and have improved my information literacy skills	259(86.3)	41(13.7)

active in Microsoft excel.

Research Question Two: What is the level of Information Literacy among university undergraduates? Table 3 depicts that 65% of the respondents can limit their search strategies by subject, language and date, while 35% cannot. 67% of the respondents can decide where and how to find information for their research and assignments, while 33% cannot. Also, 62.7% of the respondents can determine the authoritativeness, correctness and reliability of the information sources, while 37.3% cannot.

More than half of the respondents (59.3%) said that they cannot select information most appropriate to the information they need/want for their assignment and research, while, 40.7% can do so. In conclusion, 86.3%

Table 4. Showing how ICT competence among undergraduate students is gotten.

Student's ICT Competence before or during their academic admission	SA (%)	A (%)	D (%)	SD(%)
I got my training on the use of ICT from the University, through the general courses been taught on computer applications and use, Vocational Training and Departmental courses.	33 (11.0)	74 (24.7)	115(38.3)	78(26.0)
I got my training from professional training courses on computer applications and use. E.g. New Horizon, Microsoft certifications etc.	113 (37.7)	87(29.0)	77 (25.7)	23 (7.7)
I got my training from my parents, colleagues, Classmates, friends, and self-development.	76 (25.3)	104(34.7)	107(35.7)	13 (4.3)
I got my training by attending a diploma or certification course training in computer sciences, e.g. HND, Dip, ND1 and NDII, etc.	35 (11.7)	48 (16.0)	128(42.7)	89(29.7)

Table 5. showing the effect of ICT usage on undergraduate students' academic performance.

Effect of ICT usage on undergraduate students' academic performance	SA (%)	A(%)	D(%)	SD(%)
The use of ICT has helped me to improve my academic grades	49 (16.0)	50 (17.3)	123 (41.0)	76 (25.3)
I earn better grades when I apply or use ICT during class presentation, research and assignments.	98 (32.7)	146 (48.7)	31(10.3)	25(8.3)
My ability to use ICT has made me to assist my colleagues when they face problems in using ICT.	60 (20.0)	187 (62.3)	47(15.7)	6(2.0)
I will like to teach my course mates on how to use various software.	108 (36.0)	103 (34.3)	63(21.0)	26(8.7)
ICT has made me get instant message on current issues on my field of study via my computer /smart phone.	114(38.0)	111 (37.0)	53(17.7)	22(7.3)
With my knowledge of ICT sourcing for information is no longer as difficult as before.	76(25.3)	150 (50.0)	51(17.0)	23(7.7)

of the respondents have agreed that they are still learning from their information problem solving experience to improve their information literacy skills.

Research Question Three: How is ICT competence among undergraduate students obtained?

Table 4 reveals that 11% strongly agreed and 24.7% agreed that they got their training on how to use ICT through general courses like; GNS, GEDS, Vocational training computer courses, and departmental courses being taught on computer application and use, while 38.3% of the respondents disagreed and 26% strongly disagreed with the statement. Also, it was revealed that 37.7% strongly agreed and 29% agreed that they got their training from professional training courses on computer applications and use; e.g. New Horizon, Microsoft certifications etc., while, 25.7% disagreed and 7.7% strongly disagreed with the statement. It was also revealed that 25.3% of the respondents strongly agreed and 34.7% agreed that they were trained by their parents, colleagues, classmates, friends, and self-development. On the other hand, 35.7% strongly disagreed and 4.3% disagreed with the statement.

In conclusion, 11.7% strongly agreed and 16% agreed that they got their training by attending a diploma or certification course training in computer sciences, e.g. HND, Dip, ND1 and NDII, etc. while 42.7% of the respondents disagreed and 29.7% strongly disagreed with the statement.

Research Question Four: What is the effect of ICT usage on undergraduate students' academic performance?

Table 5 indicates that from the majority of the respondents (50%) in the two groups merged (SA+A) and (SD+D), the result reveals that the respondents in both schools have better grades when they apply or use ICT during class presentation, research and assignments. Their ability to use ICT has made them capable of assisting their course mates when they are faced with problems in using ICT. It has also revealed that ICT has enabled them to teach their course mates on how to use various software and that ICT has made them receive instant messages on current issues on their field of study via computers /smart phones. Finally, the knowledge of ICT has made easier the sourcing of information.

Research Question Five: What are the challenges that may cause ICT incompetence among undergraduate

Table 6. Showing the possible causes of ICT Incompetence among undergraduate students.

Challenges that may cause ICT incompetence	SA (%)	A(%)	D(%)	SD(%)
Fear of Addiction	86 (28.7)	87 (29.0)	74 (24.7)	33(17.7)
Poor/Inadequate information literacy and training programme in the university	113 (37.7)	147 (49.0)	31(10.3)	9(3.0)
Lack of finance to purchase ICT devices	93 (31.0)	105 (35.0)	79(26.3)	23(7.7)
Network authentication/ restriction from students	108 (36.0)	110 (36.7)	49(16.3)	33(11.0)
Lack of finance to subscribe or purchase Data for browsing	120 (40.0)	106 (35.3)	49(16.3)	25(8.3)
Slow Bandwidth of my Network Provider	146 (48.7)	113 (37.7)	22 (7.3)	19(6.3)
Epileptic electrical power supply	148 (49.3)	113 (37.7)	28(9.3)	11(3.7)

students?

Table 6 shows that majority (65%) of the respondents strongly agreed that network authentication/restriction from students, lack of power supply and slow bandwidth of network provider and poor/inadequate information literacy and training programme in the university are the major problems facing them in the use of ICT. While 30% of the respondents disagreed and strongly disagreed that lack of finance to purchase ICT devices can not cause ICT incompetence among university undergraduates.

DISCUSSION

The research also reveals that students are information literate in deciding where and how to source information for their research and assignments, have learned from information problem solving experience, have improved their information literacy skills and can limit search strategies by subject, language and date. The study depicts that 80% of the undergraduate students can use and operate their PC and smart phones and possess the ability to use word processing packages, e.g. Microsoft Word, Microsoft Excel and PowerPoint Presentation and Internet operation for their academic research. The plausible reason for this might be attributed to the fact that most of the students have smart phones and can use personal computer with internet connectivity which are readily accessible to them thereby facilitating high ICT-competency. This is also in line with the findings of ACARA (2010) and Eze and Nwangbo (2013) that ICT provides avenues for students to control how they learn, when they learn, and enhances instructional delivery through its dynamic, interactive, and engaging content; and it can provide real opportunities for individualized instruction.

The finding of the study also reveals that more than half of the respondents have reported that they did not get their training on how to use ICT through the general courses like; GNS, GEDS, Vocational training computer courses, and departmental courses on computer application and use which is in contrast with the findings of Ogunlana et al., (2013) that teaching ICT in the classroom can augment students' ICT-competence.

The study also shows that more than half of the respondents possessed ICT-literacy skill not due to the institutions' efforts, but rather through personal efforts, self-development, assistance from classmates and parents, and training. This is in agreement with the findings of Dorah et al., (2013) that students acquire ICT-literacy skills through their interactions with friends and peers around them. Notably, the major finding of this study was that though the students' level of ICT-competence and literacy skill were very high, the undergraduate students cannot use it skillfully in their study. The plausible reason for this might be traced to the fact that most students were using these ICT-tools extensively for social interaction and information sharing among themselves and it has limited their ability to be able to use it to enhance their study. This implies that undergraduate students are still faced with the challenge of not being able to source and select information for their academic research, are not skillfully literate and competent in the use of ICT. This corroborates Allan (2011)'s submission that without ICT competence and skills, students will not be able to perform well in their academic activities.

Conclusion

This paper investigates the Information and Communication Technology competence and literacy of undergraduate students in Babcock University and Tai Solarin University of Education and has reached the following conclusions:

(1) Regarding computer literacy of the students, undergraduates in TASUED and BU are competent in the use of ICT.
(2) The research also reveals that undergraduate students in Ogun State are ICT literate.
(3) 60% of the undergraduate students covered in this

study got their ICT-literacy skills from colleagues, classmates, friends, self-development and training from professional courses on computer applications, with less contribution from the university ICT courses.
(4) This study shows that students earn better grades when they apply or use ICT during class presentation, research and assignments, assist their course mate when they face problems in using ICT.
(5) Network authentication/restriction from students, lack of power supply and slow bandwidth of network provider and poor or inadequate information literacy and training programmes in the university are identified as the major problems facing them in the use of ICT.

IMPLICATIONS TO LEARNING

The use of ICT in a digitalized world is a vital tool for providing opportunities for students. It is not only to learn, but to define, locate, recognize, evaluate, and use acquired information knowledge to solve practical educational problems within and outside the four walls of the classroom. The use of ICT, particularly computer, stimulates a new atmosphere where students can utilize modern ICT resources for effective instructional learning in order to promote their academic achievement.

RECOMMENDATIONS

Some recommendations were made at the end of this study. These include:

ICT competence should be a major area of concern of students, parents, university administrators and should be regarded as a factor for the academic performance of the students.

The universities curriculum on the GNS, GEDs, Vocational Training in Computer and Departmental courses should be well structured to augment students' computer literacy skills. Problems such as poor electricity supply deterring ICT usage should be addressed to encourage the frequent use of ICT in the teaching and learning process. More so, the university administration should allow students use the internet facilities (Wi-Fi) and some websites can be filtered to reduce abuse and unnecessary wasting of internet data by students. Information literacy should be included in their curriculum to give better understanding on how to really use the available skills acquired in ICT to boost their academic achievement and performance.

CONFLICT OF INTERESTS

The authors have not declared any conflict of interests.

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