Analysis of ICT Competencies Among Distance Learning Students in selected Study Centres of the National Open University of Nigeria

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Abstract: This research evaluated the ICT competencies of distance learning students of the National Open University of Nigeria (NOUN), as a pre-requisite for their effectiveness in a computer-based learning environment. 186 students (66 males and 120 females) responded to the questionnaire — Learners' Competency in the use of ICT (LC in CT) — which was adopted from the UNESCO Competency Standard (2008). Results showed that distance learning students of the National Open University of Nigeria revealed competencies in the use of ICT to deepen knowledge. However, only a few can use technology and ICT to create knowledge. This is despite many of the students showing a high level of literacy in computers and technology. Further, the results showed that students' qualification influences their competency in ICT, but their gender never affects ICT competency. The research recommends the strengthening of the General Studies (GST) course in computers and technology.

Keywords: competency, Information and Communication Technology, Distance Learning, gender effect.

Introduction

Most operations in the National Open University of Nigeria (NOUN), i.e., application for admission, course registration, course management, e-examinations, checking results, payment of fees, etc., are technology (ICT) driven. This presupposes that NOUN students can apply technology for learning. They need to develop digital skills which are important for them to live, work and contribute to communities. Among others, such digital skills will include creativity, innovation, communication, collaboration, interactivity, information fluency, decision making, critical thinking, problem solving, digital citizenship and technology operations. Several efforts to provide an enabling digital environment to help students and lecturers in the Nigerian tertiary education sector have been recorded. For example, in a country report based on the Main Survey of ICT and Education in Africa, Agyeman (2007) reports that the National Universities Commission (NUC), (the government agency responsible for registering and regulating universities), has prescribed Personal Computer (PC) ownership for universities as follows: one to every four students, one PC for every two lecturers below the grade of lecturer 1, one PC per senior lecturer and one notebook per professor/reader. While some universities, like the Nnamdi Azikiwe University, have achieved a better ratio for their faculty, the same cannot be said for the student ratio (Agyeman, 2007).

NOUN, which was reactivated in 2002, has created 78 study centres across the length and breadth of the country, in states, local government headquarters, and communities. Each of these centres is

equipped with a computer laboratory/cyber café. The minimum requirement is 25 computers, but NOUN has so far surpassed this minimum in most of its study centres. However, NOUN is yet to connect the centre to NOUN's repository, reproduction, distribution and administrative headquarters (REPRODAhq) through a wide area network (WAN). When this is done, it will enable the mainstreaming of:

- Training and learning
- Assessment and testing
- Interactive sessions
- Synchronous communications (E-mail, chats, forums), and
- Access to the virtual library.

In the meantime, NOUN uses the WAN to deliver distance learning activities to all the study centres, including its online application, admission, registration, and examination procedures, learning management system (e-learning) communication and delivery of human resources. NOUN currently employs the blended mode in which appointed facilitators engage the student groups in face-to-face (f2f) facilitation after online application, admission and registration. There are now established Directorates that deal specifically with issues that border solely on ICT application in NOUN. These include the MIS (Management Information System), ICT (Information and Communication Technology) and the LCMS (Learning Content Management System). All these ICT-based activities in the National Open University of Nigeria presuppose that for students to acquire learning and character, deserving of graduation, they must acquire ICT competencies to help them navigate the ICT-driven environment of NOUN.

The problem in this study, therefore, was to find out the different competencies necessary for students of NOUN and to ascertain if students had such competencies to operate in such an environment heavily dependent on ICT.

Competency refers to the ability resulting from an individual's knowledge, skills, characteristics and attitudes to carry out work to achieve success (Kopaiboon, Reungtrakul & Wongwanich, 2014). Competency is made up of knowledge, skills, and attitudes. Knowledge connotes what a student has learned in class or in a workshop as an apprentice. This learning is subject to experience and understanding of a particular subject. Skill means to derive from knowledge the ability to perform work, in an appropriate and accurate manner, meeting a pre-determined standard. Attitude, on the other hand, refers to stance, feeling, or internal characteristics of individuals that express a sense of realizing the benefit and value of a particular thing.

According to UNESCO (2008), ICT Competency refers to knowledge, skills, and ability to take advantage of ICT for the purpose of gathering, processing and presenting information in support of activities among different groups of peoples for working purposes. NICS (2010) and Albirini (2006) also see ICT competence as knowledge, skills and ability to take advantage of ICT for gathering, processing and presenting the information. The European Commission in 2004, added communication and relaxation as part of the application of ICT knowledge, skills and ability. Kopaiboon et al (2014), also stated that individuals who are regarded as ICT competent or having ICT Competency must be able to:

- Reproduce necessary documents

- Find out solutions to problems
- Choose proper ICT tools for problem-solving and effective work
- Collect and share information in an ethical way
- Process data, and
- Possess fundamental ICT knowledge as well as use ICT tools.

To measure competency, it is imperative to have a set standard. ICT Competencies also have set standards called the ICT Competency standard. The main categories for teachers are listed by Fong, Ch'ng and Por (2013) as:

- European Computer Driving Licence (ECDL)
- EUROPEAN Pedagogical ICT Licence (EPICT)
- Computer Proficiency for Teachers (CPT) developed by the Ministerial Advisory Council on Quality of Teaching (MACOT)
- Minimum Standard for Teachers-learning Technology (MSTLT)
- Queensland ICT Continua
- International Society for Technology in Education (ISTE)
- National Educational Technology Standards for Teachers (ISTE-NETS-T), and
- UNESCO ICT Competency for Teachers.

In summary, ICT Competency is composed of three major dimensions: knowledge, skill and attitude (Belgium, 2005; UNESCO, 2008). Knowledge refers to the experiences that users have in terms of ICT and the value that users realise with regards to ICT on a daily basis. It also involves the understanding of technology and the benefits of using technology in day-to-day life.

According to Kopaiboon et al (2014), skill means the ability to capitalise on ICT knowledge and skills to perform work in the form of:

1. Information access and processing
2. Information evaluation
3. Information production
4. Information management
5. Information communication
6. The use of the Internet network.

Attitude refers to the understanding of the benefits and consequences of the use of ICT and the understanding of the use ICT in developing societies as well as the realization of the value and responsibility for communication and other purposes (Belgium, 2005). This can also involve critically evaluative skills that lead to social and ethical competencies. Belgium (2005) also states that social and ethical competencies can enhance attitudes to such an extent that it encompasses honesty and responsibility for the use of novel technology.

This study also adopts the National ICT Competency Standard Framework (NICS) for teachers. The NICS defines the competency outcomes and the supporting knowledge and skills that are needed to

utilise ICT in performing the job roles related to teaching (UNESCO, 2008). It provides the performance indicators to evaluate the level of knowledge and competence of teachers to apply ICT in the educational setting. This is very important in today's learning environment, where ICT dominates as "king" and is viewed as a change agent for education.

The NICS structure is a wealth of information presented in a very compact form, comprising the following elements:

- The standard title
- The standard descriptor
- The statements which are described in outcome terms, and
- The indicators that measure the level of competence.

The NICS framework also includes different domains, which are listed as:

- Domain A: Technology Operations and Concept Competency Descriptors
- Domain B: Social and Ethical Competency Descriptors
- Domain C: Professional Competency Descriptor.

Literature is replete with empirical research, which has investigated students' or teachers' ICT Competencies, a few of which are cited here. Every University (NOUN inclusive), focuses on developing a set of competencies which their students must acquire for them to be worthy in learning and character to be admitted into their degrees. These competencies (Aypay, 2010) are described as generic and specific competencies. ICT Competencies are within the preferred generic competencies that apply in most of the university educational programmes on the international level. UNESCO, using its various international educational programmes like Millennium Development Objectives, Education for All, United Nations Literacy Decade, and a Decade of Education for Sustainable Development has identified ICT competencies which are universal. In line with the foregoing discussion, Fuents (2007) noted competency is a set of knowledge, skills, attitudes, and values that are needed to perform an occupation or a productive role effectively. Yáñez-Galecio (2005) opined that competency could be seen as an attribute of a person: specifically, it could be related to his/her success in the performance of work, meaning that if he/she fails, it can be interpreted to mean low or no competency. ICT competencies are being taken into consideration in the educational standards that various countries have developed in the form of profiles such as NETS (National Educational Technology Standards) of ISTE (NETS, 2007) for students in the United States of America, the official certificate in computing and the Internet (B2i) in France, and the incorporation of ICTs in the National Curriculum in England (Aypay, 2010). Nigeria also formulated a National ICT Policy Development Agency (NITDA) in 2001 (FGN, 2012).

Among the well-documented applications of computers in education are the ICT competencies of public-school teachers. According to Caluza, Verecio, Function, Quisumbing, Gotardo, Lauente, Cinco and Marmite, (2017), one force generating attention to ICT in education is the growing need for life-long learning, driven by the rationale of the rapid rise in the amount of information and the need for more frequent career changes. Caluza et al (2017) also reasoned that ICT could help implement life-long learning by such activities as "on-demand" learning and project-based learning. In the 21st Century, universities are pressured to add ICT to the skills and knowledge that students need to work

and live with (Buabeng-Abbah, 2012). A lot of other factors, apart from the demand of the century, may also influence teachers' and students' decisions to use ICT in the classroom, and these may include:

- Access to resources
- Quantity of software and hardware
- Ease of use
- Incentives to change
- Support and collegiality in the school
- School and national policies
- Commitment to professional learning, and
- Background to formal computer training (Mumtaz, 2000).

Buabeng-Abbah (2012) also notes that the rise of technologies has complicated its adoption and integration in the classroom by teachers. Demetriadis et al (2003) also studied teachers' attitude towards the innovation of ICT in the curriculum. They concluded that consistent support and extensive training are necessary for teachers' integration of ICT in their teaching methodologies.

Studies on students use of ICT and their cognitive gains and achievements are commonplace, and mostly in the conventional system. The present study looks at the ICT competencies needed by distance learning students to enable them to operate successfully in their particular ICT environment.

Methodology

The research is essentially an evaluative study in which the researchers tried to survey the ICT competencies of distance learning students of the National Open University of Nigeria. The learners' competency in the use of ICT (LC in ICT) was the instrument used to gather data from one hundred and eighty-six (186) students in study centres in Abuja-Nigeria. The instrument, which is derived from the UNESCO ICT Competency Standard, is a Likert-type Questionnaire with a 4-point rating. It is divided into four sections, labelled A-D. Section A captures the demographic characteristics of the respondents, while sections B, C and D deal with ICT Competency Standards (UNESCO, 2008), with ratings ranging from Strongly Agree to Strongly Disagree.

The instrument was piloted with 50 students who were not among the participants of the formal study and a split-half reliability coefficient of international consistency of 0.67 was obtained. To that extent, the instrument is considered reliable. Being a UNESCO Standard derivative, the instrument is considered content valid.

Two hundred and fifty copies of the instrument were distributed in study centres in Abuja City. Of these, 186 copies were retrieved and constituted the sample for the study. This sample is made up of 77 MSc and MEd students, 15 PGD students and 94 B.A. and B.Sc. students in different degree programmes.

Research Questions

The following questions guided the study:

1. What is the technology literacy level of distance learning students of the National Open University of Nigeria?
2. Are distance learning students of the NOUN competent in using ICT to deepen knowledge?
3. What is the ICT knowledge creation competency level of distance learning students of the NOUN?
4. Does qualification affect the ICT competency level of distance learning students of the NOUN?
5. Does gender have any influence on the ICT competency level of distance learning students of the NOUN?

Two hypotheses were formulated to guide the resolution of Questions 4 and 5:

HO_1: There is no significant influence of qualification on the level of ICT competence of distance learning students in NOUN.

HO_2: There is no significant gender influence on the ICT competency level of distance learning students of the NOUN.

Results

The results of the analysis of data are presented in the tables below.

Table 1: Frequency Distribution (Gender) of Participants

Valid	Frequency	Percent	Valid %	Cumulative Percent
1 Male	66	35.5	35.5	35.5
2 Female	120	64.5	64.5	100.0
Total	186	100.0	100.0	

Table 1 shows the number of participants by gender. Total male = 66, representing 35.5%. Total female = 120, representing 64.5%. Total participants = 186.

Table 2: Frequency Distribution (Qualifications) of Participants

Valid	Frequency	Percent	Valid %	Cumulative Percent
3 Degree	92	48.9	48.9	48.9
4 No Degree	94	50.1	50.1	100.0
Total	186	100.0	100.0	

Table 2 shows the distribution of participants with degrees. Number of participants with degree = 92 (48.9%) and those without degrees = 94 (51.1%)

Question 1: What is the technology literacy level of distance learning students of the National Open University of Nigeria?

The mean and standard deviation of students' responses to Learners' Proficiency in ICT (Technology Literacy) was used to determine students' level of Technology Literacy. The results are presented in Table 3.

Table 3: Learners Technology Literacy Level in NOUN

S/N	Item	Mean ($\bar{x}$)	Standard Deviation
1	I can create documents of various types.	3.13*	.74
2	I can save documents in the desired location.	3.30*	.78
3	I can retrieve existing documents from the saved location.	3.28*	.73
4	I can access my online portal and check information on academic activities.	3.58*	.63
5	I can access and complete my TMAs by myself.	3.68*	.60
6	I usually print course materials that are not available by myself.	3.57*	.73
7	I can use word processors like MS Word, etc.	3.24*	.95
8	My e-examination does not pose a serious problem for me.	3.26*	.90
9	I can use PDF reader.	3.31*	.87
10	I can use ICT to present data.	2.91	.96
11	I can use ICT for professional development.	3.34*	.91

A decision mean of 3.00 is used to determine literacy in technology; Table 3 shows that most NOUN students are technology literate (*).

Question 2: Are distance learning students of the NOUN competent in using ICT to deepen knowledge?

Table 4 summarises students' responses on knowledge deepening. The mean and the standard deviation are used in the analysis.

Table 4: Mean (x̄) and Standard Deviations of Analysis of Students' Application of ICT in Knowledge Deepening

S/N	Item	Mean (x̄)	Standard Deviation
1	I use ICT to teach fellow students.	2.72	1.12
2	I can use ICT to help other students evaluate their progress.	2.76	1.10
3	I can use ICT to evaluate my academic progress.	3.00*	1.11
4	I can use ICT to undertake independent learning.	3.00*	1.16
5	I can use ICT to keep track of my academic activities.	3.10*	1.14
6	I can use ICT to search for information.	3.28*	1.03
7	I can use ICT to process data.	3.03*	1.14
8	I can use ICT to present data.	2.93	1.22
9	I can use ICT for my professional development.	3.03*	1.15

Table 4 shows that many students use ICT to deepen knowledge and other academic activities.

Question 3: What are the ICT knowledge creation competency levels of NOUN and standard deviation of students' responses on using ICT to create knowledge?

Table 5: Mean (x̄) and Standard Deviation of Analysis of Students' Ability to use ICT to Create Knowledge at NOUN

S/N	Item	Mean (x̄)	Standard Deviation
1	I can use ICT for blended learning.	2.73	1.13
2	I use ICT for teamwork with fellow students.	2.94	1.04
3	I use ICT to co-operate with fellow students.	2.93	1.12
4	I can explore diverse learning styles with ICT.	2.91	1.11
5	I can use ICT to develop skills.	3.02*	1.10
6	I can use ICT to visit websites safely.	3.11*	1.08
7	I can teach my fellow students with ICT.	2.86	1.14
8	I can create learning groups with ICT.	2.78	1.13
9	I can use ICT to socialise with fellow students.	3.06*	1.15

The results (Table 5) show that only a few students believe they can use ICT to create knowledge.

HO₁: There is no significant influence of qualification on the level of ICT competence of distance learning students of the National Open University of Nigeria (NOUN). For this hypothesis, regression analysis was used in testing this hypothesis and the results are presented in the following tables.

Table 6: Model Summary

Model	R	R-square	Adjusted R-square	t	Std. Error of Est.
1	.031[a]	.001	-.004	8.576	21.65699

Predictors (qualifications, degree and non-degree [constants]).

Table 7: ANOVA[a] for Regression

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	80.541	1	80.541	.172	.679[b]
Residual	86300.604	184	469.02		
Total	86381.145	185			

a) Dependent variable: ICT competency
b) Predictor (constant): qualification, degree, non-degree.

Results show that qualification affects ICT competency.

HO$_1$: Not retained. (F. 172 < and at 0.5 = .679).

HO$_2$: There is no significant gender influence on the ICT competency level of distance learning students of NOUN. Regression analysis for this hypothesis is presented in Tables 7 and 8.

Table 8: Model Summary

Model	R	R-square	Adj. R-Square	t	Std. Error of Est.
1	.136	.019	.013	17.732	21.46441

Predictors (constant) gender 1 = male; 2 = female)

Table 9: ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
1 Regression	1608.523	1	1008.523	3.491	0.063
Residual	84772.622	188	460.721		
Total	86381.145	185			

a) Dependent variable: ICT competence
b) Predictors (constant) gender.

With F (3.491 and P of .013 at .05 level, Hypothesis 2 is retained, i.e., gender had no influence on NOUN students' ICT competence.

Discussion of Results

Results from the analysis of data collected from distance learning students of the National Open University of Nigeria show that:

1. Most NOUN distance learning students were technology literate.

2. A majority of the distance learning students can use ICT to deepen knowledge including search information, process data and for professional development — scoring means above 3.0.

3. Only a very few believe they can use technology and ICT to create knowledge.

The results posted above re-emphasise generating attention on ICT in education, and the growing need for life-long learning, which is driven by the rationale of the rapid rise in the amount of information and the need for more frequent career changes. It is thus apt to align with Caluza et al (2017), who reasoned that ICT can help implement life-long learning by such activities as 'on-demand' learning and 'project-based' learning. Most activities in the National Open University are technology-driven. This places responsibility on the students to embrace the use of ICT skills to succeed in the pursuit of their programme at the university. As noted previously, globally, universities are under pressure to add ICT to the skills and knowledge that students need to work and live with (Buabeng-Abbah, 2012). Consistent support and extensive training are necessary for students so that they will master the use of ICT to create knowledge and for their integration of ICT in their after-school life. Demetraidis et al (2003) also held this view in studying teachers' attitude towards ICT innovation in the curriculum.

The result of Hypothesis 1 (HO$_1$) indicated that the influence of students' qualification on distance learning students' ICT competency is significant [(F(.172) < and 0.05 = 0.679)]. This led to HO$_1$ not being retained. It can be argued that this result may reflect the background academic profile of the students studied, some of whom may be familiar with various programmes at the National Open University of Nigeria. Further research is recommended to evaluate the effect of student's qualifications on their ICT competency. The present study was limited to the analysis of degree holders and non-degree holding students. Some of the students investigated may be ICT students.

The results also show that gender had no significant influence on students' ICT competency. Hypothesis 2, (HO$_2$) was retained. The resolution of Hypothesis 2 is in tandem with the findings of Tondeur, van de Velde, Vermeersch & van Houtte (2016) who found no gender differences in the ICT profile of university students. In a related study, Tondeur et al (2016) argued that computer attitudes are context-dependent constructs and that, when dealing with differences, it is essential to take into account the context-specific nature of computer attitudes and uses. The authors of this research agree no less. Similarly, Azeta & van der Merwe (2018), in a study on gender differences and technology usage among postgraduate students in a Christian University, concluded that there is no specific gender relationship in technology usage.

Conclusions/Recommendation

Based on the findings, it is concluded that:

1.   Distance learning students of the National Open University of Nigeria:

     a) showed competency in their level of technology literacy
     b) showed competence in using technology to deepen knowledge, and
     c) needed additional help on how to use ICT to create knowledge.

2.   The qualifications of distance learning students had a significant influence on their competency in the use of technology and ICT.

3.   The students' gender did not affect their competency in the application of technology and ICT in their learning community. The study, therefore, recommends further research on age relationship in technology usage among students.

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