

**The Place of Information and Communication Technology in Students' Cognitive Assessment
in Imo State Tertiary Institutions**

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ABSTRACT

The study is aimed at ascertaining awareness of the role of ICT in students' cognitive assessment and the extent of its application by lecturers in Imo State tertiary institutions. 30 lecturers from each of the five tertiary institutions were randomly selected for the study giving a total of 150 participants. Four research questions and three hypotheses were formulated to guide the study. The research design was an inferential survey using check-list for data collection. Proportion was used to answer the research questions while binominal test statistics was used to test the hypotheses. Results showed among others that lecturers are aware that ICT can play a major role in student's cognitive assessment but the application of ICT for this purpose is still low indicating minimal use of ICT for student's cognitive assessment. The paper concludes that the need for effective integration of ICT in assessment of students cannot be swept under the carpet.

Key Words: *ICT; Students' cognitive assessment; Tertiary institutions: Imo State.*

1. INTRODUCTION

The field of education has been very much affected by penetrating influence of information and communication technology (Egomo, et al. 2012). Since information and communication technology (ICT) has become a veritable tool for teaching and learning in educational institutions especially tertiary institutions the world over, there is the need for its integration in cognitive assessment of students' learning outcomes. The national policy on education recognised its role in the classroom that it was stated as a tool for teaching and learning (FGN, 2004). Despite this, the World Bank (2002) reports that low level ICT utilization is what is obtainable in most institutions making it an imperative to increase its impact in teaching and learning situations.

Cognitive assessment is the process of systematically gathering test scores and related data in order to make judgments about an individual's ability to perform various mental activities involved in the processing, acquisition, retention, conceptualisation, and organisation of sensory, perceptual, verbal, spatial, and psychomotor information (Mondofacto, 2006). In the classroom situation, Cognitive assessment is the measurement of capacity in teaching and learning. There are three tools generally used in assessing student's cognitive domain and these include:

- a) General intelligence test: a test given to determine the individual's general intellectual level at any given time. It measures the intelligent quotient (IQ) of an individual.
- b) Aptitude test/mental ability test: a test designed to measure or assesses student's potential or capability to succeed in a training programme leading to a specific profession. It predicts a child's future performance in some certain skill.
- c) Achievement test: a test designed to determine how much pupils have learnt from what skills they have been exposed to in a system.

On the other hand, information and communication technology is defined as a technological tool used to communicate, and to create, disseminate, store and manage information. Darntom and Giacolette (1992) defined ICT as the systematic study of artefacts that can be used to give form or description to facts in order to provide meaning or support for decision making, and artefact that can be used for the organization, processing, communication and application of information. Similarly, Sansanwal (2000) defined ICT as the use of hardware and software for efficient management of information, i.e. storage, retrieval, processing, communication, diffusion and sharing of information for social, economic and cultural upliftment. In the words of Ogunsola (2005) ICT is an electronic

based system of information transmission, reception, processing and retrieval, which has drastically changed our way of thinking, living and even the environment in which we live. ICT includes such technological tools as computers, internet, broadcasting technologies (radio and television) and telephone.

There is a rapid increase to the awareness of ICT in education settings in the 21st century. In recent years, there has been a groundswell of interest on how ICT can be used in the educational settings (Elmaifi, 2014) especially for assessing student's cognitive domain in higher institutions. The tremendous impact which ICT has made in other sectors of human endeavour cannot be compared with the little it has made in education so far (Oliver, 2002). The introduction of information technology in education, government and commerce has led to the development of websites. Thus governments, co-operate organizations, educational institutions, individuals etc. started uploading their information on websites in the World Wide Web (www). This has resulted in the provision of facilities for chat, e-mail, surfing, etc. It opens up a new source of information which increases accessibility to information.

Prior to the coming of ICT into education, educators were using only the print materials for searching information during assessment which limited research. This limitation has been overcome by the introduction of ICT, but the use of ICT for assessment process is still in its infancy in developing countries like Nigeria. Cachia et al. (2010) maintain that assessment procedures in traditional educational setting laid emphasis on examining knowledge and facts through formal testing. For curricula and objective changes to be effective, there is need for changes in the assessment practices (Cachia et al. 2010). The researchers strongly believe that the use of ICT has not fully been implemented for teaching and learning and especially for assessment purpose and that is why some difficulties still exist in sourcing, presenting and storing information concerning assessment. For this reason, the study seeks to survey the place of ICT in student's cognitive assessment in Imo state tertiary institutions and to find out the extent of use of ICT for this purpose.

Specifically, the research sought to find out: the role of ICT in assessing student's cognitive domain; the extent of application of ICT in test items preparation for student cognitive assessment in Imo State tertiary institutions; the extent of application of ICT in test administrations for students' cognitive assessments in Imo State tertiary institutions and the extent of application of ICT in marking and reporting of students' cognitive assessment in Imo State tertiary institutions. Accordingly, questions like: What is the place of ICT in students' cognitive assessment in Imo State tertiary institutions? What proportion of lecturers in Imo State tertiary institutions apply ICT in their test items preparation for students' cognitive assessment? What proportion of lecturers in Imo state tertiary institutions applies ICT in their test administrations for students' cognitive assessment? What proportion of Imo State tertiary institution lecturers apply ICT in marking and reporting of students' cognitive assessment? were raised.

Sequel to the above, the following hypotheses were postulated to direct the study:

- There is no significant difference between the proportion of lecturers in Imo state tertiary institutions that apply ICT in test items preparation and those who do not, ($p < 0.05$).
- There is no significant difference between the proportion of lecturers in Imo state tertiary institutions who apply ICT in test administration for student's cognitive assessment and those who do not, ($p < 0.05$).

- There is no significant difference between the proportion of lecturers in Imo state tertiary institutions who apply ICT in marking and reporting of student's cognitive assessment and those who do not, ($p < 0.05$).

2. REVIEW OF RELATED LITERATURE

A lot of work has been written on ICT and education but few have drawn the attention of teachers and lecturers on ICT and cognitive assessment of students. According to Tinio (2010) ICT are most commonly associated with higher education and corporate training, E-learning could be applied to learning at all levels, both formal and non-formal, that uses an information network-the internet, an intranet or extranet whether wholly or in part, for course delivery, interaction and/or facilitation. Some prefer to use the term online learning while others term it E-learning. Whatever the terminology, there is growing evidence that ICT application to the core business of education can accelerate or improve learning on a number of fronts, from basic skills BECTA (2000), problem solving (Oliver and Omari 1999) information management (Dellit 2000), work habits, motivation and concept developments. (Allen 2000; Combs 2000; Sherry 2001), in addition, information and communication technologies are being applied to the management of learning and to the business models of educational delivery. According to CEO forum (2001) ICT links assessment and accountability with access, analysis and most importantly alignment.

Sansanwal (2009) in his work, the use of ICT in teaching-learning and evaluation is of the opinion that IT was limited only to the textual mode of transmission of information with ease and fast but the information not only in textual form but in audio, video or any other media is also to be transmitted to the users. Thus the ICT = IT + other media has opened new avenues like, online learning, e-learning, virtual universities, e-coaching, e-education, etc. Handset which is part of ICT is used in impacting information fast and cost effective, it provides e-mail facilities and one can access it anywhere. The ICT brings more rich material in the classrooms and libraries for the teachers and students. It has provided opportunity for learner to use maximum information senses to get the information. It has broken the monotony and provided variety in teaching-learning situation. The ICT brings latest information which can be used in

- Teaching
- Learning
- cognitive assessment
- Affective assessment
- psychomotor assessment.

In terms of ICT playing a central role in cognitive assessment, Gipps, (2005) states that use of ICT to record student responses, to capture material produced and to convey feedback will grow as the use of virtual learning environments grows. Assessment is the key to any meaningful improvement in learning process and goals as learning process and goals can only change if there is a change in assessment (Redecker & Johannessen, 2013).

3. MATERIALS AND METHODS

The study is designed to be an inferential survey. This is the case since beyond the description of observations made; generalizations of the observations to the population are made through the testing of hypotheses. The population comprised of all universities, colleges of education and polytechnics in Imo state. In all, there are five such tertiary institutions in Imo state. These are:

- a) Imo State University Owerri
- b) Alvan Ikoku Federal College of Education, Owerri
- c) Federal University of Technology, (FUTO) Owerri

- d) Federal Polytechnic Nekede
- e) Imo State Polytechnic, Umuagwo.

Included in the population are all the lecturers in the five tertiary institutions in the state. A sample of 150 participants was purposively taken from the population. 30 lecturers each was selected from the participating institutions. The instrument for data collection was a check-list made up of 12 items concerning the application of ICT by lecturers in cognitive assessment of their students. The items were developed by the researchers. The check-list has the statement column and the response column. The respondent (lecturer) is expected to tick good (✓) for the statement he/she feels appropriate.

The check-list was given to experts in education, especially to professors in measurement and evaluation and ICT experts for face and content validation. The reliability of the instrument was ensured by carrying a trial testing using 30 lecturers, from a higher institution in Abia state. The results were analysed to determine the raters reliability using Kendal's coefficient of concordance (W) and the reliability was 0.85. Frequency table was used to present the extent of application of ICT by lecturers; proportion was used to answer the research questions while binominal test (of significance of proportion) was used to test the hypotheses. The IBM Statistical Package for Social Sciences (SPSS) software version 22 was used to analyse the data.

4. RESULTS AND DISCUSSION

4.1 Results

Research Question 1: What is the place of ICT in students' cognitive assessment in Imo State tertiary institutions?

On the place of ICT in students' cognitive assessment in Imo State tertiary institutions, the result is as shown in table 1.

From the result displayed in table 1, it is clear that the lecturers in the tertiary institutions in Imo state are highly aware of the place of ICT in cognitive assessment of students. All the areas of cognitive assessment received responses of not below 64% which is an indication of the level of awareness. The broad areas of students' cognitive assessment where ICT is applicable are in preparing test items, which encompasses: sourcing for information, typing the test items, storing the test items, printing out the test items and photocopying the test items; administration of test items which includes: students getting access to the questions, students responding to questions and submission of response items/answers; marking and reporting of test result, which embraces: marking of multiple choice items, recording of marks and publishing of results.

Research Question 2: What proportion of lecturers in Imo State tertiary institutions apply ICT in their test items preparation for student's cognitive assessment?

To find out the proportion of lecturers in Imo State tertiary institutions that apply ICT in their test items preparation for student's cognitive assessment, the responses are arranged in frequency table as shown in table 2. Data presented in table 2 shows that majority of lecturers (0.71) in Imo State tertiary institutions apply ICT tools in their test items preparation.

On the other hand only (0.29) of lecturers in the institutions do not apply ICT in their test item preparation. The areas of test item preparation where the lecturers apply ICT are in sourcing information, typing, storing, printing and photocopying of test items. Each of these areas received responses that indicate application not below (0.62) as indicated in the table.

Ho₁: There is no significant difference between the proportion of lecturers in Imo state tertiary institutions that apply ICT in test items preparation and those who do not, ($p < 0.05$).

In a sample of 150 lecturers taken from tertiary institutions in Imo state, 107 lecturers representing 71% (0.71) of the respondents apply ICT in the preparation of cognitive assessment test items. The observed proportion (0.71) is higher than the test proportion of (0.5) as shown in table 3. The binominal test of proportion of lectures who apply ICT in test items preparation is significant ($N=150$, $p = .000$). In other words the proportion of lecturers that apply ICT in test preparation significantly differs from (0.5). Based on this result, H_{01} is therefore rejected. The researchers therefore conclude that the proportion of lecturers in Imo state tertiary institutions that apply ICT in test preparation is significantly greater than (0.5).

Research Question 3: What proportion of lecturers in Imo state tertiary institutions applies ICT in their test administration for student's cognitive assessment?

To find out the proportion of lecturers in Imo State tertiary institutions that apply ICT in their test administration, for student's cognitive assessment, the responses are arranged in frequency table as shown in table 4. Data presented in table 4 shows that only (0.02) of the respondents used in this study apply ICT in test administration for students' cognitive assessment. A greater proportion (0.98) of the respondents does not apply ICT in test administration for students' cognitive assessment.

H_{02} : There is no significant difference between the proportion of lecturers in Imo state tertiary institutions who apply ICT in test administration for student's cognitive assessment and those who do not, ($p < 0.05$).

To test the above hypothesis, a binominal test of significance of proportion was employed. Table 5 shows the result of the test.

In a sample of 150 lecturers taken from tertiary institutions in Imo state, 147 lecturers representing 98% (0.98) of the respondents do not apply ICT in cognitive test administration. The observed proportion (0.98) is higher than the test proportion of (0.5). The binominal test of proportion of lectures who apply ICT in cognitive assessment test administration is significant ($N=150$, $p = .000$). In other words the proportion of lecturers that apply ICT in cognitive assessment test administration significantly differs from (0.5). Based on this result, H_{01} is therefore rejected. The researchers therefore conclude that the proportion of lecturers in Imo state tertiary institutions that apply ICT in cognitive assessment test administration is significantly less than (0.5).

Research Question 4: What proportion of Imo state tertiary institution lecturers apply ICT in marking and reporting of student's cognitive assessment?

To answer this research question, the responses are arranged in a frequency table and the percentages of response and proportions computed. Data displayed in table 6 shows that the proportion averages (0.21). A larger proportion of the lecturers (0.79) do not apply ICT in test marking and reporting.

H_{03} : There is no significant difference between the proportion of lecturers in Imo state tertiary institutions who apply ICT in marking and reporting of student's cognitive assessment and those who do not, ($p < 0.05$).

In a sample of 150 lecturers taken from tertiary institutions in Imo state, 118 lecturers representing 79% (0.79) of the respondents do not apply ICT in cognitive test administration. The observed proportion (0.79) is higher than the test proportion of (0.5). Table 7 shows that the binominal test of proportion of lectures who apply ICT in cognitive assessment test marking and reporting is significant ($N= 150$, $p = .000$). This implies that the proportion of lecturers that apply ICT in cognitive test marking and reporting significantly differs from (0.5). Based on this result, the H_{03} is therefore rejected. The researchers therefore conclude that the proportion of lecturers in Imo state tertiary institutions that apply ICT in cognitive test marking and reporting is significantly less than (0.5).

4.2 Summary of Findings

- i. Lecturers are highly aware of the roles ICT plays in student's cognitive assessment but the application of ICT for this purpose is still in its infancy stage as Imo state institution lecturers have not fully adopted the use of ICT in student's cognitive assessment.
- ii. Majority of lecturers (0.71) in Imo state tertiary institutions apply ICT in their test preparation.
- iii. Majority of lecturers (0.98) in Imo state tertiary institutions do not apply ICT in their test administration.
- iv. Majority of lecturers (0.79) in Imo state tertiary institutions do not apply ICT in marking and reporting of student's cognitive assessment.

4.3 Discussion

There is growing evidence that ICT application to student's cognitive assessment can accelerate and improve evaluation on a number of fronts (cost effective, saves time and more accurate). It can also provide the means of gathering; connecting and analysing data about teaching and learning in ways that enable the lecturers diagnose more accurately student's need and assess performances. One can apply ICT in all aspects of student's cognitive assessment (test items preparation, test administration, test marking and reporting, etc.) but the application of ICT has not gone into full use in Imo state tertiary institutions by their lecturers. The use of ICT in Imo state tertiary institutions is still in its infancy as Imo is a state in a developing country which according to Tinio (2012), lags behind developed world in ICT adoption.

A very large proportion of the lecturers only make use of ICT in their test preparation (gathering information, typing out the test items, printing and photocopying). This is a confirmation of the report that integration of ICT in the instructional process of most tertiary institutions in developing nations is at the level of word processing (. The reverse is the case in using ICT for test administration, marking and reporting. This could be attributed to many constraining factors such as limited infrastructure (Egomo, et al. 2012), lack of requisite ICT skills and competencies (Goshit, 2006), high cost of ICT gadgets (Adomi, 2006), etc. The few lecturers that apply ICT for test administration, marking and reporting in the institution are lecturers in computer science and information technology (IT) departments.

The results of the findings indicate that lecturers in Imo state tertiary institutions still see print materials as the cheapest, most accessible and most dominant in student's cognitive assessment. There is the tendency for the use of ICT to record student responses, to capture material produced and to convey feedback to grow as the use of virtual learning environments grows as observed (Gipps, 2005). This will be possible if the ICT policy of 2001 is implemented as planned.

4.4 Recommendations

Based on the findings of this study, the researchers have made the following recommendations to ensure effective application of ICT in cognitive assessment of students in tertiary institutions in the state.

- 1) Institutions and government should create awareness by organizing training for lecturers to improve their ICT competencies especially on the use of ICT in student cognitive assessment.
- 2) Government should equip every department with computer with internet facilities.
- 3) The institution library should also be equipped with computer with internet facilities for students to browse with.
- 4) The institutions should introduce writing examinations using computers and emphasise practical use of computers in the ICT courses the students take.
- 5) Students should be encouraged to come to school with their own laptops for learning and private purposes.

4.5 Conclusion

The work has identified the role of ICT in student's cognitive assessment and the extent of application/use of ICT in student's cognitive assessment by lecturers in Imo state tertiary institutions. The roles so identified include preparation of test items, test administration and marking and reporting of test results. On the other hand, the extent of use of ICT by Imo state tertiary institution lecturers for student's cognitive assessment is basically limited to the preparation of test items. The lecturers have not gone as far as using ICT for other purposes which has the capacity to boost ICT skills and competencies of both lecturers and students.

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Table 1: Areas in students' cognitive assessment where the use of ICT is applicable and needed ICT tools

Areas	ICT tools	Yes Resp.	%	No Resp.	%
A) Test items preparation			95.28		
• Sourcing for information	Computer, Internet, Radio, Television,	139	92.6	11	7.4
• Typing the test items	Computer, Handset	145	96.4	5	3.3
• Storing the test items	Handset, Computer,	133	88.7	17	11.3
• Printing out the test items	Printers	150	100	0	0
• Photocopying the test items	Photocopiers.	148	98.7	2	1.3
B) Test administration			81.1		
• Students getting access to the questions	Internet, computer, Power-point presentations	131	87.3	19	12.7
• Students respond to questions	Internet, computer, Handset	123	82	27	18
• Submission of response items/answers	Internet, computer, Handset	111	74	39	26
C) Marking and reporting			83.3		
• Marking of multiple choice items	OMR machines	97	64.4	53	35.3
• Recording of marks	Computer,	137	91.3	13	8.7
• Publishing of results	Computer, Internet	141	94	9	6

Table 2: Frequency Distribution of respondents that apply ICT in test preparation

Sn	Test preparation variables	Total Respondents	No Apply	%	No do not apply	%
1	Sourcing for information	150	108	72	42	28
2	Typing of test items	150	116	77.3	34	22.7
3	Storing of test items	150	93	62	57	38
4	Printing of test items	150	115	76.7	35	23.3
5	Photocopying of test items	150	104	69.3	46	30.7
	Average	150	107	71.4	43	28.62

Table 3: Test of proportion of Lecturers that apply and those who do not apply ICT in test items preparation

		Category	N	Observed Prop.	Test Prop.	Exact Sig. (2-tailed)
Application of ICT in cognitive test Preparation	Group 1	Apply ICT	107	.71	.50	.000
	Group 2	Do not apply ICT	43	.29		
	Total			150	1.00	

Table 4: Frequency Distribution of respondents that apply ICT in test administration for Cognitive Assessment

Sn	Test administration variable	Total Respondents	Freq. Apply ICT	%	Freq. Do not apply ICT	%
1	Students gain access to test item	150	0	0	150	100
2	Students respond to test items	150	0	0	150	100
3	Students submit response	150	10	6.7	140	93.3
	Average	150	3	2	147	98

Table 5: Test of proportion of Lecturers that apply and those who do not apply ICT in cognitive test administration

		Category	N	Observed Prop.	Test Prop.	Exact Sig. (2-tailed)
Application of ICT in cognitive test administration	Group 1	Do not apply ICT	147	.98	.50	.000
	Group 2	Apply ICT	3	.02		
	Total			150	1.00	

Table 6: Frequency Distribution of respondents that apply ICT in cognitive test marking and reporting

Sn	Test Marking & Reporting variables	Total Respondents	Freq.	%	Freq.	%
1	Marking of multiple choice test items	150	0	0	150	100
2	Recording of test scores	150	53	35.3	97	64.7
3	Publishing of test results	150	43	28.7	107	71.3
	Average	150	32	21.3	118	78.7

Table 7: Test of proportion of Lecturers that apply and those who do not apply ICT in cognitive test marking and reporting

			Observed	Test	Exact Sig.
Category			N	Prop.	(2-tailed)
Application of ICT in cognitive test marking and Reporting	Group 1	Do not apply ICT	118	.79	.000
	Group 2	Apply ICT	32	.21	
	Total		150	1.00	