Assessment of Information and Communication Technology Competencies of Students in Teacher Education Department, Niger Delta University, Bayelsa State

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Abstract: The study assessed the Information and Communication Technology (ICT) competencies possessed by students of Teacher Education Department, Niger Delta University, Bayelsa State, Nigeria. It adopted a descriptive survey design. Six research questions guided the study. Two hundred (200; 82 males and 118 females) teacher education students formed the sample of the study; the sample comprised fifty (50) students from each level. A validated fifty-nine (59) items on a four point Likert scale questionnaire titled Students' Competencies on Information and Communication Technology (SCICT) was used for data collection. Cronbach Alpha was used to establish the reliability index of the instrument as 0.71. The data collected were analyzed with frequency, simple percentage and mean. It was found that respondents possessed competencies in basic computer knowledge, word processing and electronic communication and fair in spreadsheet, power point and multimedia applications. It was recommended, among others, that students in Teacher Education Department should be given sufficient training on how to use ICT in their academic studies.
Keywords: Assessment, Information and Communication Technology, Competencies, Teacher Education.

INTRODUCTION

The invention of mobile technology, the internet and computers, has currently provided a vast array of information gathering techniques and communication media.

Left at peoples' finger tips is a high plethora commonly referred to as Information and Communication Technology (ICT) [1]. The utilization of ICT can be described as nothing short of astonishing. Innovative websites such as Wikipedia, the free content encyclopedia and internet search engine akin to Google have flourished in recent years, enabling anyone with an internet connection to retrieve a wide array of information with relative ease for successful education [2, 3]. Considering the technological advancement that has taken place throughout the twentieth century, it is apparent that information and communication technology has had a substantial effect on today's society [4-6].

Among the people affected by ICT are young adults, especially undergraduate. There are number of studies [7-10,6] that indicated that students in tertiary institutions are one of the highest ICT users). ICT has profound impact on tertiary education and would continue to change as technology becomes more advanced, in a world of communication and media overload. The direct linkage between information and communication technology use and competencies students' possessed and academic achievement has been the focus of extensive literature during the last two decades. Competence in ICT has helped students with their learning by improving the communication between them and their instructors [11,12] note that exponential growth in digital information changes the way students perceive study and reading of printed materials to facilitate learning. Competencies in Information and Communication Technology are, particularly, important for undergraduate in areas which include time management, note taking, the elimination of distractions, assessing a high priority to study and internet skills.

[13]States that good competence in the information and communication technology help students in critical reflection skill outcomes such as selecting, analyzing, critiquing, and synthesizing [14]

states that the competence in information communication technology increases the learning tendency that enable students work privately. ICT competency could be summed up here to mean the knowledge, skill and ability to efficiently select and utilize all sorts of electronic devices; computers, internet, mobile equipment and software resources for the purpose of teaching and learning. It is the ability to manipulate the technology both in terms of hardware and applications [15]. ICT has a marked effect on schools at all levels, and in the teaching and learning across ages, hence the need for students to be competent and versatile in the use of ICT for the purpose of exposure and learning [16].

In pursuance of the Information and Communication Technology Competency Standard for Teachers (ICT-CST) designed by [17], the Government of Nigeria through the commission on Information and Communication Technology developed a national working document titled National Competency Standard for Teachers (NCST). The document classified the ICT competencies required of teachers (including the higher education students as potential teachers) into four major categories or domain subdivided into standards and each of the standards contains a body of knowledge and skills which a teacher is required to be productive and successful in the ICT-driven classroom.

Category 1 focuses on Technology Operation and Concepts. This category includes competencies related to the technical operations and concepts and productivity of various ICT tools like computers and communication devices as well as application available online and offline. The standards within category 1, according to [17], explain the knowledge requirement of every teacher. These are stated thus:

Standard I
Teachers should demonstrate knowledge and skills in basic computer operation and other information devices including basic trouble shooting and maintenance. Examples of competencies here includes the ability to define and identify the functions of the main components, organize and merge files, folders and directories, use storage devices, protect the computer from virus and use online and offline help facilities for trouble shooting, maintenance and update of application.

Standard II
Teachers should use appropriate and teaching productivity tools. Examples of required competencies here include the ability to use a word processor to enter and edit text and images, format text, control margin, layouts and table, print, store and receive text document from word processor, use spreadsheet to enter data, use presentation packages to add text, enhance slide presentation by adding sound images and animations, print presentation, handout, make effective class presentation using the slide and LCD projector, acquire images and other media from websites, CD, flash drive etc, play various media files, attach and configure images using optical media.

Standard III
Teachers should understand and effectively use the internet and network applications. Competency indicators in this category include the ability to connect to internet, configure and use web browsers and help application, send and receive mails with attachments, manage mails, effectively use synchronous and asynchronous web based communication tools, like instant messenger, voice and teleconferencing, connect and use shared printers, shared folders and other devices within a network, effectively use search engines, web directories and bookmarks and download and install relevant applications.

Standard IV
Teachers should demonstrate knowledge and skills in information and data management. Examples of competency indicators in this standard include the ability to effectively use search engines, directories to locate information sources, search and collect textual and non-textual information from online and offline sources, effectively store, organize, collect information, distribute, share, publish and print information via print or web, properly acknowledge information sources both online and offline.

Based on these categories and the standards within it, this study assessed the competencies of higher education students in the areas of basic knowledge of computer, word processing, spreadsheet application, power point application, multimedia and electronic communication skills in the Department of Teacher Education in Niger Delta University of Bayelsa State.

Statement of the Problem
Based on the review of related literature, it is obvious that students in higher education need to be competent in Information and Communication Technology (ICT) in Nigeria. These ICT skills are necessary and have become too important in the teaching and learning in higher education. Education students, as future teachers, need to be ICT competent in the areas of basic knowledge of computer, word processing, spreadsheet application, power point application, multimedia and electronic communication skills as shown in the Information and Communication Technology Competency Standard for Teachers (ICT-CST) designed by [17]. Relatively, no study has been conducted to assess the ICT competencies of students of the Department of Teacher Education, Faculty of Education, and Niger Delta University of Bayelsa State. To bridge this gap, gave birth to this study. This study

may reveal any deficiencies and direct remedial actions to alleviate students' competencies in ICT and, therefore, enhance students' academic performance.

Research Questions

The following six research questions were formulated to guide the study:

- To what extent do teacher education students possess the basic knowledge of computer?
- To what extent do teacher education students competent in word processing?
- To what extent do teacher education students competent in the use of spreadsheet application?
- To what extent do teacher education students competent in power point presentation application?
- To what extent do teacher education students competent in multimedia application?
- To what extent do teacher education students possess electronic communication competencies?

MATERIALS AND METHODS

The study adopted a descriptive survey design. It was conducted in the Department of Teacher Education, Faculty of Education, Niger Delta University, Wilberforce Island, Bayelsa State. A simple random sampling technique was used to select fifty (50) students from each level, making a sample size of two hundred (200; 82 males and 118 females) students for the study. A validated instrument of fifty-nine (59) items of 4-point Likert rating scale of Strongly Agree (SD), Agree (A), Disagree (D) and Strongly Disagree(SD),titled 'Students' Competencies on Information and Communication Technology ' (SCICT)adapted from [17] by the researchers was used for data collection. Cronbach Alpha statistic was used to establish the reliability index of the instrument as 0.71, which was judged as good enough for this study. The questionnaire was administered by the researchers to the respondents in their various levels when they were seated to have lecture in their departmental courses. The researchers retrieved the questionnaire from the respondents during their next departmental courses. This procedure ensured a complete retrieval of the entire questionnaire from the respondents. The data collected were analyzed using frequency, percentage and mean statistics. The criterion mean was 2.5.

RESULTS AND DISCUSSIONS

Research Question 1

To what extent do teacher education students possess the basic knowledge of computer?

Table-1: Summary of Number and Mean of Respondents on the Basic Knowledge of Computer

S/N	Basic Knowledge of Computer	SA (%)	A (%)	D (%)	SD (%)	$\bar{x}$	Decision
1	Basic files	36 (18)	52 (26)	70 (35)	42 (21)	2.4	NC
2	Minimize, maximize and move windows	60 (30)	74 (37)	40 (20)	26 (13)	2.8	C
3	Check how much space left on a drive or other storage devices	80 (40)	70 (35)	26 (13)	24 (12)	3.0	C
4	Start up, log on, and shut down computer system properly	52 (26)	92 (46)	48 (24)	8 (4)	2.9	C
5	Download and install software on a hard Disk	28 (14)	46 (23)	82 (41)	44 (22)	2.3	NC
6	Check for and install operating system Updates	48 (24)	64 (32)	48 (24)	40 (20)	2.6	C
7	understand basic computer hardware components and terminology	88 (44)	72 (36)	12 (6)	28 (14)	3.1	C
8	Understand and manage the files	52 (26)	58 (29)	44 (22)	46 (23)	2.6	C
	Average Mean and Percentage	56 (28)	46 (23)	66 (33)	32 (16)	3.7	C

Source: field work, 2015.   C-competent, NC-not competent

The data presented in table 1 indicate that almost all the teacher education students do not possess the basic knowledge of backup files, download and install software on a hard disk. However, almost all the students possess the basic knowledge to

- Minimize, maximize and manage windows,
- Checking how much space left on a drive or other storage devices,
- Startup log on and shutdown computer system properly,

- Check for and install operating system updates,
- Understanding basic computer hard ware components and technology and
- Understand and manage the file structure of a computer.

The total mean response of 2.7, which is above the criterion mean of 2.5, indicates that teacher educating students, generally, possess the basic knowledge of computers.

Research Question 2
To what extent do teacher education students competent in word processing?

Table-2: Summary of Percentage Scores of Respondents on Word Processing Competencies

S/N	Word Processing Competencies	SA (%)	A (%)	D (%)	SD (%)	$\bar{x}$	Decision
9	Creating and organizing computer files and folders	62 (31)	62 (31)	44 (22)	32 (16)	2.8	C
10	Loading a word processing application e.g. MS word	84 (42)	72 (36)	12 (6)	32 (16)	3.0	C
11	Saving a document in a word processor	76 (38)	64 (32)	56 (28)	4 (2)	3.1	C
12	Using word art to shape objects	20 (10)	56 (28)	82 (41)	42 (21)	2.3	C
13	Previewing and printing text from word processor	50 (25)	64 (32)	50 (25)	36 (18)	2.6	C
14	Deleting files from recycle bin	48 (24)	52 (26)	54 (27)	46 (23)	2.5	C
15	Setting up and using tab in	52 (26)	62 (31)	52 (26)	34 (17)	2.7	C
16	Changing text font and size in a document	64 (32)	62 (31)	40 (20)	34 (17)	2.8	C
17	Inserting pictures and symbols into a document	34 (17)	52 (26)	62 (31)	52 (26)	2.3	NC
18	Merging and splitting cells in a table	24 (12)	44 (22)	72 (36)	60 (30)	2.2	NC
19	Using input devices to enter and edit text	52 (26)	62 (31)	52 (26)	64 (32)	2.7	C
20	Using storage devices (hard disk, CD, flash) for storing and sharing computer files	50 (25)	70 (35)	40 (20)	40 (20)	2.7	C
	Average mean and Percentage	51 (26)	60 (30)	51 (26)	37 (19)	2.6	C

Source: field work, 2015. C-competent, NC-not competent

The data in table 2 show that teacher education students possess word processing competencies, except in using word art to shape objects, inserting pictures and symbols into documents and merging and splitting cells in a table where they have means less than the criterion mean of 2.5.

Research Question 3
To what extent do teacher education students competent in the use of spreadsheet application

Table-3: Summary of Number, Percentage and Mean of Respondents on Spreadsheet Competencies

S/N	Spreadsheet Application Competencies	SA(%)	A(%)	D(%)	SD(%)	$\bar{x}$	Decision
21	Opening a spreadsheet application	30(15)	50(25)	62(31)	58(29)	2.3	NC
22	Moving from one cell to another	32(16)	48(24)	60(30)	60(30)	2.0	NC
23	Adjusting column's width and row's height	12(6)	40(20)	92(46)	30(15)	2.0	NC
24	Entering data in worksheet	40(20)	52(26)	64(32)	44(22)	2.4	NC
25	Applying formula and sorting data in worksheet	26(13)	42(21)	74(37)	58(29)	2.2	NC
26	Naming and renaming a worksheet	40(20)	60(30)	60(30)	40(20)	2.5	C
27	Creating and editing charts and graph	40(20)	32(16)	70(35)	58(29)	2.3	NC
28	Formatting charts and graph	30(15)	42(21)	58(29)	70(35)	2.2	NC
29	Inserting and deleting columns and rows	50(25)	54(27)	54(27)	42(21)	2.6	C
30	Previewing and printing a worksheet	50(25)	50(25)	50(25)	50(25)	2.5	C
31	Saving text in a worksheet	40(20)	40(20)	60(30)	60(30)	2.6	C
32	Paginating a worksheet	34(17)	60(30)	62(31)	44(22)	2.4	NC
	Average Mean and Percentage	**35(17.5)**	**48(24)**	**64(32)**	**53(26.5)**	**2.3**	NC

Source: field work, 2015. C-competent, NC-Not competent

Information in table 3 indicate that teacher education students do not have competencies in spreadsheet application, except in naming and remaining a worksheet, inserting and deleting columns

and rows, previewing and printing a worksheet and saving text in a worksheet where they have means above or equal to 2.5 criterion mean.

Research Question 4

To what extent do teacher education students competent in power point presentation application?

Table-4: Summary of Number, Percentage and Mean of Respondents on Power Point Presentation Application Competencies

S/N	Power Point Presentation Application	SA (%)	A (%)	D (%)	SD (%)	$\bar{x}$	Decision
33	Opening a power point work environment	30 (15)	54 (27)	60 (30)	56 (28)	2.3	NC
34	Creating slides using different layouts	28 (14)	48 (24)	64 (32)	60 (30)	2.2	NC
35	Adding titles and subtitles to a slide	66 (33)	62 (31)	42 (21)	30 (15)	2.8	C
36	Changing font size of text slide	52 (26)	48 (24)	56 (28)	44 (22)	2.5	C
37	Setting a presentation	14 (7)	54 (27)	72 (36)	60 (30)	2.1	NC
38	Creating and selecting object in a slide	54 (27)	40 (20)	64 (32)	42 (21)	2.5	C
39	Changing object attribute	50 (25)	64 (32)	50 (25)	36 (18)	2.6	C
40	Customizing animations in a Power Point	38 (19)	42 (21)	60 (30)	60 (30)	2.3	NC
41	Running a slide show in power point	48 (24)	38 (19)	64 (32)	50 (25)	2.4	NC
42	Printing and storing slide presentation	48 (24)	38 (19)	64 (32)	50 (25)	2.4	NC
43	Using slide and projector for presentation	42 (21)	40 (20)	58 (29)	60 (30)	2.2	NC
	Average Mean and Percentage	42.7 (21.35)	48 (24)	59.5 (29.75)	49.8 (24.9)	2.4	NC

Source: field work, 2015.   C-competent, NC-not competent

The data in table 4 show that teacher education students do not have competencies in power point presentation application, except in the areas of adding titles and subtitles to a slide, changing font size of text slide, creating and selecting object in a slide and changing object attribute, where they have means above or equal to 2.5 criterion level.

Research Question 5

To what extent do teacher education students competent in multimedia application?

Table-5: Summary of Number, Percentage and Mean of Respondents on Multimedia Competencies

S/N	Multimedia Competencies	SA(%)	A(%)	D(%)	SD(%)	$\bar{X}$	Decision
44	Understanding how to view media files using different media applications	70 (35)	50 (25)	50 (25)	30 (15)	2.8	C
45	Understanding the different file format of multimedia	50(25)	68(34)	52(26)	30(15)	2.6	C
46	Create or develop media files using authoring tools	48(24)	46(23)	56(28)	50(25)	2.5	C
47	Understanding what a resolution and pixel mean to an image file	48 (24)	56 (28)	50 (25)	46 (23)	2.5	C
48	Knowing what decibel and pitch mean to an audio	42(21)	30(15)	80(40)	48(24)	2.3	NC
49	Knowing how to merge media files	32(16)	40(20)	58(29)	70(35)	2.2	NC
50	Cropping, scaling and rotating image files	32(16)	36(18)	60(30)	72(36)	2.1	NC
51	Can edit audio, image and video files	58(29)	70(35)	40(20)	32(16)	2.6	C
	Average mean and percentage	48(24)	50(25)	56(28)	47(24)	2.5	C

Source: field work, 2015.   C-competent, NC-Not competent

The data presented in table 5 show that teacher education students have competencies in multimedia applications, except in the areas of knowing what decibel and pitch mean to an audio, knowing how to merge media files and cropping, scaling and rotating image files, where they have means less than 2.5 criterion levels.

Research Question 6

To what extent do teacher education students possess electronic communication competencies?

Table-6: Summary of Number, Percentage and Mean of Respondents on Electronic Communication Competencies

S/N	Electronic communication Competencies	SA (%)	A (%)	D (%)	SD (%)	$\bar{x}$	Decision
52	E-mailing	62 (31)	64 (32)	52 (26)	22 (11)	2.8	C
53	Using a common e-mail program (e.g. MS word, Outlook, Gmail, Apple mail)	60 (30)	70 (35)	50 (25)	20 (10)	2.9	C
54	Composing and sending messages	50 (25)	80 (40)	42 (21)	28 (14)	2.8	C
55	Replying and forwarding messages	50 (25)	56 (28)	50 (25)	44 (22)	2.6	C
56	Adding attachments to a message	46 (23)	54 (27)	52 (26)	48 (24)	2.5	C
57	Copying, pasting and printing message content	50 (25)	50 (25)	62 (31)	38 (19)	2.5	C
58	Organize e-mail folders	42 (21)	50 (25)	58 (29)	50 (25)	2.4	NC
59	Understanding what an electronic discussion list is and how to sign up and leave one (Listerv, Listproc)	28 (14)	42 (21)	70 (35)	60 (30)	2.2	NC
	Average mean and percentage	48.5 (24.25)	58.25 (29.125)	54.5 (27.25)	38.75 (19.375)	2.6	C

Source: field work, 2015.   C-competent, NC-not competent

The data in table 6 indicate that teacher education students have competencies in electronic communication application, except in the areas of organised e-mail folders and understanding what an electronic discussion list is and how to sign up and leave one(Lister v, List proc).

The results of the analysis of basic computer knowledge competencies, as shown in table 1, revealed that, students in Teacher Education Department, in general, are competent in basic computer knowledge. The overall mean (x) of students that agreed from all the eight items (1-8) in table 1 was 2.7 which is above the criterion mean of 2.5. This finding is in agreement with [18] who found that education students in the tertiary institutions were competent in basic computer knowledge and adequately utilized it in academics. This may be because the researchers used comparable students and methodology in executing their researches. The study, however, revealed that students in the Teacher Education Department are not competent in backing up files, downloading and installing software on a hard disk. This agrees with [19] who held that many of our teachers were not capable of teaching ICT subjects due to the shallow depth of computer skills they acquired in their teacher training institution. This, probably, may be that the students used by the researchers were comparable and that the researchers

may have used the same instrument to conduct their researches.

The results of the analysis of competencies in word processing, as shown in table 2, revealed that students in the Teacher Education Department were competent in word processing. The overall mean (x) of students that agreed from the twelve (9-20) items in table 2 was 2.6 which is above criterion mean of 2.5. This finding is consistent with [18] who found that education students in the tertiary institutions were competent in word processing and adequately utilized it in personal training. The study, further, revealed that respondents were not competent in using word art to shape objects, inserting pictures and symbols into a document, merging and spiting cells in a table. This justifies the observation of [20] that student teachers in tertiary institutions need to update their skills in using word art to shape objects, inserting pictures and symbols into a document, and merging and splitting cells in a table. This justification may be that the researchers used students with almost the same intelligent quotient in carrying out their studies.

The results of the analysis of competencies in spreadsheet applications, as shown in table 3, revealed that students in Teacher Education Department were not competent in spreadsheet application. The overall mean

($\overline{x}$) of students that agreed from the twelve items (21-32) in table 3 was 2.3 which is below the criterion mean of 2.5. This finding is in disagreement with [18] who held that student teachers in tertiary institutions were competent and adequately exposed to spreadsheet applications. However, they are competent in naming and renaming a worksheet, inserting and deleting columns and rows, previewing and printing a worksheet and saving text in a worksheet. This finding agrees with the position of [21] that shallow depths of computer skills are acquired in teacher training institutions. This difference may have resulted from the use of non-comparable samples by the researchers in their studies.

The results of the analysis of competencies in power point applications, as shown in table 4, revealed that students in Teacher Education Department were not competent in power point applications. The overall mean ($\overline{x}$) of students that agreed from the eleven items (33-43) in table 4 was 2.4 which is below the criterion mean of 2.5. This finding is not consistent with [18] who found that students were competent in the use of Microsoft power point applications. This difference might be due to differences in the background of students used in research execution. However, students were competent in adding titles and subtitles to a slide, changing font size of text slide, creating and selecting in a slide and changing object attribute.

The results of the analysis of competencies in multimedia applications, as shown in table 5, revealed that students in the Teacher Education Department were fairly competent in multimedia application. The overall mean ($\overline{x}$) of students that agreed from the eight items (44-51) in table 5 was 2.5 which is equal to the criterion mean of 2.5. This finding partly contradicts the findings [18] that held that education students adequately utilized multimedia applications in their teacher training programs on the ground that they were incompetent in knowing what decibel and pitch mean to an audio, how to merge media files and cropping, and scaling and rotating image files. However, they are competent in understanding how to view media files using different multimedia applications, understanding different file formats of multimedia and can edit audio, image and video files and understand what a resolution and pixel mean to an image file.

The results of the analysis of competencies in electronic communication, as shown in table 6, revealed that students in Teacher Education Department were competent in electronic communication. The overall mean ($\overline{x}$) of students that agreed from the eight items (52-59) in table 6 was 2.6which is above the criterion mean of 2.5. This agrees with [18] who found that education students, adequately, utilized electronic communication skills, such as e-mailing in most personal activities. However, the study showed that teacher education students were not competent in organizing e-mail folders and understanding what an electronic discussion list is and how to sign-up and leave one.

CONCLUSION

Generally, the competencies teacher education students possess in specific areas (items) could be as a result of their strong competencies in basic computer knowledge, word processing and electronic communication as transfer of learning is possible in ICT. It could also be as a result of applying information and communication technology in their academic works. However, the low competencies observed in spreadsheet, power point and multimedia applications could be as a result of non-application of information and communication technology in their academic work at the primary and secondary school levels. It may also be caused by involving the 100 and 200 level students in the study who just come to the university system and may have less exposure to the use of information and communication technology in their academic works.

RECOMMENDATIONS

Based on the findings of the study, the following recommendations were made. Students in teacher education should be given sufficient training on how to use ICT in their academic studies. This would enable them to acquire more skills that would enhance their application of technology as students in the university and as potential teachers in the classroom. The management of tertiary institutions should provide adequate technological resources to be used by both students and lecturers to enhance the teaching and learning process in the classroom. Consequently, this may give the opportunity to both students and lecturers to acquire more competencies in ICT readily without a formal training program. Based on the National ICT Competency Standard for Teachers, government should make sure that the knowledge and skills needed in these four categories for teachers should be compulsorily acquired by any student in teacher training institutions by making it part of the curriculum. Also, efforts should be made by lecturers in tertiary institutions to use ICT facilities in instructional delivery and give students assignments involving the use of internet and presentation software.

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