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Information and Communication Technology (ICT), Teaching and Learning in Tertiary Institutions in Yobe- State, Nigeria

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Abstract:

The benefits accruing from the use of ICT in tertiary institutions for teaching are enormous. Despite these, several institutions have not fully adopted ICT because of cost implication and lack of ICT compliance among staff. However, in tertiary institutions in Yobe State, ICT facilities are provided, how this has impacted on the teaching and learning prompted this study. Hence, this study assessed the impact of information and communication technology of teaching and learning in tertiary institutions in Yobe-State. The study used survey design through which it sourced primary data from a population of 15774, which consists of 6 tertiary institutions in Yobe State. These institutions are Atiku Abubakar College of Legal and Islamic Studies Nguru, College of Agriculture Gajba, Mai Idris Alooma Polytechnic Gaidem, School of Health Technology Nguru, College of Administration, Management and Technology Potiskum and Umar Suleiman College of Education Gashua. The sample size of 789 was administered questionnaire which was structured using 5 Likert scales. Data sourced were analyzed using tables, percentage, frequency and mean score. The study found that information and technology information have a significant impact on teaching and learning in tertiary institutions in Yobe State. Further findings showed that students are impacted more through the use of ICT, and the staff were always trained in the usage of ICT gadgets. Also, government and management of these tertiary institutions ensure that ICT gadgets are provided which in the long run, improve the tertiary institutions in Yobe State. The study concluded that ICT plays a very important role in improving teaching and learning in tertiary institutions in Yobe -State. The study recommends among others that, management of tertiary institutions in Yobe State should leverage on the development of ICT in schools and ensure that teaching staff are always trained on the use of ICT in teaching. This would help to improve learning of students and enhance the capacity of lecturers. Also, the students should be encouraged to have in their possession a mini laptop that can be used, in particular, when performing their assignment. This would have a positive long-term effect on them and would improve their learning capacity.

Keywords: Information and communication technology, tertiary institutions, ICT gadgets

1. Introduction

The integration of information and communication technology (ICT) into the educational sector has contributed a great deal to the development and transformation of the teaching and learning process, from the primitive method to virtual interaction between teachers and learners. This means that knowledge was imparted smoothly without the need for the physical presence of teachers and learners, making teaching and learning easier and simpler by making learners more involved in the learning process and knowledge-creating participants than mere recipients of knowledge (Bala and Suleiman 2020).

The use of ICT makes tertiary institutions more efficient and productive by providing a variety of tools and facilities that will enhance educational activities for teachers. E-learning is one of the most common ways of using ICT to provide education for both on-campus and off-campus learners through online teaching offered through web-based systems. (Yusuf, 2005). By offering a range of instruments and facilities that will improve educational activities for teachers, the use of ICT makes tertiary institutions more competitive and efficient. E-learning is one of the most popular ways to use ICT to provide education for both on-campus and off-campus learners through online instruction provided through web-based systems. (Yusuf, 2005). ICT has been used in developed countries for many years and has been successfully integrated into educational system. Unfortunately, since its emergency in Nigeria, banking industry, and stock

exchange have fully integrated it into their system but the education sector is still lagging behind in adopting ICT fully in teaching and learning. In recent time, the COVID 19 pandemic had really exposed the educational sector as this affected schools from operating, especially, the public schools in Nigeria. In addition, the following challenges such as, lack of qualified ICT personnel, cost of equipment, management attitude, inconsistency in electricity supply in most of the part of the country, lack of internet network in some remote area of the country and non-inclusion of ICT programme in teachers training curricula, contributed to the low usage of ICT gadgets in Nigerian public tertiary institutions.

Despite numerous existing studies on ICT and its impact on teaching and learning in tertiary institutions, the study found very limited studies on the subject matter in Yobe State, hence, this study becomes necessary to be undertaken. Some of the studies on the subject matter are, Quaye, Ametepe and Annan, (2015), Anyanwu, Ekechukwu, Ettu, Ndunagu and Faustina, (2016), Kwache (2007). While Quaye, Ametepe and Annan (2015) studied on the impact of ICT on teaching and learning in tertiary institution in Ghana, Anyanwu, Ekechukwu, Ettu, Ndunagu and Faustina (2016) studied competency skills and use of ICT by teacher educators in Imo state tertiary institutions Nigeria and Kwache (2007) studied the imperatives of information and communication technology (ICT) for teachers in Nigeria higher education Adamawa state.

1.1. Statement of the Problems

The application and use of ICT facilities, tools and equipment in Nigerian institutions were having some problems mitigating from effective implementation of ICT in their educational system that can bring a total transformation in teaching and learning process within the domain of education (Kwache, 2007) furthermore, stated the problems that led to the ineffective implementation of ICT in the Nigerian institutions:

- Lack of constant electricity supply within the tertiary institutions.
- Lack of internet network coverage within the tertiary institutions.
- Iii. Attitude of management, lecturers and learners toward supplying and enforcing the use of ICT gadgets and facilities such as low emphases on supplying and applying of ICT tools in the institution by the management, shy and fear for the incompetency use of ICT facilities by lecturers and in-affordable or access to ICT gadgets by the students, all these combined are the problems of making ICT ineffective in tertiary institution.
- Lack of constant maintenance and services of the available ICT gadgets within the institutions by government and management.
- Less emphases on orientation and training of lecturers and students on how they will use ICT gadgets available in the institutional environment.

The above problems were known to almost all the intending researchers in the area of ICT and its ineffectiveness in the Nigerian institutions. With the little available of ICT gadgets, equipment and facilities employed and utilized in the institutions, this study intended to assess the impact of ICT in teaching and learning in tertiary institutions in Yobe state.

1.2. Research Objectives

The main objective of this study is to assess the impact of information and communication technology (ICT) in tertiary institutions in Yobe state Nigeria and the specific objectives are:

- To identify the contributions of ICT in teaching and learning in tertiary institutions
- To examine the extent of orientation and training organized by management to lecturers on how to use ICT gadgets.
- To assess the level of usage of ICT by lecturers and students in teaching/lecturing and learning in tertiary institutions.
- To assess the availability of ICT gadgets and its maintenance in tertiary institutions.
- Assessing the effort of government toward providing ICT gadgets and facilities in tertiary institutions

1.3. Research Questions

- What are the contributions of ICT in teaching and learning in tertiary institutions?
- What is the extent of orientation and training organized by management to lecturers on how to use ICT gadgets?
- What is the level of usage of ICT by lecturers and students in teaching/lecturing and learning in tertiary institutions?
- Are there availability of ICT gadgets and facilities and its maintenance in tertiary institutions?
- What is the effort of government toward proving ICT gadgets and facilities in tertiary institutions?

1.4. Research Hypotheses

- The contribution of ICT does not have a significant impact on teaching and learning in tertiary institutions.
- The orientation and training organized by management to lecturers does not have significant impact on the use of ICT gadgets.
- The usage of ICT by lecturers and students does not have significant impact on teaching/lecturing and learning in tertiary institutions.
- The availability of ICT gadgets and its maintenance does not have significant impact on tertiary institutions.
- The effort of government does not have significant impact on providing ICT gadgets and facilities in tertiary institutions.

1.5. Scope and Limitation of the Study

This study was conducted in Yobe state of the northeastern part of Nigeria from 2019 to 2020, in which some selected Yobe state owned tertiary institutions were the places for the survey, namely Umar Suleiman College of Education Gashu'a; Atiku Abubakar College of Legal and Islamic Studies Nguru; College of Administration, Management and Technology Potiskum; Mai Idriss Aloomo Polytechnic Gaidem; College of Agriculture Gujba and School of Health Technology Nguru. Yobe state was created out from Borno state in 1991 by the military head of state General Badamasi Babangida, it has the total population of three million five hundred thousand 2,500,000 as of (2006 NPC), majority of the habitats were farmers, businessmen/women and civil servants. Yobe state shared borders with Borno state from the eastern part, Gombe state and Bauchi state from the southwest part and Jigawa state and Niger republic from Northern part of state.

Limitation of this study came as the results of the corona virus pandemic known as Covid-19 and prolong strike by the Academic staff Union of University (ASUU), these had led the to the removal of some selected institutions which have already included in the initial state of study work.

2. Literature Review

2.1. Concept of Information and Communication Technology (ICT)

Information and communication technology (ICT) as described by Ezekoka (2009) refers to a way of accessing or collecting, preserving, transmitting, encoding and sending ideas, perceptions or information, computer-based knowledge and other telecommunication facilities. Information and communication technology (ICT) has been able to capture and put vast data from multiple sources around the world in one place by making it simpler and easier for researchers and learners to access it at very cheap costs at any time from their different locations.

ICT is the technology which supports activities involving the creation, storage, manipulation and communication together with their related method, management and application. It was also defined as the range of products systems which handles, process and produce information using computers and or telecommunication technologies Agboloola, (2001).

Information Technology (IT) is the use of computer systems and networking devices in the transmission of information. It consists of three basic components, namely electronic processing by means of a computer, the transmitting of information by means of telecommunications equipment and the distribution of information in multimedia (Ayo, 2001). Information and communication Technology (ICT) refers to all kind of electronic system that are used for broadcasting, telecommunications and all forms of computer – mediated communications. It involves use of computer online, self-learning packages, interactive CDs chips, satellites, radio optic fiber technology technologies, tele-presence systems and all types of information technology hardware and software (Otunla, 2005).

Anyanwu, et al., (2016) sees information and communication technology as a process of gathering data, processing, storing, retrieving and disseminating information through print, broadcast, and computing and telecommunications media. The productive use of ICT resources, equipment and facilities depends on the expertise, interest, encouragement and good orientation provided to teachers and learners in the educational setting through learning about the value of ICT in making teaching and learning easier and simpler for both teachers and learners (Bala & Suleiman 2020).

ICT covers the provision of internet services, telecommunications equipment and services, IT equipment and services, media and large-scale casting, libraries and documentation centers, commercial information providers, network-based information services and other related information and communication activities, because of the above statement ICT is now considered to be a combination of information services (UNESCO, 2002).

Bala and Suleiman (2020) identified different ways in which ICT equipment can be used to promote teaching and learning in institutions. They include;

- Laboratory: Computer groups/ICT facilities are made accessible at a central place and can be reserved by an instructor. This can be a single classroom, part of a library, or part of a student resource centre.
- Mobile trolleys: Desk top computer/ICT should be placed on a trolley that can be secured by a teacher in a classroom setting.
- Mobile laboratory: A variety of relatively compact computers/ICT devices (ideally notebooks or palmtop computers) may be available for the instructor to teach. Computers/ICT devices are brought in and configured up for class lesson after they are returned at the end of the lesson
- Classroom computer(s): One or more computer(s)/ICT facilities can be permanently assigned to the classroom teacher.
- ICT/Computer centers: These centers were situated in a tertiary institution where large numbers of computers were assembled and connected with internet network in which the lecturers and students were allowed to get access to the computers at their convenient in order to make use of them to do research and assignments or to communicate between them and even taken virtual class or examination. These centers have made teaching and learning so simple from the traditional method.
- E- Library: This is section in a main library of the institution where computers were installed and connected with internet for the lecturers, researchers and students to use it for their furthering of searching on more latest and rich textbooks and journals online and they were able to interact with online tutors on a particular topic for more elaboration.

- Internet network coverage: Internet network were installed to cover the entire premises of the Institutions such as Wi-Fi for the lecturers and students to be able to use their owned ICT gadgets to communicate and interact between them where virtual lectures can be easily to take place. Availability of internet network in the institution had made e-learning to be effective.

2.2. Contributions of ICT in Teaching and Learning in Tertiary Institutions

Ul-Amin (2018) identified the contributions of ICT in teaching and learning in tertiary institution

2.2.1. ICT Enhancing Teaching and Learning Process

The incorporation of ICT into teaching and learning processes leads to an improvement in the engagement and acquisition of information. These possibilities indicate improvements in communication models and teaching and learning strategies used by students, giving way to new situations that favor both individual and collective learning." The use of ICT in educational environments, in itself, serves as a spark for progress in this area. ICTs, by their very existence, are instruments that promote and encourage autonomous learning. Students who use ICTs for academic purposes are immersed in the learning process, as such, more students use computers as sources of knowledge and cognitive resources. The incorporation of information and communication technology has helped to revitalize teaching and learning in many institutions. This had helped to improve the standard of education by offering curricular assistance in challenging subjects. In order to accomplish these goals, teachers need to be active in joint efforts and the creation of intervention improvement plans, which may require instructional collaborations using ICT as a guide (Reeves & Jonassen, 1996).

2.2.2. ICT Enhancing the Quality and Accessibility of Education

ICT enhances the versatility of curriculum delivery, meaning that learners can access information from anywhere and at any time. It will change how students are educated and how they learn, as the systems are now guided by learners and not teachers. In exchange, this will help train students for lifelong learning and increase the level of learning. Technology-facilitated curriculum initiatives, in combination with spatial versatility, often eliminate much of the temporal limitations facing learners with special needs. Students are beginning to understand the opportunity to learn wherever, anywhere, anywhere (Moore & Kearsley, 1996).

2.2.3. ICT Enhancing Learning Environment

ICT presents an entirely new learning environment for students, thus requiring a different skill set to be successful. Critical thinking, research, and evaluation skills are growing in importance as students have increasing volumes of information from a variety of sources. Critical thought, analysis and assessment skills are becoming increasingly relevant, modifying teaching and learning practices by introducing elements of vitality to learning environments, including virtual environments, for the purpose of (New Media Consortium, 2007).

2.2.4. ICT Enhance Learning Motivation

ICTs can enhance the quality of education in several ways, by increasing learner motivation and engagement, by facilitating the acquisition of basic skills, and by enhancing teacher training. ICTs are also transformational tools which, when used appropriately, can promote the shift to a learner centered environment. ICTs, especially computers and Internet technologies, enable new ways of teaching and learning rather than simply allow teachers and students to do what they have done before in a better way.

2.2.5. ICT Enhancing the Scholarly Performance

Based on the widespread usage of ICT in education, it seemed appropriate to unravel the misconception that the use of information and communication technology (ICT) as an aid to teaching and learning has had an influence on the academic success of students. ICTs are said to help improve access to education, enhance the importance of education to an increasingly digital workplace, and enhance the quality of education. However, the history of implementing various ICTs in schools and other educational environments around the world over the last few decades shows that the complete realization of the possible educational advantages of ICT can be accomplished.

2.3. Theoretical Framework

The theoretical basis of this research is based on Jerome Brunner's constructivist theory of learning (1960). The theory suggests that learners build new ideas or concepts on previous knowledge. Learning is a process that is active. The collection and transformation of information, the decision-making process, the generation of conclusions and the making of sense from information and experience are facets of the process. Brunner stressed the function of the learning system and how to keep it integral to teaching. Brunner also implemented the concept of resource contributions and spiral curricula organization. Brunner assumed that at any point of development, any subject should be taught in a manner that matches the child's cognitive ability. Zemeiman, Daniel and Hyde (1993) stressed that learning requires inventing and creating new concepts in all subjects. They recommend that constructivist theory be integrated into the curriculum and that teachers develop settings in which children can establish their own understandings. Brunner felt that intuitive, critical reasoning should be promoted and rewarded. He believed that intuitive abilities were under-emphasized, and he focused on the potential of professionals in any area to make intuitive strides forward. Brunner researched inspiration to think. Ideally, he believed that interest in the subject matter was the greatest incentive to understand. Constructivist beliefs have

increasingly been extended to classroom teaching and learning. Constructive education encourages critical thought which produces active, inspired and autonomous learners. The role of the teacher in the positive classroom is to promote and enable debate. The key emphasis of the instructor should therefore be on leading students by asking questions that will allow them to draw their own conclusions on the subject. Analysis shows that constructivist instruction is a successful way to teach because it motivates learners to learn. It facilitates constructive and productive learning and supports transparency and autonomy. Constructive teaching is necessary for teachers to develop professionally into constructive practice.

2.4. Empirical Review

Ghavifekr, Kunjappan, Ramasamy and Anthony (2018) conducted a study on teaching and learning with ICT tools: Issues and challenges from teachers' perceptions in Malaysia, the aims of this study is to analyze teachers' perception of the challenges faced in using ICT tools in classroom. A quantitative research design was used to collect the data randomly from a sample of 100 secondary 'schools' teachers in the state of Maleka, Malaysia. Data have been collected through distribution of modified adopted questionnaire. There key issues and challenges found to be important in using ICT tools by teachers were: limited accessibility and network connection, Limited technical support, lack of effective training, limited time and lack of teacher's competency. Furthermore, the result from independent test shows that use of ICT tools by male teachers ($M=2.08$, $SD=.997$ in the classroom is higher compared to female teachers ($M=2.04$) $SD=.992$). The outcome of the research provides proper information and recommendation to those responsible for integrating new technologies in to the school teaching and learning process.

A research on the effect of information communication and technology on teaching and learning in tertiary institutions in Ghana was performed by Quaye, Ametepe and Annan (2015). The objective of study was to analyze the advantages of the different ICT tools used by tertiary institutions, to explore the problems faced by tertiary institutions with regard to the implementation of ICT in teaching and learning and to recognize the role of lecturers, administrators and students in the introduction of ICT into tertiary institutions. Study was carried out on lecturers, administrators and students of the International University College of Wisconsin, Ghana, and data was obtained through the administration of standardized questionnaires. At the 0.05 level of significance, three null hypotheses were postulated and evaluated. Results from the study revealed that ICT has a positive effect on tertiary institutions' teaching and learning in the way that broadband is a big factor in growing teacher cooperation, digital whiteboards make a difference to facets of classroom engagement, encouraging ICT usage by both lecturers and students. The results have raised difficulties where learners need to quickly navigate computers, recurring technological errors, and the use of software applications needed skills to be learned.

Anyanwu, Ekechukwu, Ettu, Ndunagu and Faustina (2016) studied competency skills and the use of ICT by Imo State tertiary teachers. Four test theories were designed to generate answers for the analysis. The research included two hundred and forty (240) lecturers, 48 lecturers from the Imo State University of Owerri and 192 lecturers from the Alvan Ikoku Federal College of Education Data obtained for the analysis were validated through the administration of a 27-item standardized questionnaire and were also subject to reliability with an internal accuracy of 0.78r for data collection. The test re-test procedure was used to assess the reliability of the instrument, and the outcome was rated accordingly. The descriptive and inferential t-test statistics were used to test hypotheses. The studies shows that gender has no effect on the procession and use of ICT in teaching and learning by tertiary teachers. Less experienced lecturers are more exposed to ICT use than experienced lecturers. Some lecturers lacked sufficient preparation and expertise in the use of computers as a medium for efficient teaching and study.

Apaju and Wakili (2015) conducted a study to examine the availability, utilization, benefits and challenges of ICT facilities in teaching and learning vocational and technical education in Yobe State technical college. The study made use of descriptive survey. It reveals that ICT facilities was low, there are some challenges facing ICT. This includes Irregular power supply; inadequate computer literate teachers, inadequate ICT facilities. Therefore, it recommends that Yobe state government should increase the funding of education sector to cater for ICT programme in technical colleges. Also, there should be periodic training of teachers on ICT computer skills acquisition.

3. Methodology

3.1. Research Design

This research work adopted a descriptive survey research design in which primary data were used as sources of data through structured questionnaires and the item contained in the instrument were based on the research objectives. This had given a chance to our selected respondents to indicate what they were already known, physical saw and used in their institutions that were in line with the specific objectives of the study.

3.2. Population of the Study

The population of this study was comprised all the academic staff, ICT/computer centers staff and the students of the selected Yobe state owned tertiary institutions as of 15th January, 2020 which shown on the table below:

S/N	Name	Academic Staff	ICT/Computer Centres Staff	Students	Total
1	Umar Suleiman College of Education Gashu'a	335	11	4046	4392
2	College of Administration, Management and Technology Potiskum	184	11	3200	3395
3	School of Health Technology Nguru	55	4	1800	1859
4	Mai Idriss Aloomo Polytechnic Gaidem;	167	15	2556	2738
5	College of Agriculture Gujba	118	9	745	872
6	Atiku Abubakar College of Legal and Islamic Studies Nguru	190	8	2320	2518
Total		1049	58	14667	15774

Table 1: Population of the Study
Source: Authors Computation 2020

3.3. Sample Size

This study adopted a statistical formula to determine the sample size of the population of the study as formulated by Muo (2000) as cited in Olufemi and Ezekiel (2017) stated as follow:

$$n = \frac{N}{1 + N(e)^2}$$

Where n = sample size to be tested, N = total population, e = acceptance error term (0.05).
 Therefore, the sample size is calculated as follows

The sample size for academic staff is:

$$n_{as} = \frac{1049}{1 + 1049(0.05)^2} = 289$$

The sample size for ICT/computer centre staff

$$n_{cs} = \frac{58}{1 + 58(0.05)^2} = 50$$

The sample size of students

$$n_s = \frac{14667}{1 + 14667(0.05)^2} = 400$$

The total sample size was 739; however, 50 extra questionnaires were distributed to cover for none returned of questionnaire as a result of wrong filling and mutilations. Hence, the total administered questionnaire was 789 and it was shared among the academic staff, ICT/computer centre staff and students of all selected tertiary institutions in Yobe state.

3.4. Sample Technique

The stratified sampling technique was used because it enables one to obtain sample population that best represent the entire population being studied. The population is group into three strata based on the population of each group. They include academic staff, ICT/computer centers staff and students.

S/N	Academic Staff	Simple Size
1	Umar Suleiman College of Education Gashu'a	$\frac{(335)(289)}{1049} = 92$
2	College of Administration, Management and Technology Potiskum	$\frac{(184)(289)}{1049} = 51$
3	School of Health Technology Nguru	$\frac{(55)(289)}{1049} = 15$
4	Mai Idriss Aloomo Polytechnic Gaidem;	$\frac{(167)(289)}{1049} = 46$
5	College of Agriculture Gujba	$\frac{(118)(289)}{1049} = 33$
6	Atiku Abubakar College of Legal and Islamic Studies Nguru	$\frac{(190)(289)}{1049} = 52$
	Total	289

Table 2: Academic Staff Sample Size

Source: Authors Computation 2020

S/N	ICT/Computer Centre Staff	Simple Size
1	Umar Suleiman College of Education Gashu'a	$\frac{(11)(50)}{58} = 9$
2	College of Administration, Management and Technology Potiskum	$\frac{(11)(50)}{58} = 9$
3	School of Health Technology Nguru	$\frac{(4)(50)}{58} = 4$
4	Mai Idriss Aloomo Polytechnic Gaidem;	$\frac{(15)(50)}{58} = 13$
5	College of Agriculture Gujba	$\frac{(9)(50)}{58} = 8$
6	Atiku Abubakar College of Legal and Islamic Studies Nguru	$\frac{(8)(50)}{58} = 7$
	Total	50

Table 3: ICT/Computer Centre Staff Sample Size

Source: Authors Computation 2020

S/N	Academic Staff	Simple Size
1	Umar Suleiman College of Education Gashu'a	$\frac{(4046)(400)}{14667} = 110$
2	College of Administration, Management and Technology Potiskum	$\frac{(3200)(400)}{14667} = 87$
3	School of Health Technology Nguru	$\frac{(1800)(400)}{14667} = 49$
4	Mai Idriss Aloomo Polytechnic Gaidem	$\frac{(2556)(400)}{14667} = 70$
5	College of Agriculture Gujba	$\frac{(745)(400)}{14667} = 20$
6	Atiku Abubakar College of Legal and Islamic Studies Nguru	$\frac{(2320)(400)}{14667} = 64$
	Total	400

Table 4: Students Sample Size

Source: Authors Computation 2020

3.5. Sources and Method of Data Collection

Under this study, data were collected through structured questionnaires in which the items in the questionnaires are questions on the specific objectives of the study. Three categories of questionnaires were prepared; 1, 2 and 3. Questionnaire 1 is for the academic staff in which questions were asked on the contribution of ICT in teaching, the extent of training and orientation of lecturers on ICT giving or organized by institutions and their level of usage of ICT in their teaching. Questionnaire 2 is for ICT/computer centers staff, questions were asked on the availability of ICT tools, equipment, facilities and their maintenance and the effort of government and management in providing ICT tools,

equipment, and facilities in the tertiary institutions. Questionnaire 3 is for students and also questions were asked on the contribution of ICT on learning and their level of usage of ICT in their learning process.

3.6. Method of Data Analysis

The data collected were analyzed by using both the descriptive statistic, such as table, percentage and mean and mean score.

3.7. Data Presentation and Analysis

Demographic of Respondents

Sex	Frequency	Percentage (%)
Male	574	72.8
Female	215	27.2
Total	789	100.0

Table 5: Sex Distribution of the Respondents

Source: Field survey, 2020

The male respondents have the highest percentage frequency value of 72.8 % (574) when compared to the female respondents that has a percentage frequency value of 27.2 % (215).

Age	Frequency	Percentage (%)
15-24 years	289	36.63
25-34 years	306	38.40
35-44 years	129	16.35
45 years & Above	68	8.62
Total	789	100.0

Table 6: Age Distribution of the Respondents

Source: Field survey, 2020

Respondents between the age group of 25 and 34 years has the highest percentage frequency value of 38.40% (306), which is subsequently followed by respondents with age group between 15 & 24 years, 35 & 44 years, and 45 years & above, at a percentage frequency value of 36.63% (289), 16.35% (129), and 8.62% (68) respectively.

Education	Frequency	Percentage (%)
NCE/ND	398	50.44
BSc/HND	235	29.78
MSc/MBA	150	19.01
PhD	6	0.76
Total	789	100.0

Table 7: Education Distribution/ Programme of the Respondents

Source: Field survey, 2020

Respondents who are classified as NCE/ND holders in terms of their education/programme, has the highest percentage frequency value of 50.44% (398), which is subsequently followed by BSc/HND, MSc. /MBA and PhD, with a percentage frequency value of 29.78 % (235), 19.01 % (150), and 0.76 % (6) respectively.

College	Frequency	Percentage (%)
USCOEGA	226	28.64
CAMTECH	157	19.90
H.TECH	73	9.25
POLY GE	136	17.24
IC. OF. AGRIC	66	8.37
L&I	131	16.60
Total	789	100.0

Table 8: College Distribution of the Respondents

Source: Field Survey, 2020

USCOEGA has the highest percentage frequency value of 28.64 % (226) in the college category, which is subsequently followed by CABS, POLY GE, L & I, H.TECH, and C. OF AGRIC., with a percentage frequency value of 19.90% (157), 17.24% (136), 16.60% (131), 9.25% (73), and 8.37% (66) respectively.

Experience	Frequency	Percentage (%)
1-5 years	61	16.40
6-10 years	203	54.57
11-15 years	66	17.74
16 years & above	42	11.29
Total	372	100.0

Table 9: Experience Distribution of the Respondents
Source: Field survey, 2020

Respondents whose years of experience falls between 6 and 10 years, has the highest percentage frequency value of 54.57% (203), which is subsequently followed by 11-15years, 1-5years and 16 years & above at a percentage frequency value of 17.74% (66), 16.40% (61), and 11.29% (42) respectively.

4. Research Questions

S/N	Research Statements	Mean	Decision
	Contribution of ICT to teaching ^a		
1.	ICT make teaching process simple and easier?	4.73	Accepted
2.	The use of ICT application such as Projector, Zoom, WhatsApps, e-mail and Google classroom, have made the teachers and students to tract easily?	4.18	Accepted
3.	The use of ICT in teaching have transformed the teaching process in your institution?	3.64	Not accepted
4.	ICT tools and application have made the teachers to acquire and get access to latest teaching material on line?	4.73	Accepted
5.	Lecturers use ICT application to give assignment to their students?	3.00	Not accepted
	Contribution of ICT to learning ^b		
1.	ICT made learning to be simple and easier to students?	4.82	Accepted
2.	ICT application such as projector, zoom, whatsApps etc. make students to interact with their lecturers easily?	4.27	Accepted
3.	ICT have made the students to learn and understand easily?	3.90	Not accepted
4.	ICT brought new method of learning to students	4.18	Not accepted
5.	Students are using ICT tool and application to get online material for further learning?	4.16	Not accepted

Table 10: To Identify the Contributions of ICT in Teaching and Learning in Tertiary Institutions
Source: Author Computation from SPSS 17.0

- Decision Rule: if the mean value equal to or exceed the grand mean value (4.06^a and 4.27^b), research statement is *Accepted*, if otherwise, research statement *Not accepted*

The acceptability measure of the research statement was tested based on the estimated mean and grand mean value. Table 10 showed that the respondents accepted that ICT makes teaching process simple and easier, the use of ICT application have made the teachers and students to tract easily, and it has updated the teachers to get access to latest teaching material on-line with a mean value of 4.73, 4.18, and 4.73 greater than the grand mean value of 4.06 based on the contribution of ICT to teaching. Also, the respondents accepted that ICT makes learning to be simple and easier to students and that its application has make students to interact with their lecturers easily with a mean value of 4.82 and 4.27 greater or equal to the grand mean value of 4.27 based on the contribution of ICT to learning.

S/N	Research Statements	Mean	Decision
	Extent of orientation and training ^c		
1.	The institution is organizing training and orientation on ICT to their lecturers	3.55	Not accepted
2.	The lecturer is ICT literate	3.82	Not accepted
3.	Lecturer was using the knowledge that acquired in training in their teaching?	3.91	Accepted
4.	The orientation and training given to lecturers on ICT have empower them in using ICT in their teaching?	4.00	Accepted
5.	The orientation and training given to lecturers on ICT have made them to have interest and enthusiasm in using ICT application in their teaching?	4.00	Accepted

Table 11: To Examine the Extent of Orientation and Training Organized by Management to Lecturers on How to Use ICT Gadgets
Source: Author Computation from SPSS 17.0

- Decision rule: if the mean value equal to or exceed the grand mean value of 3.86^c, research statement is *Accepted*, if otherwise, research statement *Not accepted*

The extent of orientation and training organized by management to lecturers on how to use ICT gadgets as shown on Table 11 revealed that the respondents accepted that lecturers use the acquired knowledge in training in their teaching,

based on the empowerment received in using ICT, through their interest and enthusiasm in using ICT application in teaching with a mean value of 3.91, 4.00, and 4.00 greater than the grand mean value of 3.86.

S/N	Research Statements	Mean	Decision
	Level of usage of ICT in teaching ^d		
1.	Lecturers were always using in ICT in their teaching?	1.99	Not accepted
2.	Lecturers were partially using ICT tools in their teaching?	3.64	Accepted
3.	Lectures were using projector in their teaching?	2.74	Not accepted
4.	Lecturers were using micro phone and speaker in their teaching?	2.91	Not accepted
5.	Using ICT tools by lecturers have made their teaching simple and easier and making them to have interest on it?	4.00	Accepted
	Level of usage of ICT in learning		
1.	Students always learning through using ICT?	2.55	Not accepted
2.	Students partially learning through using ICT?	3.72	Accepted
3.	Students were learning through using projector?	2.46	Not accepted
4.	Students were learning through using micro phone and speaker?	1.99	Not accepted
5.	Students were having more interest and enthusiasm when they were learning by through using ICT?	4.46	Accepted

Table 12: To Assess the Level of Usage of ICT by Lecturers in Teaching/Lecturing in Tertiary Institutions

Source: Author Computation from SPSS 17.0

- Decision rule: if the mean value equal to or exceed the grand mean value (3.06^d and 3.04^e), research statement is *Accepted*, if otherwise, research statement *Not accepted*

Table 12 showed that the respondents accepted that lecturers were partially using ICT tools in their teaching, and that it has made their teaching simple, easier, and interesting with a mean value of 3.64 and 4.00 greater than the grand mean value of 3.06 based on the level of usage of ICT in teaching. Also, the respondents accepted that students are partially learning through ICT, and that is attributed to their interest and enthusiasm in learning through ICT with a mean value of 3.72 and 4.46 greater than the grand mean value of 3.04 based on the level of usage of ICT in learning.

S/N	Research Statements	Mean	Decision
	Availability of ICT gadgets and maintenance ^f		
1.	There is ICT/computer center in the tertiary institutions?	4.54	Accepted
2.	There is availability of functional computers in the ICT center?	4.28	Accepted
3.	There is internet network in the ICT center and within the premise of the institution?	3.24	Not accepted
4.	The computers and other ICT gadgets are getting adequate care and maintenance?	3.30	Not accepted
5.	The ICT gadgets and tools were well functioning and active?	3.62	Not accepted

Table 13: To Assess the Availability of ICT Gadgets and Its Maintenance in Tertiary Institutions

Source: Author Computation from SPSS 17.0

- Decision rule: if the mean value equal to or exceed the grand mean value of 3.80^f, research statement is *Accepted*, if otherwise, research statement *Not accepted*

The availability of ICT gadgets and its maintenance in tertiary institutions as shown on Table 13 revealed that the respondents accepted that there is ICT/computer center in tertiary institutions and also the availability of functional computers in the ICT center with a mean value of 4.54 and 4.28 greater than the grand mean value of 3.80.

S/N	Research Statements	Mean	Decision
	Effort of government and management in ICT improvements		
1.	Government and management were providing ICT gadgets and facilities in tertiary institution?	4.36	Accepted
2.	The ICT gadgets and facilities provided by government and management are well functioning?	4.10	Accepted
3.	The government and management are trying their best in providing ICT gadgets facilities in tertiary institution?	4.02	Accepted
4.	The government and management are giving special consideration in the area of ICT for implementation and its effectiveness?	2.54	Not accepted
5.	The government and management are enforcing the lecturers to adopt the use of ICT in their teaching?	2.50	Not accepted

Table 14: Assessing the Effort of Government toward Providing ICT Gadgets and Facilities in Tertiary Institutions

Source: Author Computation from SPSS 17.0

- Decision rule: if the mean value equal to or exceed the grand mean value of 3.50, research statement is *Accepted*, if otherwise, research statement *Not accepted*

The effort of government toward providing ICT gadgets and facilities in tertiary institutions as shown on Table 14 revealed that the respondents accepted that government and management provides ICT gadgets and facilities in tertiary institution, and that the provided ICT gadgets and facilities provided by the government and management are well functional, through the best effort the government and the management are providing with a mean value of 4.36, 4.10, and 4.02 greater than the grand mean value of 3.50.

Test of Hypotheses

4.1. Hypothesis 1

The null hypothesis says that, the contribution of ICT does not have a significant impact on teaching and learning in tertiary institutions. However, from Table 10, it was found that the mean score of 4.73, 4.18 and 4.73 are greater than the grand mean score of 4.06 and 4.27 at 5% and 10% significant level. This implies that, ICT contributed to teaching and learning in tertiary institutions in Yobe State.

4.2. Hypothesis 2

Testing the null hypothesis which stated that, the orientation and training organized by management to lecturers does not have significant impact on the use of ICT gadgets. As reported in Table 11, it was found that, the means value of 3.91, 4.00 and 4.00 are greater than the grand mean score of 3.86 at 5% level of significant. This implies that, the orientation given to lecturers has significant impact on the use of ICT gadgets

4.3. Hypothesis 3

Testing the null hypothesis which stated that the usage of ICT by lecturers does not have significant impact in teaching/lecturing in tertiary institutions. As it was presented in Table 12, it was found that, the mean value of 3.72 and 4.46 are greater than the grand mean score of 3.06 and 3.04. The implication of this is that, usage of ICT by lecturers has significant impact on teaching and learning in tertiary institution in Yobe-State

4.4. Hypothesis 4

Testing the null hypothesis 4 which stated that the availability of ICT gadgets and its maintenance does not have significant impact on tertiary institutions. As it was reported in Table 13, it was found that, availability of ICT center and its maintenance does have significant impact on tertiary institutions as the means value of 4.54 and 4.28 are greater than the grand mean score of 3.80.

4.5. Hypothesis 5

The null hypothesis 5 stated that, the effort of government does not have significant impact in providing ICT gadgets and facilities in tertiary institutions. To test this, the presentation in Table 14 shows that, the mean value of 4.36, 4.10, and 4.02 are greater than the grand mean score of 3.50. This implies that, the effort of government and the management have significant impact on provisioning of ICT gadgets and facilities in tertiary institutions in Yobe State.

5. Summary and Discussion of Findings

The study assessed the impact of information and communication technology (ICT) on teaching and learning at tertiary institutions in Yobe State. The study covers students, academics and administrative staff in ICT facilities in the institutions. All tertiary institutions in Yobe State were the study population, with a sample size of 789 questionnaires administered. The data collected was analyzed using descriptive statistics such as percentage, tables, frequency and mean score/value. The study found that male respondents accounted for 72.8 per cent more than female counterparts in these schools, while female respondents accounted for 27.2 per cent. The age range between 25 and 34 was 42.5 per cent, followed by 15-24 for 39.4 per cent and 35-44 for 12.2 per cent. It was found that NCE/ND had the largest share of 50.44 per cent in academic achievement, followed by BSc/HND, which accounted for 29.78 per cent, followed by MSc/MBA, which accounted for 19.01 per cent. College distributions showed that USCOEGA accounted for 28.64 per cent, followed by CAMTECH for 19.90 per cent, while POLY GEI accounted for 17.24 per cent, while others accounted for 16.60, 9.25 and 8.37 per cent, respectively. Years of experience shown that respondents between 6-10 years of experience have the highest frequency of 54.57 per cent, followed by 11- 15 years having 17.74 per cent and 1-5 per cent, accounting for 16.40 per cent, while 16 and above accounted for 11.29 per cent.

Further findings shown that ICT has helped to improve teaching and learning methods. Not only that, ICT has helped in improving the teaching styles of academic staff and learning of student. This is because of the concerns of the management and the government to ensure that ICT gadgets are provided and maintained by the schools. This position is consistent with Quaye (2015) who argued that ICT plays a very important role in teaching and learning. The study found that information and communication technology had a positive impact on teaching and learning in tertiary institutions. This is due to broadband, which is a key factor in ensuring cooperation between teachers and interactive whiteboards. It was also in line with Apagu and Waliki (2015) who found that ICT benefits staff and students because it makes teaching and learning interesting, helping teachers to be up-to-date in improving the quality of work of both teachers and students. Although, some challenges were found despite these benefits and these are irregular power supply; inadequate computer literate teachers; inadequate ICT facilities. The study findings are at variance with Yusuf (2018) who found that ICT facilities are not adequately provided in most of the schools of teaching and learning electrical installation and maintenance.

6. Conclusion

Having assessed the impact of information and communication technology on teaching and learning in tertiary institutions, and by testing the hypotheses, the study concluded that, ICT has significant impact on teaching and learning, both from the students and staff perspectives.

7. Recommendations

The following are recommended

- Management of tertiary institutions in Yobe State should leverage on the development of ICT in schools and ensure that teaching staff are always trained on the use of ICT in teaching, as this will improve the learning of students and lecturers.
- Students should be encouraged to have in their possession a mini laptop that can be used in particular when performing their assignment. This would have a positive long-term effect on them and would improve their learning capacity.
- ICT staff should be trained on a regular basis on how to manage and maintain ICT facilities so that they can be of use to current students and future school students.
- Government should ensure that ICT gadgets are provided to tertiary institutions in the state of Yobe, as this would improve the level of education of students and the capacity of state lecturers.

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