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IMPACTS OF INFORMATION COMMUNICATION TECHNOLOGY (ICT) ON EFFECTIVE TEACHING AND LEARNING AMONG UNDERGRADUATE STUDENTS IN SELECTED UNIVERSITY

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ABSTRACT

The role of Information and Communication Technologies (ICTs) has been acknowledged in knowledge-sharing not only within educational institutions but across different facets of society. The outbreak of the coronavirus pandemic made the role of ICTs crucial in the teaching and learning process, especially at the university level. Therefore, this study investigated the impacts of information communication technology (ICT) on effective teaching and learning among undergraduate students in a selected Nigerian University. The study adopted a descriptive survey research design. The population of the study covered undergraduate studying in the sixteen faculties at the selected university. Three research questions were raised, while two hypotheses were formulated. The sample of the study was 480 undergraduates. The sample was made through the use of simple random sampling techniques. Therefore, 30 undergraduates were selected from each of the sixteen faculties. The data collected were analyzed using descriptive statistics such as simple percentages and inferential statistics of spearman's' Rank-Order. The two hypotheses were tested at 0.05 level of significance. The study's findings show that ICT tools are available to a great extent in the selected university and are frequently used among students to improve learning activities. Based on the findings, the study recommends that stakeholders at the selected university and other universities should intensify efforts at utilizing ICTs in the teaching and learning process for effective teaching-learning process.

Keywords: Information and Communication Technologies, teaching and learning, undergraduate students, University.

Introduction

Like every other developing country, Nigeria is now adopting Information Communication Technologies (ICT) integration into its teaching and learning process in every educational sector

(Govender & Kayode, 2020). ICT for effective teaching and learning is essential as it provides opportunities for educators and learners to collaborate effectively either in face-to- face or blended learning (Kayode & Lingaliso, 2023).

In the present worldwide economy and competitive environment, ICT is becoming a generally acknowledged instrument for various advancements, considering the adaptable administrations, the new advanced innovations it offers, and the possibility of changing the conventional schooling framework (Charfeddine & Umlai, 2023; Kayode, 2019; Onodugo, 2015). Moreover, such innovations have forced most educators in the universities to integrate and use technology in their teaching practices in some developing countries (Okoye, et al., 2023; Amponsah et al., 2019). Similarly, the effectiveness of lecturers in the university system is a critical factor that should be responsible for equipping students with the knowledge and resources needed to proceed in this challenging world. However, the ability of lecturers to adequately prepare their students for the competencies required by society becomes questionable in Nigeria (Dominic & Mahamed, 2023). According to researchers, TD and Sain, (2024), suggests disincorporate activities that incorporates ICTs has potential to offer positive awareness to students to perform well in their academics. However, Chaudhary (2020) argues that the scholarly norm in all Nigerian Higher Education educational institutions has fallen impressively beneath educational policy assumptions. Such challenge is attribute to the fact that teaching and learning in most universities in Nigeria do not effectively allocate time for students to engage in hands-on ICT practice, nor allowing them to participate in teaching and learning that include empowering activities to develop their ICT skills (Kayode, 2019). Although, technology-based teaching and learning offer various exciting benefits to make the learning process more effective, fulfilling, and meaningful, most university lecturer in Nigeria faces many challenges to integrate technology in the classroom. Such challenges include unstable power supply, low speed Internet connections, lack of technological pedagogical content knowledge, lack of ICT training. Inspite of the challenges, some universities, and lecturers are exploiting the use of and potentials of ICT to expand access and enhance the quality of teaching and learning. It is also suggested that universities are of the view students learning needs are becoming increasingly more technology in dependent (Latorre-Cosculluela et al., 2024; Taufiq & Lubis, 2023). Moreover, debate on the effect of ICT to transforming education in universities in developing countries is not new; even though, the massive investments on educational technologies, the actual impact on the teaching and learning outcomes in Nigerian universities remains limited.

Research Question

In other to examine the impact of ICT on effective teaching and learning of undergraduate students in university of Ibadan, the following questions were raised:

1. What is the availability of ICT tools in the University of Ibadan?
2. How frequently is ICT used to improve learning process in the university of Ibadan?
3. To what extent does ICT resources effectively impact on students' activities in the University of Ibadan?

Hypothesis:

HO_1: There is no significant relationship between the utilization of ICT tools and impacts on students' academic activities among undergraduate students at the University of Ibadan. Oyo State.

HO_2: There is no significant relationship between gender and the use of ICT among undergraduate students at university of Ibadan, Oyo State.

Literature Review

Information and Communication Technology refers to technological tools in higher education to enhance teaching, learning and administration tasks which enable online learning , digital resources, virtual classrooms communication among educators and students that make education easily accessible, flexible and interactive. (Liesa-Orus, et al., 2020; Njagi, Nyakundi & Oigara, 2024). ICT is the technology used to communicate, create, manage, and distribute information. Also, a broad definition of ICTs includes computers, the Internet, telephone, television, radio and audiovisual types of equipment. ICT is a force that has changed many aspects of people livelihood. Information and Communication Technologies consist of the hardware, software, networks, and media for collection, storage, processing, transmission, and presentation of information (voice, data, text, images) and related services. ICTs can be divided into two components, Information and Communication Infrastructure (ICI) which refers to physical telecommunications systems and networks (cellular, broadcast, cable, satellite, postal) and the services that utilize those (Internet, voice, mail, radio, and television), and Information Technology (IT) that refers to the hardware and software of information collection, storage, processing, and presentation (Ullah et al., 2024; Kayode and Lingaliso 2022).

Information Communication Technologies (ICTs) affect all parts of life, including education (de Oliveira, Guerino & Pimentel, 2023; Karaman Aksentijević, Ježić & Zaninović, 2021; Ratheeswari, 2018). They are advancing changes in working conditions, dealing with and exchanging data resources, teaching-learning approaches, etc. ICTs are making significant differences in the teaching approaches and the manners in which students are learning. Information and Communication Technology (ICT) is increasingly becoming an indispensable part of the education system, which helps students to solve complex problems to enhance cognitive skills (Olubiyo & Olubiyo, 2023; Jonnasen & Reeves, 2016). As a result, ICT has changed the style of functioning of the educational system and its governance.

They might browse several online dictionaries and select the one that best meets their learning needs. In addition, finding good software to record their voice would be prerequisite for these learners. Therefore, the whole learning process enriches students' learning skills and broadens their knowledge beyond what they already know. By using ICT, students' creativity can be optimised.

According to Mikrel (2011), ICT offers the potential to offer learning that is collaborative, imaginative, integrative, and evaluative. Moreover, the significant guarantees of ICTs use in

educational system in developing countries centers around preparing educators in new abilities and bringing imaginative teaching methods into the study and classrooms.

The use of technological tools in university enable collaboration and networks among educational institutions, thereby increase standard of education by reducing the gap in quality of education between higher institution in urban and rural areas with objectives to foster self-paced, self-assessed, and self-directed learning through the applications of ICTs, and developing capacity in ICT policy for education and training (Kayode & Linda, 2023; Amutha, 2020; Malik, 2018). To demonstrate the importance of using ICT in education , The United Nations Educational, Scientific and Cultural Organization (UNESCO), proposed a project, commonly known as "One Laptop Per Child" (OLPC) initiative as a means of closing the digital divide gap between developed and developing nations on the use of ICT teaching and learning (Allotey & Murray, 2023). Scholars argue that though this initiative has dominated in many countries as the top education agenda, the actual implementation and practice of this "One laptop per child" is yet yield significant results especially in less developed countries (Dorris, Winter, O'Hare & Lwoga, 2024; Petersen-Carnell, 2023). HEIs access has mass increased in the last few decades to meet the demands and challenges of equal and quality education for all. This aspect has further gained momentum due to the introduction of Information and Communication Technology (ICT) in higher education and its quick advancement (Bilan, Oliinyk, Mishchuk & Skare, 2023; Burden, 2020). Thus, ICT-mediated teaching and learning are the basic needs of quality education in higher education. This suggest that the demand for skilled and competent teachers is ever increasing in the contemporary globalised higher education society. In this context, access to quality higher education has emerged as a determining factor in economic growth and development. To increase access to higher education and improve its reach to the remotest parts of the country, it is necessary to enhance the contribution of open and distance learning facilities, for example, in a developing country like India, the cost of accessing life-long education for all is a prime factor, and it should be affordable to all. In this backdrop, ICT-mediated teaching and learning could play an important role in blended learning, open distance learning, and Massive Open Online Course (MOOC). The inclusion and proper integration of ICT-mediated teaching learning technology in higher education seems to be a great challenge in most developing countries

According to Lowther et al. (2018) three crucial characteristics are needed to develop mediated ICT teaching and learning: autonomy, capability, and creativity. Students take control of their learning through self pace in the use e-learning with technological tools (Kayode, 2019). In this way, they become more capable of working independently and with others. Teachers can also authorize students to complete specific tasks with peers or in groups. Through collaborative learning with ICT, the students have more opportunities to build the new knowledge onto their background knowledge and become more confident to take risks and learn from their mistakes. Further, Dubey (2020) suggest that ICT fosters autonomy by allowing educators to create their material, thus providing more control over course content than in a traditional classroom setting. Once students are more confident in learning processes, they can develop the capacity to apply and transfer knowledge while using new technology with efficiency and effectiveness.

Many Nigerian lecturers have been unable to find effective ways to use technology in their classrooms for teaching and learning (Akudo & Obi, 2023). The possible explanation for this lack of success is not only that the use of technology in the classroom has not been encouraging and are not well trained in using ICTs in teaching as a means for educational sustainability, but the level of the educators' access to the tool of educational ICT has been very minimal notwithstanding the specifications in the National Policy of Education by the Federal Government of Nigeria (Bello & Ajao, 2024).

Teaching and learning are two essential pillars in education. No education can take place without effective teaching and learning (Bowden, Tickle & Naumann, 2021). The quality of every educational product depends on how effectively teaching and learning managed (O'Keefe, L., Rafferty, Gunder & Vignare, 2020). Also, a major contributing factor to successful teaching and learning efforts is the environment in which they occur. It is known that learning environments have both direct and indirect influences on student learning, including their engagement in what is being taught and their motivation to learn. Classroom management skills play significant roles in ensuring that students learn effectively. According to Wong and Wong (2019), a major contributory factor to the high academic achievements of the student is classroom management. The scholar, Bonna, K. (2023), asserted that effective learning occurs in a well-managed classroom. They concluded that unproductive social and academic behaviors could be traced to a failure to create an educational environment conducive to learning. It is evident that classroom management is essential in maximising students' academic and social gains.

Summarily, several studies reveal their different views on the impacts of ICT in teaching and learning (Latorre-Cosculluela et al., 2024; Kucuk, 2023; Jang, Aavakare, Nikou & Kim, 2021). In addition, several other research studies were carried out to assess the impact of ICT in the domain of education (Kayode & Lingaliso, 2023; Bariu, 2020; Tohara, 2021). The scholar, Wastiau et al. (2013) indicate that the application of ICT in education achievement has positive effects in teaching and learning.

Theoretical Framework

The integration of ICT in teaching and learning brings about powerful learning environments and helps students deal with knowledge in active, self-directed and constructive ways. Thus, all avenues to foster it should be explored. One such avenue is to isolate the factors underpinning incorporation of ICT in teaching and learning. In deriving these factors, several theories can be considered. The theory used in this research is the Unified Theory of Acceptance and Use of Technology. Venkatesh et al. (2003) developed the Unified Theory of Acceptance and Use of Technology (UTAUT), and focus on ‘behaviour’ as the primary variable, which Venkatesh et al defined as the degree to which a person accepts and uses new technology. Uses behaviour is a function of behavioural Intention (BI) and facilitating conditions. BI is a measure of the strength of one's intention to perform a specific behaviuor (Davis et al., 1989), while facilitating condition is the degree to which an individual believes that organisational and technical infrastructure required for the support of the technology exists (Venkatesh et al., 2003).

Behavioral Intention is in turn, determined by performance expectancy (PE), effort expectancy (EE) and social influence (SI). Venkatesh et al. defined *Performance expectancy* as the degree to which an individual believes that using the technology will help him or her to attain gains in job performance; effort expectancy as the degree of ease associated with the use of the technology; and social influence as the degree to which an individual perceives those essential others believe that he or she should use the technology.

Methodology

Research Design

The study adopted the descriptive survey research design type.

Study Population

The population of this study comprises of Undergraduate students in University of Ibadan, Oyo State, Nigeria. This research was carried out on undergraduate Students in all faculties in University of Ibadan Oyo State, Nigeria.

The faculties include Faculty of Education, Faculty of Social Sciences, Faculty of Technology, Faculty of Art, Faculty of public health, Faculty of Veterinary Medicine, Faculty of Pharmacy, Faculty of Agriculture.

Table 1: Population of Study

S/N	**Faculties**	**Number of Students**
1	Education	4177
2	Social sciences	1868
3	Technology	2284
4	Arts	3263
5	Basic Medical Science	1028
6	Clinical Sciences	1526
7	Dentistry	207
8	Economics	553
9	Environmental Design and mgt	120
10	Law	1056
11	Pharmacy	510
12	public Health	814
13	Science	3549
14	Veterinary Medicine	617
15	Renewable Natural Resources	649
16	Agriculture	2135
	Total	24356

Sources: The Planning Unit, University of Ibadan

Sample and sampling procedure

Simple random technique was used in this research respondents across 16 faculties in the University of Ibadan. A total sample size of 480 students was randomly chosen in each faculty.

Table 2: Sample of the Study

S/N	Faculties	**Number of Students**
1	Education	30
2	Social sciences	30
3	Technology	30
4	Arts	30
5	Basic Medical Science	30
6	Clinical Sciences	30
7	Dentistry	30
8	Economics	30
9	Environmental Design and mgt	30
10	Law	30
11	Pharmacy	30
12	Public Health	30
13	Science	30
14	Veterinary Medicine	30
15	Renewable Natural Resources	30
16	Agriculture	30
	Total	**480**

Method of Data Analysis

The questionnaires were collected, coded and analyzed using SPPS version. 20. Descriptive statistics such as; frequency, percentage mean and standard deviation were used to analyze the research questions, the hypotheses tested using inferential statistics like spearman's Rank-Order Correlation Pearson Product Moment Correlation (SRMC) at 0.05 level of significance.

Results and Discussion

Research Question 1: What is the availability of ICT tools in the University of Ibadan?

Table 3: Availability of ICT tools

Items	**SA**	**A**	**D**	**SD**	**Total**
There are available ICT tools in my school	35.6	43.8	13.8	6.9	100
I usually have access to a desktop whenever I need it in my school	19.4	36.9	31.3	12.5	100
I have free access to internet facilities in my school	13.8	45.8	29.2	11.3	100
I always have access to social media platforms in my school ICT room	14.4	42.1	28.5	15.0	100
There is always a projector to be used by lecturers for teaching	23.8	43.1	21.9	11.3	100

Table 3, expresses the measure of the availability of ICT tools at the University of Ibadan. The result shows that ICT tools are available to a great extent at the University of Ibadan. The majority of the respondents (79.4%, 56.3%, 59.6%, 56.5% and 66.9%, respectively) agreed that there are available ICT tools as they usually have access to a desktop whenever a need arises for it. They have free access to internet facilities, always have access to social media platforms in ICT laboratories and there is always a projector to be used by lecturers for teaching. In comparison, a lower percent (20.7%, 43.8%, 40.5%, 43.5% and 33.2% respectively) of the respondents responded otherwise.

Research Question 2: How frequently is ICT used to improve learning process in the University of Ibadan?

Table 4: Frequently Used ICT and Improved Learning Process

Items	SA	A	D	SD	Total
I use a computer frequently as part of my learning process	31.3	44.4	15.0	9.4	100
Lecturers make use of PowerPoint presentation regularly to better improve the learning process	18.8	51.3	21.9	8.1	100
The use of ICT tools has no positive impacts on my learning process	15.6	30.6	16.3	37.5	100
I frequently use google as part of my learning process	34.4	48.8	11.3	5.6	100
Virtual learning environment are used in the courses I am enrolled in	27.5	56.3	13.8	2.5	100
I use ICT tools a lot to do and submit my assignment	35.6	48.1	12.5	3.8	100
I research and read sometimes on google.	44.4	43.1	6.9	5.6	100

Table 4, shows the frequency with which ICT tools are used to improve learning process in the University of Ibadan. A larger percent of the respondents agreed computer is used frequently as part of their learning process, lecturers make use of PowerPoint presentation regularly to better improve the learning process, the use of ICT tools have positive impacts on their learning process, google is frequently used as part of their learning process, Virtual learning environments are used in the courses they enrolled, they use ICT tools on regular basis to do and submit assignment, they research and read sometimes on google with percentage responses of 75.7%, 70.1%, 53.8%, 83.2%, 83.8%, 83.7% and 87.5% respectively. This shows that ICT tools are frequently used to improve the learning process in the University of Ibadan and exhibit positive impacts on students' learning process.

Research Question 3: To what extent does ICT resources effectively impact on students' activities in the University of Ibadan?

Table 5: ICT Resources and Students Activities

ITEMS	SA	A	D	SD	Total
I save time if I use ICT for my learning process.	41.9	46.9	8.1	3.1	100
Information is much more easily available by using ICT tools than by using library	45.6	48.1	4.4	1.9	100
Use of ICT resources like social media affects my leaning.	32.5	45.0	17.5	5.0	100
ICT resources plays an important role in my learning process.	43.8	41.9	10.6	3.8	100
ICT tools create a better atmosphere for learning in the classroom	48.1	38.8	10.6	2.5	100
The availability of ICT resources makes learning easy and impactful	41.9	44.4	10.0	3.3	100
I will perform better in my academics if I limit my usage of ICT tools	36.9	30.6	25.6	6.9	100
Displaying of lesson through PowerPoint makes teaching and learning fun	47.5	38.8	7.5	6.3	100

Table 5, illustrates the extent to which ICT resources effectively impact on students' activities in the University of Ibadan. The result showed that majority of the respondents (88.8%, 93.7%, 77.5%, 85.7%, 86.9%, 86.3%, 67.5% and 86.3% respectively) are of the view that use ICT saves time during learning process; information is much more easily accessible by using ICT tools than through the university physical library; use of ICT resources like social media affects learning; ICT resources plays an important role in learning process; ICT tools create a better atmosphere for learning in the classroom; the availability of ICT resources makes learning easy and impactful; they will perform better in academics if they limit usage of ICT tools; and Displaying of lesson through PowerPoint makes teaching and learning fun. This shows that ICT resources effectively impact on students' activities in the University of Ibadan to a high extent.

Testing Research Hypotheses

The research hypotheses formulated were tested and the following results were obtained:

Decision rule: If P-value <0.05, reject the null hypothesis otherwise accept.

Spearman Rho: 0 to -1, negative correlation

0 to +1, positive correlation

HO_1: There is no significant relationship between the utilization of ICT tools and impacts on students' academic activities among undergraduate students at the University of Ibadan. Oyo State.

The obtained data from the institution were analyzed to test the hypothesis.

Table 6: Spearman's Rank-Order Correlation between utilization of ICT tools and impacts on students' academic activities

Items	The use of ICT tools has no positive impacts on my learning process	
	Correlation Coefficient	**Sig.**
I save time if I use ICT for my learning process.	.052	.256
Information is much more easily available by using ICT tools than by using library	-.081	.076
Use of ICT resources like social media affects my learning.	.217**	.000
ICT resources plays an important role in my learning process.	-.107*	.019
ICT tools create a better atmosphere for learning in the classroom	.008	.857
The availability of ICT resources makes learning easy and impactful	.167**	.000
I will perform better in my academics if I limit my usage of ICT tools	.254**	.000
Displaying of lesson through PowerPoint makes teaching and learning fun	.148**	.001

****p<0.01**

Spearman's Rank-Order Correlation between utilization of ICT tools and impacts on students' academic activities among undergraduate students at the University of Ibadan revealed weak negative and positive correlation values between -107 to +0.254). Correlations were significant for four variables (p-values of 0.00 and 0.19 at p<0.01 and 0.05 respectively) whereas the remaining four (p-values of 0.256, 0.076, 0.857 at p<0.05 ad 0.01 at p<0.05). This shows a partial significant relationship between the utilization of ICT tools and impacts on students' academic activities among undergraduate students at the University of Ibadan, Oyo State. Therefore, the null hypothesis was neither accepted nor rejected.

HO_2: There is no significant relationship between gender and the use of ICT among undergraduate students at university of Ibadan, Oyo State.

The obtained data from the institution were analyzed to test the hypothesis.

Table 7: Spearman's Rank-Order Correlation between gender and the use of ICT

Items	GENDER	
	Correlation Coefficient	**Sig.**
I save time if I use ICT for my learning process.	.194**	0.00
Information is much more easily available by using ICT tools than by using library	.042	.355
Use of ICT resources like social media affects my leaning.	.066	.147
ICT resources plays an important role in my learning process.	.064	.163

ICT tools create a better atmosphere for learning in the classroom	.030	.511
The availability of ICT resources makes learning easy and impactful	.049	.283
I will perform better in my academics if I limit my usage of ICT tools	.044	.334
Displaying of lessons through PowerPoint makes teaching and learning fun	-.050	.279

****. P< 0.01 level.**

The Spearman's Rank-Order Correlation between gender and the use of ICT (Table 4.8) shows there is no significant relationship between gender and the use of ICT among undergraduate students in university of Ibadan, Oyo State as the result showed weak negative and positive correlation values between -0.05 to +0.194 and p-values between 0.279 to 0.511 ($p<0.05$) except for single variable **(**I save time if I use ICT for my learning process) which showed a significant p-value of 0.00 at $p<0.01$. Therefore, the null hypothesis was accepted.

Conclusion

In this study, the following findings were made:

1. ICT tools are available to a great extent in the University of Ibadan
2. ICT tools are frequently used to improve learning process in the university of Ibadan and have shown to exhibit positive impacts on students' learning process and there is no significant relationship between gender and the use of ICT among undergraduate students in university of Ibadan, Oyo State
3. ICT resources effectively impact on students' activities in the university of Ibadan to a high extent and there is partial significant relationship between utilization of ICT tools and impacts on students' academic activities among undergraduate students in the University of Ibadan, Oyo State.

Recommendation

The study recommended that:

Students should be educated on the usefulness of using ICT resources and their impact on their academic performance. Lecturers should ensure they use the ICT tool to improve students' academic performance at the University of Ibadan. Students should use the ICT resources available to improve their learning process and for better understanding. Students should be monitored on how well they manage the ICT resources at their disposal to improve the impacts better it will have on their academic performance.

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