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Identifying of ICT Tools to Improve Project Research by Graduating Undergraduates of a Nigerian Premier University

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Abstract—ICT tools have become commonplace entities in every imaginable facet of life. They are increasingly being used to enhance productivity in academic endeavours, but there is limited empirical evidence on how final year students of universities are leveraging these tools in their project writing. This study aimed at identifying ICT tools available in the Ahmadu Bello University, access points to the tools, areas of project research the use of ICT tools improves, and the challenges faced by graduating students in using ICT tools to improve their project research. The descriptive survey design was adopted for the study. The population of the study consisted of 12, 314 graduating undergraduate students. A reliable and validated questionnaire was administered to a sample size of 291 (set 2019) project students who were randomly selected across the faculties. The descriptive statistics in the form of mean and standard deviation was used as the basis for the data analysis. The findings of the study revealed that ICT tools and access points to the tools are available (m=303, m=302) in the sampled university, and they are being used (m=2.95) to improve different areas of project research. However, several challenges still impede the effective use of ICT tools for utmost outcomes in project research. It is therefore concluded that ICT tools afford the students tremendous opportunities for improving their project works, and maintaining the accrual of these benefits to students require sustainability in the provision and access to ICT tools in the universities.

Keywords/Index terms—*Access points, Availability, Graduating students, ICT, Project research, Use, Premier University, Undergraduates, Nigeria.*

1. Introduction
Project research is a systematic academic task undertaken by undergraduate students under the supervision of academic staff during their final year of study. In Nigerian universities, project research is a core exercise that must be carried out by final year students in partial fulfilment for the award of various degrees (Ilo, *et al*, 2015). It is more so because the exercise exposes students to research concepts, principles, and practices in a practical context, thereby helping in developing their competencies for future research endeavours. Studies have shown that through project writing, students develop intellectual capabilities such as academic writing, systematic thinking, time management, and communication (Shrestha, 2007; Burgoyne, O'Flynn, & Boylan, 2010). However, Yusuf and Owolabi (2017) observed that project research is usually students' first exposure to the culture of research, implying that the exercise is not an uncomplicated undertaking for them, bearing in mind the expertise required to analyze and organize large quantum of complex information and perform other intricate tasks.

Interestingly, with the emergence of Information and Communication Technology (ICT) on the world scene, project students are empowered to improve their research experiences by leveraging the opportunities and possibilities offered by ICT tools. Broadly speaking, ICT tools include

hardware equipment (digital camera, computer), computer software (SPSS, word processor), and telecommunication infrastructure (web cameras, phones) that facilitate retrieval, storage, organization, manipulation, presentation, and transmission of information to any location of the world through electronic media (UNESCO, 2002). According to Carlos, Mabel, and Ignacio (2015), companies are now offering a wide of these tools, and their benefits are directly linked to the amount and quality of research. Egoeze, Misra, Maskeliūnas and Damaševičius (2018) affirmed that ICT tools have offered a simple means for students to access the world promptly, to find or transmit information. Moreover, productivity, editing, and analytic tools, as well as referencing and anti-plagiarism software, all help to improve project research from the conceptualization of a study challenge to the dissemination of results. These developments are driven largely by Internet technology, which is generally the emphasis of discourses on ICT (Egoeze, *et al,* 2018).

But for graduating students to effectively maximize the potentials of ICTs in project writing, such tools must be made available in sufficient quantity and quality on their campuses, for easy access and use. It is all the more important because the creation and maintenance of competitive world-class learning, teaching, and research environments demand the deployment of powerful ICT infrastructures at universities (Nuraddeen, 2015). In the opinion of Soto-Acosta (2010), ICT is essential for enhancing the development and productivity of knowledge-intensive products like project researches. However, despite the growing significance and benefits of ICT application in different aspects of academic endeavour, no previous study was found to have, particularly investigated the subject of this study, such that would probably provoke university authorities to ensure effective adoption and use of ICTs by project students. This is enough justification for this study. Therefore, the specific objectives of this study include:

1. To find out ICT tools available to improve project research by graduating students of A.B.U, Zaria.
2. To find out access points to ICT tools available in Ahmadu Bello University to improve project research by graduating students.
3. To ascertain areas in which the use of ICT tools improves project research by graduating students of A.B.U, Zaria.
4. To identify the challenges faced by graduating students in using ICT tools to improve project research in A.B.U, Zaria.

2. Related Works
This segment of the study shows the review of journal articles and documents from the Internet on the variables that the study is consisted of.

2.1 ICT Tools Availability
Asenso-Okyere and Mekonnen (2012) defined ICT as an ever-expanding collection of technology for handling data. On the other hand, Rouse (2017) defined ICT as "any devices and software programs that allow users to interact with the computer system." ICT tools are stated to be available when they are in good working order and can be accessed and operated by students to accomplish practical goals promptly. ICT availability, according to Agim et al. (2018), is the likelihood that the system will function effectively when it is requested. In a genuine sense, ICT tools aren't deemed available until they're in working order, which means that tools that are physically present but don't serve the intended procurement purpose can't be considered available.

Svetec et al., (2019) noted that the availability of ICT tools is a measure of a society's progress and development, which includes education. Students' learning experiences are enhanced by the availability of ICTs, which allows them to present a complete report on their projects. Studies have shown that universities in Nigeria have computers, flash drives, inverters, printers, Internet equipment, CDROM, telephones,

multimedia equipment, and scanning machines (Onyebinama 2013; Agim et al., 2018). Omiunu (2014) found that the availability of ICT in tertiary institutions is still limited in a similar study. In Tanzania, Mungwabi (2018) discovered that the internet, audio devices, networked PCs, YouTube (audio/visual materials), and mobile phones were all available in the university studied. ICT availability alone will not improve project research unless it is used.

2.2 ICT Access Points
ICT access points are sites, locations, or events where ICT tools are made available to as many students as possible with little cost and distance barriers. In his study, Olatokun (2007) noted that users have a habit of using ICT products that take less effort to obtain, Azizi (2011) discovered that the library was the primary location for students to utilize ICT facilities. Karim, Said, and Samadi (2017) discovered that one-third of students access the Internet through university and cybercafés in a similar study. In the Nigerian tertiary institutions, Onuka, Ajayi, and Lawani (2014) discovered that access to ICT is extremely low. According to the European Commission (2013), students with high access to ICT at school and home are more confident in their digital skills. Students' confidence in using ICT tools is harmed by a lack of or limited access to ICT, and their attitudes regarding the impact of ICT on their academic routines are skewed. Access to ICT tools is a primary reason why students value the presence of ICT tools in universities because access to ICT tools ensures that they will be used to improve research performance. Access to ICT tools is a primary reason why students value the presence of ICT tools in universities because access to ICT tools ensures that they will be used to improve research performance.

2.3 ICT Use
ICT use in this context entails incorporating digital equipment into all phases of the research project. ICT use, according to Selwyn (2008), is unquestionably a necessary component of thriving in modern society. It has the potential to improve happiness, particularly when used to achieve important or meaningful objectives

(Sims, Reed & Carr, 2017). Omiunu (2014) discovered that few students utilize ICT for research, preferring instead to engage in activities like shopping and social networking. Okeke, Oghenetega, and Umeji (2014) discovered that ICT tools assist students in completing tasks, conducting research, and making friends. Students use ICT to organize discussions, receive feedback on academic topics from teachers, seniors, and peers, and conduct research to prepare for their graduation projects, according to Basri, Alandejani, and Almadani (2018). Umunadi (2011) and Nuraddeen (2015), on the other hand, decried the misuse or non-use of ICT tools.

2.4 Challenges in Using ICT Tools for Project Research
Brown (2002) identified the ease of finding and comprehending technology, as well as individual user traits such as self-efficacy and computer fear, as important barriers to ICT tool adoption. According to Mungwabi (2018), a lack of search skills among students is a barrier to successful ICT use. Poor internet networks, a lack of computers, and formal instruction on the usage and access to the internet were identified as impediments to the efficacy of ICT by students in a separate study by Obuezie, Osuchukwu, and Ani (2018). Similarly, Tor, Wisdom, and Ezekiel (2019) discovered that too many users (students) question the usage of ICT tools for web-based learning in their study. Furthermore, due to unreliable electric power, the majority of students were only able to access their email accounts, causing them to lose out on a variety of other obligations (Chiaha, Eze & Ezeudu, 2013). Students are unable to use ICT tools to learn and accomplish other duties due to a lack of an enabling environment, which includes a heavily regulated telecommunications industry and poor performance by Internet service providers (Drummond, Sheperis & Jones, 2016). Students' use of ICT in universities has also been hampered by a lack of maintenance culture (Fagbe, Amanze & Oladipo, 2015; Ezeugwu et al., 2016). Improper ICT facility maintenance reduces their longevity and renders facilities that could have

been employed to improve project research non-functional.

In summary, this study was established within the mainstream of previously existing empirical researches. It emerged that commendable efforts have been made toward absorbing ICT tools in Nigerian universities, and students are somewhat engaging them to facilitate various academic endeavours. But these ICT tools are grossly

3.0 Methodology

As noted by Misra (2021) that researches conducted in ICT related fields should adopt a methodology, this study descriptive survey design was adopted in the study. The population of this study consisted of 12,312 bachelor's degree students of Ahmadu Bello University, Main campus (MIS, 2019). Premised on Krecie and Morgan (1970) table of determining sample size, the sample size for the above population of 12,314 students is 291. So, 291 graduating undergraduate students (set 2019) were used as a sample for the study. The simple sampling procedure was used for sample selection. This was to give ample chance to every graduating bachelor degree student across the faculties to be a part of the sample.

3.1 Sample and Sampling technique

A structured questionnaire was used as the instrument for data collection. To ensure that the instrument covers the content it was intended to measure, the questionnaire was exposed to content and face validity. Two researchers from the field of librarianship and educational technology scrutinized the instruments, and their corrections helped to improve the instrument. Afterwards, the instrument was piloted using the Cronbach reliability test which yielded a reliability index of 0.739 (ICT tools), 0.565 (Access points), 0.548 (Areas of a research project), and 0.512 (Challenges). Since the reliability index for all the sections is above 0.5 (Allison, 2012), the instrument was considered reliable.

inadequate as compared to the students' population in Nigerian universities. However, silence has been noticed in the literature concerning the use of ICT tools to improve project research by undergraduate students particularly those at the university under consideration, thereby intensifying the need and significance of this study.

3.2 Data Collection

The researchers took advantage of the final year students (FYS) meetings that attracted attendance at faculty levels to administer the questionnaire since the students were very difficult to identify within the limited time of this study. In the end, the study only attracted responses from 150 graduating bachelor degree students, representing 51% of the targeted sample of 291 students. According to Rubin and Babbie (2011), a response rate of at least 50 per cent is usually considered adequate for analysis and reporting. Also, Cohen, Manion, Morrison (2018) noted that a minimum number of cases can be used in a study as far as the main features of the population are covered. Based on the foregoing, the data collected from the field via the questionnaire were analyzed

3.3 Data Analysis

With the aid of the Statistical Package for Social Science (SPSS), mean and standard deviation were used to describe the availability, access point and use of ICT tools for project writing by the graduating undergraduate students of Ahmadu Bello University, Zaria. The constant mean of 2.5 was used for the decision.

4. Results and Discussions

The main purpose of this study was to enquiry into the availability, access point and use of ICT tools for improving project research by graduating undergraduates. The data obtained through the administration of the questionnaire is therefore presented below alongside the discussion of results.

ICT Tools for Improving Project Research

Table 1 ICT Tools for Improving Project research

Sn	ICT Tools	A	D	Mean	SD
1	Internet network	145	5	3.69	0.63
2	Flash drives/ Hard disk/CD	112	38	3.01	1.11
3	Desktops	127	23	3.22	0.94
4	Printers	125	25	3.21	0.96
5	Laptops	125	25	3.28	1.06
6	E-mail facility	120	30	3.19	1.03
7	Scanners	109	41	2.81	1.02
8	Projectors	116	34	2.92	1.01
9	Digital cameras	85	65	2.48	1.19
	Aggregate Mean			**3.03**	

Key: A=Agree, D=Disagree, SD=Standard Deviation

Table 1 displays the responses of the respondents on the ICT tools available for improving their project research. The table reveals an aggregate mean score of 3.03 which was higher than the benchmark mean of 2.5. Therefore, ICT tools for improving project research of graduating undergraduate students of Ahmadu Bello University is highly available.

The result from Table 1 reveals that ICT tools for improving project research of final year students

Access Points to ICT tools

Table 2 shows the responses of the graduating undergraduate students on the access points to ICT tools. The table reveals an aggregate mean score of 3.02 which was higher than the benchmark mean of 2.5. It can, therefore, be said that access points to available ICT tools are highly available to be accessed by the graduating undergraduates to improve their project research.

As contained in Table 2, the finding shows that all the access points studied are highly available. This finding hatched a conviction that ICT tools found to be available in the institution as presented in the above paragraph are accessed by the students at different points within the university environment. That is to say, access to ICT tools is decentralized to encourage their use by project students, thus upholding their right to access. The result corroborated the findings of Azizi (2011) who ascertained that the library was the major point for accessing ICT facilities by students. In this vein, the outcome of this study supported that of Karim, Said and Samadi (2017)

of A.B.U are highly available. This finding bared the fact that the university has succeeded in deploying relevant information technologies that can facilitate students' project research, thus bridging the gap that had existed in terms of ICT tools available to these students and those in the advanced world. The result of the study marks an improvement over the observation of Omiunu (2014) who noted that the level of availability of ICT is still low in Nigerian tertiary institutions, universities inclusive. Also, this finding revealed backing for Onyebinama (2013) who discovered the availability of computers, the Internet and multimedia equipment in the universities in Imo state. By implication, the appreciable level of availability of these tools would enhance students research experiences, if they are put to use by students in practical research contexts. This, therefore, highlights the need for the university to sustain efforts in deploying emerging ICT infrastructures suitable for creating a more technology-driven research environment for project students.

Table 2 Access Points to ICT Tools

Sn	Access Points	A	D	Mean	SD
1	E-libraries on the university campus	131	19	3.39	0.90
2	Computer labs/Digital Studio on the campus	116	34	3.00	1.05
3	Business centres/Cyber Café on the campus	108	42	2.95	1.08
4	University ICT centres on the campus	127	23	3.23	0.93
5	Digitized lecture halls on the campus	86	64	2.53	1.03
	Aggregate Mean			**3.02**	

who discovered at a university in Morocco that one-third of sampled students use ICT tools such as the Internet at cybercafés. This study implies that students in the university would better appreciate the existence of ICT tools, since accessing these tools at different points created across the campus is capable of influencing positive outcomes in their project research. As a follow-up action, the university needs to re-double her efforts in multiplying access points across the campus as this would draw ICT tools

closer to project students and influence their maximum use in the research process.

Areas where the Use of ICT tools Improves Project Research

Table 3 Project Research Areas Where the Use of ICT tools Improves

S/n	Areas	A	D	M	SD
1	Finding a research problem	134	16	3.43	0.85
2	Searching for literature	136	14	3.55	0.74
3	Collaborating with colleagues	111	39	2.89	1.01
4	Consulting research experts	103	47	2.73	1.05
5	Typing and formatting text	101	45	2.85	1.09
6	Interacting with supervisors	91	59	2.72	1.14
7	Printing project documents	119	31	3.11	0.97
8	Submitting & Receiving docs	109	41	2.83	1.01
9	Analyzing project data	110	40	2.89	1.07
10	Editing grammatical construct	98	52	2.73	1.05
11	Checking plagiarism	83	67	2.54	1.05
12	Arranging References	110	40	2.91	1.02
13	Storing documents /images	124	26	3.15	0.95
	Aggregate Mean			**2.95**	

Key: A=Agree, D=Disagree, SD=Standard Deviation

Table 3 contains the respondents' responses on the areas of project research the use of ICT tools improves. It is glaring from the table that the aggregate mean score of 2.95 was higher than the benchmark mean of 2.5. It can, therefore, be inferred that the graduating undergraduate students highly use ICT tools to improve their project research since all the areas outlined received cheering responses.

The result of the study as displayed in Table 3 revealed high use of ICT tools by graduating students to improve different areas of their project research. A critical examination of the Table 4 flaunts the responses of graduating undergraduate students on the challenges they

result exposes a sharp decline between the aggregate means of ICT availability (3.03), access (3.03) and use (2.95). This is to say that even as ICT use in project research is high, there is more to be done by the university to increase research students' maximal use of ICT equipment. Part of these efforts might include studying and addressing the challenges that are associated with the effective use of ICT by project students in the ivory tower. The outcome of this study comes to terms with Basri, Alandejani, and Almadani (2018), who found that students use ICT tools to facilitate the conduct of research to prepare their graduation projects. This suggests greater efficiency and effectiveness in students' research endeavours in that the entire research cycle is now facilitated by ICT tools. This innovation has greatly assisted in overcoming inadequacies that accompanied conventional methods of conducting project research.

Challenges in Using ICT Tools to Improve Project Research

Table 4 Challenges in Using ICT tools to Improve Project Research

S/n	Challenges	A	D	Mean	SD
1	Too many students' users	116	38	3.08	1.03
2	Too many restrictions by staff	71	79	2.31	1.09
3	Lack of time	96	54	2.72	1.03
4	Power failure	114	36	3.10	1.06
5	Poor ICT skills	80	70	2.47	1.13
6	Insufficient ICT tools	97	53	2.82	1.12
7	Lack of help from staff	77	73	2.45	1.15
8	Lack of interest	45	105	2.05	0.96
9	Poor Internet services	101	49	2.81	1.03
	Aggregate Mean			**2.65**	

Key: A=Agree, D=Disagree, SD=Standard Deviation

encounter in using ICT tools to improve their project research. Without any vagueness, table 4

reveals that the sampled students highly agreed on too many students' users, lack of time, power failure, insufficient ICT tools, and poor internet services as the most pronounced challenges. It can, therefore, be deduced that most of the challenges faced by the final year students of Ahmadu Bello University encounter in using ICT tools to improve project research are facility-related.

Arising from the above result, the respondents highly agreed on too many students' users, lack of time, power failure, insufficient ICT tools, and poor internet services as the most pronounced challenges. A careful look at the challenges makes it crystal clear that almost all the problems identified in the study are facility-related. As a premier university, the inadequacy of the facilities may well be attributed to the inability of the university to provide facilities commensurate to the students' population. This could be the apt explanation for the sharp decline in the use of ICT tools as observed in the preceding section of the discussion. The result of this study corroborated many pieces of research which found irregular electric power supply, poor internet network, too many users as challenges encountered by students while exploiting ICT for academic purposes, research inclusive (Chiaha, *et al.,* 2013; Obuezie, *et al.,* 2018; Tor, *et al.,* 2019). This implies that the use of ICT tools in improving project research would decline, with time, beyond the present state if the challenges are not urgently looked into with the view of fixing them for students' optimum performance in project research.

5. Conclusion

In this study, the researchers surveyed the use of available ICT tools to improve project researches undertaken by graduating bachelors' degree students. Using descriptive statistics, the study measured the major variables contained in the study. The analysis revealed that ICT tools are highly used to improve areas of project research undertaken by the bachelor's degree graduating students of the aforestated institution. However, too many students' users, lack of time, power failure, insufficient ICT tools, and poor internet services are the most pronounced challenges deterring the students from putting ICT tools to maximal use for utmost outcomes in their research efforts. This implies that a more technology-driven research environment would be created for project students if the identified bottlenecks are timely surmounted and efforts are sustained in deploying emerging technologies that are research-oriented in the institution.

Following the findings of the study, the researchers recommended that the management of the university should make the acquisition of ICT tools a yearly project in the same way students are admitted on annual basis. This, to some extent, would help in bridging up the gap between yearly new intakes and ICT tools available for their use. Secondly, the management of the university should multiply efforts in creating more ICT access points in research labs and libraries. This would become easier for project students to use them while carrying out their researches. Finally, the application of ICT tools in project writing should be incorporated into courses offered by project students in the university. This would grant them exposure to ICT and empower them to apply its potentials in research processes.

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