

# Assessment of Modern ICT Skills for Enhancing Quality of Research Possessed by University of Nigeria Nsukka Postgraduate Students

<sup>1</sup>Ocheni, Christopher Adah

<sup>1</sup>ESPRMC, The University of Alabama, Tuscaloosa, USA.  
<https://orcid.org/0000-0001-6007-2362>

<sup>2</sup>Asanga, Godwin Christopher

Department of Science Education, University of Nigeria, Nsukka <sup>2,3,4,5</sup>

<sup>3</sup>Azor, Francisca Ukamaka

<sup>4</sup>Nwani, Samuel Uchenna

<sup>5</sup>Anajekwu Nkechi Favour

*Corresponding Author:* Ocheni, C.

**Abstract:-** This study assessed the University of Nigeria postgraduate students ICT and research skills. The study employed analytical descriptive research design and was conducted at the University of Nigeria, Nsukka (UNN) with a sample of 114 students. Data were collected using Modern ICT skills and Research Questionnaire (MISRQ). A reliability index of .84 was estimated using Cronbach-alpha. Findings revealed that male students have better ICT and research skills than their female counterparts. From the results, Ph.D. students had better research skills than M.Ed. students. Findings also showed that students do not possess skills in use of e-resources and services, computer skills and software use. It is therefore recommended that ICT facilities needed to improve both students and lecturers should be put in place to ensure better output.

**Keywords:-** Assessment, Research skills, ICT skills, Graduate Students, Modern Research Skills, E-Resources.

## I. INTRODUCTION

Technology has come to stay; in its early days it was thought as a replacement for manual labor, and many saw it as a threat and did not embrace it. However, information communication technology (ICT) has proved otherwise, it is a tool that can help man achieve in a faster, better, and more efficient way his plans. Rouse (2023) referred to ICT as the process of facilitating the creation, collection, processing and storing or information making use of computing and telecommunication technologies, systems, and tools. These technologies according to the author include servers, laptop computers, internet of things (IoT), metaverse, software applications, among others. Michalsons (2023) further stated that ICT include information or data in paper of electronic

format, electronic communications which can be in wringing, telecommunication and broadcasting, software and hardware and other related electronics. Based on the foregoing definitions, ICT may be defined in this study as computer software, skills, media devices and other electronic resources that facilitates information generation, sharing, processing, and storing. These definitions help us to understand the scope of ICT and all that the term describes.

ICTs have experienced rapid changes which have helped to reshape global economies and foster international development over the years. According to (UNICEF, 2018), emphasis on horizontal models that aim to facilitate participation, inclusion and empowerment can be facilitated through ICTs. Bogoro in 2014 showed that some factors are responsible for the kind of development that the advanced nations have experienced. These factors according to him are quality human capital development with competencies in research skills and ICT application. Therefore, application of ICT in research is a crucial part of any national development equation because of its bearing on humanity.

There are certain skills set one need to possess to carryout research that would have significant impact in the world today (Asanga, Ocheni, Adie & Ndidigwe, 2019). These skills are not innate, they are developed over a period. In a study by Okpala, Benneh, Sefu, & Kalule (2017) he stated that Postgraduate (PG) students are involved with a lot of research, this research are not carried out in a conventional manner because at this level their work is supposed to communicate value and contribute to the development of its immediate society and betterment of lives. This research could be in the form of assignments, their thesis, dissertations, and seminars. At this level of their work, they face heavy scrutiny because the output of their research should provide solution to

problems in the society. Thus, a PG students must possess skills that can guarantee that this target will always be met.

In a study by Adeosun (2010), he stated that one of the reasons that hinders the full implementation of ICT resources is poor infrastructure. This has become a common issue that has described the situation in Nigeria, the infrastructural challenge is a major issue that does not allow for an efficient system. ICT Assisted instruction at the basic and advanced level require very good internet access, proper hardware and other infrastructure on ground. Developed, developing and underdeveloped nations can be told apart from their student to computer ratio. The term "Computer Ratio" (LCR) refers to the ratio of students to computers in a learning environment. While advanced nations widely disperse the computers in educational institutions, developing nations frequently create and manage computer laboratories (UNESCO, 2014). Aduwa-Ogiegbaen & Iyamu (2005) adds that infrastructure to support ICT also includes Power (electricity), this is true as computers need power to work. Most ICT resources require stable energy resources, and these resources are not in sufficient supply in Nigeria as the country still struggles to balance the fluctuating wheel of power (Oguguo et al., 2020). Furthermore, telecommunication facilities are necessary to ensure efficient deployment of ICT. As (UNESCO, 2014) noted, communication technologies include cable connections, narrowband, broadband fixed telephone line, among others.

The world has evolved to the point where Postgraduate research fellows must possess skills that can allow research to be conducted not only in their fields but also to compete favorably in a myriad of science and science-related careers. Thus, skills to be possessed should not just be peculiar to their fields but should be able to meet the needs of a diverse scientific workforce and marketplace (John Hopkins Medicine, 2020). Based on the forgoing, The John Hopkins University School of Medicine (SOM) identified core research competencies skills which were modified by National Postdoctoral Association (NPA) to include, safety in the laboratory, techniques of research, experimental designs, data analysis and interpretation, searching and literature evaluation, understanding manuscript submission and peer review process and statistical analysis. These skills are necessary for any kind of research in any academic environment. These skills formed the baseline for this current study, the instrument was designed to elicit information bordering on these emerging competencies.

#### ➤ *Application of ICT in Research*

ICT application is based on the researcher's logical assessment of how the resources will improve his/her output and the ease with which such output can be communicated to the world. The value given to originality and creativity influences the choice of ICT tools and resources that will be employed by the researcher in his/her work (Scholarify.in, 2019). This can be classified into:

- Pre-data analysis: This stage focuses more on literature search and data collection, and other research activity before the stage of data analysis.
- ICT in data analysis: This stage addresses both qualitative and quantitative data analysis involving such techniques as factor analysis, regression analysis, t-test, ANOVA, MANOVA, SEM, path analysis, among others, involving the use of software such as SPSS R programing, python, MATLAB Microsoft Excel, SAS NVivo, ATLAS. ti, and more.
- ICT in post-data analysis: This includes the processes of result discussion, report writing, references, plagiarism check, publication, among others.

In a research conducted by Basri, Alandejani, & Almadani (2018), the performances of females were more likely to be improved than that of the males when ICT is adopted. In another study, Siddiquah & Salim in 2017 stressed that Government and universities should increase their funding of academic programmes especially in ICT infrastructure. They envisioned this will go far in solving the ICT related challenges of students in schools. They also stated that ICT skills should be adapted into the computer course of the degree program. This will strengthen the learning process and will produce more capable students.

Furthermore, Ward, Bennett, & Bauer (2003) showed that according to students rating, continuous involvement in research improved research skills and sharpened learning abilities by a very large margin. Students agreed that their technical abilities were developed as a result of this academic activity and their skills improved with use. Thus, continually conducting research will keep their minds exercised and they can conduct research better than the last time.

#### ➤ *Statement of the Problem*

The world is becoming a data driven society and this evolution is rapid. To be part of this dimensional shift, nations (developing and developed) must employ strategies to guarantee the needed change. One of such strategies is the improvement of their ICT infrastructure, facilities and using cutting edge resources in their school system to train the next set of researchers. The research of Postgraduate students is highly intensive and requires advanced methods because its output at that level should contribute to the nation. Research cannot be efficient and effective without employing ICT skills in its procedure. Without the application of ICT in research, research output will always fall short of delivering quality. This presents a very crucial challenges and it is on this note that this study was conducted to assess the ICT and research skills of postgraduate students since the postgraduate students carry out high level research.

#### ➤ *Purpose of the study*

This study addressed the following purposes:

- what ICT and research skills are possessed by University of Nigeria Postgraduate students

- the ICT and research skills by gender
- the educational level that has the highest level of ICT and research skills.

➤ *Research Hypothesis*

**Ho<sub>1</sub>:** The influence of gender on graduate students level of ICT and research skills is not significant

**Ho<sub>2</sub>:** There influence of educational level among graduate student’s ICT and research skills is not significant.

**II. RESEARCH METHODS**

The design adopted in this study was analytical descriptive. The research work was carried out at the University of Nigeria, Nsukka (UNN), located in Enugu State, in the Southeastern part of Nigeria. The choice of this university is because of her rank as the best university in terms of quality research (Odu, 2019). This research work focused on UNN postgraduate students; this is because they are well exposed to the rudiments of research investigations. All UNN postgraduate students (master’s and Ph.D.) made up the population for this study. Postgraduate Diploma students were left out because they lack much exposure compared to the master’s and Ph.D. students. A total of 1762 students (UNN School of Postgraduate Studies (SPGS), 2020) formed the

study’s population out of which 114 students were sampled for the study. This sample size was used in line with the researchers` competencies and the manageable size of it. Purposive sampling technique was used to select only PhD, M.Sc./M.Ed students. Convenience sampling was used to select the finale sample comprising males and females.

The instrument used for the study was developed by the researchers and it is called Modern ICT Skills and Research Questionnaire (MISRQ). The MISRQ which was on a 4-point liker scale was in clusters based on the variables of interest in the study. The first cluster is on skills of students on computer related activities, the second cluster is on experiences with ICT resources/services provided by institutions, the third and fourth cluster were item statements on technology and general process research skills.

Three experts face-validate the instrument. The reliability index of MISRQ was estimated to be 0.84 using Cronbach-Alpha method due to the polytomous nature of the items. Direct delivery technique (DDT) was used in the data collection process. Mean and Standard deviation were used to answer the research questions and t-test was used to test the hypotheses. The results of analysis of this study were presented in tables below:

**Research Question One:** What ICT and research skills are possessed by graduate students?

**Table 1. Mean and Standard Deviation on ICT and research skills Possessed by Graduate Students**

<b>Descriptive Statistics</b>				
	<b>N</b>	<b>Mean</b>	<b>SD</b>	<b>Decision</b>
Which of these device(s) do you own?	114	1.62	.86	LP
Where do you access the internet mostly?	114	1.45	.69	LP
Which device do you use mostly to access the internet?	114	1.65	.86	LP
<b>Cluster mean</b>	<b>114</b>	<b>1.57</b>	<b>.80</b>	
<b>Computer Skill</b>				
Word processing (E.g. Word)	114	2.98	.87	MP
Spreadsheet (E.g. Excel)	114	2.48	.93	LP
Presentation (E.g. PowerPoint)	114	2.67	.98	MP
Search engines	114	3.10	.84	MP
Projectors	114	2.44	1.06	LP
<b>Cluster Mean</b>	<b>114</b>	<b>2.73</b>	<b>0.94</b>	
<b>Resources / Services</b>				
E-Classroom facilities (computers, projection systems, SMART boards etc.)	114	2.13	.80	LP
Computer lab/faculty/departmental e-library (for practical and internet access)	114	2.14	.84	LP
Wi-Fi access	114	2.43	.80	LP
Access to software (e.g. MATLAB, SPSS, R and Python programing)	114	1.96	.76	LP
Data Visualization software	114	1.86	.66	LP
Plagiarism detection software	114	2.23	.86	LP
e-Proceedings of conferences	114	2.07	.77	LP
Institutional Repository for sharing of Research	114	2.18	.75	LP
Publication Software	114	2.16	.83	LP
<b>Cluster Mean</b>	<b>114</b>	<b>2.13</b>	<b>.79</b>	
<b>Item Statements</b>				
Technology increase my active engagement skills in the class.	114	3.24	.73	HP
Having access to learning resources online makes me skip classes	114	2.15	.92	LP

Technology makes me feel connected to what is going on in the university.	114	3.40	.66	HP
Technology helps me feel connected to other students	114	3.39	.70	HP
Technology helps me feel connected to my teachers.	114	3.27	.71	HP
My teachers become distracted when mobile devices are used in the class	114	3.04	.81	MP
I wish my lecturers in the university would use and integrate more technology in their teaching.	114	3.46	.61	HP
I tend to be more engaged with my studies when I am using technology.	114	2.95	.80	MP
Using technology improves my grades	114	3.41	.59	HP
I am motivated to explore new topics using technology	114	3.63	.50	HP
Using technology in my studies will help improve my career	114	3.57	.51	HP
<b>Cluster Mean</b>	<b>114</b>	<b>3.23</b>	<b>.69</b>	
<b>General Research Process Skills</b>				
I understand that not all information you find on the net is accurate	114	3.48	.60	HP
I learn techniques to judge whether an internet site contains valid information	114	2.98	.68	MP
I double check relevant information properly before making use of it	114	3.39	.62	HP
I can collect data through interview schedule	114	3.29	.51	HP
I can gather data using questionnaire instrument	114	3.52	.54	HP
I have the ability to visualize ideas when writing	114	3.32	.51	HP
I have the ability to organize my writings	114	3.44	.55	HP
I can interpret results of my analysis accurately	114	3.21	.66	HP
<b>Cluster Mean</b>	<b>114</b>	<b>3.33</b>	<b>.58</b>	

LP= Low Possession (1.40-2.49); MP= Moderate Possession (2.50-3.19); HP = High Possession (3.20-4.00).

Results in Table 1 shows that on average students possess higher general research process skill with mean of 3.33 with SD .58 and very low skills in e-resources, software and visualization software with cluster mean of 2.13 and SD of .79.

**Research Question Two:** What is the difference between male and female graduate students level of ICT and research skills?

**Table 2: Mean and SD of Gender on graduate students' ICT and research skills.**

Gender	N	Mean	SD
Male	51	3.17	0.52
Female	63	2.58	0.38

The table reveals that male students have higher means (3.17) than their female counterparts (2.58). However, both means showed both genders possess ICT skills beyond the minimum level.

**Hypothesis One:** The influence of gender on graduate students' level of ICT and research skills is not significant.

**Table 3: Summary of t-test of Gender on graduate students' ICT and research skills**

Source of Variation	t-value	df	Sig. (2-tailed)
Equal variances assumed	6.93	112	.000
Equal variances not assumed	6.721		

Table 3 present an independent t-test result of gender on graduate students' ICT and research skills. The result shows that the influence of gender was significant in favor of male students with respect to their level of ICT and research skills  $t_{(2, 112)} = 6.93, p \leq 0.05$ .

**Research Question Three:** How do the ICT and research skills of graduate students vary by educational levels?

**Table 4: Mean and SD of ICT and research of master's and PhD Students**

Academic level	N	Mean	SD
Masters	78	2.62	0.37
Ph.D.	36	3.32	0.54

The result presented in Table 4 shows masters' students had a mean rating of ( $M=2.62, SD=0.37$ ) while the PhD students had a mean rating ( $M=3.32, SD=0.54$ ). This result indicates that the mean ICT and research skills of PhD students is higher than that of the master's students.

**Hypothesis Two:** The influence of educational level on graduate student's ICT and research skills is not significant.

**Table 5: Summary of t-test of academic level on graduate students' ICT and research skills**

Source of Variation	t-value	df	Sig. (2-tailed)
Equal variances assumed	-8.078	112	.000
Equal variances not assumed	-7.076		



Table 5 present an independent t-test result of academic level on graduate students' ICT and research skills. The result shows that educational level significantly influences students' level of ICT and research skills,  $t_{(2, 112)} = 8.078, p \leq 0.05$ .

**Research Question Four:** Which ICT and research skills does graduate students have the highest level of possession?

From Table 1, graduate students possess the highest level of possession of General research process skills with cluster mean of 3.33 compared to computer skills (2.73), resources / services (2.13) and technology item statements (3.23).

### III. DISCUSSION

Results in Table 1 showed that students possessed very low e-resource and services skills (mean = 2.13), moderate computer skills (mean = 2.73), high technology skills (mean = 3.23) and high general research process skills (mean = 3.33). From the results, it can be inferred that the skills that require infrastructure and facilities were the ones students recorded the lowest means on. This shows that these facilities are inadequate and as such students cannot fully possess and apply skills that involve the use of such resources in their research. This will affect the quality of their research. This agrees with Siddiquah & Salim in 2017, they stressed that Government and universities should increase their funding of academic programmes especially in ICT infrastructure. They envisioned this will go far in solving the ICT related challenges of students in schools.

From results in table 2, it revealed that male students have higher means (3.17) than their female counterparts (2.58). This contradicted the study of Basri, Alandejani, & Almadani (2018), who reported that gender influences the impact of ICT on students' academic performance in favor of females. Thus, the environment and kind of skill measured probably accounts for the disparities.

Research question three investigated graduate students ICT and research skills by educational levels. From the result, the mean rating of PhD students was higher than that of the master's degree students. This agrees with Ward, Bennett, & Bauer (2003), their study showed that according to students rating, continuous involvement in research improved research skills and sharpened learning abilities by a very large margin. Students agreed that their technical abilities were developed as a result of this academic activity and their skills improved with use. The Ph.D. students have taken up more research than the master's students and this plays out in their higher possession of these skills than the master's students.

Research question four investigated which ICT and research skills graduate students have the highest level of possession of. From Table 1, it showed that the highest level of skills is on General research process skills. All other skills require some kind of facility or infrastructure. This agrees

with the findings of Aduwa-Ogiegbaen & Iyamu (2005), their study showed that Nigeria needs infrastructure to support ICT, among these are Power (electricity). Furthermore, telecommunication facilities are necessary to ensure efficient deployment of ICT.

### IV. CONCLUSION

This study reveals the graduate students' level of possession of ICT and research skills, the possession based on gender and their academic level and also which skill the students had the highest possession. This work showed that even with the importance of ICT to improving research skills and research output, students do not yet possess in an appreciable level the skills necessary to bring the trends observed in developed countries down to Nigeria. It is therefore recommended that ICT facilities should be built and improved, and the necessary infrastructure, resources and services needed to improve both students and lecturers should be put in place to ensure better output. Agencies can also be set up to ensure compliance with these policies.

#### Declaration of Conflict of Interests

No conflicts of interest among the authors.

### REFERENCES

- [1]. Adeosun, O. (2010). Quality basic education development in Nigeria: Imperative for use of ICT. *Journal of International Cooperation in Education*, 13(2), 193-211.
- [2]. Aduwa-Ogiegbaen, S. E., & Iyamu, E. O. (2005). Using information and communication technology in secondary schools in Nigeria: Problems and prospects.
- [3]. Asanga, G. C., Ocheni, C. A., Adie, I. I., & Ndidigwe, J. C. (2019). Assessment of research skills of postgraduate students of faculty of education, University of Nigeria, Nsukka. *African Journal of Theory and Practice of Educational Research (AJTPER)*, 7, 97-106
- [4]. Basri, W. S., Alandejani, J. A., & Almadani, F. M. (2018). ICT Adoption Impact on Students' Academic Performance: Evidence from Saudi Universities. *Education Research International*, 1-9. doi:https://doi.org/10.1155/2018/1240197
- [5]. Bogoro, S. E. (2014). Institutionalization of research and development (R&D) as the launch pad for Nigeria's technological revolution. *62nd University of Ibadan Interdisciplinary Research Discourse*.
- [6]. John Hopkins Medicine. (2020). *Core Competencies for Postdoctoral Research Fellows*. Retrieved from John Hopkins Medicine: https://www.hopkinsmedicine.org/som/offices/pda/core\_competencies/
- [7]. Michalsons (2023). What is ICT? What is the meaning or definition of ICT? Retrieved from https://www.michalsons.com/blog/what-is-ict/2525

- [8]. Odu, I. (2019). UNN ranks 1st in Nigeria on quality research output. *Vanguard*. Retrieved February 25, 2020, from <https://www.vanguardngr.com>
- [9]. Oguguo, B. C. E., Okeke, A. O., Dave-Ugwu, P. O., Ocheni, C. A., Ugorji, C. O., Nwoji, H. N., & Ike, I. C. (2020). Assessment of ICT skills relevant for effective learning possessed by undergraduate students in University of Nigeria. *International Journal of Higher Education*, 9(4), 206-215. doi: 10.5430/ijhe.v9n4p206
- [10]. Okpala, H. N., Benneh, E. A., Sefu, A., & Kalule, E. (2017). Advancing the Information Literacy Skills of Postgraduate. *Journal of Applied Information Science and Technology*, 10(2), 163-181. Retrieved from <https://jaistonline.org/10vol2/18.pdf>
- [11]. Rouse, M. (2023). What is ICT? Retrieved from <https://www.techopedia.com/definition/24152/information-and-communications-technology-ict>
- [12]. Scholarify.in. (2019). *Application of ICT in Research, Role and Tools of ICT*. Retrieved from Scholarify.in: <https://www.scholarify.in/application-of-ict-in-research/>
- [13]. Siddiquah, A., & Salim, Z. (2017). The ICT Facilities, Skills, Usage, and the Problems Faced by the Students of Higher Education. *EURASIA Journal of Mathematics Science and Technology Education*, 13(8), 4987-4994. doi:4987-4994
- [14]. UNESCO. (2014). . *Information and communication technology (ICT) in education in Asia: A comparative analysis of ICT integration and e-readiness in schools across Asia*. Montreal: UNESCO Institute for Statistics. Retrieved from <http://www.uis.unesco.org/Communication/Documents/ICT-asia-en.pdf>
- [15]. UNICEF. (2018). *Communication for Development (C4D)*. Retrieved from Unicef: [https://www.unicef.org/cbsc/index\\_90242.html](https://www.unicef.org/cbsc/index_90242.html)
- [16]. UNN School of Postgraduate Studies (SPGS). (2020). University of Nigeria SPGS Statistics. UNN SPGS Statistics Unit.
- [17]. Ward, C., Bennett, J., & Bauer, K. (2003). *Content analysis of undergraduate research student evaluations*. Unpublished Report. Retrieved from <http://www.udel.edu/RAIRE/Content.pdf>