



DIGITAL SKILLS AS PREDICTORS OF TECHNOLOGY-DRIVEN RESEARCH ABILITY OF POSTGRADUATES IN THE UNIVERSITY OF CALABAR, CALABAR, CROSS RIVER STATE, NIGERIA

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Abstract

The study investigated digital skills as predictors of the technology-driven research ability of postgraduates at the University of Calabar, Cross River State, Nigeria. Two research questions were formulated to guide the study in line with the corresponding hypotheses. A correlational design was adopted for the study, and a stratified random sampling technique was used to obtain a sample of 400 postgraduates in the University of Calabar. Data for the analysis was collected using questionnaires titled Web-Based Skills Questionnaire (WBSQ), Computer Literacy Skills Questionnaire (CLSQ), and Technology-Driven Research Ability Questionnaire (TDRAQ). Cronbach's Alpha was used to establish the reliability of the instruments. It yielded coefficients of .72, .78, and .81. The study questions were answered using mean and standard deviation, and hypotheses were subsequently tested using simple linear regression analysis. The findings revealed that web-based skills significantly predict the technology-driven research ability of postgraduates, and computer literacy skills significantly predict the technology-driven research ability of postgraduates. It was concluded that digital skills significantly predict the technology-driven research ability of postgraduates at the University of Calabar. Based on this study's findings, it was suggested that universities incorporate web-based skills training into postgraduate courses to improve students' research abilities.

Keywords: Web-based skills, Computer literacy skills, Technology-driven research ability

Introduction

In the modern academic world, incorporating technology into education has changed assessment and research methodologies, particularly for postgraduate students. With the rapid advancement of digital tools and platforms, mastering digital skills has become essential for success in postgraduate programmes. Digital skills are a broad set of competences that allow people to efficiently explore, assess, and generate information utilising digital technology. Digital skills are

the fundamental understanding of how to interact with a computer and its programs and make it perform what you want in real time.

Digital competence is the capacity to find, organise, comprehend, analyse, and produce knowledge using digital technology (Sousa & Rocha, 2019). Kumar et al. (2021) state that digital learning includes various components, tools, and applications that assist and empower instructors and students, such as online courses, blended or hybrid learning, and digital material and resources. Digital literacy is comprehending and successfully using digital technology in everyday work. Currently, it appears unavoidable that the use and reliance on digital technology will continue to rise in unprecedented numbers. While reading books and paper materials and manual writing remain critically important, this current age may constitute a watershed moment in the march towards digital dominance (Hassan, 2020).

Artificial Intelligence (AI) represents a rapidly advancing field within computer science, focused on developing machines capable of executing tasks traditionally performed by humans. Its integration in the healthcare, finance, and transportation sectors highlights its potential for enhancing efficiency and precision while raising ethical concerns regarding employment displacement and biased decision-making. Consequently, the ethical implications of AI must be rigorously addressed to ensure its beneficial integration into society. Online databases, cloud storage, and collaborative tools have streamlined data collection, analysis, and sharing. Postgraduate students who utilise these technologies can conduct more efficient and comprehensive research. Moreover, digital skills facilitate access to a wealth of information, allowing students to stay abreast of the latest developments in their various disciplines (West et al., 2019).

It thus becomes beneficial to provide today's postgraduates with the necessary tools, understanding, and practice in using digital technologies to ensure that they are not left behind from what is potentially the 21st-century reality in research and other academic endeavours, if not highly likely, shift towards technological-based research. Postgraduate students should be introduced to good research techniques and taught how to utilise them appropriately and professionally (Phillips & Johnson, 2022). Lecturers must teach ideas and procedures that allow postgraduate students to work with any digital device and quickly acclimate to new technology while utilising the skills and concepts they have learnt to research. Digital technology has transformed the globe, but the innovation propelling some rich countries forward threatens to leave underdeveloped countries behind. As technology rapidly affects the education system, many individuals are being excluded due to the more dominant need for digital or computer skills (Susskind & Susskind, 2022).

Despite the clear advantages, many postgraduate students encounter challenges in acquiring and applying digital skills. A significant hurdle is the varying levels of digital literacy among postgraduate students. The society characterised rapid technological advancement, and digital skills have become essential for effective research within the educational sector. The poor digital skills extend beyond individual students; they affect educational institutions, societal progress, and technology development. The educational sector has increasingly adopted technology-driven methods for research and other educational activities. The online assessments, digital portfolios, and data analytics are commonplace, enhancing the learning experience and providing valuable insights into student performance (Hooda et al., 2022). Therefore, students and educators lacking digital skills would find adapting to this innovative technology challenging.

The Inadequate digital skills could influence inaccurate research knowledge and abilities. Educators not proficient in digital assessment tools may misinterpret data or fail to utilise

available features that enhance evaluation (Ajah & Chigozie-Okwum, 2019). This may result in misalignment between teaching methods and student needs, ultimately compromising the educational outcomes of students. Students who struggle with technological knowledge may not perform adequately in online assessments to the best of their abilities, leading to evaluations that cannot survive internal and external validity apart from not accurately reflecting their knowledge or potential. The reliance on digital resources for research means that students must be knowledgeable at locating, evaluating, and synthesising information from diverse online platforms (Nwachukwu, Ugwu, & Wogu, 2021). Students lacking these skills may produce substandard research, which can negatively impact their academic pursuit and diminish the overall quality of research output within educational institutions (Ogunode et al., 2024).

Insufficient digital skills affect not only students but also the broader society. Economy-driven knowledge, the ability to leverage technology for research, is crucial for informed decision-making and societal progress. The workforce that lacks digital knowledge may struggle to adapt to modern-day industrial demands, leading to a skills gap that hampers economic growth. Society is increasingly dependent on data-driven insights to solve complex societal issues, for example, public health, environmental challenges, and economic differences. Inadequate research knowledge resulting from poor digital skills can hinder progress. This can perpetuate existing differences, as students without access to technology or the skills to use it are left behind (Fang et al., 2019).

Developing new technologies and processes is strongly dependent on research and innovation. Poor digital skills among academics can discourage creativity and impede the development of new ideas. When researchers cannot use digital technologies successfully, their ability to conduct thorough investigations suffers, leading to a slower rate of technological improvement (Amankwah-Amoah et al., 2021). Furthermore, a lack of digital abilities might impede research thinking and approach consistency. If a sizable segment of the research community cannot connect with developing technology, vital insights and novel solutions may be lost. This impacts the technology environment and can hinder societal progress by neglecting to approach urgent challenges via different and new perspectives (Kalkanci et al., 2019).

As a result, the study examined digital skills as predictors of technology-driven research capacity among postgraduate students at the University of Calabar in Calabar, Cross River State. Postgraduate students' critical digital abilities for technology-driven research include various competencies, such as web-based skills and computer literacy. Tsai (2020) defines web-based skills as the talents and competencies necessary to effectively use the internet, web applications, and online resources for communication, collaboration, learning, and research. These abilities include navigating web platforms, utilising search engines, managing digital information, comprehending online privacy and security, and using web-based technologies for productivity and collaboration (Wedlake et al., 2019). They cover the technical and cognitive abilities required to successfully access, analyse, and utilise online resources. They are consistent with the wider idea of digital literacy, which emphasises the important use of technology for information retrieval, communication, and problem-solving (Onyanha, 2023).

Among students, web-based abilities are vital owing to the increasing reliance on technology in education and professional situations. These abilities provide access to large amounts of online knowledge, improve learning experiences through tools such as virtual laboratories and collaborative platforms, and facilitate successful communication and cooperation via email, online meetings, and cloud-based applications. Berniak-Woźny et al. (2023) suggest that promoting technical competency prepares pupils for businesses prioritising

technology. Web-based skills are especially important for postgraduate students looking to improve their research talents. They make information retrieval easier by using modern search engines, internet databases, and academic networks.

The above abilities also allow for critical source reliability and relevance evaluation, improved access to collaborative technologies for working with peers and experts worldwide, and sophisticated data analysis and visualisation utilising programs like SPSS, R, and Tableau (Thornhill-Miller et al., 2023). Furthermore, web-based platforms make publishing and sharing research findings with a worldwide audience easier. Mastering these abilities allows students to maximise their academic and research potential, contributing to new solutions and information dissemination in their particular sectors (Tariq, 2024).

Similarly, computer literacy implies the capacity to use computer systems, software, and applications successfully for a wide range of tasks. These competencies include fundamental computer skills, file management, productivity software use (e.g., word processors, spreadsheets, presentation tools), and comprehension of internet functioning. More advanced computer literacy abilities include diagnosing technological problems, programming, and utilising specialised software for academic or professional objectives (Stopar & Bartol, 2019). Computer literacy is the knowledge and skills required to use computer technology efficiently to accomplish activities, solve issues, and support learning. It entails knowledge of technology, software, and digital tools and thinking critically about utilising them. The above is consistent with digital literacy, which promotes the safe, responsible, and effective use of technology for communication, learning, and problem-solving (Falloon, 2020).

Computer literacy knowledge is essential for pupils since technology plays such an important role in education and jobs. These abilities help students learn by allowing them to access online educational materials, create and edit documents, and interact with virtual learning environments. They also facilitate successful communication via email, internet collaboration tools, and multimedia presentations. Furthermore, computer literacy prepares students for a technologically driven society, increasing their adaptability and competitiveness in the workplace (Coetzee, 2023).

Knowledge of computers substantially impacts students' research ability when conducting postgraduate research at institutions. It makes it easier to access internet databases, academic publications, and specialised software used for performing literature reviews, data collecting, and analysis (Linnenluecke et al., 2020). Proficiency with statistical tools such as SPSS, MATLAB, or Python improves data analysis accuracy and efficiency (Ozgur et al., 2021). Furthermore, computer literacy enables the successful distribution of research findings through the preparation of well-structured reports, presentations, and publications. Postgraduate students who gain good computer literacy abilities can maximise their research potential, participate in creative academic work, and make substantial contributions to their fields of study (George, 2023).

While much research is carried out concerning digital skills for technology-driven research, this regrettable scenario of flawed technology-driven research must not be condoned, especially given the importance of digital skills as stated in the literature. This present study seeks to answer the question: Could digital skills (web-based skills and computer literacy skills) be used to predict the poor technology-driven research ability of postgraduate students at the University of Calabar, Cross River State?

Research Questions

The following research questions led the study:

1. To what extent do web-based skills predict the technology-driven research ability of postgraduate students at the University of Calabar?
2. To what extent do computer literacy skills predict the technology-driven research ability of postgraduate students at the University of Calabar?

Hypotheses

1. Web-based skills do not significantly predict the technology-driven research ability of postgraduate students at the University of Calabar.
2. Computer literacy skills do not significantly predict the technology-driven research ability of postgraduate students at the University of Calabar.

Methodology

The study used a correlational research design. The number of postgraduates at the University of Calabar is 2,455. Simple random sampling procedures were used to choose a sample of 16.29% (400) postgraduates. The questionnaires utilised for data collection were termed "Web-Based Skills Questionnaire (WBSQ), Computer Literacy Skills Questionnaire (CLSQ), and Technology-Driven Research Ability Questionnaire (TDRAQ)". The questionnaire received favourable feedback with enhanced four-point rating scales ranging from strongly agree (SA = 4) to disagree (SD = 1) strongly. Experts in measuring and assessment validated the instruments for content and face validity. Cronbach Alpha method was used to establish the reliability, which yielded coefficients of .72, .78 and .81 for web-based skills, computer literacy skills and technology-driven research ability. Mean and standard deviation were used to answer the research questions, and Simple linear regression was used to test the hypotheses at a 0.05 level of significance.

Results

Research question 1

To what extent do web-based skills predict the technology-driven research ability of postgraduates at the University of Calabar?

Table 1 Mean ratings with standard deviations of Web-based skills (n = 400).

S/N	"Item Statement"	\bar{X}	SD	Remark
1	I am proficient in using online search engines to find academic information	2.81	1.06	Agree
2	I can evaluate the reliability and relevance of web-based information for academic purposes	3.04	0.96	Agree
3	I am skilled in using online academic databases (e.g., JSTOR, Scopus) to gather research materials	3.07	0.92	Agree
4	I can utilise web-based tools to organise and schedule my research activities effectively	2.98	1.03	Agree
5	I am skilled in accessing and participating in online academic forums, webinars, or virtual conferences	3.08	1.01	Agree
	Grand mean	2.99	0.99	Agree
	Criterion mean value = 2.50. Mean values above 2.50 indicate agree. Mean values below 2.50 indicate disagree.			

As shown in Table 1, the study's findings illustrate how well web-based abilities predict technology-driven research capacity among postgraduates at the University of Calabar. It should be noted that items 1–5 all received mean ratings of 2.50 or above, indicating that respondents agreed with all five items on web-based skills to forecast the technology-driven research capacity of postgraduates.

Research question 2

To what extent do computer literacy skills predict the technology-driven research ability of postgraduates at the University of Calabar?

TABLE 2
Mean ratings with standard deviations of Web-based skills (n = 400).

S/N	Item Statement	\bar{X}	SD	Remark
6	I am proficient in using basic computer applications, such as word processors (e.g., Microsoft Word)	3.61	0.43	Agree
7	I am confident in creating and editing spreadsheets using software like Microsoft Excel or Google Sheets	3.39	1.12	Agree
8	I can effectively create and deliver presentations using tools like PowerPoint or Google Slides	2.07	1.02	Agree
9	I have the skills to install and use new software applications relevant to my academic work	2.61	0.99	Agree
10	I can effectively use graphic or data visualization tools, such as Canva, Tableau, or SPSS	3.13	0.98	Agree
	Grand mean	2.96	0.91	Agree
	Criterion mean value = 2.50. Mean values above 2.50 indicate agree. Mean values below 2.50 indicate disagree.			

The result of the study, as shown in Table 2, indicates the extent to which computer literacy skills have predicted the technology-driven research ability of postgraduates at the University of Calabar. It could be noted that items 6 - 10 all had a mean rating of 2.50 and above, which shows the respondents agreed with all the five items on computer literacy skills to predict the technology-driven research ability of postgraduate students.

TABLE 3
Mean ratings with standard deviations of technology-driven research ability of postgraduate students (n = 400).

S/N	Item Statement	\bar{X}	SD	Remark
11	I am skilled in utilizing technology tools to design and conduct surveys (e.g., Google Forms, SurveyMonkey).	2.63	1.57	Agree
12	I regularly use plagiarism detection tools (e.g., Turnitin, Grammarly) to ensure the integrity of my research	3.54	1.97	Agree
13	I am adept at collaborating with peers using online platforms (e.g., Slack, Microsoft Teams) for research purposes	2.98	1.38	Agree
14	I can efficiently manage and organize research materials using cloud-based storage systems (e.g., Dropbox, Google Drive)	2.50	1.17	Agree
15	I am confident in adapting to new and emerging technologies that support my research activities	3.49	2.00	Agree
16	My ability to integrate technology in research significantly	3.93	2.21	Agree

	enhances my productivity and quality of academic work			
18	I can identify and apply the appropriate software for statistical, textual, or image analysis in my research	3.13	0.86	Agree
	Grand mean	3.17	1.59	Agree
	Criterion mean value = 2.50. Mean values above 2.50 indicate agree. Mean values below 2.50 indicate disagree.			

Table 3: Technology-driven research ability of the University of Calabar postgraduate students. The result of the study, as shown in Table 3, indicates the extent to which the technology-driven research ability of postgraduate students of the University of Calabar. It could be noted that items 10 - 18 all had a mean rating of 2.50 and above, which shows the respondents agreed with all eight items on the technology-driven research ability of postgraduate students.

Hypothesis one

Web-based skills do not significantly predict the technology-driven research ability of postgraduates at the University of Calabar. The explanatory variable is web-based skills, while the dependent variable is the technology-driven research ability of postgraduate students, both measured contiguously.

TABLE 4 Summary of regression analysis of the prediction of web-based skills on the technology-driven research ability of postgraduates

Model	Unstandardised Coefficients		Standardised Coefficients	t	Sig.
	B	Std. Error	Beta		
Constant)	9.283	.484		19.160	.000
Web-based skills	.612	.023	.712	27.177	.000

$R = .712$; $R^2 = .507$; Adjusted $R^2 = .506$; F-ratio (1,398) = 738.612*, P-value = .000

Simple linear regression was used to test this hypothesis, and the outcomes are presented in Table 4. A simple regression investigation was employed to investigate how well web-based skills predict the technology-driven research ability of postgraduates sampled for the study. The R^2 was .507, indicating that 50.7% of the variance in the technology-driven research ability of postgraduate students was explained by web-based skills. The results were statistically significant $F(1, 398) = 738.612$, $p < .05$. Here, the null hypothesis that web-based skills do not significantly predict the technology-driven research ability of postgraduate students sampled for the study was rejected. In other words, web-based skills significantly predict the technology-driven research ability of postgraduates at the University of Calabar.

Hypothesis Two

Computer literacy skills do not significantly predict technology-driven research ability of postgraduates in University of Calabar. The explanatory variable is computer literacy skills while the dependent variable is technology-driven research ability of postgraduate students, both measured contiguously.

Table 5 Summary of regression analysis of the prediction of computer literacy skills on technology-driven research ability of postgraduates

Model	Unstandardised Coefficients		Standardised Coefficients	t	Sig.
	B	Std. Error	Beta		
Constant)	9.408	.514		18.291	.000
Digital skills	.603	.024	.687	25.338	.000

R = .687, R² = .472, Adjusted R² = .471, F-ratio (1,398) = 642.020*, P-value = .000

To test this hypothesis, simple linear regression was used, and the results are presented in Table 5. Simple regression analysis was employed to determine how well computer literacy skills predict the technology-driven research ability of postgraduate students sampled for the study. The R² was .472, indicating that computer literacy skills explained 47.2% of the technology-driven research ability of postgraduate students. The results were statistically significant F(1, 398) = 642.020, p<.05. Here, the null hypothesis that computer literacy skills do not significantly predict the technology-driven research ability of postgraduate students sampled for the study was rejected. In other words, computer literacy skills significantly predict the technology-driven research ability of postgraduates at the University of Calabar.

Discussion

The study indicated that web-based abilities strongly predict technology-driven research abilities among postgraduate students. This finding emphasised the importance of digital competencies in current academic and professional settings. Students with web-based abilities may access and use various online resources, including academic databases, collaboration tools, and data analysis abilities, which are critical for conducting high-quality research. This link emphasises the need for educational institutions to incorporate web-based skill training into the postgraduate curriculum via targeted seminars and mentorship programs. Because these abilities are increasingly important for research and are transferable across other professional areas, developing them improves students' academic achievement and job prospects. Nevertheless, discrepancies in access to digital resources may cause inequities, prompting more research to build inclusive skill development methods. Prioritising these abilities allows institutions to equip their students better to meet the needs of technology-driven research and innovation.

This study's conclusion is consistent with the findings of Hatlevik et al. (2018), who investigated the relationship between web-based skills and increased research quality among postgraduate students. According to the findings, students with sophisticated web-based abilities are better prepared to undertake complicated tasks in technology-driven research, such as data interpretation, problem-solving, and online collaboration. Similarly, Bennett et al. (2020) discovered that students who lacked fundamental web-based abilities struggled with research that required virtual laboratories, interactive simulations, or online testing platforms, emphasising the predictive impact of digital skills in assessment results.

The discovery that computer literacy abilities strongly predict postgraduate students' technology-driven research capacity emphasises the critical relevance of digital competence in academic achievement. Computer literacy includes abilities like navigating software, organising digital files, and using productivity tools, all of which are necessary for performing effective and innovative research. This association emphasises the necessity of providing postgraduate students with these skills in order to improve their capacity to use sophisticated research tools, analyse data, and interact successfully in digital settings. Educational institutions must prioritise

computer literacy training in postgraduate programs to ensure that students are equipped to fulfil the needs of technology-driven research.

In addition, addressing possible inequities in access to digital resources and training is critical for creating fair chances for skill development. Universities can enable students to flourish academically while contributing significantly to technology-driven innovation by improving their computer literacy. This conclusion is consistent with that of Okeji et al. (2020), who evaluated the impact of computer literacy abilities on the research outputs of postgraduate students at Nigerian institutions. The researchers discovered that students with excellent computer literacy abilities were likelier to create high-quality articles and finish their theses on time. The study found that specific competencies, such as the capacity to perform literature reviews utilising online databases and fluency in research tools like SPSS and NVivo, were significant indicators of research success.

Conclusion and Recommendation

The findings of this study indicate a significant prediction of digital skills on the technology-driven research ability of postgraduates in the University of Calabar Cross River State, Nigeria. This highlights the critical role of digital skills competencies in equipping postgraduate students to conduct, document, and present research effectively in accordance with academic standards.

1. The universities should integrate web-based skills training into postgraduate curricula to enhance students' research abilities.
2. The institutions must provide comprehensive computer literacy programs covering essential software and research tools.
3. Special technical support, workshops, and access to software should be offered to sustain and improve students' research capabilities.
4. Postgraduates should actively use and be trained in digital research tools as part of their coursework and research projects.
5. The universities should periodically assess and update students' technological skills while offering certifications to encourage improvement.

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