UNIJERPS
Unizik Journal of Educational Research and Policy Studies VOL.19 (4);
January-June, 2025 https://unijerps.org
2023 Impact Factor: **6.834;** 2022 ***Impact Factor***: 5.156; ***2021 Impact Factor: 5.641;***
2020 Impact Factor: 5.355. *Indexing and Impact Factor URL: http://sjifactor.com/passport.php?id=21363*

GENDER VARIATIONS IN UNDERGRADUATE STUDENTS' ICT SELF-EFFICACY AND USAGE IN RESEARCH IN FEDERAL UNIVERSITIES IN SOUTH-EAST, NIGERIA

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ABSTRACT

The study examined gender variations in undergraduate students' ICT self-efficacy and usage in research in Federal Universities in South-East Nigeria. Two research questions and two hypotheses guided the study. This study adopted descriptive survey design. The population of the study comprised all undergraduate students of faculty of the social sciences in federal Universities in South-East Nigeria. The sample size for this study was 360 students selected randomly. Two instruments were used for data collection. The instruments are ICT Self-Efficacy Scale (ICTSES) and ICT Research Usage Scale (ICTRUS) developed by the researchers. The instruments were validated by three experts; two from the department of social science education and one in the Department of Science Education (Measurement and Evaluation Unit), Faculty of Education, University of Nigeria, Nsukka. The instruments were trial tested and data gotten were analyzed using Cronbach Alpha which yielded reliability indices of 0.88 and 0.73 for the three instruments. The data collected for this study were analyzed and presented using percentage and mean and standard deviation and the hypotheses were tested using independent sample t-test at 0.05 level of significance. The study found that there is a significant gender variation in undergraduate students' ICT self-efficacy and usage of ICT in research and the level of students' self-efficacy in the use of ICT is high. The level of students' usage of ICT in research in federal Universities in South-East, Nigeria is low and there is also a significant variation in usage based on gender. The study recommends that Universities should establish a clear plan to integrate ICT tools into research and academic programs, ensuring equal opportunity for all students irrespective of gender.

Keywords: Self-efficacy, Usage, Gender, ICT

Introduction

Universities are regarded as modern sources of knowledge and innovation. In higher education institutions, research and learning are intertwined, as participation in research endeavors always enhances learning. Therefore, the university grading system requires students to produce compulsory research outputs to meet graduation requirements, through assignments, term papers, seminars, group projects, field research, and notably, the final year project report. As a result, for any student to successfully complete their academic program in any field, they must engage in research activities pertinent to that field. Traditionally, students dedicated countless hours in libraries, immersing themselves in old books, turning the pages of yellowed texts, and searching through printed journals for relevant information. Recently, research has shifted from a dependence on traditional books and manual data collection to utilizing Information Communication Technology (ICT) tools (Alkasim, Adamu, Sufi, & Adamu, 2021). This transition from exhaustive library searches to immediate access to online databases and digital libraries has increased the pace of research, thereby highlighting the significance of ICT in research endeavors.

In higher education, the integration of ICT has become an essential element of the research process for students. As a result, governments and other stakeholders in the education sector, including university administrations, have invested millions of naira in the acquisition and implementation of ICT tools over the last decades (Lawrence, 2015). This suggests that most universities, including those located in South-East (SE) Nigeria, should have embraced ICT to enhance education, particularly in research. The implementation of ICT in academic research has greatly contributed to the advancement and evolution of the research process, transitioning from primitive methods to virtual interaction between researchers and subjects (Bala and Suleiman, 2020).

The use of ICT in research encompasses the employment of electronic tools and resources for various stages of research activities, such as pre-data analysis, data analysis, and post-data analysis. Information and Communication Technology is advantageous because of the speed, efficiency, and access to a wide range of sources it offers in research. Despite the benefits of ICT in promoting effective and efficient research, the actual utilization of ICT tools among students in universities in South-East Nigeria remains modest and varies between institutions. At the University of Nigeria Nsukka, facilities like the Center for Distance and E-learning, Nnamdi Azikiwe Library, MTN library, and various Faculty and Department ICT units are meant to provide students with opportunities to access available ICT tools for research. However, many students primarily encounter these tools for examination-related purposes. Numerous students rely on their personal devices and cybercafés for their research needs. Similarly, students at Nnamdi Azikiwe University Awka also use the university library ICT center for General studies exams. This may be the situation for students in other federal universities in South-East Nigeria as well. Existing

literature presents differing findings concerning ICT usage in research. Ankamah (2019) indicated that many students often utilize ICT facilities such as e-resources, communication and collaboration tools, citation and bibliography applications, data analysis software, and platforms for sharing or publishing in their research activities. Arcila-Calderón, Piñuel-Raigada, and Calderín-Cruz (2013) noted that students engage with ICT applications like databases and digital scientific journals for their research tasks. In contrast, Adeagbo, van-Deventer, Asubiojo, and Pienaar (2016) reported a low level of ICT usage in research among researchers. Atuase (2016) found minimal use of ICT resources in research by postgraduate students in Ghana. Le-Thi (2020) observed low ICT utilization in research within tertiary institutions. Egoeze, Misra, and Akman (2014) identified low usage linked to factors such as limited access, inadequate speed, insufficient computers available for users, and unstable power supply. While some researchers have explored related subjects, particularly the role of ICT resources utilized by academics (Egoeze, Misra & Akman, 2014; Ifeakor, 2018; Itighise & Babayemi, 2018; Nwana, Ofoegbu & Egbe, 2017; Okoli & Osuafor, 2018; Le-Thi, 2020), there is a notable lack of empirical data regarding ICT usage for research among university students. For students to effectively engage with ICT for research in higher education, they need to possess confidence in their ability to use ICT tools.

ICT self-efficacy entails the capability to effectively handle ICT tools and software for research objectives. It implies an individual's competence in utilizing a computer effectively to achieve a research goal. According to Wang and Zhao (2021), ICT self-efficacy is defined as users' assessment of their abilities to master and utilize technologies, including multimedia, computers, and the internet, to perform tasks. As internet technology has advanced, an increasing number of students have gradually been adopting ICT for research activities, leading to a shift in focus towards computer self-efficacy. However, limited experience with ICT tools, inadequate training, and a lack of practice among students contribute to their uncertainty. Few students have cultivated the essential skills needed to navigate digital resources, handle data, and apply software. Moreover, anxiety about technology, apprehension, and the perceived complexity of ICT tools further diminish self-efficacy. Past research has indicated that ICT self-efficacy is a vital factor in students' educational and research activities (Aesaert & van Braak, 2014; Moreira-Fontán et al., 2019; Thomas, Egbro, & Osaide, 2014; Aslan, & Zhu, 2016). Thomas, Egbro, and Osaide (2014) highlight that, students who have higher self-efficacy regarding technology usage are more likely to embrace technological tools and application software. Existing literature has yet to emphasize students' self-efficacy in employing ICT for research within universities in South-East Nigeria.

The relationship between ICT self-efficacy and its usage is affected by gender. Gender refers to the social distinctions associated with being male or female, extending beyond biological differences inherent in men and women. Adigun,

Onihunwa, Irunokhai, Sada, and Adesina (2015) suggest that gender encompasses a broad spectrum of biological, behavioral, physical, and mental traits that differentiate males from females. Research has demonstrated a gender disparity in ICT self-efficacy and usage (Omar & Firat, 2019; Wong, Teo & Russo, 2012; Scherer & Siddiq, 2015; Ezegbe, Igbokwe, Ezenwaji, & Ugwu, 2016; Lee, Czaja, Moxley, Sharit, Boot, Charness & Rogers, 2019; Altun & Akyildiz, 2017; Tam, Chan & Lai, 2020). Ezegbe, Igbokwe, Ezenwaji, and Ugwu (2016) assert that a significant number of males have a more favorable perception of ICT and use it to enhance their learning. Omar and Firat (2019) find that male teachers possess greater technological knowledge compared to their female counterparts. In a different context, Wong, Teo and Russo (2012) conclude that gender did not have a moderating effect on perceived usefulness and attitude towards computer usage among pre-service teachers in Malaysia. Scherer and Siddiq (2015) contend that there exists a gender gap in technology-related self-efficacy. Altun and Akyildiz (2017) indicate that educators across various disciplines may have differing self-efficacy needs for the incorporation of technology in education. Stone (2020) found significant variations between males and females concerning confidence with computers and perceived self-efficacy in certain word processing and spreadsheet tasks. Male participants were shown to have notably more prior experience with programming and received considerably more encouragement from family and friends to engage with computers. Abosede, Issa, and Wilfred-Bonse (2024) reported that teachers' self-efficacy regarding ICT use for teaching in Abuja metropolis is at an average level, and that the gender of teachers does not significantly impact their professional development in technology. While considerable advancements have been achieved in the study of ICT self-efficacy, a significant gender gap in technological access persists. Many studies show conflicting findings regarding gender disparities in ICT self-efficacy and usage; some suggest females have the advantage, whereas others indicate males have the upper hand (Siddiq & Scherer, 2019a). Nevertheless, this study explored differences in ICT self-efficacy and utilization among university students in South-East Nigeria.

Information and Communication Technology significantly impacts nearly every sector of human activity, changing and shaping people's lives. To a considerable degree, ICT profoundly affects the educational landscape. Given the demands of research and development, higher education institutions in developing countries like Nigeria are working to enhance students' ICT skills to optimize research outcomes. Recent trends in research processes have witnessed remarkable changes and transformations due to the plethora of ICT innovations introduced for research purposes. The use of ICT has also led to shifts in research methodologies at all levels, with resources frequently accessed online, and processes such as data collection, analysis, and result dissemination now transformed. Despite the advantages of ICT in promoting effective and efficient research, its utilization among university students in South-East Nigeria remains limited and varies by institution. The low engagement

with ICT for research can be linked to insufficient skills in using these tools. Students encounter difficulties in accessing specialized software, databases, and digital libraries because of subscription limitations and restricted institutional resources. Moreover, issues like power outages, outdated technology, and a lack of technical support further hinder access. Additionally, inadequate training and insufficient practice among students lead to heightened self-doubt. A small number of students have acquired the essential skills to navigate digital resources, manage data, and utilize software applications. Furthermore, anxiety around technology, feelings of apprehension, and the perceived complexity of ICT tools diminish self-efficacy and reinforce gender stereotypes concerning technology use. This study examined gender variations in self-efficacy and ICT usage in research among students in Federal Universities in South-East Nigeria.

Purpose of the study

The general purpose of the study was to investigate the gender variation in self-efficacy and usage of Information and Communication Technology in research among students in Federal Universities in South-East Nigeria. Specifically, the study sought to determine;

1. The variation in the level of students' self-efficacy in the use of ICT in Universities in South-East Nigeria, based on gender
2. The variation in the level of students' usage of ICT in research in Universities in South-East Nigeria based on gender

Research questions

The study was guided by the following research questions

1. What is the variation in the level of students' self-efficacy in the use of ICT in Universities in South-East Nigeria, based on gender?
2. What is the variation in the level of students' usage of ICT in research in Universities in South-East Nigeria based on gender?

Hypotheses

H_O1: There is no significant difference in the level of students' self-efficacy in the use of ICT in Universities in South-East Nigeria, based on gender

H_O2: There is no significant difference in the level of students' usage of ICT in research in Universities in South-East Nigeria based on gender

Methods

This study adopted descriptive survey design. According to Nworgu (2015) descriptive survey design is one in which a group of people or items is studied by collecting and analyzing data from only few people or items considered to be representation of the entire group. The study was carried out in the Federal Universities in South-East Nigeria. The population of the study was five thousand, three hundred and forty-two (5342) final year students in social science faculties in Federal Universities in South-East Nigeria. Out of the 5342 students, 2735 are females while 2607 are males. The sample size for this study was 360 students. Purposive sampling technique was used to sample two states with federal universities that have social science faculties. Anambra

and Enugu states were sampled. The Federal universities in these states are Nnamdi Azikiwe Universiity, Awka and University of Nigeria, Nsukka. Simple random sampling was used to sample 180 students from each university. Two instruments were used for data collection. The instruments are ICT Self-Efficacy Scale (ICTSES) and ICT Research Usage Scale (ICTRUS) developed by the researchers. The instruments were validated by three experts from the University of Nigeria, Nsukka. The data collected from trial testing of the scale were analyzed using Cronbach Alpha. It yielded reliability indices of 0.88 and 0.73 for the two instruments. The instrument for data collection was administered directly to the sampled students in their respective Universities by the researchers with 99.72% instruments returned valid. The data collected for this study was analyzed and presented using percentage and mean and standard deviation and the hypotheses were tested using independent sample t-test at 0.05 level of significance.

Results

Research question 1: What is the variation in the level of students' self-efficacy in the use of ICT in Universities in South-East Nigeria, based on gender?

Table 1: Mean rating and standard deviation of respondents on the level of students' self-efficacy in the use of ICT for research based on gender

Gender	N	Mean	SD	D
Male	171	2.77	0.72	High
Female	188	2.51	0.81	High

Table 1 above shows the mean responses of male and female students on the level of students' self-efficacy in the use of ICT for research. The overall mean of male students is 2.77 which shows the level of male students' self-efficacy in the use of ICT for in Universities in South-East Nigeria is high. Also, the overall mean of female students is 2.51. This also implies the level of female students' self-efficacy in the use of ICT for research in Universities in South-East Nigeria is high.

Hypothesis 1: There is no significant difference in the mean responses of students on the level of students' self-efficacy in the use of ICT for research based on gender**.**

Table 2: summary of t-test analysis on the level of students' self-efficacy in the use of ICT for research based on gender

Gender	N	Mean	SD	T	Df	Sig. (2-tailed)
Male	171	2.77	0.72	2.29	357	0.023
Female	188	2.51	0.81			

The analysis on table 2 shows that the t-cal at 2.29 is significant at 0.023 which is less than the 0.05 level of significance. Therefore, null hypothesis is rejected. Thus,

there is a significant variation in the mean responses of male and female students on the level of students' self-efficacy in the use of ICT for research. This implies that the variation in the level of self-efficacy of male and female students in the use of ICT in research is significant.

Research question 2: What is the variation in the level of students' usage of ICT in research in Universities in South-East Nigeria based on gender?

Table 3: mean rating and standard deviation of respondents on the level of students' usage of ICT in research in Universities in South-East, Nigeria based on gender

Gender	N	Mean	SD	D
Male	171	2.27	0.35	Low
Female	188	2.09	0.34	Low

Table 3 shows on the responses of male and female students on the level of students' usage of ICT for research in Universities in South-East, Nigeria. The mean scores of male and female students are 2.27 and 2.09 respectively. These mean scores are below the 2.50 benchmark for accepting a mean. This implies that level of male and female students' usage of ICT in research in Universities in South-East, Nigeria is low.

Hypothesis 2: There is no significant difference in the mean responses of students on the level of ICT usage in research in Universities in South-East, Nigeria based on gender

Table 4: Summary of t-test analysis on the level of ICT usage in research in Universities in South-East, Nigeria based on gender

Gender	N	Mean	SD	t	Df	Sig. (2-tailed)
Male	171	2.27	0.35	5.56	357	0.00
Female	188	2.09	0.34			

The analysis on table 4 shows that the t-cal at 5.56 is significant at 0.00 which is less than the 0.05 level of significance. Therefore, null hypothesis is rejected. Thus, there is a significant difference in the mean responses of male and female students on the level of ICT usage in research in Universities in South-East, Nigeria. This therefore implies that the differences in the level of ICT usage in research among male and female students in Universities in South-East, Nigeria is significant.

Discussion

The self-efficacy levels of male and female students in utilizing ICT for research in universities located in South-East Nigeria are high. There exists a significant variation in the mean responses between male and female students regarding their self-efficacy in using ICT for research purposes. This suggests that male students possess a higher level of self-efficacy in utilizing ICT for research compared to their female

counterparts. Factors such as societal stereotypes, unequal access to ICT resources, and differing educational experiences may contribute to this disparity. This indicates that female students require focused support to close the self-efficacy gap, thereby ensuring equal research opportunities. This result aligns with Stone (2020), who found that gender differences continue to exist in the perception of certain ICT skills, despite a small effect size. Males exhibited more confidence than females in their fundamental computing abilities, particularly in tasks such as installing and uninstalling programs, managing files, and scanning for viruses. Additionally, Ahmed and Hassan (2022) noted that while both male and female students display high self-efficacy, there is no significant difference in their self-efficacy concerning the use of ICT for learning purposes. Abosede, Issa, and Wilfred-Bonse (2024) indicated that the gender of teachers does not affect their technology professional development.

The level of ICT usage for research among male and female students in universities in South-East Nigeria is low. This limited engagement with ICT resources is attributed to inadequate access, impacting both genders similarly. Furthermore, there is a significant difference in the average responses of male and female students regarding their ICT usage levels in research contexts in these universities. This observation supports the findings of Mbagwu and Udo-anyanwu (2021), who reported that male lecturers displayed higher competence with ICT resources than their female counterparts. Similarly, Ahmed and Hassan (2022) highlighted a significant difference between male and female undergraduates in their usage of ICT for learning purposes. In addition, Busch in Stone (2020) identified notable gender differences concerning confidence with computers and perceived self-efficacy in certain word processing and spreadsheet tasks. Male participants were found to have considerably more hands-on experience with programming and received greater encouragement from family and friends to engage with computers. However, Aslan and Zhu (2016) presented contrasting findings, revealing that female students view themselves as more skilled than males in communication-related tasks (such as email and instant messaging), while male students consider themselves more skilled with technically focused tasks (like file management and searching). Furthermore, Stone and Madigan (2007) discovered that first-year students of both genders perceived their ICT skills to be higher than their actual skills, with no significant differences found in actual ICT competencies across genders. Unegbu et al. (2015) also found that both male and female students utilize ICT tools at equivalent rates.

Conclusion

The research investigated differences in ICT self-efficacy and usage for research purposes among students in South-East Nigeria. The findings revealed significant variation in students' ICT self-efficacy and research usage between federal universities in the region. This highlights the existing inequalities in ICT self-efficacy and research engagement between male and female students, which can significantly affect their academic success, research output, and future

job opportunities. It is essential for stakeholders, including educators, policymakers, and university leaders, to create and implement focused strategies that promote gender inclusivity in the use of ICT. This could be achieved through initiatives like training programs, workshops, and mentorship opportunities that specifically address the unique needs and challenges faced by female students. Consequently, a more inclusive and supportive academic environment will foster the development of necessary ICT skills and confidence in female students, enabling them to thrive academically and contribute positively to the research community.

Recommendations

The study offered the following suggestions based on its results:

1) Universities should create a comprehensive strategy to embed ICT tools in research and academic curricula, ensuring equal access for all students regardless of gender.

2) University ICT departments ought to conduct regular training sessions, webinars, and practical workshops to improve students' ICT proficiency and research skills. These training opportunities should be designed to cater to both male and female student needs.

3) Universities should invest in e-databases and ensure access to e-books, e-journals, and e-manuscripts to support academic and research activities, including access to quantitative data analysis tools like SPSS and qualitative analysis software like NVivo and Atlas.ti, so that both male and female students can utilize them effectively.

4) Universities ought to establish ICT support centers or helpdesks to assist students with ICT-related inquiries and difficulties, without regard to gender.

5) Universities should offer equal recognition and rewards, such as scholarships and awards, to both male and female students whose research contributions are exceptional.

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