mining Gender Digital Divide in the Internet Usage Patterns of Students of Tertiary Institutions in Katsina State, Nigeria

Mukhtar El-Kasim, PhD and Bishir Bala

Department of Mass Communication,
Ahmadu Bello University, Zaria

Abstract

Despite the recent phenomenal increase in the number of Internet users around the world and its increasingly recognized role in promoting development, it is becoming clear that substantial gender variation exists among its users. Using survey as a research method, this study examines gender differences in the Internet usage patterns of students of tertiary institutions in Katsina State, Nigeria, based on a sample of 377 respondents. The sample was selected from a population of 20,148 students using a stratified proportionate sampling procedure. Data for the study were collected using questionnaire. Descriptive statistics of frequency counts, simple percentages and inferential statistics of t-test were used for data analysis. The findings reveal that the respondents are heavy Internet users (with a usage rate of up to 98.13%). It also indicates that more male students (58.86%) use the Internet more than female students (41.14%). The study shows further that while male students primarily use the Internet for academic related activities (31.48%), their female counterpart mainly use it for social networking (26.49%). Results of the study also reveals that there is statistically significant gender difference in the Internet usage experience of the students. The study concludes that digital gender divide exists among students of tertiary institutions in Katsina with regard to their Internet usage habits. The research recommends, among other things, that higher education administrators should device effective institutional interventions and formulate pedagogical approaches that would aim at closing gender gaps in Internet usage among students.

Key words: Internet, gender, digital divide, usage pattern, students, tertiary institutions.

Introduction

Technological advancements in the communication field have revolutionized the media of mass communication over the past decades. In the earlier part of the last century, traditional media such as radio, television, newspapers, and magazines were the primary sources of news, information, and entertainment (Boerboom, 2015). However, the advent of the Internet in the 1980s, followed by its widespread use in the 1990s, brought about a tremendous increase in people's access to information. This development was fueled by the creation of the World Wide Web by the British physicist Tim Berners-Lee, and now with the introduction of 4G/5G-enabled smartphones, individuals can connect to the

Internet anytime and anywhere, resulting in unprecedented access to information on an unparalleled scale.

The Internet, a vast global network of interconnected computers, has connected billions of people worldwide, providing them with instant access to information and knowledge. Above all, the Internet has transformed the lives of billions by opening doors to new ideas, opportunities, empowerment, innovation, and sustainable growth (Broadband Commission for Digital Development, 2013). Furthermore, Internet access enables the exercise of fundamental human rights, including freedom of expression, and even plays a role in poverty reduction. For example, research indicates that for every ten individuals who gain Internet access, approximately one person is lifted out of poverty, and one new job is created (Zuckerberg, 2015).

The Internet's origins can be traced back to the 1960s with the establishment of ARPANET (Advanced Research Project Agency Network), an experimental computer network created by the United States Department of Defense to decentralize communication networks (Colley & Matlby, 2008). By the late 1980s, governments and educational institutions were already utilizing the Internet (Harry, 1998). The public's use of the Internet dramatically increased in the early 1990s, and since then, it has continued to grow in availability, connectivity, and global reach. The latest statistics indicate that nearly 5 billion people are now using the Internet (Global Connectivity Report, 2022).

Due to its numerous advantages within the context of education, the Internet is extensively utilized by higher education students. This is because it offers them quick and convenient access to a wide range of scholarly publications, making it an indispensable source of knowledge for students worldwide. In fact, several studies have established that students of higher education are the most conspicuous users of the Internet (Ofodu, 2012; Khausar & Zobia, 2006; Omotayo, 2006).

Rai (2014) agrees with the above perspective and suggests that the Internet has become an integral part of higher education students' lives. He argues that for many students, the Internet serves as a primary channel for accessing study-related information and completing various projects. Prensky (2001, p. 4) vividly captures this reality by describing modern-day higher education students as

"digital natives," as they are constantly surrounded by and immersed in digital media, whether at home, on campus, or on the go.

However, despite this exponential growth in the Internet access and usage among students of higher education and the recognized role of the Internet in promoting development, it is becoming clear that Internet access and usage are unevenly distributed among males and females. This inequality stems from differences in access to technology and the necessary knowledge and skills to fully benefit from it (Funmilayo, 2013; Li & Kirkup, 2007). Supporting this view, scholars such as Bujala (2012), Wong and Hanafi (2007), and Ono and Zavodny (2003) observed that gender is the most prevalent dimension of inequality in Internet usage.

This unequal access to and utilization of the Internet has commonly been referred to as the "digital divide." Initially, the term referred to the disparity in access to computers and related technology, but it was later expanded to include the gender and socio-economic gaps between communities with and without access to modern technologies like the Internet (Lucky & Achebe, 2013). In essence, the digital divide describes the unequal patterns of access to and usage of information and communication technologies, such as computers and the Internet, based on factors such as income, race, ethnicity, gender, age, and geographical location, which emerged in the mid-1990s (Mossberger, Tolbert & Stansbury, 2003).

Against this backdrop, this study aims to investigate gender differences in the Internet usage patterns of students of three state-owned tertiary institutions in Katsina State namely Umaru Musa Yar'Adua University, Katsina; Hassan Usman Katsina Polytechnic; and Isah Kaita College of Education, Dutsinma.

Statement of the Problem

Within the past two decades, research on digital divide has predominantly concentrated on technologically advanced regions such as Europe and North America. These regions were among the earliest adopters of the Internet (Thanuskodi, 2013; Bujala, 2012; Jones, Yale & Millermaier, 2009). Although, similar studies have been conducted worldwide, the amount of research conducted in Nigeria, specifically concerning students of tertiary institution students, is significantly inadequate. Moreover, the existing literature on digital divide in Nigeria primarily focuses on identifying the gap in Internet access, referred to as the first-level digital divide (Wang, Chen & Hsu, 2009). The second-level digital divide, which explores the disparity in Internet usage, is largely understudied.

This study therefore, aims to investigate gender differences in the Internet usage patterns of students of three state-owned tertiary institutions in Katsina State, namely Umaru Musa Yar'Adua University, Katsina, Hassan Usman Katsina Polytechnic, and Isah Kaita College of Education, Dutsinma, with a view to fill the identified gap in the literature.

Objectives of the Study

The specific objectives of the study are:

i. To determine the extent of Internet access among students of tertiary institutions in Katsina State.
ii. To find out gender differences among students of tertiary institutions in Katsina State on how they use the Internet.

Hypothesis

The following null hypothesis is to be tested at 0.05 level of significance.

- There is no statistically significant gender difference in the Internet experience of students of tertiary institutions in Katsina State.

Literature Review

Studies related to gender digital divide have continued to trigger an unprecedented interest to mass media researchers in recent years. For instance, Eduljee, Kumar and Buhariwala (2020) conducted a survey to investigate gender differences in the Internet usage habits of 323 college students in the Indian city of Mumbai. Specifically, the researchers set out to determine whether gender differences exist in the students' Internet skills and experience, Internet knowledge and access, time spent on the Internet, purposes for using the Internet, and barriers to using the Internet. Results of the study indicated that the students are heavy Internet users (with males having a usage rate of 98.6 percent, whereas females have 92.5 percent). Moreover, findings of the study revealed that significant gender differences were obtained regarding the purposes for using the Internet. Male students' outstanding purpose for using the Internet is education, representing 62.8 percent, while entertainment and socializing with friends is the most outstanding purpose for using the Internet among female students, representing 44.8%. However, both genders reported that lack of time and cost of usage are the biggest barriers that hinder them from making optimum use of the Internet.

In a similar vein, Tian, Zuo, Sun, Sun, Cao and Qin (2021) examined gender differences in generalized problematic internet use (GPIU) and specific problematic internet use (SPIU), among students from elementary school, junior high school, senior high school, and university across five cities in China. The researchers designed survey questionnaire to elicit responses from a total of 5,215 students across the different schools involved in the study. Findings of the study revealed significant gender differences for online shopping and online pornography for all educational levels above elementary school.

Likewise, in 2022, Shahidzay and Aslamzai conducted a survey to unmask the gender differences in Internet usage among students of Kabul University in Afghanistan. The study employed survey method and sampled 400 students from faculties of the university using stratified random sampling procedure. The researchers found that the Internet was gender neutral in terms of accessibility. However, the study reported that statistically significant gender differences were found in the Internet usage habits of the students. In comparison to their female counterparts, more male students viewed pornographic websites, visited more sports websites frequently than female, and were more interested in news websites than females. In contrast, female students exhibit more interest in surfing the Internet for fashion and entertainment related issues.

Sultana and Imtiaz (2018) carried out a study to investigate gender differences in the Internet usage patterns of university students in Bangladesh. The researchers sampled 176 students to carry out the study. Results of the study showed that there is insignificant difference between students of both genders in overall Internet usage pattern. It also found that there is no significant difference in the level of Information and Ccommunication Technology (ICT) self-efficacy between males and females. The researchers concluded that the insignificant gender gap in the student's Internet usage habit might be due to both genders having high exposure to the technology through their educational experience.

The findings of Sultana and Imtiaz are similar to that of Rajasekhar, Veena and Kumar (2017) who conducted a study that explored gender differences in Internet preferences and usage pattern among first year students of Medicine at PESIMR, Kuppam in India. The study reported insignificant gender differences in the Internet preference and usage patterns of the students.

Finally, Saha and Zaman conducted a study in 2017 on a sample of 300 students at the University of Barisal, Bangladesh. The study was aimed at exploring gender

gap in access to ICTs among the students, assess the gap in the ability to use ICTs between male and female students and to also find out gender gap in actual use of the ICTs among the students. Results of the study indicated that significant gender gap exists among the students in their ability to use ICTs. Findings revealed further that although female students are capable of using ICTs for communication purposes, they are less competent at downloading and installing software from the Internet. In contrast, male students were found to be pretty much good in using the Internet, as well as downloading and installing software from the web. Saha and Zaman concluded their study by identifying mental dependency and less learning curiosity of female students in the ICT sector as the reasons for the gender gaps among the students.

Taken together, the studies reviewed thus far have reported mixed results. While some have found no statistically significant gender differences (Sultana, et.al., 2018; Rajasekhar, et.al., 2017) others like Eduljee, et.al. (2020), Tian, et.al. (2021) have found gender differences in the Internet usage patterns of the individuals they studied. These findings suggests the dynamic nature of the relationship between gender and Internet usage, hence the need for continued investigation in the area.

Theoretical Framework

This study employed two theoretical frameworks namely uses and gratifications theory and the individual differences theory of gender and information technology. The uses and gratifications theory assumes that media audience are aware of and can articulate their reasons for consuming various media content and that the effect of a given message is highly unlikely to be the same for everyone. The driving mechanism of the theory, as Sparks (2012, p. 358) puts it, "is need gratification". The uses and gratifications theory is appropriate for this study as it is located within the framework that mass media product serves the audience. Today, when the Internet provides a pool of information, society at large and students in particular enjoy the luxury of choosing which information serves them most, as well as choosing the way they use it for other reasons. By employing the theory, the study would help contribute to a deeper understanding of gender-related dynamics in Internet usage and inform strategies for promoting equitable and inclusive access to digital resources.

The individual differences theory of gender and information technology on the other hand views women and men as individuals who possess different technical

talents and inclinations and respond to the social shaping of gender in unique and particular ways that vary across cultures (Trauth, 2006). The theory is composed of three essential constructs, which according to Trauth (2002), explain individual's decisions to have access to and use information and communication tools such as the Internet.

The three constructs are *the individual identity construct*, which entails personal demographic data such as gender, age, ethnicity, socio-economic status, etc. The *individual influence construc*t which includes personal characteristics, (e.g. experiences with computing/Internet, etc.) and the *environmental influence construct* which consists of cultural attitudes and values (e.g. attitude towards information technologies such as the Internet, the country in which one lives, etc.). The theory posits that these constructs account for the differences among males and females in the way they experience and respond to issues related to information technology, such as the Internet (Trauth, Quesenberry, & Morgan, 2004).

Incorporating the individual differences theory of gender and IT into this study will help provide insights into the varying Internet usage patterns of male and female students of tertiary institutions. Such understanding would help inform strategies for promoting equitable access, addressing gender-based disparities, and tailoring interventions to enhance Internet usage and digital literacy among students of higher education.

Methodology

This study employed descriptive survey method, which enabled the researcher to describe the differences in the Internet usage patterns of the students of tertiary institutions in Katsina State based on gender. The population of the study is comprised of all the regular students of the three selected state-government owned tertiary institutions in Katsina State namely: Umaru Musa Yar'Adua University, Katsina (UMYU), Hassan Usman Katsina Polytechnic (HUKP), and Isah Kaita College of Education, Dutsin-ma (IKCOE). These institutions were purposely selected based on the fact that they are the largest and most diverse tertiary institutions in Katsina, consisting of students from virtually every part of the State. Using stratified proportionate sampling, 144 students were selected from UMYU, 95 from HUKP and 138 from IKCOE thus forming a total of 377 respondents. This sample size was chosen based on the Krejcie and Morgan (1970) table of sample size. The demographic characteristics of the respondents revealed 220 as males and 154 as females, reflecting the proportion of male to

female students in Nigerian tertiary institutions (Adeyemi & Akpotu, 2014). The questionnaire administered to the respondents was divided into five sections. Section A deals with the demographic data of the respondents such as age and gender. Section B deals with Internet access among the students. Section C deals with the frequency of Internet usage, while section D asks questions about the purpose of Internet usage. Finally, section E deals with Internet experience. Descriptive statistics of percentages, frequency count and t-tests were used for data analysis with the Statistical Package for the Social Sciences Software (SPSS). Out of the 377 questionnaires administered, 374 were returned giving a response rate of 99 percent.

Results

Table 1: Respondents Internet Usage & Frequency of the Usage

Internet Usage	**Frequency**	**Percentage**	**Usage Frequency**	**Frequency**	**Percentage**
Yes	367	98.13	Daily	178	48.50
			Twice a week	33	8.99
			Thrice a week	68	18.53
No	7	1.87			
			Sometimes	29	7.90
			Quite often	59	16.08
Total	**374**	**100**	**Total**	**367**	**100**

Table 1 depicts the responses of the respondents in the sample on whether they use the Internet or otherwise as well as the Internet usage frequency. This finding, as depicted on the table, supports several studies (e.g. Khausar & Zobia, 2006; Omotayo, 2006; Ofodu, 2012, Bala 2013, etc.) conducted on students' Internet usage which contend that Internet usage is more prevalent among younger, more educated people, particularly students of higher institutions.

As the findings on the table indicate, majority of the students of tertiary institutions in Katsina fall within the age range of 17 – 24 years and these are the group whom Prensky (2001, p. 4) aptly describes as "digital natives" for they are, as he says, "living their entire lives surrounded and immersed within the digital media" such as computers, tablets and smartphones, whether on campus, at home or on the go. Therefore, it is not in any way surprising that majority of them make use of the Internet.

With regards to the frequency at which the students use the Internet, the table shows that slightly less than half of the respondents use the Internet daily. This relative low percentage of daily Internet usage may be connected to the problems/constraints that students often cite while using the Internet such as higher Internet subscription rate, constant breakdown of Internet services in their institutions and epileptic power supply.

Table 2: Gender Wise Respondents' Internet Usage

Internet Usage	Gender of Respondents	Frequency	Percentage
	Male	216	58.86
Yes	Female	151	41.14
Sub-total		367	100
	Male	4	57.14
No	Female	3	42.86
Sub-total		7	100
Grand total		**374**	**100**

Table 2 shows the respondents' Internet usage across their gender distribution. The table indicates that despite heavy use of the Internet among both genders, more male students use the Internet compared to their female counterparts. This finding is in agreement with what obtains in the bulk of the literature on gender digital divide which demonstrates that more males engage in Internet use than females (Swarry, Gillwald, Morrell & Khan, 2012; Helsper, 2010, etc.).

Table 3: Gender Wise Responses on the Respondents' Purposes of Using the Internet

	Males		Females	
Purpose of Internet Use	**Frequency**	**Percentage**	**Frequency**	**Percentage**
Social networking	31	14.35	40	26.49
Education/research	68	31.48	27	17.89
Entertainment	23	10.65	20	13.25
Playing online games	21	9.72	11	7.30
Online shopping	7	3.24	5	3.31
Fashion related information	18	8.33	30	19.87
Health related information	12	5.56	2	1.32
Internet banking	6	2.78	2	1.32
Sending/receiving e-mails	30	13.89	14	9.27
Total	**216**	**100**	**151**	**100**

Table 3 shows the students' responses on the purposes for which they use the Internet across genders. The figures generally indicate that there are differences in the purposes for which male and female respondents use the Internet. When the figures for the two samples are compared, it can be evidently inferred that social networking is the most frequently used feature of the Internet by female respondents with a usage rate of 26.49% while 31.48% of male students indicated that their most frequent use of the Internet is for academic related purposes.

Table 4: T-test of Gender Comparison on Internet Experience Based on Usage Hours

Variables	N	Mean	SD	df	t.cal	t.critical	Remark
Males' hours spent on the Internet	216	17.87	7.45	365	6.45	1.645	S*
Females' hours spent on the Internet	151	11.38	10.68				

Table 4 shows the results of t-test of gender comparison on the Internet experience of the students of tertiary institutions in Katsina State based on usage hours. It indicates that t.critical at 5% level of significance is 1.645. Since t.calculated (6.45) is greater than t.critical, the null hypothesis is rejected and the alternative is accepted. This means that there is statistically significant gender difference in the Internet experience of the students.

Discussions on Findings

The research questions and hypothesis formulated for this study were meant to achieve the objective of examining gender differences in the Internet usage patterns of students of tertiary institutions in Katsina State, Nigeria. Research Question One was asked to find out the extent of Internet access among the students of the selected tertiary institutions. It was germane to ask this question for it will help establish the extent of Internet access among the respondents in the first place. This is because gender differences in how the respondents use the technology can only be investigated after establishing their access to the Internet. The data on Tables 1 and 2 answers this question. As figures on Table 1 show, the respondents are heavy Internet users, with a usage rate of up to 98.13 percent, and a daily usage frequency of 48.50 percent. Only a negligible 1.87 percent of the sample reported not using the internet. The data on table presented gender-wise responses of the students regarding Internet usage. The data shows that 58.86 percent and 41.14 percent of male and female students reported accessing and

using the Internet. This heavy usage of the Internet suggests that there is a derivation of maximum utility and a considerable dosage of gratification from the respondents. This finding echoes the results of several previous studies (Khausar & Zobia, 2006; Omotayo, 2006; Ofodu, 2012, Bala 2013, etc.) conducted on students' Internet usage which contend that Internet usage is more prevalent among younger, more educated people, particularly students of higher institutions.

Research Question Two was asked to find out gender differences among students of tertiary institutions in Katsina State on how they use the Internet. The data presented on Table 3 answers this question. Findings as depicted on the table indicate that there are differences in the purposes for which male and female respondents use the Internet. The table shows that social networking is the most frequently used feature of the Internet by female respondents with a usage rate of 26.49%, while 31.48% of male students indicated that their most frequent use of the Internet was for academic related purposes. This finding agrees with the results of the study by Eduljee et. al. (2020), which found that the most outstanding purpose of using the Internet among male students is education, while female students mainly use the Internet to seek for fun and entertainment, including socializing with friends. However, the finding is not consistent with the results of the study conducted by Sultan and Imtiaz (2018) showed that there is insignificant difference between students of both genders in overall Internet usage pattern.

The data presented on Table 4 was meant to establish the veracity or otherwise of the null hypothesis formulated for this study. The hypothesis states that there is no statistically significant gender difference in the Internet experience of students of tertiary institutions in Katsina State. To prove the veracity of this hypothesis, a quantitative perspective and a t-test was carried out on the respondents' Internet experience based on usage hours. The data on the table indicate that t.critical at 5% level of significance is 1.645. Therefore, since t.calculated (6.45) is greater than t.critical, the null hypothesis is rejected and the alternative is accepted. This means that there is statistically significant gender difference in the Internet experience of the students. This finding is consistent with a number of previous studies such as that of Saha and Zaman (2017) and Eduljee, et. al. (2020), which found significant gender differences in the Internet experience of the population they studied.

Overall, the above findings can be explained within the uses and gratifications theory, which is one of the theories upon which the present study is hinged. The theory's fundamental assumption is that people deliberately use media for particular purposes, with the ultimate goal of need gratification. Within the context of this study, for example, the students' use of the Internet for social networking, academic related tasks and other sundry uses highlights the importance of the Internet as an important communication channel by which the respondents gratify several needs.

Likewise, findings of the study also highlight the relevance of the individual differences theory of gender and information technology in explaining the gender disparities identified among the students in their Internet usage patterns. For instance, experience with the Internet, which falls under the theory's *individual influence construct*, is a factor that helps explain the gender differences in the students' Internet usage pattern. As Table 4 indicates, male students have more experience with the Internet than their female counterparts.

Conclusion and Recommendations

This study provides interesting findings on differences in Internet usage with regard to students of tertiary institutions in Katsina State, Nigeria. Based on the findings of this study, it is concluded that the students of tertiary institutions in Katsina make high use of the Internet. Another equally important conclusion is that gender differences exist in the Internet usage patterns of the students, with male students using the Internet primarily for academic related activities, while their female cousins use it mainly for social networking. This study also concludes that there is a statistically significant gender difference in the Internet usage experience of male and female students of tertiary institutions in Katsina State.

From these conclusions, the following recommendations can be made:

i. Higher education administrators should take into consideration the gender differences in Internet usage patterns among students and design appropriate interventions to bridge the gap.
ii. Pedagogical approaches should be formulated to teach male and female students the importance of the Internet, particularly for academic activities.
iii. There is the need to promote Internet usage among female students. This could be done through the provision of free Internet access facilities and training programmes targeted at female students.

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