Research Paper

Pattern of Internet Use among Undergraduate Clinical Medical Students in a Nigerian University during the Covid-19 pandemic.

Marcia Morayo Ihekaike[1], Maryam Yakubu Shehu[1], Maureen Makama[2]

[1]Department of Paediatrics, Bingham University/ Bingham University Teaching Hospital, PMB 2238, Jos, Nigeria.
[2]Monash University, Wellington Road Clayton, Victoria 3800, Australia,
*Corresponding author: Marcia Morayo Ihekaike, marciaihekaike@yahoo.com

ABSTRACT
Internet use has become a way of life for the majority of higher education students all around the world especially in light of the recent COVID 19 pandemic. In the wake of the pandemic and accompanying lockdown globally, the internet serves as a functional tool through which undergraduates can easily interact with others and get information. The aim of this study is to determine the pattern of internet use among undergraduate clinical medical students in a Nigerian University. Thiscross sectional descriptive study was carried out among fourth to sixth year medical students of Bingham University. The sampling method used was a stratified proportionate sampling of clinical medical students who consented to the study. Data was collected through a structured questionnaire.Out of 383 students, 147 (38.4%) were males and 236 (61.6%) females. The mean age of the study participants was 23.5 ± 3.3 years for males and 22.3 ± 2.2 years for females. All the study participants have access to the internet with 99.5% using internet for study purposes and 95% using internet on a daily basis. The most frequent problem encountered while using the internet was slow speed. The male students were better in their internet search skills than the female p = 0.003. In conclusion, internet use is widespread among medical students in Bingham University and can be integrated into the medical curriculum to ease study, save time and cost of learning especially in this era of the global COVID 19 pandemic.
KEYWORDS: Bingham University, Internet, Clinical Medical Students, COVID 19

I. INTRODUCTION

The internet is a global system of interconnected computer networks linked by a broad array of electronic, wireless and optical networking technologies that serve billions of users worldwide.[1,2] It has become the world's biggest library where retrieval of scientific resources is only a mouse click away.[3]It is cost effective, fast and has the advantage of assessing information from any source.[4] Across the globe, internet services are revolutionizing every aspect of human interaction and enterprise,[5] as all over the world millions of people use the internet for several purposes.[6] It represents an essential part of every sphere of human life, especially education.[7] Online information is so readily available that the internet has become a potential driving force of the economy, society, and education.[8]

The use of computer and the internet has increased among college students[9]since the past decade, and medical students are not left out.[4] Today's students in medical school have lived in the presence of online technology their whole lives. They prefer new media technologies and online learning.[10,11] Students are at great advantage in the twenty first century in their academic endeavours because every form of information resource needed to support academics is available on the internet both retrospective and current.[12] For most university students, the internet is a functional tool through which one can easily interact with others and get information.[11,13] Computers are used for a wide range of functions in medical education, from computer-based lectures to more advanced simulations and intelligent tutoring systems.[14] The internet appeals to many because it reduces the time lag between the production and utilization of knowledge, promotes the exchange of opinions and sharing of information and enables multidisciplinary research. In previous studies, majority of students

reported the internet as a helpful tool for worldwide communication, and that use of the internet actually helped them improve their grades through improved reading, writing, and information processing skills.[2,15] Availability of medical full-text articles and other databases may have a major impact on the selection of information resources among students. Students can review case reports and have the opportunity to learn about different views on controversial topics.[16] In addition, the computer and internet can motivate medical students to undertake research and help them develop skills in collecting and analysing data.[4]

According to the guidelines of the World Federation for Medical Education (WFME), the use of computers as well as access to the internet and, in particular, the worldwide web should be integrated into the medical curriculum in order to enhance the quality of care and keep knowledge updated.[17,18] One of the major goals of medical education is to encourage students to improve their knowledge of medical science by becoming life-long learners. Adequate skills in information seeking and regular use of original scientific sources are key elements in this process.[19]

Despite the fact that the internet is a rich information resource that can support medical education, internationally, many reports show that medical students predominantly use the internet for non-medical purposes such as social media, email and surfing.[20-23] However, some studies show predominant use of the internet by medical students for academic and research purposes.[24-25] Therefore, this study is aimed at describing the patterns of internet use among clinical medical students at Bingham University, Jos campus, Nigeria. Being that the internet is fast becoming the major way of learning and acquiring information especially during the period of the global COVID 19 pandemic,[26] understanding these patterns could support the incorporation of internet-based materials into the medical education curriculum in Nigeria.

II. MATERIALS AND METHODS

This descriptive, cross-sectional study was carried out at Bingham University, Jos campus, Plateau State, in the North Central part of Nigeria. The study population included fourth to sixth year undergraduate clinical medical students of Bingham University. The study was carried out between the months of May and August, 2021. The sampling method used was a stratified proportionate sampling of clinical medical students who consented to the study. In each level, a consecutive sampling of students was done until the sample size is obtained.

Sample size determination: The minimum sample size was determined using the Fischer's formula.[27]

$$n = \frac{(Z)^2(1-P)(P)}{d^2}$$

Where:

n = desired sample size

P = prevalence of internet use in medical students $(63.0\%)^{28}$

Z = 95% confidence interval = 1.96

d = absolute precision at 95% confidence interval = 0.05

$$n = \frac{(1.96)^2\ (1-0.63)\ (0.63)}{(0.05)^2} = 358$$

Allowing for a 12% attrition rate (n=43), a minimum sample size of 401 students were recruited for this study.

Total number of students in 400L is 219.

Total number of students in 500L is 184.

Total number of students in 600L is 101.

Using the proportionate formula: $\frac{A}{B} \times C$

Where:

A= Total number of students in a level

B= total number of clinical students in the three levels

C= calculated sample size.

The number of students in 400L selected were: 219/504 X 401 = 174 students

The number of students in 500L selected were: 184/504 X 401 = 146 students

The number of students in 600L selected were: 101/504 X 401 = 80 students

The grand total number of students selected were 174+ 146+ 80 = 401 students

A total of 401 questionnaires were administered, out of which 383 were returned and completed giving a response rate of 95.5%. Verbal informed consent was obtained after which the students who consented were given a structured paper-based questionnaire to fill.

The questionnaire (Appendix I) contained questions such as age, gender, use of internet, internet access devices, purposes of internet use, problems encountered while using the internet, and frequency of internet use. The questionnaire was anonymous to encourage participation and reduce respondents' bias. The students were

informed about the aims of the study before administration of the questionnaire and reminded that some of the questions allowed multiple responses.

Inclusion criteria: All undergraduate clinical medical students of Bingham University, Jos campus who consent to the study.

Exclusion criteria: All clinical medical students of Bingham University, Jos campus who did not consent to the study.

Ethical approval: Ethical approval was obtained from the Health Research Ethics Committee of Bingham University Teaching Hospital, Jos.

Data obtained was analysed using the Software Package for Social Science (SPSS) version 21.0 for Windows. Data was presented using descriptive statistics in the form of frequencies and percentages. Interval and ratio variables were presented in the form of means and standard deviations. Chi-square and Fisher's exact tests were used to determine associations. Significant levels were set with *P* value of <0.05.

III. RESULTS

There were 147 male and 236 female students giving a male to female ratio of 0.62:1. The participant's age ranged from 18 to 49 years. Majority (43.3%) of the students were in the fourth year of study (Table 1). All the students used the internet and were on social media platforms and 99.5% of the students use the internet for study.

Table 1: Basic characteristics of study participants

Characteristics	n (%)
Age (years)[a]	
Male	23.5 ± 3.3
Female	22.3 ± 2.2
Gender	
Male	147 (38.4)
Female	236 (61.6)
Year of study	
400 level	166 (43.3)
500 level	140 (36.6)
600 level	77 (20.1)

[a] Mean ± SD

Most of the students began using the internet between the ages of 10 and 14 years (Figure 1) and 95% of the participants use the internet on a daily basis (Table 2).
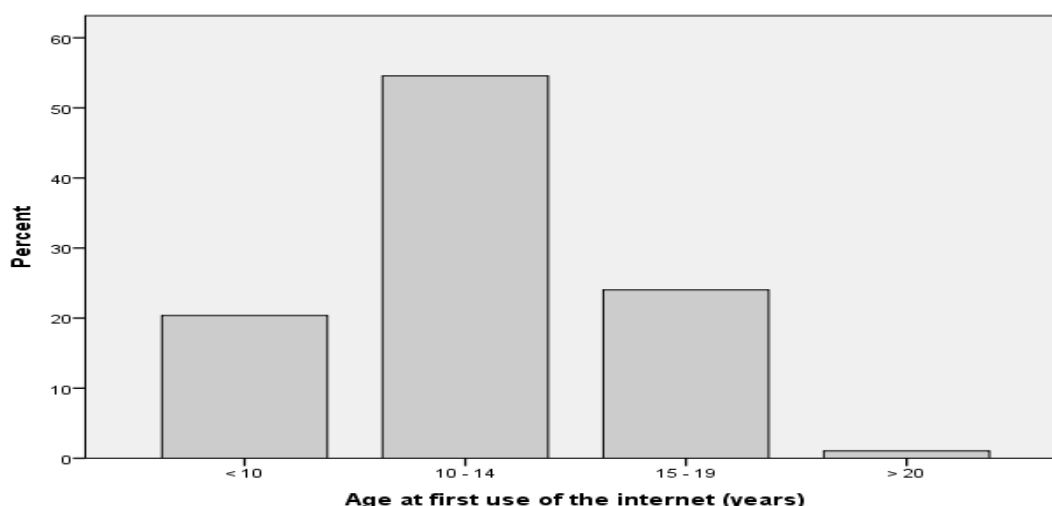

Figure 1: Bar Chart showing age at first use of the internet

Table 2: Internet Use Pattern of medical students

Characteristics	Male n (%)	Female n (%)	Total n (%)
Frequency of internet use			
Daily	139 (94.6)	228 (95.3)	364 (95.0)
Two or more times a week	8 (5.4)	8 (3.4)	16 (4.2)
Weekly	0	2 (0.8)	2 (0.5)
Fortnightly	0	1 (0.4)	1 (0.3)
Duration of internet use per day			
≤ 1 hour	6 (4.1)	9 (3.8)	15 (3.9)
1 – 2 hours	42 (28.8)	49 (20.9)	91 (23.9)
3 – 4 hours	54 (37.0)	97 (41.3)	151 (39.6)
≥ 5hours	44 (30.1)	80 (34.0)	124 (32.6)
Preferred time of internet use			
Early hours of morning	11 (7.5)	25 (10.6)	36 (9.4)
Morning	6 (4.1)	12 (5.1)	18 (4.7)
Afternoon	6 (4.1)	26 (11.1)	32 (8.4)
Evening	52 (35.3)	75 (31.9)	127 (33.3)
Late at night	51 (34.7)	79 (33.6)	130 (34.0)
All day	21 (14.3)	18 (7.7)	39 (10.2)
Purpose of internet access [a]			
Movies	110 (74.8)	183 (77.5)	293 (76.5)
Music	123 (83.7)	201 (85.2)	324 (84.6)
Games	80 (54.4)	86 (36.4)	166 (43.3)
Chats	126 (85.7)	213 (90.3)	339 (88.5)
News	116 (78.9)	157 (66.5)	273 (71.3)
Research	117 (79.6)	182 (77.1)	299 (78.1)
Study and educational purposes	125 (85.0)	221 (93.6)	346 (90.3)
Problems with Internet use [a]			
Slow speed	93 (63.3)	149 (63.1)	242 (63.2)
Irrelevant information	76 (51.7)	114 (48.3)	190 (49.6)
Problems with downloading	38 (25.9)	84 (35.6)	122 (31.9)
Cost	83 (56.5)	150 (63.6)	233 (60.8)
Lack of time	27 (18.4)	32 (13.6)	59 (15.4)
Lack of skills	3 (2.0)	12 (5.1)	15 (3.9)
Internet search engines [a]			
Google	147 (100.0)	232 (100.0)	379 (100.0)
Yahoo	8 (5.4)	10 (4.3)	18 (4.7)
Bing	9 (6.1)	6 (2.6)	15 (4.0)
MNS	1 (0.7)	2 (0.9)	3 (0.8)
Safari	0	14 (6.0)	14 (3.7)
Opera	1 (0.7)	2 (0.9)	3 (0.8)
Mozilla Firefox	0	1 (0.4)	1 (0.3)
Devices used to access internet [a]			
Smart phones	146(99.3)	236 (100.0)	382 (99.7)
Laptop	95 (64.6)	157 (66.5)	252 (65.8)
Desktop	9 (6.1)	10 (4.2)	19 (5.0)
iPad	15 (10.2)	26 (11.0)	41 (10.7)
Tablet	27 (18.4)	39 (16.5)	66 (17.2)

[a]Some have given multiple responses to question

Late night and evenings were the most preferred time of internet use. Study and educational purposes followed by chats were the most frequent reasons for accessing the internet while, games was the least common reason. The common problems encountered in both genders while using the internet were slow speed and cost. Google was the universal search engine used and almost all the students access the internet using smart phones. There was a significant difference in the internet search skills of male and female students (P = 0.003), a higher proportion of males (43.6%) reported being very proficient than females (27.6%) (Table 3).

Table 3: Internet search skills

Search skills	Male n (%)	Female n (%)	P value
Very proficient	64 (43.6)	65 (27.6)	
Proficient	55 (37.4)	98 (41.5)	0.003
Average skills	28 (19.0)	69 (29.2)	
Little skills	0	4 (1.7)	

IV. DISCUSSION

The present study was conducted among clinical medical students and all the students included were using the internet. This finding is similar to that of previous works by in Iran and in India.[4,14] An earlier study[24] in Pakistan, however reported that only 84% of medical students used the internet. This suggests increasing and widespread access to internet facilities among medical students over the years. Majority (95%) of the students in the present study use the internet daily. This is much higher than the finding of an Indian study[29] where 78% of the medical students were found to use the internet daily. Daily use of the internet suggests that the internet is fast becoming a part of our daily lives and an integral part of academic pursuits.

In the present study, 20.4% of the students were already using the internet before the age of 10 and 54.6% became internet users between the ages of 10 – 14. Only 1% began to use the internet at or after the age of 20. Consistent with this, another study[9] found that 93 out of 250 (37.2%) students where less than 10 years old when they began using the internet, while 122 (48.8%) were between the ages of 10 – 15 years at first exposure to the internet. Only 2 (0.8%) students began to use the internet after the age of 20. This reveals that students are getting exposed to the internet at a much younger age even in developing societies like ours.

Late nights (34%) and evenings (33.3%) were the most preferred time for using the internet in both sexes as noted in the present study. This is comparable to the findings of other studies.[2,14] This is probably because clinical medical students are usually very busy with academic and clinical activities during the morning and afternoon hours.

There were varying purposes for using the internet noted in this study, the commonest of which is for study and educational purposes. More females (93.6%) than males (85%) were using the internet for study and educational purposes. Next to this purpose was chatting as 90.3% of females and 85.7% of males used the internet for chatting purposes. Males (54.4%) were more likely to use the internet for gaming purposes than females (36.4%). Similarly, males were more likely to use the internet for news (78.9%) than females (66.5%). In contrast to our findings, other studies[14,29] found more students using the internet to access social sites than for academic related purposes.

The common problems encountered while using the internet in the present study were slow internet speed (63.2%) followed closely by cost (60.8%) then by irrelevant information or adverts (49.6%). Slow speed and cost has also been noted in other studies[3,29] as the most frequently encountered problem with internet use.

Google was the universal search engine as all the students were using it. Other studies[2-4,14,29] have shown a similar pattern with Google being the most frequently used search engine. Other search engines used were Yahoo, Bing, and Safari.

With respect to internet search skills, we found that 43.6% of the male students and 27.6% of the females felt they were very proficient. This difference was found to be statistically significant with P value of 0.003. The findings of our study seem to suggest that the male folks were more likely to be better in their internet search skills than their female counterparts.

Majority (99.7%) of the participants accessed the internet through their smartphones. This appears to show increasing preference for mobile and hand held devices for internet access and is comparable to findings in studies done in Nigeria[12] and India[2]. In the present study, only 65.8% of the students accessed the internet using laptops and 5% using desktop. This finding suggests a limitation to the use of internet for educational purposes as some educational software are not compatible with mobile devices.

The strength of this study is the high response rate. Some limitations include the limited generalizability of the findings since the study was performed in only one medical school in Nigeria. Also, as the study is cross-sectional, we could not determine the trend of internet use over time. Furthermore, all data were self-reported which could introduce some bias.

V. CONCLUSION

Internet use is widespread among medical students as many of them are increasingly dependent on the internet for educational purposes. It is therefore, fast becoming an inseparable part of today's educational system. The internet also allows students the convenience of studying at their own pace and place thus, its integration into the medical curriculum would ease study, save time and cost of learning.

We recommend the incorporation of online medical teaching in the medical education curriculum of Nigeria especially in light of the recent COVID – 19 pandemic which resulted in a halt in face to face education for several months.

REFERENCES

[1]. Prashanthi B. Internet Usage Pattern of Adolescents. IOSR Journal of Humanities And Social Science 2017; 22(2):1-5.
[2]. Rajasekhar P, Veena CN, Kumar S. Gender differences in internet preferences and usage pattern among medical students. Natl J Physiol Pharm Pharmacol 2018;8(5):683-686.
[3]. Neeraj C, Swarupa C. Internet Access and Utilization among Medical Undergraduate and Post Graduate Students of a Medical College in Madhya Pradesh. Natl J Community Med. 2015; 6(1):78-81.

[4].   Ayatollahi A, Ayatollahi J, Ayatollahi F, Ayatollahi R, Shahcheraghi SH. Computer and Internet use among Undergraduate Medical Students in Iran. Pak J Med Sci 2014; 30(5):1054-1058.

[5].   Khan MA, Khan S, Rehman A, Ghouse S. Internet Usage Patterns: An Exploratory Study in Oman. International Journal of Applied Engineering Research. 2017;12(7):1232-1236.

[6].   Cindhana S, Amalimary A.A study on the internet usage pattern and internet addiction among the people. ICTACT Journal on Management Studies, 2018; 4(3):816-819.

[7].   Masic I, Karcic E, Hodzic A, Mulic S. Information technologies in education of medical students at the University of Sarajevo. Acta Inform Med. 2014; 22(4):228-31.

[8].   Yi Z. Internet use patterns in the United States. Chinese Librarianship: An International Electronic Journal. 2008;25(June 2008):1-12.

[9].   Tushar B, Swapnali K, Pooja B. Computer and internet use among undergraduate medical students. International Journal of Contemporary Medical Research 2016;3(5):1317-1321.

[10].   Han H, Nelson E, Wetter N. Medical students' online learning technology needs. Clin Teach. 2014 Feb;11(1):15-9.

[11].   Deniz MH, Geyik SK. An Empirical Research on General Internet Usage Patterns of Undergraduate Students. Procedia - Social and Behavioral Sciences, 2015;195:895-904

[12].   Anyaoku EN, Nwafor-Orizu OE, Oguaka CN. Internet information seeking and use by Medical Students of Nnamdi Azikiwe University, Nigeria. International Journal of Library and Information Science. 2015; 7:148-154.

[13].   Salubi OG, Muchaonyerwa N. An empirical study of Internet usage pattern of undergraduate students in South Africa. *Library Philosophy and Practice (e-journal)*. 2018

[14].   Kumar SB, Veena CN, Vastrad BC, Nandan TM. Awareness and use of internet services among first MBBS students. Int J Res Med Sci 2016;4:5261-4.

[15].   Suhail K, Bargees Z. Effects of excessive internet use on under graduate students in Pakistan. Cyber Psychol Behav 2006;9:297-307.

[16].   Hattab NM, Lahmiti S, Ben Abdelaziz A, Saidi H, Fikry T. Internet and medical student in Marrakech. Ann Afr Med. 2010 Apr-Jun;9(2):68-72.

[17].   Ghabili K, Alizadeh M. Computer and Internet use among Iranian medical students. Med Educ. 2008; 42(1):114.

[18].   World Federation for Medical Education. Guidelines for using computers in medical education. Med Educ 1998; 32:205–208

[19].   Romanov K, Aarnio M. A survey of the use of electronic scientific information resources among medical and dental students. BMC Med Educ. 2006 May 9; 6:28.

[20].   Maroof KA, Parashar P, Bansal R. How are our medical students using the computer and internet? A study from a medical college of north India. Niger Med J 2012; 53:89-93.

[21].   Kumar P. Application of information and communication technology (ICT) by medical students: A study of Government Medical College, Chandigarh, India Int. J. Libr. Inf. Sci. 2012; 4(3):45-51.

[22].   Kommula VM, Kusneniwar GN. Computer and Internet Use among Medical Students of a Private Medical college of South India. Natl. J. Med. Dent. Res. 2013;1(4):34-38.

[23].   Chathoth V, Kodavanji B, Arunkumar N, Pai SP. Internet Behaviour Pattern in Undergraduate Medical Students In Mangalore. Int. J. Innovat. Res. Sci. Eng. Technol. 2013; 2(6).

[24].   Jadoon NA, Zahid MF, Mansoorulhaq H, Ullah S, Jadoon BA, Raza A, Hussain M, Yaqoob R, Shahzad MA. Evaluation of Internet access and utilization by medical students in Lahore, Pakistan. BMC Med. Inform. Decis. Making. 2011;11:37.

[25].   Akporido CE. Medical Students Use of Internet in College of Health Sciences, Delta State University, Abraka, Nigeria. J. Emerg. Trends Comput. Inform. Sci. 2014; 5(2):72-75.

[26].   Dhawan S. Online Learning: A Panacea in the Time of COVID-19 Crisis. Journal of Educational Technology Systems. 2020; 49(1):5-22.

[27].   Araoye M.O. Research Methodology with Statistics for Health and Social Sciences. Nathadex; 2003; 115-20.

[28].   Ajuwon, G.A. Computer and internet use by first year clinical and nursing students in a Nigerian teaching hospital. *BMC Med Inform Decis Mak* **3,** 10 (2003). https://doi.org/10.1186/1472-6947-3-10

[29].   Aggarwal SS, Ambalkar DD, Kale KM, Aswar NR, Bhatkule PR. Pattern of internet use among medical students: a cross sectional study. Asian Journal of Science and Technology. 2015; 6(4):1285-1288.