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Digital Technology Usage in Undergraduate Students at a Medical College of Nepal

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ABSTRACT

Background

The ubiquitous use of digital gadgets is changing the teaching-learning methods in medical education. This study aims to assess the patterns of electronic device and internet use among undergraduate medical students; and to explore their preferences, digital literacy, and use of various online and traditional study resources in their education.

Methods

This descriptive cross-sectional study was conducted among 122 medical students at Universal College of Medical Sciences, Lumbini, Nepal using enumerative sampling. A self-administered questionnaire was used to collect data on sociodemographic characteristics, electronic device and internet use patterns, and its use in their study. Data were analysed by descriptive statistics.

Results

Among 122 participants, most were female (82.78%), with a mean age of 20 (range 17-26) years. Almost all students used smartphones regularly, spending an average of 4.27 hours on weekdays and 6.86 hours on holidays on devices. Social media was the primary use of smartphones. Most students had moderate level of knowledge and interest in computer technology, but 11 students expressed high interest in learning despite low knowledge. For medical study, conventional textbooks and online videos were most popular modes. More than half (59%) expressed the benefit of having online contact with teachers.

Conclusions

Health science students of the medical college rely heavily on electronic devices and social media in daily life as well as for studies; highlighting the need to integrate technology-based learning strategies into medical education curricula.

Keywords: artificial intelligence; basic medical science; computer; internet; medical education; smartphone; social media.

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INTRODUCTION

The current widespread use of mobile devices has changed the way students learn and interact. Most of the young people are being engaged with internet usage for their study, information, social interaction, and entertainment.[1,2] In medical education, the reliance on digital resources is particularly pronounced, given the vast amount of information and rapid advancements in the field. Studies demonstrate a high prevalence of internet usage among students and its potential impacts on health, academic performance, and overall well-being.[3,4] Despite these, its implications on health and learning remain understudied. Understanding how health-science students employ such technology for their academic pursuits is crucial for enhancing educational strategies and optimising resources. This study explores the use of digital media in medical students, and its application for basic medical science study. We aim to provide insights for enhancing educational strategies, optimising resources, and promoting responsible and healthy technology use for health science students.

METHODS

This descriptive cross-sectional study was conducted at Universal College of Medical Sciences (UCMS), Bhairahwa during November and December 2023. Ethical clearance was taken from the Institutional Review Board, Universal College of Medical Sciences, (Ref. No. UCMS/IRC/086/23), before starting the investigation. All undergraduate health science students from various schools of UCMS, including medical, dental, nursing, pharmacy, medical laboratory technology, imaging technology, and public health programs were the target population. Enumerative sampling technique was applied. Inclusion criteria specified that only undergraduate health science students from batch 2023 of any age and sex who provided consent to participate were considered for the study. No exclusion criteria were applied from the researcher's side. Data were collected using a self-formulated questionnaire based on extensive literature review. It consisted of 3 parts: (a) General demography, (b) Computer usage habits (daily duration of device and internet use, common uses of the gadgets, knowledge of computer technology, and usefulness of internet in study); and (c) basic medical science study modalities and use of gadgets in it.

The questionnaire was pretested among 20 students at Karnali Academy of Health Sciences having similar course structures. It showed a good internal consistency with Cronbach alpha of 0.7. Feedback and comments from this pretesting phase were utilised for improvement to the questionnaire. Study variables included demographic characteristics such as age, sex, and course of study; internet usage frequency, duration, and purpose; and study-related variables like tools and frequency of gadget usage for studying. Each student was described about the nature and purpose of the study and written consent was taken from each before data collection. Questionnaire were distributed in class and participants responded during the same session. No personal identifiable information was collected in the data, and participants were free to withdraw from the project without any explanation or penalty. Descriptive statistics were performed to analyse the data in LibreOffice and GNU PSPP software version 1.4.1. The data were presented using frequencies and percentages for categorical variables and means with standard deviations for continuous variables.

RESULTS

Among total 190 students, 168 responded the questionnaire, from which 46 were discarded because of incomplete data. Hence, total 122 responses were collected: thirty-four from medical, 43 from dental and 45 from nursing or midwifery programs. Most of the participants were from Rupandehi district, i.e., 48(39.34%), however, the participants' addresses ranged from Jhapa in the east to Bajhang in the west of Nepal. Their mean age was 20±1.47 years. The majority of the students were female, 101(82.78%). Regarding the socioeconomic status, only 63 students revealed their family income, which was on average NPR 1.625±1.09 million per year. Almost all the students reported of having some form of electronic

device used regularly at the time of data collection, except 3 students, who used them irregularly. Majority of them had smartphone (n=118), followed by personal computer (n=49). Only 20 students had tablet and 8 had smart TV in their residence. They had been using internet for an average of 6.26(SD=2.13) years. Their average daily screen use time was 4.27(SD=2.04) hours on regular weekdays, and 6.86(SD=2.72) hours in weekends and holidays. Similarly, their internet use was 3.75(SD=1.81) hours on regular weekdays, and 6.30(SD=3.07) hours in weekends and holidays (Table 1).

Table 1. Sociodemographic and electronic device usage parameters of the participants. (n=122)

Parameters	Mean ± SD	Range (Min. - Max.)
Age (years)	20±1.47	17-26
Family income (Lakh NPR per year) (n=63)	16.25±10.92	3-50
Years of internet use	6.26±2.13	3-15
Screen use in weekdays (hours per day)	4.27±2	0.5-12
Screen use in weekends and holidays (hours per day)	6.9±2.72	1-15
Internet use in weekdays (hours per day)	3.75±1.8	1-12.5
Internet use in weekends and holidays (hours per day)	6.3±3.1	2-25

Note: Min.=Minimum, Max.=Maximum.

Most of the students used the device in evening, 67(54.92%) and night time, 46(37.70%), while 2 of them reported to use the device throughout a day equally. The students spent their smartphone time mostly in social media, 79(64.75%), where Facebook was the most common, 37(30.33%), followed closely by Instagram, 34(27.97%), as their primary platform. Next most common use of smartphone was reading and watching videos (n=16 each) (Figure 1). Among 49 PC holders, its most common use was reported to be reading by 42(85.71%) of PC users.

The participants' common purposes of using social media are given in Figure 2. They use social platforms mainly for text and video chatting by 47(38.52%) followed by file sharing and study discussions.

All the participants had smartwatch, but only 25(20.50%) used it also for fitness tracking.

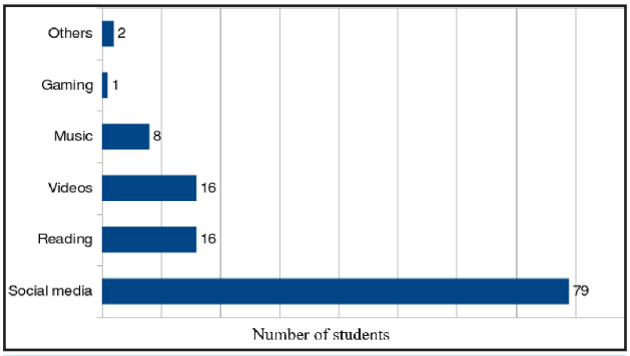

Figure 1. Primary uses of smartphone by participants. (n=122)

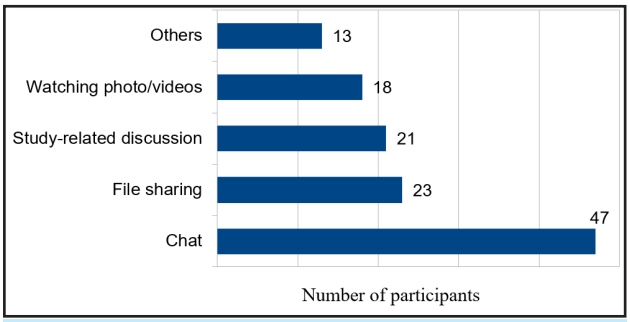

Figure 2. Common uses of smartphone by participants. (n=122)

Regarding the knowledge and interest in technology, most of the participants reported to have moderate knowledge as well as moderate interest in computer technology. However, there were 11(9.02%) students who revealed having low knowledge but expressed high interest in learning technology. Majority of them also responded that internet was quite useful and some were dependent on it for study (Table 2).

Table 2. Responses of participants about the knowledge and interest on technology and the utility of internet in their study. (n=122)

Response	Knowledge in technology n(%)	Interest in technology n(%)	Internet useful for study n(%)
None	11(9.02)	5(4.10)	0 (0)
A little	35(28.69)	22(18.03)	3(2.46)
Moderate	61(50)	43(35.25)	13(10.66)
Good amount	12(9.84)	27(22.13)	83(68.03)
Very much	3(2.46)	25(20.49)	23(18.85)

We also asked the students if they used artificial intelligence technology recently. Seventy (57.38%) of them did use the AI technology, among which ChatGPT was most common by 52(42.62%). Other AI tools used were Snapchat AI, Siri, Google

assistant and Amazon Alexa. Among those who used the AI tools (n=70), most common purpose of it was for searching quick facts in internet as a replacement of conventional search engine, 53 (75.71%), followed by entertainment, for intimate chat as a friend and for other purposes (Figure 3).

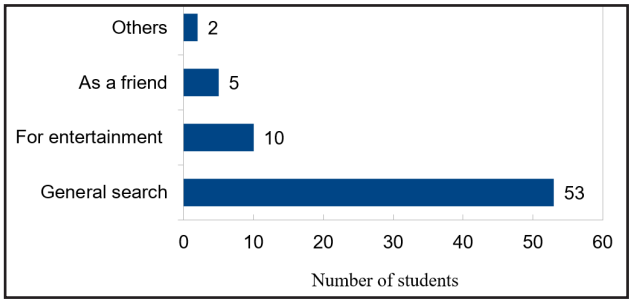

Figure 3. Response of participants about the use of artificial intelligence in daily activities. (n=70)

The different modalities and sources of study in the students are given in following table. Among them, majority of students studied the overall basic science using conventional textbooks, 80(65.57%), followed by using online videos, 26(21.31%). Notably, e-books and presentation slides were also popular. Online videos were particularly popular as a next source of knowledge for their study, 76(66.07%) (Table 3).

To understand the behaviour and preference of the pupils over the online sources of study, we asked five questions with 5-point Likert scale. Most of the respondents seem to enjoy learning basic medical sciences, and would like to have online contact with the teachers for easy learning. Most of them did "fact-check" of the information found in online sources. On the question if online videos were more helpful than class lecture, there were more pupils agreeing than those who disagreed. Sharing the course materials on social media was not very popular on our students (Table 4).

Table 3. Different modalities of basic medical science study in the participating students. (n=122)

Sources of Knowledge	As primary source n(%)	As second source n(%)
Conventional textbooks	80(65.57)	7(5.74)
E-books	6(4.92)	6(4.92)
Discussion with friends	-	9(7.38)
Presentation slides	6(4.92)	-
Online Videos	26(21.31)	74(60.66)
Social media	1(0.82)	2(1.64)
Wikipedia	1(0.82)	8(6.56)
Random E-search	-	9(7.38)
Teacher/Senior's notes	2(1.64)	7(5.74)

DISCUSSION

The present study provides an insightful examination of digital gadget usage patterns among undergraduate health science students at Universal College of Medical Sciences, revealing critical trends that underscore the dual role of technology in medical education. We chose Universal College of Medical Sciences (UCMS) for our study since it is centrally located with a long history of using technology, and having students from all over the country. The predominance of female participants in this sample may be due to inclusion of nursing students which are exclusively females. However, even among medical and dental students, only 26% (20 out of 77) were

Table 4. Students' behaviour and preferences regarding online learning. (n=122)

Statements	Strongly Agree n(%)	Agree n(%)	Neutral n(%)	Disagree n(%)	Strongly Disagree n(%)
I enjoy learning Physiology and basic medical science.	16(13.11)	72(59.02)	34(27.87)	-	-
I always 'fact-check' or review the Physiology information obtained from online sources; using textbooks, articles and/or faculty members.	16(13.11)	62(50.82)	32(26.23)	8(6.56)	4(3.28)
I would like to have online contact with my teachers for easy learning from them.	21(17.21)	51(41.80)	36(29.51)	10(8.20)	4(3.28)
Online videos of teaching physiology are usually more helpful for me than lectures in classroom.	23(18.85)	24(19.67)	49(40.16)	21(17.21)	5(4.10)
I would enjoy interacting/sharing with course materials on a social media page.	9(7.38)	31(25.41)	40(32.79)	37(30.33)	5(4.10)

males. Literature have indicated a higher enrolment of women in health science disciplines at higher education.[5] This gender disparity may reflect broader societal trends in education and career choices.

The average daily usage of smartphones-over 4 hours on weekdays and almost 7 hours on holidays-highlights a significant engagement with digital devices, and is comparable to other studies,[6,7] but is higher than students from Jumla, a remote place of the country[8]. Importantly, this figure of daily screen use is significantly higher than the recommended 2-hour period by US National Institute of Health (NIH).[9] Moreover, as this use is mainly concentrated to evening and night time of a day, its effect in sleep pattern is concerning as many studies have suggested.[10,11,3]

The most common social media our students used were Facebook and Instagram; which is similar to other studies in Nepal.[8,12] Notably, the predominance of social media as the primary application of smartphone usage raises concerns about the potential for distraction and the impact on academic performance, mental health and subjective well-being.[4,13,14] In addition, the risk on privacy and data loss is an important but neglected issue of social media use whose privacy policy is aligned mainly with profiting from the users' personal data. Additionally, considering the high usefulness of internet reported by majority (87%) students for their studies, it is important for educational institutions and policymakers to implement strategies that promote healthy internet usage habits and provide appropriate support systems for students.

Our study indicates the conventional textbooks and online videos being the most favoured study modes. This preference suggests a hybrid approach to learning, where traditional methods coexist with digital resources. In broad sense, it reflects the trend towards visual learning, which has been shown to enhance understanding and retention of complex medical concepts.[15-17] However, the low proportion of students with high level of knowledge and interest in computer technology among students raises questions about the adequacy of their digital literacy skills. It is noteworthy that a significant proportion of students reported inadequate computer skills (beginner or working level comprising 37.7% of all students), but only 22% are not or little interested in learning such technologies. These figures are much lower than that in remote place,[8] which shows students at accessible places and metro cities have higher digital literacy and motivation. Interestingly, the finding that about 10% students exhibited high interest in learning about computer technology despite their low knowledge indicates a potential gap in educational support and resources. It also suggests a need for targeted interventions to enhance digital literacy among medical students, enabling them to utilize technology effectively in their studies. Insufficient technical proficiency may hinder students' ability to effectively engage in online classes, utilise digital platforms and access educational resources.

Previous researches have discussed the importance of integrating digital literacy into medical curricula to prepare students for the demands of contemporary healthcare environments.[18-20] However, for this, investing in infrastructure and faculty development will be vital. At the same time, in low- and middle-income countries (LMICs), electronic learning has shown varying effectiveness and has often fallen short of its full potential.[21] This is primarily due to financial constraints and limited evaluation frameworks. Nevertheless, studies acknowledge the considerable potential of e-learning in these contexts and suggest that institutions must embrace and adequately fund e-learning initiatives. To achieve this, a more innovative and adaptable approach is needed, alongside comprehensive and transparent evaluation methods. Moreover, the expressed benefit of online contact with teachers by over half of the participants points to a growing acceptance of digital communication tools in medical education. This aligns with the findings of Meskó et al. (2015), who advocate for the incorporation of internet and digital communication into medical training; although it also necessitates clear guidelines to ensure professional boundaries and effective communication practices.[22]

Similarly, as the online information may not be always correct, specially the language model-generated ones, students need to fact-check the online contents regularly. Although there are reports with favourable attitude towards AI in medical education, its over-reliance is emphasized to have adverse effect in the users' cognitive and analytical abilities.[23-25]

In light of these findings, it is imperative for medical educators to consider the implications of technology use in their pedagogical strategies. While the integration of digital tools has the potential to enrich the learning experience, there must be a concerted effort to mitigate the risks associated with overuse and distraction, such as privacy threats, crimes like cyberbullying, problematic internet use, internet addiction and mental health disorders, which are frequently reported in literature.[8,14,26] Medical educators can take several steps to promote healthy use of technology and digital literacy among health science students. Incorporating training in digital literacy into curricula could help them to develop essential skills for navigating online resources, while avoiding potential privacy and security issues like cybercrimes and data breaches. Institutes can also establish guidelines for effective but responsible privacy-friendly social media use, barring its overuse and misuse. Furthermore, policymakers can consider promoting internet access and proper training in these groups, recognising the critical role the technology plays in health education.

Limitations

A single centric study limits its generalisation in wider population. No causal relation can be extracted from a cross-sectional study. Also, a questionnaire-based study inherently brings the social desirability bias and recall bias. Future research can generalise the issues raised in this study, preferably with an interventional design, implementing a trial of digital practice to see its effectiveness in cohort. Such studies can also further explore the changing modalities of medical education, especially with the utilisation of artificial intelligence.

CONCLUSIONS

In conclusion, the computer usage patterns of health science students at Bhairahawa reveal a blend of social and academic interaction, with significant implications for their study, curriculum design and instructional delivery in medical education. Future research should aim to explore the dynamics of digital device use in medical study, and teacher-student interaction in relation to technology use. By addressing these areas, medical education can evolve to better prepare students for the complexities of modern healthcare delivery, and inform evidence-based practices in medical education.

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