



# College student perception toward use of mobile learning during coronavirus disease 2019 (COVID-19) era in 2021, Ethiopia

Kedir Abdu Yesuf

Department of Health Informatics, Dessie Health Science College, Dessie, Ethiopia

Correspondence to: Kedir Abdu Yesuf, Lecturer, Department of Health Informatics, Dessie Health Science College, South Wollo Zone, Amhara Region, Dessie, Ethiopia. Email: abdukedirkapbc@gmail.com.

**Background:** The coronavirus disease 2019 (COVID-19) pandemic affects the educational sector across the globe. Mobile phones help students improve their learning activities. The mobile phone was a widely available device among students. Mobile phones have made a significant contribution to assisting learning in the pandemic era. Therefore, this study assessed student perceptions towards mobile learning during the COVID-19 era.

**Methods:** A cross-sectional study was conducted from September 10, 2021, to November 13, 2022. Participants include one government health college and four private health colleges in Dessie City. First stage, sample size is allocated in five colleges proportional to size. Then a total of 401 college students were recruited using simple random sampling. Data was collected via a structured questionnaire through interviews. The data was entered into Epi Info version 4.6 and exported into Stata version 14. Stata software was used to analyze the data. The data was presented using frequency counts, percentages, mean, and standard deviation.

**Results:** The study response rate was 96.9%; a total of 401 students were interviewed. Nearly 401 (98%) of the respondents had a mobile phone. About 285 (71.1%) and 261 (65.1%) of the respondents used mobile phones for teaching aids and clinical settings, respectively. In this study, 44.0% of students agree mobile learning minimizes the study gap during the COVID-19 era. More than half (62.3%) of students were perceived mobile as easier to share in class discussions both online and offline during COVID-19. Most of (85.9%) of students believe mobile learning helped them recover from a study gap during the COVID-19 period. In this study, small screens, financial constraints, time shortages, a lack of skills, a lack of support, and a lack of interest were the barriers to using mobile devices for learning.

**Conclusions:** This study revealed that mobile phones are the most available technological tools in colleges. Therefore, mobile learning has a great role in assisting learning and clinical practice. This study recommends the integration of mobile learning into the curriculum and trains students to help them develop a positive perception of mobile learning in the teaching and learning process.

**Keywords:** Mobile phone; perception; learning aid; college; Ethiopia

Received: 04 November 2022; Accepted: 31 May 2023; Published online: 30 June 2023.

doi: 10.21037/ht-22-14

View this article at: <https://dx.doi.org/10.21037/ht-22-14>

## Introduction

coronavirus disease 2019 (COVID-19) is a pandemic that spreads quickly around the world. To stop the spread of this pandemic, different measures were implemented, like lockdown, social distancing, and quarantine (1,2). The COVID-19 pandemic has extremely interfered with education systems globally. Schools, colleges, and

universities have temporarily closed to slow the spread of the pandemic. COVID-19 pandemic measures such as social distancing, self-isolation, and restricting close contacts with students and teachers in educational institutions (2,3). In addition, many libraries and public services have closed across the globe (3). Overall, this lockdown damages the educational sector hardly. In this time, students

need technology-based assisting tools different from the traditional way, which might be important to narrow gaps in learning activities during this pandemic (4).

UNESCO recommended the use of distance learning programmes, open educational applications, and platforms that schools and teachers can use to reach learners remotely and it can limit the disruption of education (5,6). Some colleges implement technology-based distance learning and assign tasks if they have secure access to an internet connection at home (7). There are also different types of educational tools available in developing countries that assist in learning about this pandemic. Amongst this, mobile learning has been an easily accessible technology by students during this period (8).

The COVID-19 pandemic negatively affects clinical and nonclinical learning. It restricts medical students from attending classes in preclinical and clinical practice (9,10). Hospitals suspended medical students from attending clinical attachments by limiting clinical rotation exposure, laboratory experiences, and observing and assisting relevant medical and surgical procedures (11-13). This limit consequence reflects inadequate clinical skill and interpersonal communication skill among students (9,12). So, hospitals need to focus on technological innovation other than traditional learning practices like mobile learning or E-learning methods to compensate for this gap (14).

Mobile learning is crucial in pandemic time due to its great advantages of not being limited by time and place (15). Mobile learning was an alternative device for overcoming the shortage of technological tools in schools. Mobile devices have become the latest technology for learning tools across the globe. Tremendous evidence revealed that mobile phones are considered vital tools for both teaching and learning processes (16-18).

Mobile learning refers to a method of supporting learning in modern ways using mobile devices (19). Mobile learning has created a new method in the educational sector to connect students with their teachers and colleagues. It has a great role in enhancing knowledge-sharing activities among academicians and students (20). Mobile learning devices include mobile phones, notebooks, laptops, iPads, PDAs, and smart phones (19). These mobile devices are important for students to collect learning material, read electronic books, and collect and analyze data (18).

Students mostly use mobile devices for taking pictures, sending or receiving SMS, interacting with friends, recording and listening to audio or video files, and making more phone calls (21,22). It is used to access information or

services on the internet, such as chat, an e-book reader, and sending, or receiving email. Additionally, it helps to access e-libraries, e-conferences, and other educational resources (21,23). Mobile capabilities, including connectivity, portability, GPS, cameras, and file storage, have great potential to enrich the teaching experience (21).

The mobile device is now a common device that is used in all aspects of life in both developed and developing countries (24). Mobile phone use patterns increased significantly in Africa, rising by 97% from 2004 to 2005. Nowadays, many are reporting ownership and penetration rates reach 100% in developing countries (25,26). Students frequently use mobile phones, and their use expands exponentially across the developing world. Mobile phone adoption among students in the developing world has also increased significantly (25).

Mobile phones helped to improve educational outcomes in two specific ways: by improving access to education and by promoting new learning (27,28). Mobile technology is seen as a viable tool in achieving the objectives of raising standards of learning, teaching, and research in higher education (8,20). Studies revealed that mobile learning not only improved access to education but also maintained the quality of the education delivered (8,29). On the other hand, mobile learning introduces new learning styles by facilitating alternative learning processes and instructional methods. Moreover, some literature points out the use of mobile learning in educational policies and instruction (25).

During the COVID-19 era, mobile learning is one of the most common solutions to the educational sector's pandemic challenges. The mobile learning programme in the educational sector is important to bring new technology into the classroom; it can be used to diversify the types of learning, and it can be a useful add-on tool for students with special needs (20,27). The most important future of mobile learning is that it enables group or individual learning. It can be an option for the personalization of learning, to work interdependently, and to work on projects. Generally, in school, mobile learning facilitates active learning, small group work, and student engagement in the content (30).

Mobile learning is mostly accepted by students because the device is simple to carry, friendly, cheap, easy to use, and constantly available in all walks of life (31). There is greater availability and affordability of mobile devices in lower-income countries because of factors such as mobility, portability, and the ability to access and share content. Therefore, it offers a vital opportunity for both teaching and learning (31,32).

There are many barriers to adopting mobile learning in educational institutions, including low rates of mobile use, a low degree of ICT penetration, and a lack of access to technology (33). Finance shortages to buy an appropriate phone, lack of skill, lack of support, and lack of internet were common barriers for mobile phone adoption in the developing world setting. Other barriers include a small screen, a shortage of time, teacher resistance, improper policy coordination, and a lack of interest (33,34).

The popularity of mobile phones among students provides opportunities for learning and teaching in higher education institutions. Mobile phone ownership and access can have major implications for teaching and learning during the COVID-19 pandemic (13). Evidence revealed that integrating information technology in the curriculum would enable students to access appropriate information and evidence-based resources, which are crucial to providing evidence-based patient care (20,32).

### *Rationale and knowledge gap*

Mobile phones help students improve their learning activities. The mobile phone was a widely available device among students. Mobile phones have made a significant contribution to assisting learning in the pandemic era. There is tremendous evidence indicating compensation mechanisms to prevent the spread of COVID-19 have harmed the education sector across the world (2). It also disrupted medical learning. Evidence from the multicenter area indicated that 74.7% of students agreed the pandemic limited their clinical learning (12). In Ethiopia, 59.9% of students perceived high COVID-19 negative impacts on their recent clinical learning (35).

In Ethiopia, there is no national policy and strategy that facilitate mobile learning. But there is opportunity of using mobile phone in learning activity. There is no any evidence that assess students' perceptions towards the use of mobile phones as learning aids among college students. This study helps the policymaker and manager to consider mobile learning as learning aid in education sector. So this study fills this gap by asses' students' perceptions towards the use of mobile phones as learning aids among college students.

### *Objective*

The objective of this study is to investigate students' perceptions towards the use of mobile phones as learning aids among all health college in Dessie, Ethiopia 2021.

## **Methods**

### *Study setting and design*

The study was conducted in Dessie city, Amhara regional state, Northeast Ethiopia from September 10, 2021 to November 13, 2022. According to the 2007 Ethiopian census report, Dessie has a total population of 160,450 (22). Administratively the town is divided into 5 sub-cities and 10 Kebele administrations. In Dessie administration, there are four private colleges and one governmental college. In this study, five colleges are included Dessie Health Science College, Alkan Health Science College, Tropical Health Science College, Dream Health Science College and Mancon Health Science College. In these colleges, enrolled number of students are 280, 310, 276, 210 and 193 respectively. The study design was institution-based cross-sectional quantitative study.

### *Sampling technique, sample size and population*

Study participants include students from all health colleges in Dessie administration city. Participants are from one governmental health college and four private health colleges. The sample size of the study was determined using a single population proportion formula to estimate the sample size for determining levels of students' perception towards use of mobile phones as learning aids. In the study, the following assumptions were made: a 95% confidence level ( $Z_{\alpha/2} = 1.96$ ) and an absolute precision or margin of error of 5% ( $d=0.05$ ). The study population proportion of student perception towards using a mobile phone as a learning aid was unknown, which was taken as 0.5. This study added 10% non-respondent rate. The total sample size for this study was 401 students from all colleges in Dessie administration city. The sample of students was selected using simple random sampling techniques by using separate class rosters as the sample frame. Equal size of sample was taken randomly in each college.

### *Data collection tool and procedure*

The data collection instrument was a self-administered questionnaire. The tool was adopted and is in accordance with the suggested evidence. The evidence retrieved from various researches. A self-administered, structured questionnaire was distributed to a representative sample of the study. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). The tool consists of three different parts, which develop

**Table 1** Socio-demographic characteristic of students from all health college in Dessie, Ethiopia 2021

Variable	No. of students (%)
Age (years)	
15–19	61 (15.2)
20–24	314 (78.3)
≥25	26 (6.5)
Sex	
Male	166 (41.4)
Female	235 (58.6)
Place of resident	
Rural	266 (66.4)
Urban	135 (33.6)
Marital status	
Single	357 (89.1)
Married	44 (10.9)
Academic level	
Diploma	77 (19.2)
Degree	324 (80.8)
Academic year	
First	192 (47.9)
Second	120 (30.0)
Third	68 (17.0)
Fourth	21 (5.2)

from retrieving literature. The first part consists of socio-demographic factors such as age, sex, place of residence, marital status, academic year, and academic level after searching relevant literature related to student perceptions towards using a mobile phone as a learning aid. The second part consists of items describing the features of mobile phones. The final part consists of a measure of perception towards the use of mobile phones as learning aids. It has a five Likert type scale (strongly disagree—1, disagree—2, neutral—3, agree—4, and strongly agree—5) consisting of 18 items positively to evaluate perception of mobile phone use for educational purposes. The pretest was conducted among 5% of student from Health Science college in Kombelcha city, other than study area. The instrument's reliability has been checked using Cronbach's alpha technique, which was 0.74. The self-administered interview

was carried out following informed consent in the student's common seating area in the college. Data was collected by four health professionals and after two days training.

### *Statistical analysis*

The data was first checked for completeness and consistency. The collected data was cleaned, and questionnaires with missing variables were checked. The questionnaires were entered using Epi Data version 4.6. The questionnaires were exported and analyzed using the Statistical Package for Social Sciences (SPSS) software package. A description of the data using the mean, standard deviation, and frequencies for the variables was done. Study results have been presented using tables.

### *Ethical consideration*

Ethical clearance was obtained from the continuous education and research board of Dessie Health Science College and registered in board with ID number of 032/13. The purpose and importance of the study were being explained to the participants. Data was collected after informed verbal consent was obtained. The confidentiality of the information was maintained by excluding names and keeping their privacy by interviewing them alone.

## **Results**

### *Sociodemographic characteristic of student*

A total of (n=401) students from all colleges participated in the study. Among colleges, 314 (78.3%) of students were aged between 21–24 years. More than half of the respondents 235 (58.6%) were female. A large proportion of respondents (89.1%) were single. Regarding academic level, 324 (80.8%) was enrolled in degree programmes (*Table 1*).

### *Characteristics of mobile and related use by student*

The majority of respondents had a mobile phone. Out of the 401 participants, 278 (69.3%) had a smart phone, and 123 (30.7%) had a cell phone. More than half of the respondents, 285 (71.1%), use mobile phones as a teaching aid. More than half of respondents 261 (65.1%) were use mobile phones in clinical settings. Regarding internet use, 248 (61.8%) students used internet connections via their phones for learning purposes (*Table 2*).

**Table 2** Characteristics of mobile and related use by students from all health college in Dessie, Ethiopia 2021

Variable	No. of students (%)
Own mobile phone	
Yes	392 (98.0)
No	9 (2.0)
Type of mobile device	
Cell phone	123 (30.7)
Smart phone	278 (69.3)
Laptop	55 (13.7)
Other	12 (3.0)
Do you use mobile for teaching aid	
No	116 (28.9)
Yes	285 (71.1)
Do you use mobile for clinical setting	
No	140 (34.9)
Yes	261 (65.1)
Internet use	
No	123 (30.7)
Yes	278 (69.3)
Internet use for retrieve learning material	
No	153 (38.2)
Yes	248 (61.8)
Social media used	
No	97 (24.2)
Telegram	123 (30.7)
Facebook	201 (50.1)
YouTube	45 (11.2)
Other	13 (3.2)

### *Perception toward mobile learning among student*

This section of the questionnaire measures university students' perceptions about mobile learning during COVID-19 pandemic time (Table 3). Percentage is used to figure out the result (5 strongly agree to 1 strongly disagree). In result, agreed or strongly agreed response interpreted as agreement and other response are interpreted as disagreement.

From Table 2, about 79.3% of students agree that mobile

is flexible for learning anytime and anywhere. In this study, 44.0% of students agreed that mobile learning minimizes the study gap during COVID-19, while 29.4% of students disagreed that mobile learning minimizes the study gap during COVID-19. About 62.3% and 37.0% of student responses indicate that mobile is easier to share in class discussions both online and offline during the COVID-19 period and that mobile learning enhances motivation to finish studies during the COVID-19 period. About 43.1% of social media applications helped with educational fulfillment during COVID-19. The majority of students (85.9%) believed that mobile learning would help them recover from their study gap during the COVID-19 period. More than half (58.0%) of students agreed that mobile acts as a learning companion during COVID-19 time.

## **Discussion**

### *Key finding*

Mobile phones are important to improve student learning opportunities, especially during the COVID-19 era. Mobile phones are widely used for learning purposes by students in different areas, including clinical settings. So, these studies explore student perceptions towards the use of mobile phones as learning aids among college students in Dessie City, Ethiopia.

The study response rate was 96.9%; a total of 401 students were interviewed. Nearly 401 (98%) of the respondents had a mobile phone. Out of the 401 participants, 278 (69.3%) of students had smart phones, and 123 (30.7%) of students had cell phones. About 285 (71.1%) and 261 (65.1%) of the respondents used mobile phones for teaching aids and clinical settings, respectively. In this study, 44.0% of students agree mobile learning minimizes the study gap during the COVID-19 era. More than half (62.3%) of students were perceived mobile as easier to share in class discussions both online and offline during COVID-19. Most of (85.9%) of students believe mobile learning helped them recover from a study gap during the COVID-19 period. In this study, small screens, financial constraints, time shortages, a lack of skills, a lack of support, and a lack of interest were the barriers to using mobile devices for learning.

### *Study and limitation of study*

The study includes all college of study area. This improves the study's power and enables the generalizability of the

**Table 3** College student's perception toward use of mobile phone as learning aid from all health college in Dessie, Ethiopia 2021

Variable	SA (%)	A (%)	N (%)	D (%)	SD (%)	Mean	St.D
The use of mobile is flexible to learn anytime, anywhere	34.9	44.4	7.9	9.4	3.2	3.89	0.52
Mobile learning minimizes the study gap during COVID-19 time	16.4	27.6	26.1	14.6	14.8	3.16	0.06
Mobile is easier to find relevant information of my studies	49.9	39.9	5.5	2.0	2.7	4.32	0.04
Mobile learning helps to improve my study	21.9	37.6	4.7	24.7	10.9	3.35	0.07
Mobile is easier to access to find my study materials	35.5	42.6	13.9	6.7	1.2	4.04	0.05
Mobile is easier to share in class discussions both online and offline during COVID-19 period	28.6	33.7	28.4	4.4	4.7	3.77	0.05
Use of mobile helps to improve knowledge in my field of study	20.9	29.5	18.4	27.4	3.7	3.36	0.06
Mobile learning enhance motivation to finish studies during COVID-19	9.4	27.6	8.4	40.5	13.9	2.78	0.06
Mobile helps me to solve study related problem	30.9	39.9	18.5	8.7	2.0	3.89	0.05
Mobile learning helps me to learn d/f ways & various learning fields	25.1	39.4	7.4	25.4	2.4	3.59	0.06
Social media applications help educational fulfillment during COVID-19	20.5	22.6	7.2	33.9	15.7	2.98	0.07
Social media use helps to strengthen the communication with others	48.6	23.9	14.9	8.8	3.7	4.05	0.06
Mobile learning is a faster way to get feedback	17.4	33.6	24.2	20.9	3.7	3.40	0.06
Mobile learning helps to improve interactivity b/n student & teacher	29.9	45.4	17.2	5.4	2.0	3.96	0.05
During COVID-19-time, mobile acts as a learning companion	34.9	23.1	5.9	35.6	1	3.57	0.06
Pandemic time, high internet charge of mobile network affect learning	47.3	39.4	7.7	4.4	1	4.28	0.04
I think mobile learning help me to recover my study gap at COVID-19	35.6	50.3	5.7	4.9	3.2	4.10	0.05
Screen size of my mobile does not affect my learning	7.9	6.7	7.2	26.5	51.6	2.08	0.07

SA, strongly agree; A, agree; N, neutral; D, disagree; SD, strongly disagree; St.D, standard deviation; COVID-19, coronavirus disease 2019.

findings about student perceptions towards the use of mobile phones as learning aids among college students. The study had some limitations. This study is based on self-reported information from the students. The study does not include various aspects of technological challenges like mobile phone device failure.

#### *Explanations of findings and comparison with similar researches*

The majority of respondents (97.3%) owned a mobile phone, either a cell phone or a smart phone. Out of the 401 participants, 278 (69.4%) had a smart phone, and 123 (30.6%) had a cell phone. Almost all students use some type of mobile device. The reason might be that mobile phones are available with low cost, mobility, portability, and simplicity to use at any time (31). It was lower than different studies that indicated that nearly all students own smart phones (36,37). This is different due to the availability of

mobile phones and variations in economic levels (28).

More than half of 285 (71.1%) respondents use mobile phones as teaching aids, which is higher than the previous finding in India (56.4%) (38). This finding is also similar to a previous study due to mobile phones helping students with independent learning and improving their access to learning materials (28,39). It was appearing to be a more convenient learning tool than any other technological tool in terms of portability, accessibility, affordability, operability, and applicability. Additionally, mobile learning enabled multitasking, comprehensive learning environment in the classroom, which facilitates the acquisition of instructional skills and knowledge at any time and place (28).

Regarding to internet use, 232 (57.9%) students were used internet connection by their phone for learning purpose. This result was an agreement with study which showed more than half of students were using internet mobile more than once a day and at least several times per week or more respectively (40). But it was lower than

other study conducted among student which reported that more than 94.8% of participant search internet for medical information (41). The reason includes students in developing countries have trouble accessing the internet in remote area and difficulty in affording technology (38).

More than half of respondents 261 (65.1%) were use mobile phones in clinical settings. The study revealed that most students used their smartphones frequently in clinical areas. Previous studies have also shown that medical students use their smartphones in clinical areas to provide immediate access to information (42). In another study, mobile learning helped facilitate effective decision making and the learning of evidence based guidelines for safe patient care (43). Evidence was found that mobile devices are used to obtain medication information and are kept updated and connected (21).

Students most frequently use mobile phones at the teaching area for communication, to collect and retrieve learning material, to open documents as dictionaries, and for calculation purposes. In other words, a few students use their mobile phones in the learning area for consultation, downloading learning related videos. A study done in India indicated that three-fourths of students preferred the extensive use of mobile technology for communication, and more than half (50%) of students used it for academic purposes (38). In another study, students used their mobile phones to learn sciences, as a dictionary and calculator, to read pdf files, spreadsheets, and word-processed documents (16).

The small screen of the mobile phone, as well as a lack of funds to purchase an appropriate phone, is common barriers to using a mobile phone as a learning aid. Additional barriers were a shortage of time to focus on the mobile phone, a lack of skill, a lack of support, and a lack of interest. This is supported by a study that indicated that the price of smartphones and apps can be a barrier to their use in education (44). Similarly, the small screen size, lack of internet connections, lack of support, and lack of finances were factors affecting mobile learning (45). Other studies also mentioned barriers to using mobile learning, including difficulty using the keypad, lack of interest, greater acceptance of mobile phones, difficulties concentrating on mobile learning, and limited types of learning activities (15,33).

This study focuses on mobile college students' perceptions about mobile learning during the COVID-19 pandemic. In this study, students agree that mobile is flexible for learning anytime and anywhere. In this study,

44.0% of students agreed that mobile learning minimizes the study gap during COVID-19, while 29.4% of students disagreed that mobile learning minimizes the study gap during COVID-19. About 62.3% and 37.0% of mobile devices are easier to share in class discussions both online and offline during COVID-19 and mobile learning enhances motivation to finish studies during COVID-19. About 43.1% of students say social media applications help educational fulfillment during COVID-19. The majority of students (85.9%) believe that mobile learning will help them recover from their study gap during the COVID-19 period. More than half of students (58.0%) agree that mobile acts as a learning companion during COVID-19 time.

This is supported by a study that revealed that m-learning is very helpful to recover from the study gap during this COVID-19 pandemic time. Evidence from Tanzania showed that most students believed that mobile phones supported learning activities (46). In another study, almost all students expressed that smartphones can support their learning and promote positive health outcomes (25). A similar study also indicated that students think mobile learning is flexible and easy to share learning materials at anytime and anywhere. This study also revealed that students agree that mobile learning minimizes the study gap and enhances motivation during COVID-19 time (15). Additional studies also indicated that social media applications may enhance learning and teaching during COVID-19 time (46).

The previous studies have revealed similar findings, including that students who learned through mobile applications had high positive attitudes regarding the compatibility of a mobile phone, self-efficacy, and perceived ease of use (47). The previous study also confirmed that the students admitted the usefulness and ease of use of a smartphone in the learning process (44,47).

### *Implications and actions needed*

Mobile phones were the most available technology among students. It creates an opportunities for learning and teaching in higher education institutions. Mobile phone ownership and access can have major implications for teaching and learning during the COVID-19 pandemic. This evidence revealed that integrating information technology in the curriculum would enable students to access appropriate information and evidence-based resources. Varieties of educational method including mobile learning are crucial to providing evidence-based patient

care especially in pandemic period.

Minster of education and policymaker should implement mobile learning in educational sector. Mobile learning enables students to learn online and distantly. This was a promise to educational sector by changing traditional educational system.

## Conclusions

To increase mobile learning in college, it needs to integrate informatics and health care technology in a variety of courses, including clinical practice courses. An implication for nursing curriculum is to consider the inclusion of this type of learning activity early in the programme.

## Acknowledgments

The author thanks Dessie Health Science College for their cooperation and support to conduct the study.  
*Funding:* None.

## Footnote

*Data Sharing Statement:* Available at <https://ht.amegroups.com/article/view/10.21037/ht-22-14/dss>

*Conflicts of Interest:* The author has completed the ICMJE uniform disclosure form (available at <https://ht.amegroups.com/article/view/10.21037/ht-22-14/coif>). The author has no conflicts of interest to declare.

*Ethical Statement:* The author is accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki (as revised in 2013). Ethical clearance was obtained from the continuous education and research board of Dessie Health Science College and registered in board with ID number of 032/13. The purpose and importance of the study were being explained to the participants. Data was collected after informed verbal consent was obtained. The confidentiality of the information was maintained by excluding names and keeping their privacy by interviewing them alone.

*Open Access Statement:* This is an Open Access article distributed in accordance with the Creative Commons Attribution-NonCommercial-NoDerivs 4.0 International

License (CC BY-NC-ND 4.0), which permits the non-commercial replication and distribution of the article with the strict proviso that no changes or edits are made and the original work is properly cited (including links to both the formal publication through the relevant DOI and the license). See: <https://creativecommons.org/licenses/by-nc-nd/4.0/>.

## References

1. Chandasiri O. The COVID-19: impact on education. *Journal of Asian and African Social Science and Humanities* 2020;6:37-42.
2. Marinoni G, van't Land H, Jensen T. The impact of Covid-19 on higher education around the world. *IAU Global Survey Report* 2020.
3. Sahu P. Closure of Universities Due to Coronavirus Disease 2019 (COVID-19): Impact on Education and Mental Health of Students and Academic Staff. *Cureus* 2020;12:e7541.
4. Ferdig RE, Baumgartner E, Hartshorne R, et al. Teaching, technology, and teacher education during the COVID-19 pandemic: Stories from the field. NC: Association for the Advancement of Computing in Education Waynesville, 2020.
5. Mustafa N. Impact of the 2019–20 coronavirus pandemic on education. *International Journal of Health Preferences Research* 2020;4:25-30.
6. Setiawan AR. editor. *Scientific Literacy Worksheets for Distance Learning in the Topic of Coronavirus 2019 (COVID-19)*, 2020.
7. Patricia Aguilera-Hermida A. College students' use and acceptance of emergency online learning due to COVID-19. *International Journal of Educational Research Open* 2020;1:100011.
8. Alghazi SS, Wong SY, Kamsin A, et al. Towards sustainable mobile learning: A brief review of the factors influencing acceptance of the use of mobile phones as learning tools. *Sustainability* 2020;12:10527.
9. Torda AJ, Velan G, Perkovic V. The impact of the COVID-19 pandemic on medical education. *Med J Aust* 2020;213:188-188.e1.
10. Gaur U, Majumder MAA, Sa B, et al. Challenges and Opportunities of Preclinical Medical Education: COVID-19 Crisis and Beyond. *SN Compr Clin Med* 2020;2:1992-7.
11. Ahmed H, Allaf M, Elghazaly H. COVID-19 and medical education. *Lancet Infect Dis* 2020;20:777-8.
12. Harries AJ, Lee C, Jones L, et al. Effects of the COVID-19



- pandemic on medical students: a multicenter quantitative study. *BMC Med Educ* 2021;21:14.
13. Kaul V, Gallo de Moraes A, Khateeb D, et al. Medical Education During the COVID-19 Pandemic. *Chest* 2021;159:1949-60.
  14. Goh PS, Sandars J. A vision of the use of technology in medical education after the COVID-19 pandemic. *MedEdPublish* 2020;9:49.
  15. Guo J, Huang F, Lou Y, et al. Students' Perceptions of Using Mobile Technologies in Informal English Learning during the COVID-19 Epidemic: A Study in Chinese Rural Secondary Schools. *Journal of Pedagogical Research* 2020;4:475-83.
  16. Kafyulilo A. Access, use and perceptions of teachers and students towards mobile phones as a tool for teaching and learning in Tanzania. *Education and Information Technologies* 2014;19:115-27.
  17. Raja R, Nagasubramani P. Impact of modern technology in education. *Journal of Applied and Advanced Research* 2018;3:33-5.
  18. Chung CJ, Hwang GJ, Lai CL. A review of experimental mobile learning research in 2010–2016 based on the activity theory framework. *Computers & Education* 2019;129:1-13.
  19. Kumar Basak S, Wotto M, Belanger P. E-learning, M-learning and D-learning: Conceptual definition and comparative analysis. *E-learning and Digital Media* 2018;15:191-216.
  20. Bernacki ML, Greene JA, Crompton H. Mobile technology, learning, and achievement: Advances in understanding and measuring the role of mobile technology in education. *Contemporary Educational Psychology* 2020;60:101827.
  21. Mohapatra DP, Mohapatra MM, Chittoria RK, et al. The scope of mobile devices in health care and medical education. *International Journal of Advanced Medical and Health Research* 2015;2:3.
  22. Thomas KM, O'Bannon BW, Bolton N. Cell phones in the classroom: Teachers' perspectives of inclusion, benefits, and barriers. *Computers in the Schools* 2013;30:295-308.
  23. Ally M. *Mobile learning: Transforming the delivery of education and training*. Edmonton: Athabasca University Press, 2009. Available online: [https://books.google.fr/books/about/Mobile\\_Learning.html?id=Itp60WteuJsC&redir\\_esc=y](https://books.google.fr/books/about/Mobile_Learning.html?id=Itp60WteuJsC&redir_esc=y)
  24. Mihailidis P. A tethered generation: Exploring the role of mobile phones in the daily life of young people. *Mobile Media & Communication* 2014;2:58-72.
  25. Porter G, Hampshire K, Milner J, et al. Mobile phones and education in Sub-Saharan Africa: From youth practice to public policy. *Journal of International Development* 2016;28:22-39.
  26. Aker JC, Mbiti IM. Mobile phones and economic development in Africa. *Journal of Economic Perspectives* 2010;24:207-32.
  27. Sattarov AR, Khaitova NF. Mobile learning as new forms and methods of increasing the effectiveness of education. *European Journal of Research and Reflection in Educational Sciences* 2020;7:1169-75.
  28. Mehdipour Y, Zerehkafi H. Mobile learning for education: benefits and challenges. *International Journal of Computational Engineering Research* 2013;3:93-101.
  29. Chang CY, Lai CL, Hwang GJ. Trends and research issues of mobile learning studies in nursing education: A review of academic publications from 1971 to 2016. *Computers & Education* 2018;116:28-48.
  30. Lall P, Rees R, Law GCY, et al. Influences on the Implementation of Mobile Learning for Medical and Nursing Education: Qualitative Systematic Review by the Digital Health Education Collaboration. *J Med Internet Res* 2019;21:e12895.
  31. Ahmad T. Undergraduate mobile phone use in the Caribbean: Implications for teaching and learning in an academic setting. *Journal of Research in Innovative Teaching & Learning* 2019;13:191-210. Available online: [www.emeraldinsight.com/2397-7604.htm](http://www.emeraldinsight.com/2397-7604.htm)
  32. Barker A, Krull G, Mallinson B, editors. A proposed theoretical model for m-learning adoption in developing countries. *Proceedings of mLearn; 2005*. Available online: <https://www.semanticscholar.org/paper/A-Proposed-Theoretical-Model-for-M-Learning-inBarkerKrull/77661f9fcc6291271be7728a886ee62c3409a7ec>
  33. Criollo-C S, Luján-Mora S, Jaramillo-Alcázar A. editors. Advantages and disadvantages of M-learning in current education. 2018 IEEE world engineering education conference (EDUNINE); 2018: IEEE. Available online: <https://www.semanticscholar.org/paper/Advantages-and-Disadvantages-of-M-Learning-in-Criollo-C-Luj%C3%A1n-Mora/b9fc2964509494a66d25d0da130a67216453a22a>
  34. Faulkenberry JG, Luberti A, Craig S. Electronic health records, mobile health, and the challenge of improving global health. *Curr Probl Pediatr Adolesc Health Care* 2022;52:101111.
  35. Angasu K, Bekela T, Gelan M, et al. COVID-19's Negative Impacts on Clinical Learning and Proposed Compensation

- Mechanisms Among Undergraduate Midwifery and Nursing Students of Jimma University. *Advances in Medical Education and Practice* 2021;12:1411.
36. Sharma N, Advani U, Sharma L, et al. Pattern of mobile phone usage among medical students. *International Journal of Academic Medicine* 2019;5:118.
  37. Loredó E Silva MP, de Souza Matos BD, da Silva Ezequiel O, et al. The Use of Smartphones in Different Phases of Medical School and its Relationship to Internet Addiction and Learning Approaches. *J Med Syst* 2018;42:106.
  38. Subhash TS, Bapurao TS. Perception of medical students for utility of mobile technology use in medical education. *Int J Med Public Health* 2015;5:305-11.
  39. Liaw SS, Hatala M, Huang HM. Investigating acceptance toward mobile learning to assist individual knowledge management: Based on activity theory approach. *Computers & Education* 2010;54:446-54.
  40. Anderson KJ. Internet use among college students: an exploratory study. *J Am Coll Health* 2001;50:21-6.
  41. Montagni I, Cariou T, Feuillet T, et al. Exploring Digital Health Use and Opinions of University Students: Field Survey Study. *JMIR Mhealth Uhealth* 2018;6:e65.
  42. O'Connor S, Andrews T. Mobile technology and its use in clinical nursing education: a literature review. *J Nurs Educ* 2015;54:137-44.
  43. Fulantelli G, Taibi D, Arrigo M. A framework to support educational decision making in mobile learning. *Computers in Human Behavior* 2015;47:50-9.
  44. Cheon J, Lee S, Crooks SM, et al. An investigation of mobile learning readiness in higher education based on the theory of planned behavior. *Computers & Education* 2012;59:1054-64.
  45. Achora S, Labrague LJ. An Integrative Review on Knowledge and Attitudes of Nurses Toward Palliative Care: Implications for Practice. *J Hosp Palliat Nurs* 2019;21:29-37.
  46. Mtega WP, Bernard R, Msungu AC, et al. Using mobile phones for teaching and learning purposes in higher learning institutions. The case of Sokoine University of Agriculture in Tanzania, 2012. Available online: <https://www.semanticscholar.org/paper/Using-Mobile-Phones-for-Teaching-and-Learning-in-of-Mtega-Bernard/d7ddc584107398be8cb256ba54b80d5e102ae325>
  47. Rahmi B, Birgoren B, Aktepe A. A meta analysis of factors affecting perceived usefulness and perceived ease of use in the adoption of e-learning systems. *Turkish Online Journal of Distance Education* 2018;19:4-42.

doi: 10.21037/ht-22-14

**Cite this article as:** Yesuf KA. College student perception toward use of mobile learning during coronavirus disease 2019 (COVID-19) era in 2021, Ethiopia. *Health Technol* 2023;7:3.