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Araştırma Makalesi/ Research Article

Examination of the Attitudes of Nursing and Midwifery Students Receiving Distance Education during the COVID-19 Pandemic towards Mobile Learning

COVID-19 Pandemi Sürecinde Uzaktan Eğitim Alan Hemşirelik ve Ebelik Öğrencilerinin Mobil Öğrenmeye Yönelik Tutumlarının İncelenmesi

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ABSTRACT

Objective: This descriptive study was conducted to determine the attitudes of nursing and midwifery students receiving distance education during the COVID-19 pandemic toward mobile learning.

Methods: The population of this study comprised 618 1st, 2nd, 3rd, and 4th year students enrolled in the Faculty of Health Sciences Department of Nursing and Midwifery. There was no sample selection and research was completed with 237 students who volunteered to participate in the study. A Questionnaire Form and the Mobile Learning Attitude Scale (MLAS) were used to collect data.

Results: The mean MLAS score of the female students was 58±11.5 and the mean score of male students was 58±16.0. There was no difference between the total scale and sub-scale scores concerning sex, age, department, and year of students ($p>0.05$). During the COVID-19 pandemic, students mostly used their smartphones to access the internet. The most significant advantage of M-learning was the ease of use and access; however, the disadvantage was that education was not efficient and effective. Moreover, the biggest difficulty experienced by students in M-learning during the COVID-19 pandemic was internet access and the associated cost. The majority of students who participated in this study felt that M-learning did not affect their academic achievements but was not suitable for nursing and midwifery students.

Conclusions: The attitudes of nursing and midwifery students toward M-learning during the COVID-19 pandemic were moderate.

Key Words: M-learning, nursing, midwifery, COVID-19, pandemic, attitude

ÖZ

Amaç: Bu çalışma, COVID-19 pandemi sürecinde uzaktan eğitim alan hemşirelik ve ebelik öğrencilerinin mobil öğrenmeye yönelik tutumlarının belirlenmesi amacıyla yapılmıştır.

Yöntem: Araştırmanın evrenini Sağlık Bilimleri Fakültesi Hemşirelik ve Ebelik Bölümü'ne kayıtlı 1., 2., 3. ve 4. sınıfa devam eden 618 öğrenci oluşturmuştur. Araştırmada örneklem seçimine gidilmemiş olup, araştırmaya katılmaya gönüllü 237 öğrenci ile araştırma tamamlanmıştır. Veriler, Tanıtıcı Bilgi Formu ve Mobil Öğrenme Tutum Ölçeği (MÖTÖ) kullanılarak toplanmıştır.

Bulgular: Araştırmaya katılan kız öğrencilerin toplam MÖTÖ puan ortalamasının 58±11.5, erkek öğrencilerin puan ortalamasının 58±16.0 olduğu saptanmıştır. Öğrencilerin cinsiyet, yaş, okuduğu bölüm ve sınıfına göre MÖTÖ toplam puan ortalaması ve ölçek alt boyutları puan ortalamaları arasında fark olmadığı belirlenmiştir ($p>0.05$). COVID-19 pandemisi sürecinde öğrencilerin internet erişimi için en fazla akıllı telefon kullandıkları, mobil öğrenmenin en büyük avantajının kullanım ve erişim kolaylığı olduğu, dezavantajının ise eğitimin verimli ve etkin olmaması olduğu belirlenmiştir. Öğrencilerin, COVID-19 pandemisi sürecinde mobil öğrenmede yaşadığı en büyük güçlüğün ise internete erişim ve maliyet olduğu saptanmıştır. Çalışmaya katılan öğrencilerin çoğunluğu mobil öğrenmenin akademik başarılarını değiştirmediğini ancak hemşirelik ve ebelik bölümü öğrencileri için uygun olmadığını düşündükleri saptanmıştır.

Sonuç: COVID-19 pandemisi sürecinde hemşirelik ve ebelik bölümü öğrencilerinin mobil öğrenmeye yönelik tutumlarının orta düzeyde olduğu belirlendi.

Anahtar Kelimeler: M-öğrenme, hemşirelik, ebelik, COVID-19, pandemi, tutum

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Introduction

COVID-19 pandemic, which has killed about a million people all over the world, has adversely affected all spheres of life, especially education, because there is no effective drug as of today and vaccine trials are still in their infancy. At present, education is performed in the digital world via distance learning environments (Lu et al., 2020; Yamamoto and Altun, 2020).

In recent years, the changes observed in information and communication technologies have their reflection in the field of education (Şenyuva, 2019). Rapidly adapting to the developing technology, this Y-generation of students defined as digital natives, want to receive education in a learning style most appropriate for them because of technological developments at the time and under conditions they want. At this point, mobile learning (M-learning) has emerged as an educational model that responds to the demands of students (Özsarı and Saykılı, 2020; Şahin and Başak, 2017). M-learning, an innovative educational approach, is a method of learning in which learning is performed using mobile communication tools such as smartphones and tablets, regardless of time and place (Gambo et al., 2017; Şahin and Başak, 2017). M-learning is an advantageous method that enables continuous learning process to occur. However, M-learning has disadvantages such as data transmission and storage limitations caused by the technical features of mobile devices, problems related to battery and screen size, internet connection, and cost (Alsancak-Sırakaya and Seferoğlu, 2018; O'Connor and Andrews, 2018; Zayim and Ozel, 2015).

The profession of nursing and midwifery is an applied health discipline that requires a meaningful combination of theoretical knowledge with practical skills (McKenna et al., 2020). M-learning is extensively used in nursing education and provides various capabilities such as comfortably carrying teaching materials with portable mobile tools, storing and transferring large amounts of information using tools with large memory capacity, and ease of access to up-to-date guidelines and evidence-based care practices in clinical environments (O'Connor and Andrews, 2018; Şahin and Başak, 2017; Şenyuva, 2019). Studies on this subject reported that >50% of nursing students often use M-learning methods and nurses have a positive perception of M-learning (Gallegos et al., 2019; Xiao et al., 2018). In a systematic review where Kim and Park assesses the impact of smartphone-based M-learning, it was found that smartphone-based M-learning had a positive impact on knowledge, skills and learning attitude of nursing students and it may be an alternative for better nursing education (Kim and Park, 2019).

During the COVID-19 pandemic, educational institutions that train new healthcare providers have faced many challenges (Dewart et al., 2020). During this time, nursing and midwifery education, which has both theoretical and practical course content, has been forced away from the traditional classroom and clinical environment. Moreover, education and training activities have begun to be performed via distance learning. Thus, M-learning has become increasingly important and indispensable for sustainable education. However, to eliminate certain limitations in M-learning and to provide data to future plans for developing M-learning, studies investigating students' attitudes and thoughts toward M-learning are required. This study was conducted to determine the characteristics of internet usage, difficulties, thoughts and attitudes of students during the COVID-19 process.

Method

Study Design

This research was conducted as a descriptive study to determine the attitudes of nursing and midwifery students receiving distance education from the Faculty of Health Sciences of a university in Central Anatolia during the COVID-19 pandemic toward M-learning.

Study Population and Sample

The population of this study comprised 618 1st, 2nd, 3rd, and 4th year students enrolled in the Faculty of Health Sciences Nursing Department and Department of Midwifery of a university located in Central Anatolia, Turkey. The study was carried out between 17.06.2020 and 30.06.2020. Before starting the research, the sample size was calculated based on a known population at 95% confidence level (type 1 error margin, $\alpha = 0.05$) and 90% power (second type error margin $\beta = 0.10$); moreover, the minimum required sample size was reported to be 220. Because certain students would not want to fill out the questionnaires or participate in the study, questionnaire forms were sent online to 315 students. However, because 77 students did not complete the questionnaire, the study was completed with 237 volunteer students. After data collection, post-hoc power analysis was conducted using G-Power 3.1.94 with a confidence interval of 0.05 and an effect magnitude of 0.50, and power was

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reported to be 95%, indicating that the sample size was adequate.

Data Collection Tools

The data were collected using the questionnaire form and the Mobile Learning Attitude Scale (MLAS).

Questionnaire Form

This form was prepared by the researchers based on literature data (Gallegos et al, 2019; Şenyuva, 2019; Zayim and Özel, 2015). It comprises 15 questions on certain sociodemographic features such as age, gender, internet usage before and during the COVID-19 pandemic, and characteristics associated with M-learning.

Mobile Learning Attitude Scale (MLAS)

The mobile learning attitude scale developed by Çelik (2013) was used to measure students' attitudes toward M-learning (Çelik, 2013). The scale comprises a total of 21 items and 4 subdimensions. These are "advantages of mobile learning (items 1-2-3-4-5-6-7), limitations (items 8-9-10-11-12), usefulness (items 13-14-15-16-17), and freedom (items 18-19-20-21)". The scale is a five-point Likert-type scale and includes 21 attitude statements. The lowest score that can be obtained from the scale is 21, whereas the highest score is 105. The Cronbach alpha reliability coefficient of the scale found by Çelik was 0.88; in this study, the Cronbach alpha reliability coefficient of the scale was 0.79.

Data Collection

Data were collected from the students online. Data collection tools were presented to nursing and midwifery students online. After the necessary information about the research was provided, volunteering students were asked to participate in the study. Students were then asked to fill out the consent form on the first page, indicating that they agreed to participate in the research, and then complete the remaining questionnaire.

Data Analysis

Descriptive statistics were then presented as number (n), percentage (%), median (M) and interquartile range (IQR) values. The normality of M-learning scores was evaluated by the Shapiro–Wilk normality test and Q-Q charts. Mann–Whitney U test was used to compare M-learning Scores between two groups, and Kruskal–Wallis test was used to compare the scores between three or more groups. Dunn–Bonferroni test was used as a multiple comparison test. $p<0.05$ was considered statistically significant for all analyses.

Ethical Considerations

Before starting the research, ethical approval (Approval No:11/09-17.06.2020) was obtained from one university's ethics commission. Moreover, institutional approval was obtained from the Faculty of Health Sciences in which the research would be performed, and approval was obtained from the Board of the Ministry of Health, which was created for studies on COVID-19 pandemic. Furthermore, informed consent was obtained from all students participating in the study. For the use of the scale, permission was requested by contacting Çelik via e-mail, and the original form of the scale and the information content related to the scoring were also requested and received.

Results

Table 1 shows socio-demographic characteristics and information about internet usage of nursing and midwifery students who participated in the research. As per Table 1, 86.5% of the students participating in the study were female, 71.4% were 18–21 years old, 65% were registered in the nursing department and 32.1% were first-year students. Moreover, 93.2% of the students used smartphones to access the Internet during the COVID-19 pandemic. Note that 42.6% of the students had moderate internet usage skills before the pandemic and 57% had good internet usage skills during the pandemic. Furthermore, 53.3% of the students had problems with internet access during distance education, and 60.2% of those had an internet connection problem. Table 2 presents the distribution of characteristics associated with M-learning. Moreover, 54.6% of the students participating in the study used M-learning methods every day prior to the COVID-19 pandemic; this ratio increased (86.1%) during the pandemic. The students who participated in the study stated the advantages of M-learning as ease of use and access, supporting learning, independence of time and space, and being economical. Students listed the disadvantages of M-learning as follows: education not efficient and effective, the lack of face-to-face communication, internet access problems, M-learning not being suitable for applied lessons, and time wastage. Moreover, 72.6% of the students stated that M-learning was not suitable for the education of nursing and midwifery students, and 38.4% stated that M-learning methods did not affect their academic achievement status. Table 3 shows the distribution of MLAS scores as per the descriptive characteristics of students.

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It was determined that the mean total MLAS score of female students in the study was 58±11.5 and the mean score of male students was 58±16.0. In the present study, there was no statistically significant difference between the mean total score and subscale scores as per sex, age, department, and the grade of students (p>0.05) (Table 3).

Table 1. Descriptive characteristics of nursing and midwifery students

Variables	n	%
Gender		
Female	205	86.5
Male	32	13.5
Age		
18-21 years old	169	71.4
22 years and older	68	28.6
Department		
Nursing	154	65.0
Midwifery	83	35.0
Class		
First-year Students	76	32.1
Second-year Students	74	31.2
Third-year Students	44	18.6
Fourth-year Students	43	18.1
Devices used for internet access during the COVID-19 pandemic process*	221	93.2
Smart Phone	95	40.1
Computer	12	5.1
Tablet	5	2.1
Other (Smart clock, Playstation)		
The internet usage skills before the COVID-19 pandemic	10	4.2
Bad	101	42.6
Middle	96	40.5
Good	30	12.7
Very good		
The internet usage skills before the COVID-19 pandemic	8	3.4
Bad	43	18.1
Middle	135	57.0
Good	51	21.5
Very good		
Difficulty in internet access during the distance education process	111	53.2
Having difficulty	126	46.8
Without hassle		
Reason for having difficulty in internet access in the distance education process * (n = 111)	68	60.2
	64	56.6
Internet connection problem	13	11.5
The cost of the internet	5	4.5
Mobile device-related issues		
Other (time problem, technical problem, etc.)		

**More than one answer was given*

According to Table 4, there was no statistically significant difference between the students' frequency of internet use before and after the pandemic related to mobile learning and their opinions on whether mobile learning is suitable for the nursing-midwifery and the Mobile Learning Attitude Scale score (p>0.05). Students' freedom subscale scores differed statistically according to the effect on academic achievement (p<0.05). The freedom scores of the students who answered "mobile learning methods increased academic achievement" were statistically higher than the scores of the students who answered, "it did not change".

Discussion

In the present study that was conducted to determine the attitudes of nursing and midwifery students toward M-learning, which has become a necessity rather than an option during the COVID-19 pandemic, it was determined that the mean MLAS score of the students was moderate. There are certain differences in the results of the studies conducted on M-learning before and during the COVID-19 pandemic in the literature (Biswas et al., 2020). This difference is attributed to M-learning, which was optional before the pandemic and has now become a necessity.

In multiple studies conducted before the COVID-19 pandemic, students were determined to have a positive attitude toward mobile applications (Hay et al 2017; Kim and Park; 2019). Hay et al. conducted a study with nursing students and reported that students used mobile technology and social media and were keen to engage in ongoing learning and collaboration using these resources (Hay et al., 2017). Kim and Park's study reported that smartphone-based M-learning may be an alternative or supportive method for improved nursing education (Kim and Park, 2019). In the study of Pimmer et al. (2014), nursing students stated that they used M-learning as an effective problem-solving method in the process of giving care to patients (Pimmer et al., 2014).

However, studies conducted during the COVID-19 pandemic reported that the majority of students in medicine, dentistry, nursing, and midwifery departments with applied courses in the curriculum expressed a negative attitude toward M-learning (Abbasi et al., 2020; Diab and Elgahsh, 2020; Ramos-Morcillo et al., 2020). Note that 61.6% of nursing students receiving online education and 77% of the students studying medicine and dentistry during the COVID-19 pandemic expressed negative attitudes toward e-learning (Abbasi et al., 2020; Diab and Elgahsh, 2020). In the study of Abbasi et

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al., (2020) it was reported that students did not prefer e-teaching over face-to-face teaching during the lockdown situation and the majority of students considered that e-learning limited student-teacher interaction. Similarly, in another study conducted with nursing students switching from face-to-face education to e-learning during the COVID-19 pandemic, students preferred face-to-face education.

Table 2. The characteristics of nursing and midwifery students related to M-learning

Variables	n	%
Frequency of using mobile learning methods before the COVID-19 pandemic		
Everyday	130	54.9
Every other day	18	7.6
Three times a week	23	9.7
Once a week	30	12.7
Once every two weeks	15	6.3
Once a month	21	8.9
Frequency of using mobile learning methods other than listening to lectures during the COVID-19 pandemic process		
Everyday	204	86.1
Every other day	13	5.5
Three times a week	10	4.2
Once a week	5	2.1
Once every two weeks	2	0.8
Once a month	3	1.3
Advantages of mobile learning		
Ease of use and access	75	31.7
Supporting learning the lesson	69	29.1
No advantage	30	12.7
Time and space independence	36	15.1
Being economical	5	2.1
Other (being with the family, increasing adaptation to technology, etc.)	22	9.3
Disadvantages of mobile learning		
Education is not efficient and effective	68	28.7
Lack of face-to-face communication	40	16.9
Internet access problems	40	16.9
Not suitable for practical courses	36	15.1
No disadvantages	15	6.3
Waste of time	11	4.7
Other (adversely affect eye health, lack of motivation, etc.)	27	11.4
Suitability of mobile applications for the education of nursing/midwifery students		
No	172	72.6
Yes	65	27.4
The effect of mobile learning methods on academic success		
Did not change	91	38.4
Increased	74	31.2
Reduced	72	30.4

It was reported that e-learning imposed limitations to elderly students, rural residents, students with home and work responsibilities, and those having electronic resources problems. In the same study, theoretical courses can be conducted through online education but clinical applications and practices are indispensable for nursing students (Ramos-Morcillo et al., 2020). The fact that nurses and midwives are the professionals who spend the most time with patients, and the necessity of empathy, compassion and effective communication as well as theoretical knowledge and professional skills in care delivery suggest the necessity of bedside training in clinical settings.

This view was supported in the present study as 72.6% of the students reported that M-learning was not suitable for nursing and midwifery education. Although it is considered that M-learning alone cannot be sufficient in the health field, particularly in branches such as nursing and midwifery that require clinical practice and training to gain the necessary skills, it can be used as an alternative training option supported by simulation during times of necessity such as the COVID-19 pandemic. However, note that the development and enrichment of M-learning and providing equal opportunities for all students is important for this method's success.

There are studies in the literature with emphasis on the importance of blended learning technique, which incorporates both online education and classroom education, which has come to the forefront with the emergence of M-learning (Button

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et al., 2014; Jowsey et al., 2020; Rajab et al., 2020). In a literature review of Button et al. on e-learning and information communication technology (ICT) in nursing education, the majority of students and educators stated that combining classroom education with online learning would be more effective (Button et al., 2014).

Table 3. Distribution of MLAS scores according to the descriptive characteristics of students

Variables	Total MLAS score		Advantages of Mobile Learning		Limitations		Usefulness		Freedom	
	M	*IQR*	*M*	*IQR*	*M*	*IQR*	*M*	*IQR*	*M*	*IQR*
Gender										
Female	58.0	11.5	19.0	4.0	13.0	3.0	16.0	5.5	10.0	4.0
Male	58.0	16.0	19.0	3.5	14.0	3.0	15.0	4.5	10.0	5.0
*Test Statistics**	*z*=0.791 *p*=0.429		*z*=1.037 *p*=0.300		*z*=0.917 *p*=0.359		*z*=0.677 *p*=0.499		*z*=0.077 *p*=0.939	
Age										
18-21 years old	57.0	12.0	19.0	5.0	13.0	3.0	15.0	6.0	10.0	4.0
22 years and older	59.0	11.5	19.0	4.0	13.0	3.0	16.0	4.0	10.0	4.0
*Test Statistics**	*z*=0.315 *p*=0.715		*z*=0.862 *p*=0.389		*z*=0.157 *p*=0.875		*z*=0.875 *p*=0.382		*z*=0.444 *p*=0.657	
Department										
Nursing	59.0	12.0	19.0	4.0	13.0	3.0	16.0	5.0	10.0	5.0
Midwifery	57.0	11.0	19.0	4.0	13.0	4.0	15.0	6.0	10.0	4.0
*Test Statistics**	*z*=0.314 *p*=0.753		*z*=0.584 *p*=0.559		*z*=1.149 *p*=0.250		*z*=0.465 *p*=0.642		*z*=0.183 *p*=0.855	
Class										
First-year Students	58.0	13.8	19.0	4.0	14.0	3.0	15.0	6.0	10.0	5.0
Second-year Students	57.0	9.3	19.0	4.0	13.0	3.0	15.0	6.0	10.0	5.0
Third-year Students	60.0	11.8	19.0	4.0	13.0	4.0	16.5	5.8	11.0	5.0
Fourth-year Students	59.0	13.8	19.0	4.0	13.0	3.0	16.0	4.0	10.0	4.8
*Test Statistics***	*z*=1.653 *p*=0.648		*z*=4.043 *p*=0.257		*z*=2.727 *p*=0.436		*z*=3.355 *p*=0.340		*z*=3.520 *p*=0.310	

*M: Median, IQR: Inter quartile range, *Mann-Whitney U test, ** Kruskal-Wallis Analysis*

In a study on blended learning in distance education, when blended learning was purposefully delivered and effective in terms of managing and supporting student active learning, it positively influenced the achievements of students (Jowsey et al., 2020). Rajab et al. conducted a study with faculty members and students and reported that the majority of participants preferred the blended system (Rajab et al., 2020). In applied sciences such as nursing and midwifery, it is thought that applied courses should be held in clinics and online education can be used to conduct theoretical courses. However, the most important points here are that students actively participate in theoretical courses and adopt an interactive learning style. It is important to provide and maintain the online education infrastructure for the courses to be efficient in this way.

In a study with 416 students studying at different universities in Bangladesh during the COVID-19 pandemic, it was reported that most participants had a positive attitude toward M-learning. In this study, participants listed the advantages of M-learning as filling the educational gap formed during the COVID-19 pandemic, increasing communication with teachers, and enabling classroom participation outside the classroom (Biswas et al., 2020).

In the present study, the majority of students reported that the primary advantage of M-learning is ease of use and access. They stated that M-learning has advantages such as supporting the learning process, independence of time and space, and being economical. In particular, in lockdown situations, the ability to create a classroom environment at home shows the importance of M-learning. There are studies in the literature that support our results and these studies especially emphasize the flexibility of M-learning with respect to time and space (Biswas et al., 2020; Button, Didy et al., 2014). Expressing online learning during the COVID-19 pandemic as "A Panacea", Dhawan identified time flexibility and location flexibility as strengths in the SWOC analysis related to online learning in crises such as COVID-19 (Dhawan, 2020). Moreover, in this study, the mean scores of the Mobile Learning Attitude Scale freedom sub-dimension scores of the students who stated that

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mobile learning increased academic achievement were high.

In this study, the majority of students reported the lack of efficiency and effectiveness of education as the most significant disadvantage of M-learning. Students listed other disadvantages of M-learning as lack of face-to-face communication, problems with internet access, M-learning not being suitable for applied lesson, and time wastage.

Table 4. Distribution of students' MLAS scores according to M-learning-related characteristics

Variables	Total MLAS score		Advantages of Mobile Learning		Limitations		Usefulness		Freedom	
	M	*IQR*	*M*	*IQR*	*M*	*IQR*	*M*	*IQR*	*M*	*IQR*
Frequency of using mobile learning methods before the COVID-19 pandemic										
Everyday	57.0	14.0	19.0	4.0	13.0	3.0	16.0	6.0	10.0	4.0
Every other day	59.0	11.3	19.5	2.3	13.0	4.0	16.5	5.5	10.0	6.5
Three times a week	58.0	11.0	19.0	2.0	14.0	3.0	15.0	6.0	9.0	4.0
Once a week	61.0	11.0	19.0	5.0	13.0	3.0	15.0	4.5	11.0	3.5
Once every two weeks	60.0	17.0	19.0	7.0	14.0	7.0	17.0	5.0	11.0	5.0
Once a month	57.5	7.5	20.0	2.8	13.5	3.0	15.0	6.0	10.0	3.0
*Test statistics***	*z*=3.448; *p*=0.631		*z*=3.479; *p*=0.627		*z*=3.215; *p*=0.667		*z*=2.644; *p*=0.755		*z*=3.241; *p*=0.663	
Frequency of using mobile learning methods other than listening to lectures during the COVID-19 pandemic process										
Everyday	59.0	12.0	19.0	4.0	13.0	3.0	16.0	5.0	10.0	5.0
Every other day	56.0	10.0	19.0	5.5	13.0	3.5	15.0	6.0	10.0	5.0
Three times a week	57.5	13.0	19.0	4.8	14.0	4.0	14.5	4.8	9.5	3.8
Once a week or less	56.0	14.0	20.0	5.8	13.0	4.0	15.0	6.0	9.0	4.8
*Test statistics***	*z*=0.240; *p*=0.971		*z*=0.362; *p*=0.948		*z*=1.541; *p*=0.673		*z*=1.336; *p*=0.721		*z*=1.414; *p*=0.702	
Suitability of mobile applications for the education of nursing / midwifery students										
Suitable	14.3	19.0	3.5	13.0	4.0	15.0	5.0	11.0	6.0	58.5
Not Suitable	11.0	19.0	4.0	13.0	3.0	16.0	5.0	10.0	4.0	58.0
*Test statistics**	*z*=0.328; *p*=0.743		*z*=0.945; *p*=0.345		*z*=0.546; *p*=0.585		*z*=1.025; *p*=0.306		*z*=0.939; *p*=0.348	
The effect of mobile learning methods on academic success										
Increased	59.0	12.0	19.0	4.0	13.0	5.0	16.0	5.0	11.0[a]	5.0
Reduced	60.0	9.0	19.0	5.0	13.5	3.0	16.0	5.8	10.5[ab]	4.0
Did not change	56.0	13.0	19.0	4.0	13.0	3.0	15.0	6.0	9.0[b]	4.0
*Test statistics***	*z*=4.541; *p*=0.103		*z*=0.058; *p*=0.972		*z*=1.471; *p*=0.479		*z*=3.558; *p*=0.169		*z*=**10.128**; *p*=**0.006**	

*M: Median, IQR: Inter quartile range, *Mann-Whitney U test, ** Kruskal-Wallis Analysis*

Biswas et al. reported that although the majority of students were keen on M-learning, they considered high internet fees during the COVID-19 pandemic adversely affected M-learning (Biswas et al., 2020). Zayim and Özel reported that battery life and high cost of communication were common

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problems for both smartphones and tablet systems, and hardware quality and financial restrictions were effective (Zayim and Özel, 2015). Determining the disadvantages of M-learning, minimizing them, and transforming them into advantages will shed light on the solution of these problems in education during the COVID-19 pandemic.

In this study, the device most effectively used by students during the COVID-19 pandemic was reported to be smartphones. In the study of Xiao et al., smartphones were the most used M-learning tools, followed by tablets and laptop computers (Xiao et al., 2018). In the study of O'Connor and Andrews, most students reported owning a smartphone but just <50% used mobile apps to help them learn in clinical practice (O'Connor and Andrews, 2018). Determining the most used device in M-learning and knowing the difficulties encountered in M-learning for these devices will contribute to the plans for further development and improvement of M-learning.

Conclusion and Practical Implications

This study reported that students' attitudes toward M-learning are moderate and sex, age, department and grade of students do not affect students' attitudes toward M-learning. The most significant difficulty experienced by students in M-learning during the COVID-19 pandemic is Internet access and associated costs. The majority of students reported that M-learning is not suitable for the nursing and midwifery department and did not affect their academic achievements. Although there are certain limitations of M-learning, it is obvious that it has been a lifesaver for everyone during the COVID-19 pandemic. Equal opportunity in M-learning and technological infrastructure is of vital importance in the dissemination and more effective use of this learning method. M-learning is an indispensable method in emergency situations such as pandemics and natural disasters, and it is important to develop and diversify appropriate M-learning methods for health-related applied sciences such as medicine, dentistry, nursing, and midwifery. At this point, a significant responsibility falls on the shoulders of nursing and midwifery educators in the development and diversification of M-learning methods.

Limitations

Because the results obtained in this study are limited only to nursing and midwifery department students enrolled in the university and faculty where this research was conducted, the results cannot be generalized to the entire population.

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What did the study add to the literature?

- During the COVID-19 pandemic, the mean Mobile Learning Attitude Scale score of the students was moderate.
- The most significant advantage of M-learning was the ease of use and access.
- The most significant disadvantage of M-learning was that education was not efficient and effective.
- The biggest difficulty of mobile education during the COVID-19 pandemic was internet access and the associated cost.

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