


## Change in Nursing Education: Mobile-Based Learning Approaches

### Abstract

Coronavirus disease-2019 pandemic, causing outbreaks in all countries as well as Turkey, has affected the education system and has drawn attention to the importance of making preparations to integrate the distance education process with the use of mobile technology. Mobile learning is one of the methods that takes the educational process beyond physical limits, supports lifelong learning regardless of time and place, and provides ease of access to learning materials and learning. Accordingly, it is inevitable to restructure nursing education in line with technological developments and changes and to benefit from different learning methods and approaches. In this review article, the advantages and disadvantages of mobile learning in nursing education in the world and in our country were discussed in line with the literature information.

**Keywords:** Nursing education, student, mobile applications, distance learning

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### Introduction

In today's world, where technology is developing rapidly, mobile communication tools have become an important part of our daily lives. In addition to their communication features, mobile devices also have a large number of features such as cloud support, using interactive programs, connecting to social networks, accessing location information, and exchanging data.<sup>1-4</sup> Significant changes have occurred in the field of education in direct proportion to the development of technology, and it has been realized that there is a significant relationship between the use of mobile technologies and learning in the process of acquiring knowledge and transferring to practice. Developments in information technologies have increased the need for using mobile devices in addition to computers, especially in distance education environments.<sup>2,4,5</sup>

The young generation, including nursing students, continue their daily lives intertwined with highly advanced mobile technology. This situation necessitates nurse educators to improve themselves with the integration of mobile technology into education so that the quality of education offered can be increased.<sup>6</sup> In mobile-based learning, regardless of place and time, learners have the opportunity to access information and lessons with portable operational tools without being dependent on the classroom environment. Mobile learning has benefits such as providing equal opportunities in education, supporting lifelong learning, accessing educational materials, and providing ease of learning to the individual at any time.<sup>5,7</sup>

The use of information technology, technological devices, wireless networks, telemedicine, and smart devices has gained importance in nursing education.<sup>8</sup> Using these technologies in nursing education facilitate instant access to information. Thus, students, educators, and nurses can access evidence-based information about caring processes and standards any time they want. When the literature about mobile technology is examined, it can be seen that significant progress has been made in this regard.<sup>9</sup> In this review, the definition, importance, advantages, and disadvantages of mobile learning, devices used in mobile learning, and the importance and benefits of mobile technology use in terms of nursing education have been discussed in line with the relevant literature.

### What Is Mobile Learning?

Technological developments have made mobile devices an indispensable part of life. Reasons such as fast and easy access to information, portability, easy accessibility

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and providing wireless connection have increased the use of mobile devices in the field of education.<sup>10</sup>

Many definitions of mobile learning have been made in the literature. Koole<sup>11</sup> defined mobile learning as “learning in physical and virtual environment supported through mobile technologies;” Wyne<sup>12</sup> defined it as “learning and teaching activities that take place by using laptop, tablet and smart phones;” Li et al<sup>13</sup> defined it as “spontaneous, personal, formal or informal, contextual, portable, ubiquitous, and non-formal learning.” Although there are changes in the tools used depending on the development of technology, it can be said that the focus in the definitions of mobile learning is individual learning speed and learning independent of time and space. As a matter of fact, individuals in the learning process can easily access information quickly wherever they want and whenever they want via mobile devices.<sup>13-15</sup> Today, mobile devices and applications are widely used in all age groups. When Turkish Statistical Institute<sup>16</sup> Household Information Technologies rates are examined, the rate of having mobile devices at home has been reported as 98.7%. Statistics on internet use has shown an increase in the use of mobile phones and a serious decrease in the use of computers, tablets, and other devices. It has also been reported that mobile devices and the internet are mostly used between the ages of 24 and 35, and the rate of internet use in young people between the ages of 16 and 24 has been reported to be 90.8%.<sup>16</sup> These rates show that internet and mobile technologies are widely used by the young. Widespread use of mobile devices among young people has made mobile learning important in all levels of education, especially in higher education.<sup>10</sup>

### Tools and Mobile Technologies Used in Mobile Learning

Mobile learning is a learning method that emerges through the combination of mobile informatics and e-learning environments, providing access to educational content and benefiting from changing services regardless of a specific place and time.<sup>2</sup> This method both supports traditional education and can be used for distance learning.<sup>17,18</sup> Smartphones, tablets, personal digital assistants, and pocket computers are among the tools used in mobile learning.<sup>19</sup> Especially after 2000s, these mobile tools are continuing to be developed to include many features of desktop computers. In this development process, many devices with telephone, camera, video recorder and player, and voice recorder features have been developed to communicate.<sup>20</sup> Mobile phones and desktop computers have been made smaller, and their portability and usability levels have been increased. User experiences have been enriched with advanced-level touch and motion sensors.<sup>2,21</sup>

Technologies used in mobile devices include technologies such as wireless fidelity (Wi-Fi), Bluetooth, Worldwide Interoperability for Microwave Access (Wi-Max), long-term evaluation, Global System for Mobile Communications (GSM), General Packet Response Service, podcasting, 3G, 4G, and 5G.<sup>21</sup> *Wireless fidelity* technology is the wireless network technology that enables 2-way communication by using radio waves. With Wi-Fi, many devices can use a single wireless network connection at the same time.<sup>21</sup> *Bluetooth* is a personal wireless network that can transfer data with license-free, low power, short-wave radio frequency band. Data can be transferred to 8 devices at the same time via Bluetooth. *Worldwide Interoperability for Microwave Access* technology is the wireless network technology that provides communication, especially in long distances and rural areas.<sup>22</sup> *GSM* is

one of the digital mobile telephone systems that provide voice mail, high-speed data, fax, paging, short message service, and safe communication.<sup>21</sup> *General Packet Response Service* is a technology with high speed, wireless internet, and it provides receiving multimedia messages in addition to short messages and thus enables accessing multimedia content such as video, pictures, and voice.<sup>21</sup> *Podcasting* is defined as transfer of voice files to mobile devices. While podcasts were originally non-educational mp4 format voice records, they are now used as mobile learning tools. After voice recordings shared via the internet are uploaded to mobile devices, they can listen again at any time without the need for the internet.<sup>5</sup> Wireless web-based access with *3G technology* can be found in applications such as e-mail, video conference services, and multimedia services in which voice and data flow are combined.<sup>8</sup> Unlike Wi-Fi, 3G technology provides the development of high-speed internet access in wide-area cell phone networks and video conference services.<sup>21</sup> Devices with *4G technology* are important tools for mobile learning. 4G technology in mobile phone systems provides high access speed and capacity to individuals with low cost. Mobile learning based on this technology provides individuals with the opportunities to take their own learning process under control, to plan their work independent of a specific place and time, to increase their performance in learning environments, and also provides self-learning individuals with the opportunity to create their curriculum in line with their own preferences and wishes.<sup>21</sup> *5G technology* can realize the features of 4G technology faster and more effectively. This technology provides mobile users with convenience via cloud support without needing to download applications on the internet.<sup>21</sup> Cloud technology was initially used to define information and communication networks. This technology is an internet-based service that makes internet service open, provides the use of data at any time and at any place with the help of a device with internet access, and allows editing, transferring, assigning, and managing resources shared between many users.<sup>23</sup>

### Advantages and Disadvantages of Mobile Learning

Rapid developments in mobile and network technologies and the increase in the level of accessibility to mobile devices and the internet have caused a change of paradigm in education. As a result of this situation, the popularity of learner-centered mobile learning approach has increased.<sup>19,24</sup> Mobile learning, which is very easy to use in the learning and teaching process, has many advantages. Its most important advantage is that it allows students and educators to access the necessary content and activities whenever and wherever they want by using internet connection.<sup>8,25</sup> In Ağca and Bağcı's<sup>18</sup> study, students stated that mobile devices provided them advantage in terms of portability that they could use the devices whenever they wanted since they were with them all the time and that they could access information quicker. Mobile learning provides individuals with the opportunity of lifelong learning since it facilitates access to information and integrates learning process into social life regardless of time and space.<sup>26,27</sup>

Since mobile learning method eliminates time and space dependence of learners, it provides convenience to students who cannot go to school, who have difficulty in learning indoors, and who are constantly moving.<sup>25</sup> Since it offers ease of use inside and outside the classroom, it facilitates the learning process by preventing students from disconnecting from the learning process. Thus, it also increases the effectiveness and permanence of the education that individuals

receive.<sup>26-28</sup> In the mobile learning process, individuals can create their working environments themselves. This situation encourages individuals to be active in the learning process.<sup>29</sup> In addition to these, mobile learning increases the success and motivation of individuals and makes the learning process more economic.<sup>4,15,26,27</sup>

Although the mobile learning approach has many advantages, it also has some disadvantages and limitations. Individuals' lack of knowledge and skills to use mobile applications and practices, insufficient technical features of the device such as battery life, screen, keyboard and memory, limited or no internet access, and cyber security problems can limit mobile learning.<sup>5,15,27</sup> In a study by Ağca and Bağcı,<sup>18</sup> the problems experienced by students in the use of mobile phones were listed as small screen size, expensive internet access, and not being able to view all kinds of content. On the other hand, Kirkwood<sup>30</sup> stated that after a certain period of time, there was a possibility that students would turn to other applications not required for the learning process and social media instead of learning content. Another disadvantage of mobile learning has been reported as insufficient technology literacy of students or educators.<sup>31,32</sup>

In some studies conducted with the participation of nursing students, mobile learning approaches have been found to increase students' motivation, self-confidence, and satisfaction.<sup>33</sup> In a study by Pimmer et al<sup>34</sup>, it was reported that during patient care, nursing students used mobile learning as an effective problem-solving method. In a qualitative study by Mackay et al<sup>35</sup>, it was stated that mobile device use in clinical education may have a positive effect on applications. In another study conducted by Hay et al<sup>36</sup> on nursing students, it was found that students wanted to use mobile technology during educational processes. Thus, mobile learning approach, which allows students to get information in any environment can be used as a method that will facilitate learning in cognitive, affective, and psychomotor fields.<sup>13</sup> In addition to these, it has been reported that using mobile learning approaches in nursing education will facilitate accessing resources about patient care and prepare patient care plans as evidence based by supporting clinical decision-making.<sup>35,36</sup> Mobile learning approaches can prevent the development of a face-to-face and humanitarian communication process between the educator and the student. Excessive use of mobile phones and technological devices can also cause a feeling of loneliness, as well as a decrease in life satisfaction and interpersonal communication.<sup>37</sup> All these factors listed can have a negative effect on the quality of nursing care offered by nursing students to individuals, family, and society after graduation. For this reason, it is very important to use technology appropriately and carefully.

### The Place and Importance of Mobile Learning in Nursing Education

Nursing is a professional health discipline that constantly improves in line with sociocultural, scientific, and technological changes, provides care to individuals of all age groups in the society, and requires cognitive, psychomotor, and behavioral learning.<sup>38</sup> The use of innovative approaches in education and clinical field is very important. The use of developing technology in education can accelerate students' cognitive, affective, and psychomotor learning process and keep the learning environment away from monotony. It can also strengthen students' bond with education by enabling them to be active in the learning process.<sup>33</sup> The fact that mobile devices, which have become a part of our daily lives, eliminate the concept of time and space

and that they are faster, more economical, practical, and interesting increases the use of these tools in many areas.<sup>15,28,39</sup> Since nursing education can be realized in different learning environments such as classroom, laboratory, and clinical areas, it is important to use mobile learning approaches in nursing education.<sup>40</sup> It has been reported that in courses where it is important to develop psychomotor skills in addition to theoretical knowledge, supporting theoretical explanations with visual, auditory documents, and video recordings prepared by the academic helps to reinforce students' knowledge and skills regarding practice. In a study conducted by Lee and Kwon<sup>42</sup> by using smartphone video to evaluate students' success in basic nursing practices, although no significant difference was found between self-efficacy and skill proficiency, students' satisfaction with the practice increased. In another study conducted on the topic, it was reported that nursing students were satisfied with mobile technology use when compared with traditional teaching methods and they preferred these methods more and using video recordings in nursing skills education improved learning outputs.<sup>6</sup> The use of mobile technologies is important not only in the field of gaining psychomotor skills but also in order to improve the communication skills of students. In a study, Choi et al<sup>43</sup> examined the effects of video clips shared with smartphones in increasing communication skills and emotional intelligence, and it was found that communication competence and emotional intelligence of the experimental group improved significantly when compared with the control group.

There are a large number of studies conducted abroad on the efficiency of mobile learning in nursing education.<sup>40-45</sup> In some studies conducted in Taiwan<sup>44</sup> and Canada<sup>45</sup> with the participation of nursing students, it was reported that mobile learning gave positive results in nursing. It was also reported that the students within the context of the study stated that mobile learning method was easy and useful.<sup>44,45</sup>

Wu et al<sup>40</sup> used mobile devices and simulation models so that students could learn physical examination processes and create "nursing skills education system." They uploaded materials about vital signs, physical evaluation, identification of diseases, emergency nursing care, and treatment into nursing skill education system. This system helped students to get demographic and clinical information at simulated bedside, to collect data about the patient by performing standard evaluation process, and apply physical evaluation procedures at the patient's bedside. As a result of this study, it was reported that the method applied improved learning outputs significantly and supported students' showing a better performance about physical examination and evaluation.<sup>39</sup>

In another study where nursing students evaluated acute pain with mobile learning, it was found that mobile devices have a positive effect on learning.<sup>42</sup> In a study, Juric and Zalik<sup>46</sup> compared nursing students' states of determining the location of veins by uploading imaging software to smartphone with traditional methods, and it was reported that 35.2% of the students who used this method were successful in determining vein localization. In a meta-analysis conducted by Kim and Park<sup>47</sup> to find out the effects of smartphone-based mobile learning on nurses and nursing students, experimental and randomized-controlled studies conducted between 2009 and 2019 were evaluated. In this meta-analysis, it was reported that smartphone-based mobile learning had a high effect on nursing students' knowledge, skills, performance, self-confidence, and learning

attitudes. In another meta-analysis conducted by Talan<sup>27</sup> to find out the effects of mobile learning on learning performance, it was found that mobile learning had a positive effect on the learning performance of students.

Studies conducted in our country and in the world showed that including mobile learning in nursing education developed students' skills level,<sup>37</sup> enabled them to access information freely in every environment,<sup>24</sup> increased students' motivation, self-confidence, and satisfaction,<sup>33</sup> positively affected students' attitudes toward lesson and developed their problem-solving skills,<sup>47</sup> and enabled them to access different learning environments anytime or anywhere.<sup>34,48-50</sup> It is also emphasized that mobile technology can increase students' interaction with their peers and teachers.<sup>51,52</sup> On the other hand, since studies conducted on the topic are heterogeneous and the applications and criteria used do not have a specific standardization, it is also recommended to conduct experimental and randomized-controlled studies.<sup>53</sup>

## Conclusion

Nurse educators should be aware of the learning needs of the new generation; they should meet their expectations and needs related to education. On the other hand, as in Turkey, the coronavirus disease 2019 pandemic affected the education system in all countries where the pandemic was experienced and drew attention to the importance of integrating mobile technology to distance education process. With the integration of technological methods into education, it will be possible to educate equipped nurses who can meet the expectations of the health care system and society. It is important to create the necessary technical infrastructure in the mobile learning model in order to provide equality of opportunity in education and to facilitate individualized learning. On the other hand, it is thought as important for not only students but also for academic nurses to develop themselves in this field.

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