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Assessment of the effect of mobile-assisted education regarding intramuscular injection by using the Instagram app

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ABSTRACT

Background & Aim: The nursing profession should include information technology into nursing education curriculums to provide the necessary knowledge and skills. This study was done to evaluate the effect of mobile-assisted education regarding intramuscular injection on the ventrogluteal site by using the Instagram application and to nursing students.
Methods & Materials: The study was designed experimental randomized controlled. Students participating in the study were divided into the Instagram app (n=69) and classroom teaching (n=69) groups by using simple random sampling. Mobile-assisted teaching methods trained the students in the Instagram app group by using Instagram. The students in the classroom teaching group were trained in the classroom. The data of the study was collected by Student Demographic Form, Knowledge Evaluation Form, and Skill Checklist. The Wilcoxon Signed-Rank Test evaluated the mean scores of the dependent groups, and the Mann-Whitney U test evaluated the mean scores of the independent groups
Results: While it was not found any statistically significant difference between two groups regarding the knowledge mean scores of the students in the Instagram app and classroom teaching groups immediately after and 15 days (p=0.445; p=0.111). The comparison of mean scores of skills of the students between the two groups was not revealed a statistically significant difference in the phase of preparation for IM injection (p=0.460), the phase of application (p=0.711), the ending phase of IM injection (p=0.581) and total mean scores of skill checklist (p=0.379).
Conclusion: The results of the present study indicate that mobile assisted teaching by using the Instagram application was found to be as effective as classroom teaching for evaluating the knowledge and skills of nursing students.

Introduction

Nursing is a practical occupation that requires the integration of theoretical knowledge with practical skills (1). Nursing education should acquire the knowledge, skill, attitude, and values required for being a nurse to the students (2). In nursing education, traditional teaching methods are used such as explaining, showing, and using the professional practice laboratories in order to acquire psychomotor and cognitive skills to the students (1,2). Additionally, different methods are started to be included in nursing education with scientific and technological developments. When the literature is examined, it can be observed that simulations are used (3), video-assisted (4,5) and web-assisted (6,7) teaching is performed, mobile applications compatible with smartphones are developed (8,9), virtual reality games are prepared (10) and social media is used (11).

Mobile assisted learning is defined as learning that enables access to educational content without needing any space, provides communication with others, responds to the individual needs of the user and improves productivity (12,13). This learning method removes the limits in accessing knowledge such as time, space, and resource in terms of instructive (2,10). Mobile assisted teaching is an interactive learning method providing individual and social learning opportunities in which student is in the center of the learning, and where the instructor takes on tasks such as guidance, moderator, coach and mentor (14). The latest innovation that comes along with the development of

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mobile devices and the widespread use of the internet is social media (15). Social media is defined with the simplest term as the developed and interacting online communication channels in which target groups participate, hosting communities within, and linking communities (16). The "communication" and "sharing" underlie at this concept. Social media, which appeals to a wide range of interests, also contributes to the social, emotional and cognitive development of the individual (16,17). Social media is widely used and has been increasingly more popular among college students (17). Being free for multithreading, being continuously updated, making the virtual sharing with large communities possible, accessible through mobile devices quickly, and providing information exchange by forming the group are among innovations and convenience that social media brought along (17,18). The students support their education and training processes with effective, creative and collaborative learning through social media (15,19). This virtual environment increases student-student, student-content, and student-teacher interaction, and it supports students to use and improve their skills of research, inquiry, and problem solving (14,15,20). According to 2018 Global Digital reports, 37% of the world's population is social media users, and 91% of users have access to social media via mobile devices. 20% of internet users use Instagram applications (21).

These new communication possibilities, brought by technology, also prepared a new environment where information can be transferred to individuals. The nursing education also needs to use new and different methods suitable for the development of the technology by the requirements of the digital age (22-24). IM injection procedure skill is one of the essential skills that is required to be taught to the students. IM injection procedure, which has an essential place in drug applications, is a method that is frequently used by the nurses (24). Although the IM injection procedure seems easy, it causes many complications. A nurse should be able to know the advantages and disadvantages of the injection site, determine the anatomic marking points, and perform IM injection practice by using the correct injection technique in order to prevent complications (24,25). The literature emphasizes that dorsogluteal (DG) site, which is one of the IM injection procedure areas and the first preferred one, should not be used since it is too risky and ventrogluteal (VG) site should be the first to prefer since it is safe. Students who are preparing for nursing should graduate by possessing sufficient knowledge and skill in the IM injection procedure (25).

There are studies in nursing education in which the knowledge and skills of students are evaluated by mobile devices and applications as well as web-based training (6-11). However, it is seen that the studies about how social media tools affect the teaching and learning process in nursing education and whether they have an effect on the success of the students are limited (11,15).

This study was done to evaluate the effect of mobile-assisted education regarding IM to the VG site by using the Instagram app and to nursing students.

Methods

This study, which is a randomized controlled trial, was conducted Department of Nursing, Faculty of Health Sciences, in Muğla Sıtkı Koçman University between February 6 and 28, 2018 in Turkey.

The population of the study consists of 226 first grade undergraduate students. The study was conducted with 138 students who were using the Instagram app on a mobile device, had no experience of IM injection experience, had an internet connection, and accepted to participate in the study. Students participating in the study were divided into the Instagram app group (n=69) and classroom teaching group (n=69) by using simple random sampling. The students in the Instagram app group were trained by mobile-assisted teaching with Instagram application, and

the students in the classroom teaching group were trained by in-class training in compliance with the classical curriculum. A specialist nurse collected the data of the study. The 45 minutes of training was given to this nurse by the researcher. Additionally, how she would evaluate the skills of students, and issues to which she should pay attention were taught to her. No information about groups was given to the students who participated in the study and the nurse who collected data of the study.

The data of the study was collected by Student demographic form, knowledge evaluation form, and skill checklist.

Student demographics form: This form includes the age and gender of the students.

Knowledge evaluation form: The researcher prepared this form by reviewing the literature (26-28). There are 20 questions in the form that evaluate the knowledge of students regarding IM injection to the VG site. Every question in this form by which the knowledge of the student is questioned was graded as "1" point if the question is true, and "0" point if it is false or empty. The students were expected to score a minimum of 0 points and a maximum of 20 points per the form. The content validity of the knowledge evaluation form was 0.97. The reliability analysis was calculated with the Kuder Richardson-20 (KR-20) formula to examine the internal consistency between the test scores in the knowledge evaluation form (KR-20 = 0.74).

Skill checklist: The researcher prepared the skill checklist by reviewing the literature (26-29). The checklist includes skill levels for the IM injection application into the VG site. The form consists of a total of 27 skill levels, of which 7 skills in IM injection preparation phase, 15 skills in IM injection application phase, and 5 skills in IM injection ending phase. The student, successful in injection application was evaluated by the "1" point and the student who was not successful by "0" point. Students were expected to score a minimum of "0" points and a maximum of "27" points per skill checklist. The content validity of the skill checklist was 0.91. The Kuder-Richardson (KR-20) reliability coefficient of the skill checklist was 0.77.

The students in the Instagram app group were trained by the Instagram application as a mobile-assisted teaching method. Before the teaching process, a teaching web-page called "ventrogluteal" was opened in the Instagram application by the researcher. Only the students in the Instagram app group were accepted to this page and were ensured to follow the page. The purpose of this teaching web-page was explained to the students, and it was stated that they should give feedback by following the sharings of the researcher. The duration of the study lasted five days by taking into account the access days and hours of the students to the Instagram application. Sharings were mostly made in the evening times during which students intensively accessed to the Instagram application. The feedback regarding teaching materials shared by the instructor was given by students through the sharing of their "likes and comments" by using the Instagram application page. Also, it has benefited from the direct message, questionnaire, and story applications. The primary material of the teaching web-page is "Instagram posts." These "posts" are photographs of powerpoint presentations that are prepared by reviewing the literature, and subject-related pictures, handwritten notes, questionnaires and videos (26-29).

Teaching content includes definition of IM injection, sites into which IM injection applied, the characteristics of DG and VG site, muscles in these sites, detection methods of these sites, disadvantages of the DG site, advantages of the VG Site, and IM injection application steps. The purpose of the study, the definition of the IM injection, and the sites into which IM injection applied were shared on the first day of

teaching. The characteristics of the DG site, the muscles in these sites, the methods of identifying the site, and the disadvantages of the site were shared on the second day. The reason why the DG site should not be used was emphasized both in the posts and in the description section. The “posts” containing questions related to the topic were shared, and question and answer interaction was provided with the participants of research. The information and images regarding the characteristics of the VG Site, the muscles in these sites, the identifying of the site, and the advantages of the site were shared on the third day. The reason why the VG site should be used was expressed both in the “posts” and in the description section. The anatomical locations used in the determination of the VG site were marked on the model, and their photographs were taken, and shared as “posts.” Also, the handwritten notes were added to the web-page for reminding and drawing attention during the day. Besides, the posts containing questions about the subject were shared, feedback was received from the students, incomplete information was completed, and wrong information was corrected through question-answer in the commentary section. That the DG site should not be used for IM injections and that the VG site should be used as the first choice was reminded by visual sharing on the fourth day.

Additionally, the steps of IM injection application were described with both information and images in the "posts" and explanation section. In addition to this, a five-minute video, including the teaching content prepared by the researcher, was shared. The anatomical locations on the IM injection model which are used for the detection of VG site, how the site to detect, how IM injection to apply and points to consider were demonstrated in practice through these videos. The information on the page was corroborated through questions and answers in order to ensure the permanence of the knowledge learned during the day. The summative notes, images and research results, which are a general revision of the four-day teaching period and include information and application about the subject were shared on the last day of the research. Students evaluated this teaching method published from the "ventrogluteal" teaching page through a questionnaire on the Instagram application. Also, 20 minutes of live webcast was made by determining the appropriate hours for the students. The questions of the students were answered on the live webcast, and why they should choose the VG site as the safest region for IM injection instead of the DG site, were described with justifications. Besides, students were asked to evaluate teaching methods on live webcasts, and their recommendations regarding teaching were taken.

A total of 64 teaching materials consisting of images, PowerPoint presentation photographs, handwritten notes, questionnaires, and videos were shared during the five-day mobile-assisted teaching by using the Instagram application. Also, information about the subject was republished by the researcher on live webcasts on the last day of the teaching process.

The application of the study on the Instagram app group was shown in Figure 1.

In-class training was given to the students in the classroom teaching group per the classical curriculum. The content of the teaching presentation (26-29) for this group was prepared to be the same as the Instagram app group. That the knowledge and practice presentation of the teaching has to be equal in both groups was taken into consideration. The instruction method was mainly used in teaching.

Also, showing the anatomical locations on the IM injection model used in the determination of the VG site, how to determine the site, how to apply injection were demonstrated in practice with the IM injection application steps in the classroom.

At the end of the teaching process, the information given was summarized, and the

question and answer method corroborated the information that students learned about the topic. Teaching lasted 45 minutes. The knowledge level of the students in both groups was measured with Knowledge Evaluation Form by giving 20 minutes to students in the classroom both after teaching and on the 15th day after the end of the teaching process. Students did their practice on the IM injection model, and these practices were recorded to the Skill Checklist by the expert nurse.

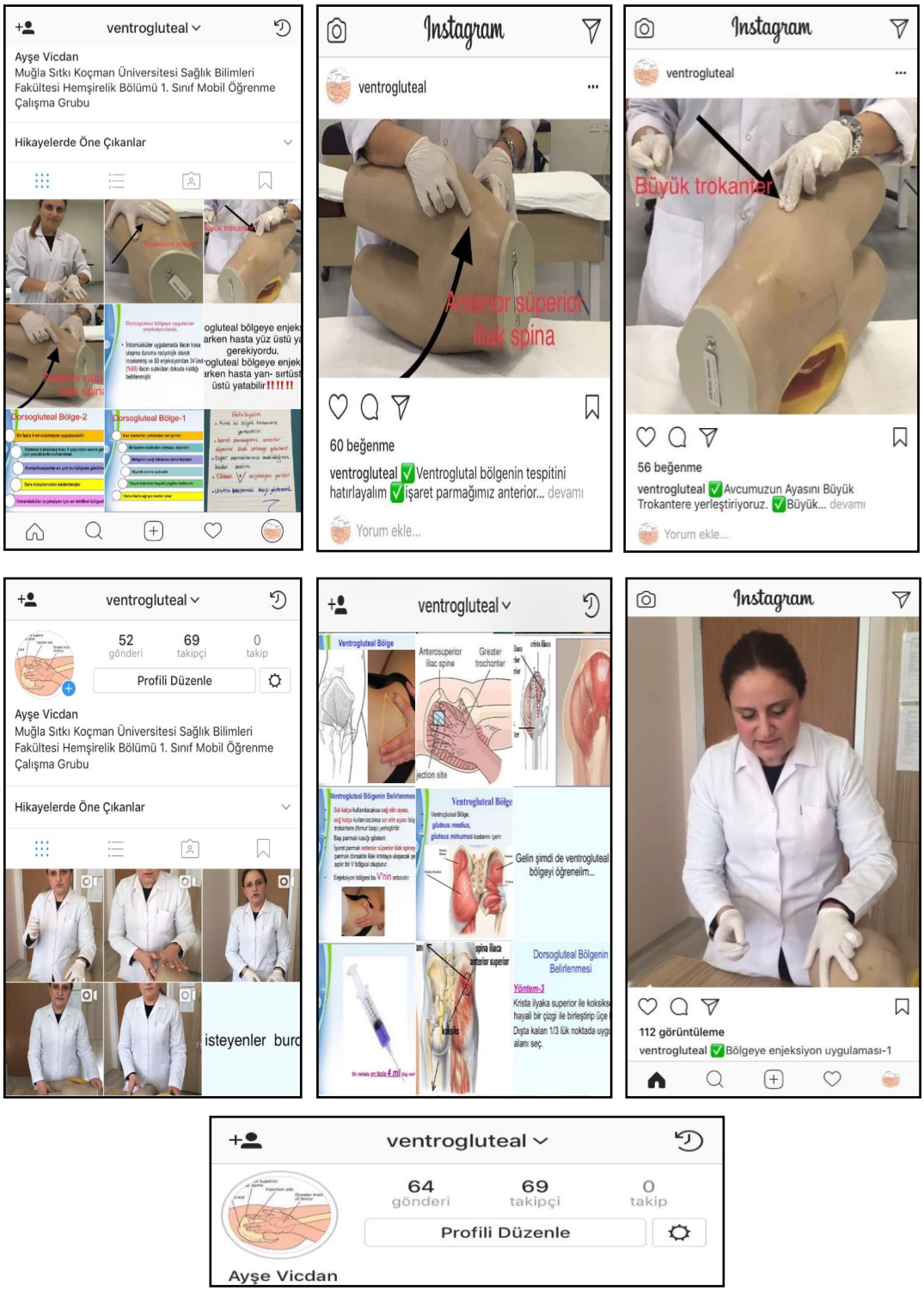

Figure 2. The application of the study on Instagram app group

Statistical Package for the Social Sciences (SPSS) 22.0 package program was used in the evaluation of the data. The Shapiro-Wilk test was used to determine whether the data of the study were usually distributed. The mean scores of knowledge and skill tests of the students were accepted as dependent variables, mobile-assisted teaching, and in-class instruction as independent variables. Percentage, frequency, arithmetic mean, and standard deviation were used in the evaluation of the data. Since the data of the study were not distributed normally, the mean scores of the dependent groups were evaluated by the Wilcoxon Signed Rank Test, and the Mann-Whitney U test evaluated the mean scores of the independent groups. The statistical significance level was accepted as $p \leq 0.05$.

Ethical approval (Date: 01.24.2018; Protocol No: 180002; Decision No: 6) was obtained from Muğla Sıtkı Koçman University Scientific Research, and Publication Ethics Board and permission were obtained from the institution where the research was made in order to conduct the research. Also, the written consent of the students who were participated in the research was taken by explaining the purpose of the study.

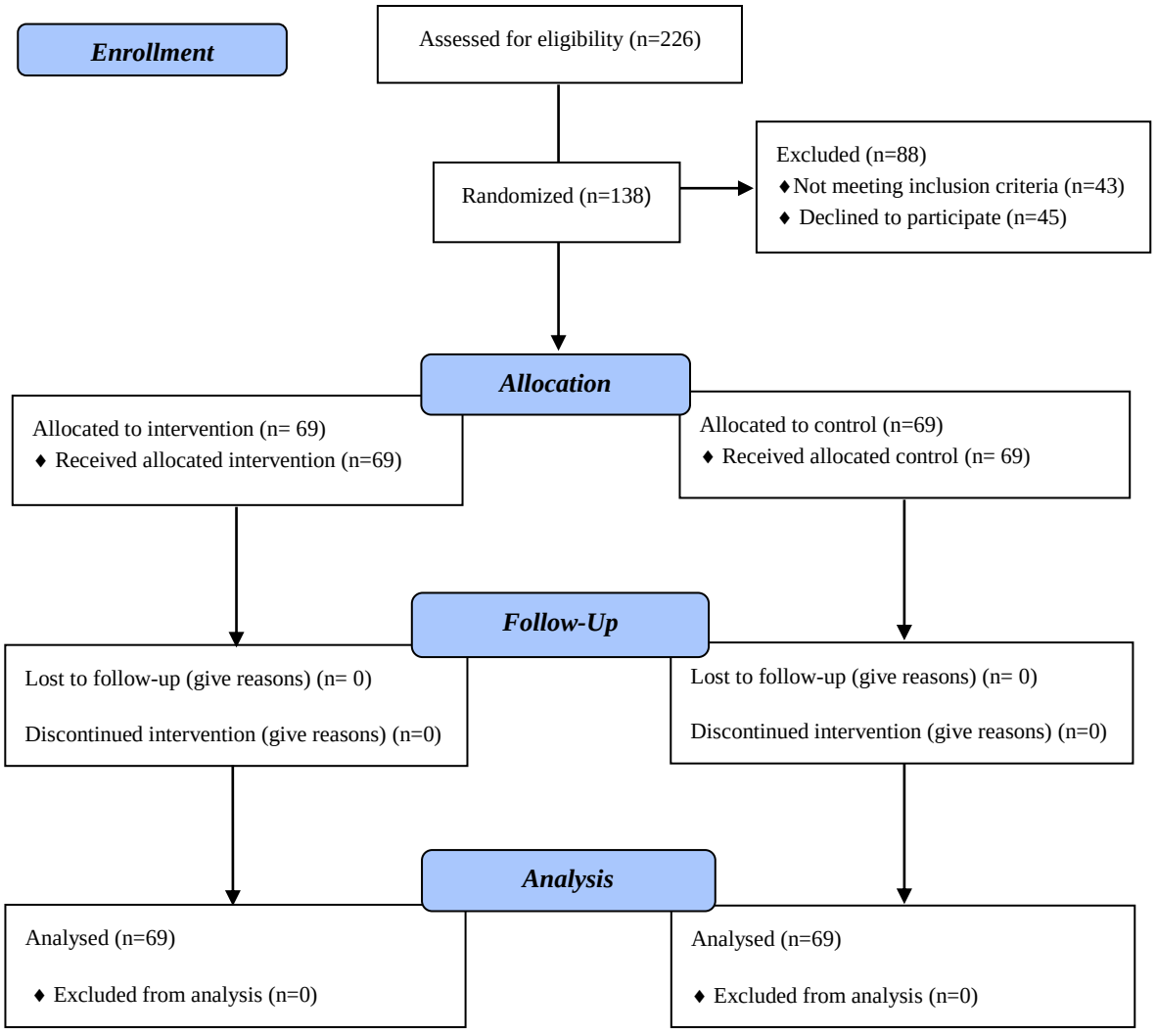

Figure 2. Consort flow diagram of the study

Results

In this study, data from 138 undergraduate nursing students were analyzed (Figure 2). 71% of the students in the Instagram app group were female, 29% were male, and the mean age was 19.23±1.48 (Minimum=17, Maximum=24). Of the students in the classroom teaching group, 62.3% were female, and 37.7% were male. The mean age was 18.96±0.89 (Minimum=18 - Maximum=24) (Table 1).

After teaching, the knowledge mean scores of the participants in the Instagram app group were 17.33±3.04, and 15 days after teaching their knowledge mean scores were 17.58±2.87. After teaching, the knowledge mean scores of the students in the classroom teaching group were 18.10±1.90, and 15 days after teaching their knowledge mean scores were 18.35 ± 2.04. The knowledge means scores of the students in the Instagram app and classroom teaching group were evaluated both immediately after and 15 days after the teaching period, and it was not found any statistically significant difference ($p>0.05$) between them (Table 2).

When the skill score averages after 15 days of training were evaluated, it was determined that the students in the Instagram app group scored 5.88±1.79, 13.03±2.48, 2.91±1.04, 21.83±4.57 points and the students in the classroom teaching group scored 6.51±1.77, 12.91±2.75, 2.87±1.08, 22.29±4.46 points. It was found that there was no statistically significant difference between the skill level mean scores of the students in the Instagram app and classroom teaching groups ($p>0.05$) (Table 3). After teaching, the knowledge mean scores of the female students in the Instagram app group were 18.24±1.83, and 15 days after teaching, they were 18.73±2.61. Their total mean scores of skill checklist were 22.16±4.71. These values for male students were 17.75±2.07, 17.40±2.66, and 21.27±4.37, respectively. After teaching, the knowledge means scores of the female students in the classroom teaching group were 17.26±3.32, and 15 days after the teaching, they were 17.42±3.30. Their total mean scores of skill checklist were 22.18±4.65. These values for male students were 17.85±2.01, 17.46±2.58, and 22.55±4.07, respectively. When the mean scores of the students were compared in terms of gender, it was not found any statistically significant difference between the Instagram app and classroom teaching groups ($p>0.05$).

Table 1. The distribution of the demographic characteristics of students participated in the study (n=138)

Demographic characteristics		**Instagram app group (n=69)**	**Classroom teaching group (n=69)**
		N (%)	**N (%)**
Age	18-19 years	54 (78.3)	47 (68.1)
	20 years or older	15 (21.7)	22 (31.9)
Gender	Female	49 (71)	43 (62.3)
	Male	20 (29)	26 (37.7)
Total		69 (100)	69 (100)

Table 2. Comparison of knowledge mean scores of students in the Instagram app group and classroom teaching group (n=138)

	Instagram app group (n=69)	Classroom teaching group (n=69)	P value for between group comparision
	Mean ± SD	Mean ± SD	
Immediately after the teaching knowledge	17.33 ± 3.04	18.10 ± 1.90	0.445**
15 days after the teaching knowledge	17.58 ± 2.87	18.35 ± 2.04	0 .111**
P value for within group comparision	0.151*	0.275*	

*Wilcoxon Signed Ranks Test ** Mann-Whitney

Table 3. Comparison of skill checklist mean score of students in the Instagram app group and classroom teaching group (n=138)

Skill checklist mean scores	Instagram app group (n=69)	Classroom teaching group (n=69)	P value*
	Mean±SD	Mean±SD	
IM injection preparation phase mean scores	5.88±1.79	6.51±1.79	0.460
IM injection application phase mean scores	13.03±2.78	12.91±2.75	0.711
IM injection ending phase mean scores	2.91±1.04	2.87±1.08	0.581
Total mean score	21.83±4.57	22.29±4.46	0.379

*Mann-Whitney U test

Discussion

This study was done to evaluate the effect of mobile-assisted teaching methods on teaching the VG site and IM injection application into this site to nursing students by using the Instagram application. The results of this study show that the Instagram application improves the knowledge and skills of nursing students related to the subject, and it is a method to be used for effective nursing education.

While it was not found any statistically significant difference between the knowledge mean scores of the students in the Instagram app and classroom teaching groups immediately after and 15 days after the teaching period, the knowledge mean scores were at high values in both groups ($p > 0.05$) (Table 2). When the evaluation was done about the mean scores of skill checklist of the students regarding the phase of preparation for IM injection, the phase of the application and the ending phase of IM injection, it was found that there was no statistically significant difference between the two groups ($p > 0.05$) (Table 3). The skill levels of the students in the Instagram app and classroom teaching groups regarding applying IM injection into the VG site were found to be at a high level.

Taking into account these results, it is considered that the students are accustomed to this method because the in-class instruction for nursing knowledge is made within the classical curriculum. Besides, it is seen that they use this period effectively and efficiently since they know that a particular topic should be learned within a specified period. That the teacher determined and showed the VG site on the model, made students learn instantly by seeing during the teaching phase of the subject. Moreover, it is thought that students can find an opportunity to understand by asking at the moment they do not understand because instructors and students interact face to face during in-class instruction. Besides, it is considered that the knowledge and skills of the students are reinforced along with summarizing and repeating of the subject at the end of the teaching.

The success of the students in teaching by using the Instagram application shows that faced a different teaching method, along with the classical education concept, was effective. The teaching method published on the social media page attracted the interest of the students. Thus, the students encountered the material shared by the teacher during the Instagram follow-ups and realized the unconditional learning by internalizing sharings related to the subject like sharings in daily life. Teaching, which was enriched with visual items over the Instagram app, made it easier for students to envisage what they need to learn about the subject. That the shared teaching materials could be recorded by the students instantly, made the training be more effective in this method and enabled teaching material to be recorded and stored at the desired time, and to be accessible again. Another factor that enhances the success of the students is that the student can find an opportunity to be able to work as often as desired at the desired time and in the desired environment. Because participating in mobile-assisted teaching does not require a specific time and environment, students were able to find an opportunity to participate in teaching in any environment where they felt comfortable.

When looking at different studies on subjects related to the professions of nursing students made by using the technological developments (web, mobile, social media supported) for developing their knowledge and skills; Lu et al. (6) found that using of online-accessible training videos in the classroom for teaching IM injection skills, increased the knowledge, skills and self-efficacy scores of students. Özturk and Dinç (7) found that there was no difference between knowledge scores of students in the study done for urinary catheterization by using web-based teaching and in-class instruction, while skill scores of the web-based group was higher. Kim et al. (11) found that the knowledge and skills scores of the group using mobile applications were higher in the study of necessary nursing skills teaching. Kim et al. (8) did not find any difference between the knowledge scores of the group who were trained for identifying the newborn airway obstruction with smartphone application and the group trained by the in-class instruction, but they found that the skill scores of the group who used the smartphone application was higher. Lee et al. (4) and Mackay et al. (30) found that mobile devices have a positive effect on the teaching skills in the study, which was done by using mobile devices in clinical nursing education. Turaç et al. (11) found that the skill scores of the WhatsApp assisted group was higher in the study, which was done for teaching nasogastric catheterization by using the WhatsApp assisted teaching and complete learning model.

As seen in this study and other studies, the nursing education based on the teaching of knowledge and skills provides positive contributions to the success of students when it is supported in the light of scientific and technological developments. In this study, like in the study of Turaç et al. (11), it is seen that social media can contribute to nursing education.

Conclusion

The results of the present study indicate that the knowledge and skills of the group which was trained via the Instagram application and the group which was trained in the classroom environment, increased equally. At the same time, it was determined that there was not a significant relationship between the genders of students and their knowledge and skill score averages. Per these results, it is considered that using social media applications in the nursing skill education by integrating them in the standard education would be beneficial. Furthermore, it is suggested that comprehensive studies can be conducted with more large sample groups on the

different nursing skills in nursing skill education with the use of social media.

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