



Effects of Nursing Students' Practices using Smartphone Videos on Fundamental Nursing Skills, Self-efficacy, and Learning Satisfaction in South Korea

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Received 1 September 2016 • Revised 28 November 2016 • Accepted 28 November 2016

ABSTRACT

This is a quasi-experimental study with a non-equivalent group pre-test and post-test designed to investigate the effects of learning with smartphone video recordings in fundamental nursing practice. General 'intramuscular injection' practice for sophomore nursing students was given to the experimental and control groups for two weeks. The effects of the learners' self-evaluation, fundamental nursing practice competency evaluation, self-efficacy, and learning satisfaction were measured and analyzed using an independent t-test, paired-sample t-test, and ANCOVA. The results indicated that the smartphone video recording practice method, which was applied to nursing students, had significant positive effects on the improvement of fundamental nursing practice competency and learning satisfaction. Therefore, the smartphone video recording method for learning fundamental nursing skills can be considered effective for improving students' learning and satisfaction in the self-directed learning context.

Keywords: nursing students' practice, fundamental nursing skills, self-efficacy, learning satisfaction

INTRODUCTION

Nursing education institution practice assists trainee nurses in developing their skills prior to applying what they have learned at school to patients in clinical settings. This reported practice experience has a positive influence on nursing students' nursing values, professional attitudes, and clinical competencies (Jho, 2014; Kim, 2007). For this reason, it is considered very important in nursing education.

Among the types of practice, fundamental nursing practice is an important component wherein students learn about nursing skills related to actual nursing before they begin their clinical practice. Nursing education institutions have recognized the importance of fundamental nursing practice and have made great efforts to increase skills, accuracy, and proficiency. However, ensuring one-on-one learning between the instructor and learner is

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State of the literature

- Nursing educational institutes have made attempts to increase nursing students' nursing value, professional attitude, and nursing competency.
- Efficient learning methods for cultivating fundamental nursing competency in nursing students must be sought for considering the learners' characteristics.
- Nursing students' attitude in practice, self-efficacy, learning satisfaction, and self-directedness influenced their fundamental nursing practice competency.

Contribution of this paper to the literature

- The smartphone video recording practice method for learning fundamental nursing skills was effective for improving the nursing students' fundamental nursing practice competency and learning satisfaction.
- Effective intervention needs to be organized to increase the learning effect through self-directed learning and improve learning satisfaction.

difficult, and students' basic nursing competencies have not been satisfactory (Chae & Ha, 2016; Song, Kim, & Yu, 2012). As a result, improving competency is deemed necessary. Recently, patients' safety and rights have been prioritized, and nursing students' opportunities to apply the skills that they have learned directly to patients have gradually decreased. Nevertheless, medical fields are in need of experienced students with nursing skills. To improve fundamental nursing practice competency, efficient learning methods must be sought that consider the clinical environments and learners' characteristics.

Influential factors should be identified and controlled as a means of enhancing fundamental nursing practice competency. According to the results of previous studies, nursing students' attitudes toward practice, self-efficacy, the frequency of open practice room use, learning satisfaction, and self-directedness influenced their fundamental nursing practice competency (Cowan, Norman, & Coopamah, 2005; Levett-Jones, 2005; Liou, Chang, Tsai, & Cheng, 2013; Park & Lee, 2008; Raines, 2010; Song, Kim, & Yu, 2012). For the improvement of fundamental nursing practice competency, increasing learning satisfaction and self-efficacy through repeated learning is thought to be effective.

In general, fundamental nursing practice faces restrictions in securing sufficient training time because it is conducted in an appointed practice room within a limited time. Recently, the Korean Accreditation Board of Nursing Education (KABONE) recommended the performance of self-practice at every school to ensure the quality of education and improvement of competency. Self-practice is an option based on the student's will in contrast to the issue of practice room availability. Therefore, a self-directed learning attitude is very important for basic nursing skills training (O'Shea, 2003). To improve students' nursing practice competency, nursing education institutions need to seek an engaging and effective practice method that will facilitate self-directed repeated learning.

Self-directedness is the learner's will to take responsibility for their successful learning process with their own learning plan and performance evaluation (Kyndt, Govaerts, Dochy, & Baert, 2011; Raemdonck, 2006). It is known to be a major variable in the learning outcome. The effectiveness of prior learning with videos that took advantage of self-directed learning (Caldwell & Atwal, 2005; Riley & Manias, 2004), repeated learning, or web-based learning has been investigated (Horiuchi, Yaju, Koyo, Sakyō, & Nakayama, 2009; Hosny, Mishriky, & Youssef, 2008; Koch, Andrew, Salamonson, Everett, & Davidson, 2010; Koeckeritz, Malkiewicz, & Henderson, 2002). In the case of prior learning with the use of web-based content or videos in previous studies, prior learning of exemplary procedures is possible; however, it is limited because students cannot objectively monitor their own performance and it is difficult to expect them to receive feedback on their competencies.

In South Korea, current smartphone penetration and smart learning rates have significantly increased. Smart learning is a method in which learning, evaluation, and analysis through the use of a smartphone are possible without the limitations of time and place, and it has the advantages that the learner's interest can be encouraged through immediate feedback, thereby facilitating compensatory and repeated learning. With this trend, studies on the effectiveness of smart learning (e.g., Al-Fahad, 2009; Baya'a & Daher, 2009; Evans, 2008) and the development of educational technologies (Chen & Hsu, 2008; Chen, Kao, & Sheu, 2003; Ketamo, 2003) have been conducted.

Therefore, considering the characteristics of nursing students' development stage, familiarity with a smartphone, and levels of smartphone utilization, smart learning can be applied to their nursing practice. If students utilize a video recording of their progress in basic nursing performance via a smartphone for the purpose of learning, their skill practice progress can be objectively monitored and immediate feedback is possible. This could be an interesting and effective way of learning.

There was a recent study in Korea that investigated the effect of video practice development, wherein the nursing students were considered a single experimental group (Park, 2012). Only a few studies (Lee & Kwon, 2016; Chae & Ha, 2016) have been conducted on smart learning that targeted nursing students; therefore, it is necessary to examine the intervention effect of pure smart learning with a control group based on different variables. In addition, nursing students are still undergoing the training process, and their basic nursing competencies are still undeveloped. As a result of watching videos, the instructor will be able to accurately evaluate the performance levels of students during the practice, and the learners will be able to evaluate themselves. Even after completing the practice, if the students are instructed to study by watching the videos by themselves, a repeated learning effect will emerge.

In this study, the students' individual practice progress was recorded on video with a smartphone during the fundamental nursing practice. After that, self-directed repeated learning was implemented using the videos. The purpose of this study is to investigate the effects of learning through the use of smartphone video recording on learners' self-evaluation,

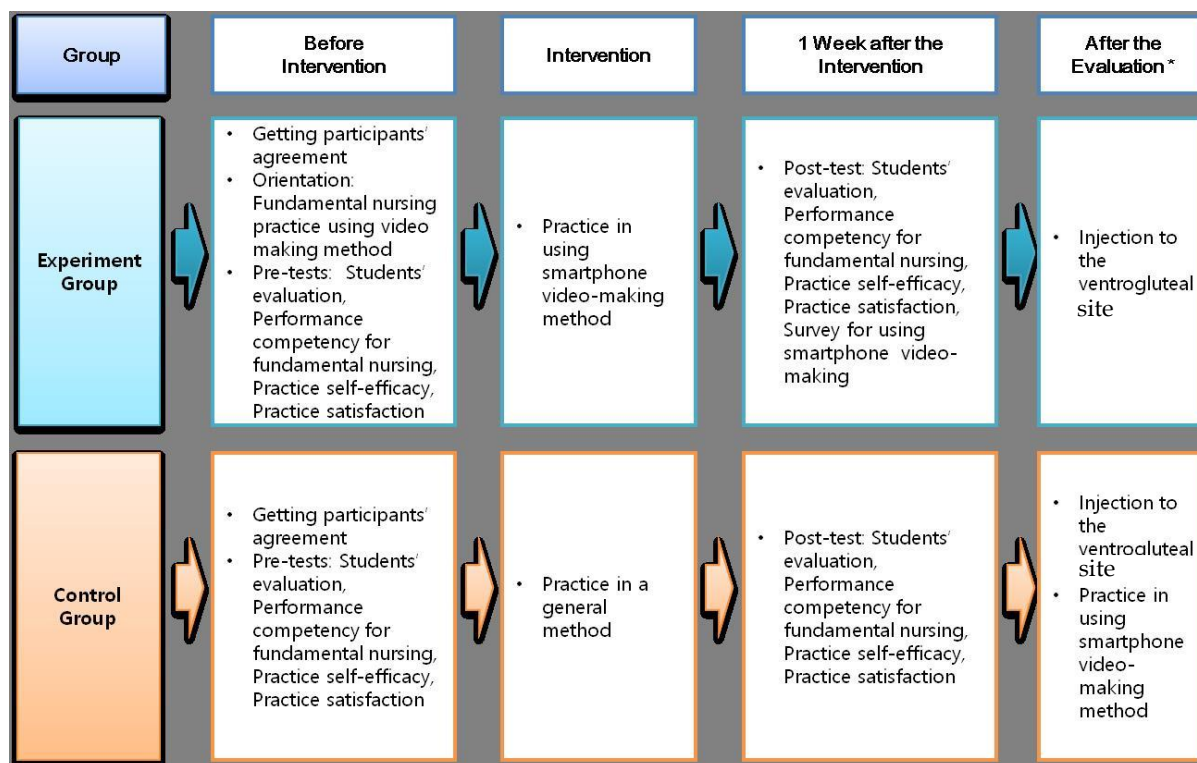


Figure 1. Research procedure

fundamental nursing practice competency, self-efficacy, and learning satisfaction in nursing students' fundamental nursing science practice.

RESEARCH METHOD

This is a quasi-experimental study with a non-equivalent group pre-test and post-test designed to investigate the effects of the utilization of video recordings on nursing students' self-evaluation, fundamental nursing practice competency, self-efficacy, and learning satisfaction in the fundamental nursing science practice that nursing students undergo.

Participants

The study participants consisted of 76 nursing students in their sophomore year at a university located in the Chungnam Province of Korea. This study confirmed that 76 nursing students were taking a nursing major class because there were 60 to 80 participants in the prior studies (Lee & Kwon, 2016; Chae & Ha, 2016). The fundamentals of nursing practice were demonstrated by dividing the participants into the following four teams: team 1 (22 people), team 2 (17 people), team 3 (18 people), and team 4 (19 people). To best monitor the experimental effects, the 39 students from teams 1 and 2, in which the practice was conducted on the same day, were assigned to the experimental group, while the 37 students from teams 3 and 4 were assigned to the control group. There were no study drop-outs, and all participants completed the pretest and posttest.

Data collection

Data collection period

Data was collected for two weeks from November 17, 2015, to November 30, 2015.

Study procedures

Prior to the intervention, an explanation of the study was given to the experimental and control groups, while the signatures of the participants were obtained through a written informed consent form. Considering the participants were sophomores at a nursing school, 'intramuscular injection' with a 'medium' difficulty level was selected as the practice item from twenty core fundamental nursing skills suggested by the KABONE (2014). During the first week, after the completion of a pre-test in the experimental group, smartphone video recording practice was conducted, while in the control group, general fundamental nursing science practice was carried out. Until the second-week practice, the participants in the experimental group were instructed to learn through a video. After the completion of the second-week practice in the experimental and control groups, a post-test was performed, and after the completion of the experiment, smartphone video recording practice was also conducted in the control group.

Intervention: Fundamental nursing practice via video recording

The video-recording practice, which was applied to the experimental group, was conducted by dividing them into groups of two. The classes for the experimental and control groups were separately held on different weekdays, and the experimental-group students were allowed to share the class content with their classmates only. All students trained in the practice item for two hours a week for two weeks.

After the instructor's demonstration, one person shot a video of the practice process, while another person practiced the skill. The student who practiced the skill conducted a self-evaluation by watching the video and comparing their basic nursing performance with the step-by-step protocol of the KABONE. The instructor conducted an objective evaluation of the fundamental nursing practice competency while the student practiced the skill. After that, the student was instructed to conduct self-learning by using the video for one week until the next practice. For the control group, after the instructor's demonstration, general practice training for the skill was conducted. In the second-week practice, the experimental group and the control group both filled out a learner self-evaluation, instructor evaluation, self-efficacy survey, and learning satisfaction survey. For the experimental group, questions on smart learning were added. Taking ethics into account, after the completion of the experiment, the same fundamental nursing science practice using a video recording as that in the experimental group was carried out in the control group.

Instrument

Learners' self-evaluation

The nursing students evaluated themselves using the protocol for injection into the ventrogluteal area from the twenty core fundamental nursing skills suggested by the KABONE. The protocol consisted of twenty steps; for each step, the students chose an appropriate score (1 point for 'not performed,' 2 points for 'insufficient,' and 3 points for 'performed'). A total of two tests (pre-test and post-test) were conducted. The Cronbach's alpha values representing the reliability of the instrument were 0.71 for the pre-test and 0.62 for the post-test.

Fundamental nursing practice competency evaluation by professor

The instructor evaluated fundamental nursing practice competency using the protocol for injection into the ventrogluteal area from the twenty core fundamental nursing skills suggested by the KABONE. The protocol consisted of twenty-two steps; for each step, the instructor chose an appropriate score for the student's performance (1 point for 'not performed,' 2 points for 'insufficient,' and 3 points for 'performed'). A total of two tests (pre-test and post-test) were conducted. The Cronbach's alpha values representing the reliability of the instrument were 0.73 for the pre-test and 0.72 for the post-test.

Self-efficacy

Self-efficacy was measured with ten items by modifying the protocol for injection into the ventrogluteal area, which was selected as a practice item from the twenty core fundamental nursing skills suggested by the KABONE. For each item, the imperative sentence 'Do -' was modified to 'I can do -.' For example, the item 'Confirm prescription medications (medication card, computer output, etc.) and dosing principles (five rights, namely, the patient registration number, patient name, drug name, dose, route, time, etc.)' was changed to 'I can confirm prescription medications (medication card, computer output, etc.) and dosing principles (five rights, namely, the patient registration number, patient name, drug name, dose, route, time, etc.).' The score ranged from 10 to 50 points. The higher the score, the higher the self-efficacy. The Cronbach's alpha values representing the reliability of the instrument were 0.86 for the pre-test and 0.80 for the post-test.

Learning satisfaction

Learning satisfaction was divided into overall learning satisfaction and learning method satisfaction. Each item had a five-point scale, in which 'not satisfied at all' was 1 point, 'not satisfied' was 2 points, 'average' was 3 points, 'satisfied' was 4 points, and 'very satisfied' was 5 points. The students had to choose the score that best represented their satisfaction levels.

Students' smart learning evaluation

For the smart learning evaluation, an instrument developed by the author was used after a nursing professor confirmed its validity. It consisted of four items and asked questions about smart learning, including the frequency of watching a video, their location while watching, their willingness to use it for later practice (five-point scale), and its appropriateness as a practice method (five-point scale).

Data analysis

For the participants' general characteristics, levels of variables, and questions related to learning satisfaction and smart learning, descriptive statistics were used. For the learners' self-evaluation, fundamental nursing practice competency, self-efficacy, and learning satisfaction before the experiment in the experimental and control groups, the mean and standard deviation were presented. The differences after the experiment between the experimental and control groups with regard to the learners' self-evaluation, self-efficacy, and learning satisfaction were analyzed by an independent sample t-test. The pre-test and post-test differences between the experimental and control groups with regard to the learners' self-evaluation, self-efficacy, and learning satisfaction were analyzed through a paired-sample t-test. Fundamental nursing practice competency was analyzed by ANCOVA (analysis of covariance) because there was a significant difference in the pre-test scores between the experimental and control groups. To verify the reliability of the instrument, Cronbach's alpha was used.

Ethical considerations

This study was performed by obtaining a review exemption from the Institutional Review Board (IRB) that the author is affiliated with (IRB KNU_IRB_2015-57).

RESULTS

Demographic

Among the participants, female subjects constituted 84.2% (50% of the experimental group, 34.2% of the control group) and those with 'no religion' constituted 53.9% (28.9% of the experimental group, 25% of the control group). In terms of admission motivation, 'employment/recommendation of others' was the most common reason for 72.4% (34.2% of the experimental group, 38.2% of the control group). With regard to participants' school records, 23.7% had 'high' grades (18.4% of the experimental group, 11.08% of the control group), while 34.2% had 'middle' grades (18.4% of the experimental group, 15.8% of the control group). Regarding satisfaction with their major, 61.9% were 'satisfied' (31.6% of the experimental group, 30.3% of the control group). For interest in practice, 75% were 'interested' (36.8% of the experimental group, 38.2% of the control group). For the importance of practice, it was 'important' for 96% (51.3% of the experimental group, 44.7% of the control group). Meanwhile, the characteristics of the participants were homogeneous in the two groups.

Table 1. Characteristics of the participants (N=76)

Variables	Category	Experimental (N=39)	Control (N=37)	t(p)/χ ² (p)
		M(SD) or N(%)	M(SD) or N(%)	
Gender	Female	38(50.0)	26(34.2)	10.538(.001)
	Male	1(1.3)	11(14.5)	
Age		21.10(4.967)	20.54(1.574)	1.776(.187)
Religion	Yes	17(22.4)	18(23.7)	.196(.416)
	No	22(28.9)	19(25.0)	
Entrance Motivation for Nursing School	SAT Score	2(2.6)	1(1.3)	1.334(.513)
	Getting a Stable Job	26(34.2)	29(38.2)	
	Service	11(14.5)	7(9.2)	
GPA	High	14(18.4)	9(11.8)	2.116(.347)
	Medium	14(18.4)	12(15.8)	
	Low	11(14.5)	16(21.1)	
Satisfaction for Major	High Satisfaction	24(31.6)	23(30.3)	3.587(.166)
	Medium Satisfaction	15(19.7)	11(14.5)	
	Low Satisfaction	0(0.0)	3(3.9)	
Interested in nursing practice	Very interested	28(36.8)	29(38.2)	1.188(.552)
	Interested	10(13.2)	8(10.5)	
	Not interested	1(1.3)	0(0.0)	
Importance of the practice	Important	39(51.3)	34(44.7)	3.292(.111)
	Not important	0(0.0)	3(3.9)	

Relationship between learners' self-evaluations and fundamental nursing practice competency

The learners' self-evaluations before the intervention had a high positive correlation with the pre-fundamental nursing practice competency, while the learners' self-evaluation after the intervention had a high positive correlation with the post-fundamental nursing practice competency.

Table 2. Correlation between self-evaluation score and fundamental nursing practice competency (N=76)

Variables	Pre-test (Fundamental nursing practice)	Post-test (Fundamental nursing practice)
Pre-test (Self-evaluation)	.503(<.001)	
Post-test (Self-evaluation)		.501(.001)

Table 3. Effects of video mediated fundamentals of nursing practicum on self-efficacy, self-appraisal, practice competency, satisfaction with practicum among nursing students (N=76)

Item	Group	Pre intervention	Post intervention	Within group difference <i>t(p)</i>
Self-efficacy	Exp.*	3.68(.46)	4.16(.36)	-6.691(<.001)
	Cont.**	3.76(.47)	4.03(.37)	-3.483(.001)
Between group difference	<i>t(p)</i>	-0.771(.443)	1.575(.120)	
Self-evaluation	Exp.*	2.53(.19)	2.72(.15)	-6.005(<.001)
	Cont.**	2.44(.27)	2.60(.17)	-4.024(<.001)
Between group difference	<i>t(p)</i>	1.658(.096)	3.238(.002)	
Fundamental nursing practice competency	Exp.*	2.60(.18)	2.66(.17)	-1.698(.098)
	Cont.**	2.33(.19)	2.46(.18)	-3.607(.001)
Between group difference	<i>t(p)</i>	6.389(<.001)	2.401(.019)**	
Satisfaction with practice	Exp.*	3.85(.48)	4.05(.51)	-2.084(.044)
	Cont.**	3.92(.60)	4.05(.78)	-1.152(.257)
Between group difference	<i>t(p)</i>	-0.584(.561)	-0.018(.152)	
Satisfaction with practice method	Exp.*	3.90(.45)	4.18(.45)	-3.451(.001)
	Cont.**	4.00(.53)	4.16(.69)	-1.434(.160)
Between group difference	<i>t(p)</i>	-0.913(.362)	.130(.879)	

* Exp. = Experimental group(N=39), ** Cont. = Control group(N=37)

Effects of fundamental nursing practices using a video

Self-efficacy

Before the experiment, the self-efficacy of the experimental and control groups appeared to be homogeneous. The post-data of the two groups were compared. After the intervention, the self-efficacy was 4.16 (0.36) points in the experimental group and 4.03 (0.37) points in the control group. There was no statistically significant difference. However, the comparison of the self-efficacy in each group before and after the intervention showed significant increases in both the experimental and control groups.

Learners' self-evaluation

Before the experiment, the self-evaluation scores were homogeneous in the experimental and control groups, and the post-data were compared between the two groups. After the intervention, the learners' self-evaluation scores were significantly higher in the experimental group (2.72 [0.15] points) than in the control group (2.60 [0.17] points). On the other hand, the

self-evaluation scores of each group were compared before and after the intervention, and significant increases were shown in both the experimental and control groups (Table 3).

Fundamental nursing practice competency

Before the experiment, fundamental nursing practice competency was significantly higher in the experimental group than in the control group, indicating that the two groups were not homogeneous. Therefore, a pre-test score for clinical competency could be a covariate for the intervention effect, and the intervention effect on clinical competency was analyzed using ANCOVA. After the intervention, the clinical competency was 2.66 (0.17) points in the experimental group and 2.46 (0.18) points in the control group. The difference was statistically significant. Meanwhile, the levels of clinical competency of each group were compared before and after the intervention, and the change in the experimental group was not significant. However, there was a significant increase in the control group, as shown in Table 3.

Learning satisfaction

Learning satisfaction was divided into overall satisfaction and practice method satisfaction. The overall learning satisfaction before the experiment was homogeneous in the experimental group and groups. After the intervention, the overall learning satisfaction was 4.05 (0.51) points in the experimental group and 4.05 (0.78) points in the control group. The difference was not statistically significant. According to the comparison of the self-evaluation scores of each group before and after the intervention, the overall learning satisfaction significantly increased in the experimental group, while there was no difference in the control group.

Before the experiment, the learning method satisfaction was homogeneous in the experimental and control groups. After the intervention, the learning method satisfaction was 4.18 (0.45) points in the experimental group and 4.16 (0.69) points in the control group. However, there was no significant difference. Meanwhile, the comparison of the learning method satisfaction of each group before and after the intervention showed that the scores of

Table 4. Analysis of smart-learning effect among experimental group (N=39)

Item	1	2	3	4	5
1 Frequency for watching video (Weekly)	Less than 1 13(33.4)	2 12(30.8)	3 11(28.2)	4 2(5.1)	More than 5 1(2.6)
2 Place of watching video	Home 30(76.9)	University 5(12.5)	PC cafe 0(0.0)	Library 1(2.6)	Others 3(7.7)
3 Intention to utilize the video after the practice	Never	Rarely 1(2.6)	Medium 14(35.9)	Somewhat 21(53.8)	Actively 3(7.7)
4 Validity of the video practice in fundamental nursing practice	Never	Rarely	Medium 3(7.7)	Somewhat 29(74.4)	Very 7(17.9)

the experimental group significantly increased, while there was no difference in the control group.

Additional analysis: Smart learning

Smart learning was examined in the experimental group, in which self-directed learning using a video was implemented. With regard to the frequency of watching the first video, 33.4% watched it less than once, 30.8% watched it twice, and 28.2% watched it three times. Regarding their location while watching the video, 'home' was the most common answer (76.9%). Regarding the willingness to use it for later practice, 61.5% of respondents answered that they were willing to use the video in the future. With regard to the appropriateness of video practice as a method of fundamental nursing science practice, 92.3% answered it was 'appropriate' or 'very appropriate.'

CONCLUSION, DISCUSSION, AND RECOMMENDATION

This is a quasi-experimental study to investigate the effects of the smartphone video recording practice method in fundamental nursing science practice. In the experimental group, the students recorded their practice progress using a smartphone and utilized the video for self-learning. Meanwhile, in the control group, general practice was performed. After the practice, learners' self-evaluation, fundamental nursing practice competency, self-efficacy, and learning satisfaction were examined and compared between the experimental and control groups.

In terms of self-efficacy, there was no significant difference between the experimental and control groups before and after the experiment. When the results were compared before and after the intervention within each group, self-efficacy was found to have significantly increased in both the experimental and control groups, while the level of increase was greater in the experimental group. Self-efficacy is one's self-perception regarding the belief that they can perform special duties efficiently. If self-efficacy was already high, fundamental nursing practice competency was reported to also be high (Park & Lee, 2008). The results of this study revealed that, albeit insignificant, the increased level of self-efficacy was higher in the experimental group compared with the control group. It is assumed that the results were not significant because the practice item, which was an intramuscular injection with 'medium' difficulty, was selected while taking into account the fact that the participants were nursing students in their sophomore year. In the case of intramuscular injection, if it is not directly injected into humans, there is a lower risk; thus, the students were able to perform it confidently without any psychological burden. Since the procedure was relatively simple, self-efficacy seemed to sufficiently increase only with training during regular practice hours. The effects of self-directed learning using smartphone video recording practice need to be investigated in relation to complex and difficult skills by increasing the difficulty of the practice items.

Next, in terms of the effects of the intervention on the learners' self-evaluation, before the experiment, the self-evaluation scores were homogeneous in the experimental and control groups. However, the scores after the experiment was significantly higher in the experimental group than in the control group, indicating that the smartphone video recording practice was effective for improving the self-evaluated competency of the students. In the analysis of both the experimental and control groups, learners' self-evaluation of their practice competency significantly increased after the experiment compared with before the experiment, but the level of the experimental group's increase was greater than that of the control group.

Regarding the fundamental nursing practice competency evaluated by the instructor, the score before the intervention was significantly higher in the experimental group than in the control group. Since the two groups were not homogeneous, the pre-test score was considered a covariate for the intervention effect in the analysis. After the intervention, the fundamental nursing practice competency was significantly higher in the experimental group than in the control group. In the comparison before and after the intervention in each group, a significant increase was observed only in the control group.

The findings presented in this study were slightly different from those of the prior studies that used smartphones in nursing classes (Lee & Shin, 2016; Chae & Ha, 2016). In this study, the fundamental nursing practice competency in the experimental group was already higher than that of the control group before the experiment. However, the scores of the control group before the intervention were relatively low; thus, the increase was greater.

For learning satisfaction, two items (overall learning satisfaction and practice method satisfaction) were evaluated. When comparing the learning satisfaction scores for overall learning and the practice method before and after the practice within the groups, significant increases were found in the experimental group for both items, whereas the control group did not exhibit any significant changes for both items. As learning satisfaction was an influential factor for skill competency (Song, Kim, & Yu, 2012), it was thought to be a preferred outcome due to the fact that it significantly improved in the experimental group through the intervention. It is assumed that the significant increase of learning satisfaction in the experimental group occurred because the smartphone video recording practice facilitated students' self-directed learning in the course of the practice, including their performance, evaluation of the practice process, and repeated learning.

Questions regarding smart learning with the smartphone video recording practice method were given to the experimental group. With regard to the frequency of watching the first video, 33.4% watched it less than once, 30.8% watched it twice, and 28.2% watched it three times. This means that the utility level was high, although it was only for a short period (one week). As mentioned above, a practice room equipped with devices must be secured for fundamental nursing science practice, and the amount of time that the students had to use a practice room was limited. Therefore, it is concluded that repeated video watching offered

opportunities for the learners to monitor their practice progress, receive feedback, and learn without limitations on time and place.

In addition, regarding their location while watching the video, 76.9% watched it at home, which showed that there might be a limitation in the utilization place. Since the duration for which students could perform self-learning using a video was short (one week), the frequency of use and place need to be examined after increasing the time of using a video in the future. For the question on students' future use of the video practice, 61.5% answered that they were willing to use it for their next practice. For the question on whether the video practice is appropriate as a method of fundamental nursing science practice, 92.3% answered 'yes,' indicating that they preferred the video recording learning method.

However, analyzing the reviews of the students, which were related to the new practice method, revealed that video recording caused embarrassment, and there were suggestions for the provision of a standard video for the students to base their performance on. To increase the learning effects in the future, the comments of the experimental group need to be reviewed when smartphone video recording practice is used. Many videos that contained fundamental nursing skill performances have been already made. The KABONE has also suggested a protocol for the procedures of the core fundamental nursing skills; therefore, the supplementation of insufficient parts is possible. Group members watched the entire practice process of shooting a video while a student practiced a skill. If the practice is carried out as a group and an opportunity to share opinions among the group members is provided, the practice could be more efficient. As a result, further studies need to investigate the practice effect through peer evaluation.

In conclusion, the smartphone video recording practice method used in fundamental nursing science practice was effective for the improvement of the nursing students' fundamental nursing practice competency and learning satisfaction. Based on the opinions of the students that were expressed in the reviews, a plan is required that can increase the accuracy and proficiency of fundamental nursing skill performance using the smartphone video recording practice method and that at the same time provides a video of standard performance procedures.

SUGGESTIONS FOR FUTURE RESEARCH

The study results showed that the smartphone video recording practice method, which was applied to nursing students in this study, had significant positive effects on fundamental nursing practice competency and learning satisfaction. Fundamental nursing science practice is an important process for nursing students preparing for clinical practice, establishing nursing professionalism, and increasing their self-efficacy regarding skill competency. Therefore, the smartphone video recording practice method is thought to be an effective intervention that can increase the learning effect through self-directed learning and improve students' learning satisfaction.

Below are suggestions for further research based on the study results:

1. Studies on the long-term effect of self-directed repeated learning are required.
2. Studies to investigate the effect of practice using peer evaluation are required.

REFERENCES

- Al-Fahad, F. N. (2009). Students' attitudes and perceptions towards the effectiveness of mobile learning in King Saud University, Saudi Arabia. *The Turkish Online Journal of Educational Technology*, 8(2).
- Baya, N. F., & Daher, W. M. (2009). Learning Mathematics in an Authentic Mobile Environment: the Perceptions of Students. *ijIM*, 3(S1), 6-14.
- Caldwell, K., & Atwal, A. (2005). Non-participant observation: using video tapes to collect data in nursing research. *Nurse Researcher*, 13(2), 42-54.
- Chae, Y. J., & Ha, Y. M. (2016). Effectiveness of education program for core fundamental nursing skills using recording video with smartphone and formative feedback, *Journal of Digital Convergence*, 14(6), 285-294.
- Chen, C. M., & Hsu, S. H. (2008). Personalized intelligent mobile learning system for supporting effective English learning. *Educational Technology & Society*, 11(3), 153-180.
- Chen, Y. S., Kao, T. C., & Sheu, J. P. (2003). A mobile learning system for scaffolding birdwatching learning. *Journal of Computer Assisted Learning*, 19(3), 347-359.
- Cowan, D. T., Norman, I., & Coopamah, V. P. (2005). Competence in nursing practice: a controversial concept—a focused review of literature. *Nurse Education Today*, 25(5), 355-362.
- Evans, C. (2008). The effectiveness of m-learning in the form of podcast revision lectures in higher education. *Computers & Education*, 50(2), 491-498.
- Horiuchi, S., Yaju, Y., Koyo, M., Sakyō, Y., & Nakayama, K. (2009). Evaluation of a web-based graduate continuing nursing education program in Japan: A randomized controlled trial. *Nurse Education Today*, 29(2), 140-149.
- Hosny, S., Mishriky, A. M., & Youssef, M. (2008). Introducing computer-assisted training sessions in the clinical skills lab at the Faculty of Medicine, Suez Canal University. *Medical Teacher*, 30(2), e35-e40.
- Jho, M. Y. (2014). Effects of core fundamental nursing skills education on self-efficacy, clinical competence and practice satisfaction in nursing students. *Journal of Korean Academy of Fundamentals of Nursing*, 21(3), 292-301.
- Ketamo, H. (2003). xTask-an adaptable learning environment. *Journal of Computer Assisted Learning*, 19, 360-370.
- Kim, Y. H. (2007). Changes in nursing values and nursing professional attitudes after practical education based fundamental nursing practice education. *Journal of Korean Academy of Fundamentals of Nursing*, 14(4), 420-428.
- Koch, J., Andrew, S., Salamonson, Y., Everett, B., & Davidson, P. M. (2010). Nursing students' perception of a web-based intervention to support learning. *Nurse Education Today*, 30(6), 584-590.
- Koeckeritz, J., Malkiewicz, J., & Henderson, A. (2002). The seven principles of good practice: Applications for online education in nursing. *Nurse Educator*, 27(6), 283-287.
- Korean Accreditation Board of Nursing Education (2012-b). *Accreditation assessment standards for education of Korea (the course of the nursing bachelor's degree)*. (2013, May 20). Retrieved from <http://kabon.or.kr/kabon02/120120319133351.pdf>

- Kyndt, E., Govaerts, N., Dochy, F., & Baert, H. (2011). The learning intention of low-qualified employees: A key for participation in lifelong learning and continuous training. *Vocations and Learning*, 4(3), 211-229.
- Lee, S. S., & Kwon, M. K. (2016). Effects of self-directed fundamental nursing practice using smartphone videos on self-efficacy, practice satisfaction, and skill competency. *Journal of Korean Academic Society of Nursing Education*, 22(3), 255-263.
- Lee, S. G., & Shin, Y. H. (2016). Effects of self-directed feedback practice using smartphone videos on basic nursing skills, confidence in performance and learning satisfaction. *Journal of Korean Academy of Nursing*, 46(2), 283-292.
- Levett-Jones, T. L. (2005). Self-directed learning: implications and limitations for undergraduate nursing education. *Nurse Education Today*, 25(5), 363-368.
- Liou, S. R., Chang, C. H., Tsai, H. M., & Cheng, C. Y. (2013). The effects of a deliberate practice program on nursing students' perception of clinical competence. *Nurse Education Today*, 33(4), 358-363.
- O'Shea, E. (2003). Self-directed learning in nurse education: a review of the literature. *Journal of Advanced Nursing*, 43(1), 62-70.
- Park, J. Y. (2012). Self-assessment, self-efficacy and satisfaction after OSCE using smart phone. *The Journal of Korean Academic Society of Nursing Education*, 18(1), 120-130.
- Park, S. N., & Lee, S. K. (2008). Factors influencing basic nursing skill competency in nursing students. *Journal of Korean Academy of Fundamentals of Nursing*, 15(1), 6-13.
- Raemdonck, I. (2006). *Self-directedness in learning and career processes: A study in lower-qualified employees in Flanders* (Unpublished doctoral dissertation), Ghent University, Gent, The Netherlands.
- Raines, D. A. (2010). Nursing practice competency of accelerated bachelor of science in nursing program students. *Journal of Professional Nursing*, 26(3), 162-167.
- Riley, R. G., & Manias, E. (2004). The uses of photography in clinical nursing practice and research: a literature review. *Journal of Advanced Nursing*, 48(4), 397-405.
- Song, M. R., Kim, E. M., & Yu, S. J. (2012). An analysis on the Competency of Nursing Students' Basic Nursing Skills. *The Journal of the Korea Contents Association*, 12(6), 390-401.

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