

# The Effects of Simulation Based Practical Education on Nursing Students' Self-efficacy, Performance Confidence, and Educational Satisfaction

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**Objective:** This study is a single-group pre-post experimental study to determine the effects of simulation-based practice education on nursing students' self-efficacy, performance confidence, and educational satisfaction.

**Design:** Single-group pre-post experimental studies

**Methods:** This study was conducted from September 1, 2023 to November 30, 2023 for nursing undergraduate students in a simulation based practical education program. The subjects were provided with learning materials about an acute myocardial infarction case with chest pain for preliminary learning. After that, they were divided into teams of 6 people and asked to do self-study for 2 hours per team, twice a week, before conducting simulation practice. For the simulation based practical education, the participants were divided into 9 teams of 6 people each, and each team had 10 minutes for orientation, 15 minutes for scenario operation, and 50 minutes for debriefing.

**Results:** After the simulation based practical education, self-efficacy increased statistically significantly from a mean of 3.51 before training to a mean of 3.80 after training ( $t = -2.12$ ,  $p = 0.038$ ). However, there was no significant difference in performance confidence. There was a significant positive correlation between self-efficacy and performance confidence ( $r = 0.62$ ,  $p < 0.001$ ) and training satisfaction ( $r = 0.67$ ,  $p < 0.001$ ) after the simulation based practical education. Self-confidence was also significantly correlated with educational satisfaction ( $r = 0.76$ ,  $p < 0.001$ ).

**Conclusions:** The results of this study showed that utilizing simulation-based practical education can increase nursing students' self-efficacy, which positively affects their performance confidence and educational satisfaction. Therefore, simulation-based practical education is an effective nursing education method that can improve nursing students' practical skills.

**Key Words:** Simulation, Education, Self-efficacy, Performance confidence, Satisfaction

## Introduction

The need for research

Simulation-based learning is a learning method that uses realistic scenarios and simulators to simulate clinical situations and improve learners' nursing knowledge and clinical performance without causing harm to patients [1]. Through simulation classes, nursing students are able to effectively solve the health problems of the target population through the nursing

process of various cases that are difficult to experience in the clinical setting under a safe environment [2]. Today, simulation education is commonly used to improve students' teamwork, therapeutic communication, and clinical performance. Attempting to overcome the limitations of traditional teaching methods, simulation-based education can bridge the gap between theory and practice by creating patient cases that mimic real-world situations, allowing students to practice until they become proficient. In particular, it has been reported that through the debriefing phase, students can

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acquire knowledge related to clinical performance, increase their satisfaction and confidence in practical education, and induce learning motivation [3, 4].

Simulation-based practical education allows nursing students to correct their mistakes when faced with complex and urgent simulated situations, without causing harmful consequences to the patient due to the nursing care performed. In addition, they can learn a variety of complex skills in a safe environment and practice various clinical skills. So far, studies on simulation education in Korea have reported positive effects of simulation education on nursing students, such as increasing nursing performance, improving performance confidence, increasing self-efficacy, increasing self-directed learning skills, and improving educational satisfaction [5, 6].

According to Bandura [7], self-efficacy is defined as "a judgment of one's ability to execute and organize some kind of performance" by selectively mobilizing the behavioral, cognitive, and emotional resources necessary for successful performance. It is a characteristic of perceiving one's ability to successfully organize and execute a task, and the tendency to willingly involve oneself and dedicate oneself even when taking on difficult tasks is characteristic of people with high self-efficacy. Nursing students with high self-efficacy showed lower stress levels for academic and employment compared to students with low self-efficacy [8]. In particular, it was said that nursing students mature under heavy learning burden, fierce competition, and marginal situations, but it was suggested that a personalized nursing education process that can promote socialization of nursing students should be developed [9].

Self-confidence can be defined as a perceived judgment about one's abilities, and the confidence in performance that nursing students have is a factor that influences their adjustment to clinical practice, clinical performance, and quality of patient care. Confidence in clinical judgment was found to be higher when high-realism simulators were applied in practical education [10, 11]. As a result of these studies, simulation-based practical education can be seen as a factor that improves confidence.

Therefore, this study aims to provide basic data for the development of effective nursing education methods that can improve nursing students' practical skills by

identifying the effects of practical education using simulation in the curriculum on nursing students' self-efficacy, performance confidence, and educational satisfaction.

## Purpose

The purpose of the study was to determine the impact of simulation-based practical education on nursing students' self-efficacy, skill performance confidence, and educational satisfaction following the implementation of simulation-based training.

First, to determine the impact on nursing students' self-efficacy after participating in simulation-based practice education.

Second, to determine the impact of simulation-based practical education on nursing students' performance confidence.

Third, to determine the impact of simulation-based practice education on nursing students' educational satisfaction.

## Research Methods

### A. Study Design

This is a single-group pretest-posttest time-lapse design to develop a simulation-based education program for acute myocardial infarction with chest pain and determine its effect on nursing students' self-efficacy, performance confidence, and practice satisfaction (figure 1).

### B. Research Subjects

The subjects of this study were fourth-year nursing students, and the number of subjects calculated by using G\*Power program (version 3.1.9.2, University of Duffeldorf, Duffeldorf, Germany) for paired t-test analysis with an effect size of 0.4, significance level of 0.5, and power of 0.8 was 52. A total of 57 participants were recruited for this study, excluding 4 who did not respond to the survey.

Recipients were selected based on the following criteria

- Completion of basic nursing theory and practice coursework.
- Someone you can communicate with.
- No previous experience with simulation-based training

Pre	Intervention *	Post
• General Characteristics	Simulation-based practical education	• Self-efficacy
• Self-efficacy	(Acute Myocardial Infarction with Chest Pain)	• Performance confidence
• Performance confidence		• Educational satisfaction
* 1 week of group self-study + 2 total simulation trainings + debriefing		

**Figure 1.** Study design

- Understand the purpose of the study and agree to participate in the study

subject, with a higher score indicating a higher level of confidence in the subject's performance.

### C. Research Tools

#### *Self-efficacy*

The General Self-Efficacy Scale is an adaptation of an instrument developed by Kim [12]. It consists of 14 items that are rated on a 5-point scale, with higher scores indicating higher self-efficacy (Appendix 4). The reliability at the time of development was Chronbach  $\alpha = .89$ , and the reliability in this study was Chronbach  $\alpha = .89$ .

#### *Educational satisfaction*

To measure the overall educational satisfaction of participants in a simulation-based training program, we used the simulation based practical education Satisfaction Assessment Tool developed by Park [6] and modified and supplemented by Kim [13]. The tool consists of nine questions, eight of which are based on a Likert 5-point scale, with higher scores indicating higher satisfaction with the simulation based practical education, and one subjective question, "What was the best and worst part of the simulation based practical education?", which allows participants to freely write their opinions. The reliability of Kim's tool was Cronbach's  $\alpha = .93$  [13]. In this study, Cronbach's  $\alpha = .93$ .

#### *Performer confidence*

Performer confidence was measured using a visual analogue scale with a 10-centimeter horizontal line. The tool scores 0 for "not at all confident" at the left end of the line and 10 for "very confident" at the right end. The score is expressed as the length (in centimeters) from the left end of the line to the part marked by the

### D. Procedures and Methods

#### *Subject selection process*

The study was conducted from September 1, 2023 to November 30, 2023. Fourth-year students enrolled in a nursing program in the city of M were recruited by posting a recruitment advertisement including the purpose and method of the study in an online community, and those who applied were given further explanation and written consent to participate in the study. The students had completed theoretical and practical courses related to basic nursing as prerequisite learning, and those who could provide basic nursing care and had no experience in simulation practice were selected.

#### *Ethical considerations*

Written or online consent was obtained for the purpose and method of the study to prevent leakage of personal information and for ethical protection. Participants were informed that if they did not wish to participate in the study, they could stop or withdraw at any time and would not be penalized for doing so. We explained that the data collected will be used anonymously and will not be used for any purpose other than the purpose of the research, and we will guarantee confidentiality and anonymity. At the end of the study, a small gift was provided as compensation for participating in the study.

#### *Simulation based practical education*

Based on the study of Lee et al. [14], we developed a simulation template that modified the scenario

developed by the National league for nursing (NLN) for simulation education. During the development process, we tried to ensure that the scenarios were based on actual clinical cases by receiving clinical advice from a head nurse at Hospital S in Seoul and supervision from two nursing professors who teach simulation.

A high fidelity simulator (SimMan<sup>®</sup>3G, Laerdal, Stavanger, Norway) equipped with a simulated scenario of myocardial infarction was used to perform the nursing intervention, and the simulation assessment was recorded with the informed consent of the participants.

In this study, a general orientation on the machine operation method, equipment and supplies required for the simulation practice was conducted in advance.

The procedure of simulation based practical education was to first provide the subjects with learning materials on the case of acute myocardial infarction with chest pain for preliminary learning. After that, they were divided into teams of 6 people and asked to do self-study for 2 hours per team, twice a week, before conducting simulation practice. For the practice group operation, we divided the subjects into 9 teams of 6 people, and each team had 10 minutes of practice orientation, 15 minutes of scenario operation, and 50 minutes of debriefing. The debriefing included watching a video recording of the subject's own simulation training.

### *Debriefing*

After completing the simulation-based practical education of acute myocardial infarction with chest pain, a debriefing was conducted in a discussion-style classroom of the participant's choice using video of the simulation process. A total of 9 subjects were divided into 3 groups of 3 each, and the debriefing was conducted for 50 minutes per group. The debriefing was recorded with the participants' prior consent, and the recordings were transcribed by the researcher and a trained research assistant for later data analysis.

The main question was an open-ended one: "What are your experiences with simulation-based training programs?". Specific questions related to this were "How do you feel about experiencing a simulation lab? What was the most impressive thing about the simulation lab, what was the most challenging thing about the simulation lab, and in what ways do you

think the simulation lab was beneficial to you?"

The debriefing included feedback on the simulation-based training of acute myocardial infarction with chest pain, a self-reflection process, training on how to write a nursing record as a record of the nursing process, and patient education after the nursing intervention.

One day after the end of the simulation based practical education, a trained research assistant administered a post-survey questionnaire on self-efficacy, performance confidence, and educational satisfaction.

### E. Data analyze

The data collected was analyzed using the SPSS 25.0 statistical program.

- \* The general characteristics of the subjects were analyzed as frequencies and percentages.
- \* The reliability of the instrument was tested with Chronbach's  $\alpha$ .
- \* The pre- and post-simulation-based training self-efficacy and performer confidence were analyzed using paired t-tests.
- \* Educational satisfaction after simulation-based training was analyzed by mean and standard deviation.
- \* The correlations between self-efficacy, performance confidence, and educational satisfaction were analyzed by Pearson correlation.

### F. Study Limitations

As this study is limited to nursing students in the same academic year at a single university, careful consideration should be given to generalizing and expanding interpretations, and continuous, systematic, and repeated studies using the same instrument are needed before universal application.

## Research Results

### General characteristics of the audience

A total of 53 subjects participated in this study, and their general characteristics are shown in Table 1.

The gender breakdown was 10 males (18.93%) and 43 females (81.1%), with an average age of 23.89 years.

Interest in basic nursing theory and practice was most often rated as "interesting" (64.2% for theory and 83.0% for

practice). The average nursing course grade from the previous semester was 6 (11.3%) "A or better", 17 (32.1%) "B<sup>+</sup> or better", 21 (39.6%) "B or better", and 9 (17.0%) "C or better" in the experimental group.

Differences in self-efficacy and performance confidence before and after simulation based practical education

After simulation based practical education, self-efficacy increased statistically significantly from a mean of  $3.51 \pm 0.71$  before training to a mean of  $3.80 \pm 0.58$  after training ( $t = -2.12$ ,  $p = 0.038$ ). However, there was no

significant difference in performance confidence (table 2).

Educational satisfaction of simulation-based practice in the nursing students

As shown in Table 3, the participants' overall educational satisfaction level after the simulation-based training was  $4.05 \pm 0.69$  out of 5. When broken down by item, "Cooperation with colleagues" was the highest with an average score of  $4.21 \pm 0.82$ .

**Table 1.** Homogeneity test for General Characteristics

Characteristics	Categories	n	(%)
Gender	Male	10	18.9
	Female	43	81.1
Age (year)	Mean±SD		
	≤ 22	6	11.3
	23	25	47.2
	24	8	15.1
Interested in basic nursing theory	≥ 25	14	26.4
	Not interested	4	7.5
	Usually	15	28.3
Interest in basic nursing practice	Interested	34	64.2
	Not interested	3	5.7
	Usually	6	11.3
Attitudes toward self-study	Interested	44	83.0
	Passive	4	7.5
	Usually	19	35.8
Academic grades	Active	30	56.6
	≥ A	6	11.3
	B <sup>+</sup>	17	32.1
	B	21	39.6
	< B	9	17.0

**Table 2.** Effects of simulation-based practical education

Variable	pre	post	t	p
Self-efficacy	3.51(0.71)	3.80(0.58)	-2.13	0.038
Performance confidence	7.75(2.17)	8.09(1.79)	-0.83	0.412

**Table 3.** Educational satisfaction on Simulation-based Practice in the Nursing Students (N=53)

Categories	Mean(SD)
Reality	3.94(0.86)
Clear goal	4.11(0.72)
Actual clinical situation	4.04(0.78)
Cooperation with colleagues	4.21(0.82)
Instructor preparation	4.13(0.81)
Debriefing	4.04(0.92)
Facility	3.91(1.01)
Overall satisfaction	4.04(0.78)
Total	4.05(0.69)

Correlations between nursing students' self-efficacy, performance confidence, and educational satisfaction

Self-efficacy after simulation based practical education was significantly positively correlated with performance confidence ( $r=0.62$ ,  $p<0.001$ ) and educational satisfaction ( $r=0.67$ ,  $p<0.001$ ). Self-efficacy was also significantly correlated with educational satisfaction ( $r=0.76$ ,  $p<0.001$ ) (table 4).

### Additional analysis

Additional analysis of student evaluations during the post-simulation debriefing revealed the following.

In terms of the evaluation of simulation-based practical education, first of all, they expressed unfamiliarity and embarrassment because it was the first time they had experienced it. They said that the actual hands-on experience made the training more vivid and rich, and that the content was more memorable and beneficial compared to lecture-based training.

The benefits included "Improved ability to handle situations," "It was good to experience nursing skills that

I had only learned in theory," "I think I can be proactive in clinical practice," "I learned the importance of decision-making and prioritization in clinical practice," "Watching simulated practice situations through videos and identifying their strengths and weaknesses," and "Experiencing it as if I were doing it to a patient."

Cons and suggestions included "not enough time for debriefing," "working with teammates who don't see eye-to-eye," "not enough time to practice beforehand," and "not enough lab materials."

### Discussion

After the simulation based practical education, self-efficacy significantly increased from a mean of 3.51 before training to a mean of 3.80 after training. This supports the findings of Kwon and Kim [15], who implemented high-risk maternal simulation based practical education and analyzed its effectiveness, and Kim and Park [16], who evaluated the effectiveness of simulation by learning type for nursing students, as their self-efficacy improved significantly after the application of simulation compared to before the training. In addition, the post-training results were higher than the 3.38 scores of nursing students who received emergency nursing simulation based practical education by Kim et al. [17], and higher than the 3.21 scores of Yoo et al. [18]. Bandura [6] stated that self-efficacy is formed through actual and vicarious experiences, praise and encouragement from others, and physiological states. It is thought that students' self-efficacy is improved by actively exercising their competence while recognizing that they are not harming patients in simulation-based education, as

**Table 4.** Correlations between variables after simulation based practical education

		Self-efficacy	Performance confidence	Educational satisfaction
Self-efficacy	r	1		
	p			
Performance confidence	r	0.62	1	
	p	<0.001		
Educational satisfaction	r	0.67	0.76	1
	p	<0.001	<0.001	

opposed to passive practice based on observation in clinical practice. Therefore, when applying simulation education, it is believed that it is effective to improve self-efficacy by providing success experiences and providing practices appropriate to the learner's level.

In this study, there was no significant difference between pre- and post-performance confidence. This is similar to the results of Kim and Choi [19], who found no significant difference in learner confidence after virtual simulation (VSIM) or simulation-based laboratory simulation (Lab SIM) alone. On the other hand, Song and Jeong's study [4] showed that nursing students' performance confidence was significantly higher after implementing a simulation based practical education program for emergency nursing care of hypoglycemic patients, and Kim and Jeong's study [20] showed that augmented reality simulation-based autonomous practice training resulted in higher performance confidence, which is contrary to this study. This is thought to be due to repeated training using simulation, which increased learners' confidence. In light of Lee and Jung's study [21] that clinical experience, attitude, experience in performing chest compressions, and educational experience are factors related to confidence in performing CPR, it is thought that confidence will increase significantly if simulation-based practical education is provided with realistic acute myocardial infarction situations after theoretical lectures, repeated skills, and debriefing.

In this study, the satisfaction level after simulation-based training was high with an average score of 8.09 out of 10. The satisfaction scores in this study are different from the instruments in previous studies, so it is difficult to compare them accurately, but they are similar to the results of Lee et al. [14] who showed moderate to high satisfaction with simulation based practical education with an average score of 3.92 on a 5-point scale, and Park and Lee [22] who showed high satisfaction with simulation based practical education with an average score of 5.5 out of 7.

The correlation between self-efficacy, performance confidence, and educational satisfaction after simulation based practical education showed a significant positive correlation. In the study of Kim and Koh [23], self-efficacy was found to be significantly positively related to learning satisfaction ( $r = .64, p < .001$ ). This

was similar to previous studies in which Park and Lee's study [22] showed that nursing students' self-efficacy was significantly related to basic nursing skills, and students who were satisfied with basic nursing lecture and practice had significantly higher self-efficacy [24, 25].

The results of Kim et al [26] were similar to the results of this study as they found a significant positive correlation between learner confidence and learning satisfaction after an evidence-based nursing simulation education program. It is thought that self-efficacy, which is the belief that one can successfully perform the behaviors necessary to achieve a desired outcome, enhanced confidence, which in turn positively influenced learning satisfaction.

Based on the above results, we believe that self-efficacy and self-confidence are very important psychological factors for nursing students who need to acquire nursing skills. However, this study is a single-group before-and-after design study, so there are limitations in drawing conclusions.

## Conclusion

The results of this study showed that practical education utilizing simulation increased nursing students' self-efficacy. Therefore, practical training using simulation is an effective nursing education method that can improve nursing students' practical skills.

## Conflict of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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