

# Effect of the Education of Using Structured Multimedia on Stress, Self-efficacy and Performance Confidence in Undergraduate Nursing Students

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## Abstract-

**Background:** The The purpose of this study was to identify the effects of the education of using structured multimedia on self-efficacy, stress, and performance confidence in future nursing professionals. **Methods:** A quasi-experimental study with a non-equivalent control group pretest-posttest design was used. Participant were recruited from two nursing colleges. The sample consisted of an intervention group (n=29) that participated in the educational program and a control group (n=30). The data were collected using self-administered questionnaires. Data analyses utilized  $\chi^2$ -test, fisher's exact probability & t-test with the SPSS 21.0 program. **Results:** As a result of research, the experimental group showed significantly increases in self-efficacy ( $t=2.694$ ,  $p=.027$ ) and performance confidence ( $t=1.825$ ,  $p=.031$ ) than the control group. Also, the experimental group showed significantly decreases in stress ( $t=-4.026$ ,  $p=.031$ ) than the control group. The findings indicate that the education of using structured multimedia on self-efficacy, stress, and performance confidence in future nursing professionals is an effective teaching method for nursing students. **Conclusions:** It is important to manage the psychological well-being to prepare successful professionals. In addition, it will be necessary to consider teaching-learning method strategies for applying structured multimedia learning in the nursing education.

**Keywords –Nursing, Self-efficacy, Stress, Performance confidence**

## I. INTRODUCTION

One of the useful educational methods for promoting students' learning ability by inducing interest in learning is education using structured multimedia. In particular, the educational method using computer or media of a smartphone is a very useful teaching and learning method in the curriculum for future nursing professions [1]. In the 4th industrial era, various teaching and learning methods using multimedia are increasing in nursing colleges to effectively perform practical education for nursing students. In nursing practice education, education using multimedia is actively encouraged as one of the useful educational strategies to achieve learning goals more easily by inducing students' learning motivation compared to traditional lectures [2].

College of Nursing focuses on nursing students with practical skills and core competencies by appropriately responding to the changing health and medical environment when setting a practical education goal to acquire the knowledge and skills necessary as a professional. In institutions that evaluate and certify nursing education, it is emphasized that nursing students must achieve the core fundamental nursing skills required in practice and the learning outcomes necessary to achieve educational goals [3]. Therefore, core fundamental nursing skills are essential for nursing students who are nursing professionals in the future, and various interests and efforts from related institutions and education personnel are required.

Recently, related multimedia educational materials have been produced based on core fundamental nursing skills and are introduced as one of various teaching and learning methods in the educational field. The educational medium using multimedia is an educational method with many differentiated advantages over traditional lectures or hands-on teaching methods with demonstrations [4]. Therefore, the structured multimedia utilization practice education should be spread as an effective educational method to nursing students.

Compared to other university students, nursing students experience the burden of balancing both heavy academic studies and clinical practice [5]. If these stresses are not adequately addressed, they will not only negatively affect physical health but may also bring out psychological health [6]. When the stress of nursing students increases, self-efficacy is affected, and when self-efficacy increases, it helps to adjust to college life, improves the ability to respond positively to difficult situations, and builds confidence in the ability to control oneself [7]. Therefore, it is necessary for schools and clinical institutions to find solutions to the stress of nursing students in a nursing education environment.

Self-efficacy is an important factor in college life and adjustment. As the self-efficacy increases, the coping ability according to the situation is formed through the interaction with the environment, and when the coping ability is strengthened, the performance confidence improves even in a complex situation. In particular, it was found that practical education using multimedia applied in nursing education not only provided necessary knowledge, but also corrected and supplemented the deficiencies through feedback, and had a positive effect on self-efficacy and clinical practice in nursing students [4]. Therefore, there is a need for an interest in actively utilizing such multimedia and an efficient plan.

In previous studies, there was a study on educational intervention through education using multimedia [1] [4] [7] [8]. However, there is currently no research on the effect of correcting and

supplementing the existing errors according to a structured multimedia, that is, Korean Education and Evaluation protocol, for core fundamental nursing education. Therefore, this study was attempted as an intervention study for the mental health of nursing students. Specifically, this study was attempted to confirm the effect of educational intervention on the stress, self-efficacy and self-confidence of nursing students, who are nursing students in the future, through core fundamental nursing education using structured multimedia.

## II. METHODS

### 2.1 Participants

This study's participants were students enrolled in the second year of the department of nursing college at C and S colleges. The experimental group was selected as an education subject for applying structured multimedia, and the control group was selected for students who did not receive structured multimedia use education. The appropriate number of participants for this study was calculated, based on significance level ( $\alpha$ ) .05, effect size .60, power .70 when using G\*power 3.1 program[9]. The final number of participants were 29 in the experimental group and 30 in the control group.

### 2.2 Measures

In order to measure the stress of nursing college students, a stress measurement tool suitable for Korean nursing students developed in 2008 by Yoo et al. [10] was used. The reliability in this study was Cronbach's  $\alpha$ =.89. In order to measure the self-efficacy of nursing students, Sherer and Maddux et al. [11] developed it in 1982, and Jung [12] used a modified and supplemented tool with content suitable for nursing students in 2007. The reliability in this study was Cronbach's  $\alpha$ =.84. A tool developed by Bang [13] in 2014 was used to measure performance confidence. The reliability in this study was Cronbach's  $\alpha$ =.93.

### 2.3 Intervention

The structured multimedia to be used for educational intervention in this study was made to meet the achievement goals according to the practical education goals and core fundamental nursing skills. In the application of educational intervention, three educational instructors taught 10 core basic nursing skills in consideration of the high, medium, and low levels and execution time. The training was operated by placing 10 people in each training room, 5 groups per training room, and 2 people in one group. The evaluation was conducted in the last week of the educational intervention after all the self-study of each student, including the core fundamental nursing skills practice of the students, were completed. The educational interventions of this study are as follows [Table 1].

Table-1: Basic Structure of the Education Program

Types of core fundamental nursing skills	Periods	Education Contents	Education Methods
Vital Signs	6weeks	<ul style="list-style-type: none"> <li>·Textbook</li> <li>·Practice guideline</li> <li>·Cellular phone</li> <li>·Computer</li> <li>·Virtual IV system</li> <li>·Simulator</li> </ul>	<ul style="list-style-type: none"> <li>·Lecture</li> <li>·Demonstration</li> <li>·Practice</li> <li>·Observation</li> <li>·Evaluation (peer)</li> <li>·Open lab</li> <li>·Q &amp; A</li> </ul>
Oral Administration			
IM Injection			
SC Injection			
ID injection			
IV infusion			
Transfusion Care			
Nelaton catheterization			
Foley catheterization			
Cleansing Enema			

#### 2.4 Data Collection

Data collection took place from September 5, 2016, just before the intervention period of the experimental group to October 21, the date of education. Before data collection, a self-reporting method was used to explain questionnaire contents. During data collection, it was informed that it was possible to withdraw it at any time, if desired, and made it clear that the collected data will be anonymously and thoroughly protected.

For this study, first, the director of the participating institution explained the purpose of the study and obtained consent for the study. In this study, students who agreed to participate in the study received written consent, answered the research method, precautions, necessities, and questions, and proceeded with the research.

#### 2.4 Data Analysis

The collected data used SPSS/win 21.0 Program. The experimental group and control group were analyzed with Kolmogorov-Smirnov to verify the normal distribution of stress, self-efficacy and performance confidence. The homogeneity test between the experimental group and the control group was analyzed by  $\chi^2$ -test, Fisher's exact probability test, and t-test. After intervention was provided, changes in stress, self- efficacy and performance confidence in the experimental group and the control group were verified using the t-test.

### III. RESULTS

#### 3.1 General Characteristics and Homogeneity Test of between Two Groups

As a result of testing the homogeneity of each characteristic of the experimental group and the control group collected in advance before intervention, there was no statistically significant

difference between the two groups. Therefore, the two groups participating in the study could be viewed as relatively homogeneous groups [Table 2].

Table-2: Homogeneity test on the characteristics between groups (n=59)

General Characteristics		Exp. (n=29)	Cont.(n=30)	$\chi^2$ or t	p
		M±SD or n(%)	M±SD or n(%)		
Age		21.75±6.72	22.02±6.90	1.425	.201
Gender	Male	3(10.3)	2(6.7)	.999*	.727
	Female	26(89.7)	28(93.3)		
Academic achievement	< 3.0	3(10.3)	2(6.7)	6.106*	.176
	3.0≤~<3.5	11(37.9)	14(46.7)		
	3.5≤~<4.0	13(44.9)	13(43.3)		
	4.0≤~<4.5	2(6.9)	1(3.3)		
Inter-personal relationship	Poor	13(44.8)	14(46.7)	.694	.297
	Good	16(55.2)	16(53.3)		
Religion	Christian	9(31.0)	13(43.3)	3.33*	.298
	Catholic	6(20.7)	2(6.7)		
	Buddhism	3(10.3)	2(6.7)		
	No religion	11(38.0)	13(43.3)		
Personality	Introverted	10(34.5)	6(20.0)	.623*	.581
	Middle	10(34.5)	14(46.7)		
	Extroverted	9(31.0)	10(33.3)		
Major satisfaction	Unsatisfied	12(41.4)	13(43.3)	.725	.432
	Satisfied	17(58.6)	17(56.7)		

\*Fisher's exact probability test

### 3.2 Homogeneity Test of Dependent Variables between Two Groups

There was no statistically significant difference between the two groups as a result of testing the homogeneity of stress, self-efficacy and performance confidence between the experimental group and the control group collected before educational intervention. Therefore, the two groups participating in the study could be viewed as relatively homogeneous groups [Table 3].

Table-3: Homogeneity test on the dependent variables between groups (n=59)

Variables	Exp. (n=29)	Cont.(n=30)	t	p
	M±SD	M±SD		
Stress	171.72±15.79	165.73±13.24	2.486	.427
Self-efficacy	49.97±10.22	48.24±11.36	1.245	.286
Performance confidence	65.78±11.67	64.71±9.94	-.387	.489

### 3.3 Changes in Stress, Self-efficacy and performance confidence

As a result of analyzing the difference in the change in the stress score before and after the experiment between the experimental group and the control group, the experimental group decreased by 31.30 points to 171.72 points before and 120.42 points after the experiment, and the control group decreased by 5.05 points to 165.73 points before and 160.68 points after the experiment, slightly decreasing between the two groups. The score change showed a statistically significant difference ( $t=-4.026$ ,  $p=.047$ ), and the second hypothesis was supported [Table 4].

As a result of analyzing the difference in the change in the self-efficacy score before and after the experiment between the experimental group and the control group, the experimental group increased by 11.36 points to 49.97 points before and 61.33 points after the experiment, and the control group increased by 1.80 points to 48.24 points before and 50.04 points after the experiment slightly. The change in liver score showed a statistically significant difference ( $t=2.694$ ,  $p=.027$ ), and the first hypothesis was supported [Table 4].

As a result of analyzing the difference in the change in the performance confidence score before and after the experiment between the experimental group and the control group, the experimental group increased by 10.34 points to 65.78 points before and 76.12 points after the experiment, and the control group increased by 1.33 points to 64.71 points before and 62.39 points after the experiment. The change of the liver score showed a statistically significant difference ( $t=1.825$ ,  $p=.031$ ), and the third hypothesis was supported [Table 4].

Table-4: Changes in Stress, Self-efficacy and performance confidence (n=59)

Variables	Groups	Pretest	Posttest	Difference	t	p
		Mean±SD	Mean±SD	Mean±SD		
Stress	Exp. (n=29)	171.72±15.79	140.42±15.69	-31.30±17.31	-4.026	.047
	Cont.(n=30)	165.73±13.24	160.68±12.03	-5.05±13.01		
Self-efficacy	Exp. (n=29)	49.97±10.22	61.33±10.03	11.36±10.04	2.694	.027
	Cont.(n=30)	48.24±11.36	50.04±9.35	1.80±11.01		
Performance confidence	Exp. (n=29)	65.78±11.67	76.12±8.76	10.34±10.23	1.825	.031
	Cont.(n=30)	64.71±9.94	62.39±8.56	1.33±8.94		

#### IV. DISCUSSION AND CONCLUSION

This study was attempted to provide basic data for nursing practice education by grasping the effects of education using structured multimedia on stress, self-efficacy and performance confidence of future nursing professions. As a result of the study, it was confirmed that the structured multimedia use practice education improved the self-efficacy and performance confidence of nursing students, and the stress was reduced so that the structured multimedia use education was an effective educational method for second year nursing students. The items discussed in this study are as follows.

First, the level of stress of the experimental group who participated in the core basic nursing education using structured video media was significantly reduced from 171.72 points before intervention to 31.30 points after post-intervention. The stress of nursing students is caused by both the psychological burden and responsibility of providing safe care for humans without mistakes in the clinical field after graduation [14]. Therefore, the ability to cope with the situation is improved through the improvement of self-efficacy, reducing stress and coping power. There is a need for training to increase the level [15]. In this study, since the experimental group who participated in the core fundamental nursing education had a decrease in the level of stress after education, it is necessary to continuously apply the education to meet the needs of students.

Second, the level of self-efficacy of the experimental group who participated in the core basic nursing education using structured video media increased 11.36 points from 49.97 points before the intervention to 61.33 points after the death, and there was a statistically significant difference in the level of self-efficacy than the control group. The results of this study are similar to those of the study that after applying medication-related skills training using structured video media to nursing students, students' knowledge is improved, which is influenced by the increase in self-efficacy, thereby reducing practical stress [1]. In addition, the result is similar to a study showing a great improvement in learning ability by improving self-efficacy after educational intervention using self-learning through video recording [8]. For nursing students who are about to practice, academic self-efficacy is a very important ability to achieve their learning achievement goals. It is a good teaching method to successfully achieve your learning goals.

Third, the level of performance confidence of the experimental group participating in the core fundamental nursing education using structured multimedia was 10.34 points, from 65.78 before intervention to 76.12 after the death, and the difference in score was 1.33 for the control group, so there was little difference between the two groups. There was a statistically significant difference in degree. Considering that there is an improvement in performance confidence in the trained experimental group, it is essential to strengthen core fundamental nursing skills in the future. In addition, if education using various multimedia or educational materials is actively conducted to improve students' performance confidence, it will be very helpful in nurturing the competence of nurses [16].

In this study, the experimental group who participated in the core fundamental nursing education using structured multimedia showed statistically significant differences in stress, self-efficacy and performance confidence. A nursing student's confidence in performing core fundamental nursing skills is also highly related to the ability to feel self-efficacy with the skill, and the higher the self-efficacy of the ability to perform basic nursing practice, a subject applied in the core basic nursing school, the higher the basic nursing practice score [4]. In order to improve the performance confidence of nursing students, it is necessary to establish an education system that receives feedback and corrects and supplements the insufficient part of the practice method. If such an education system is systematically established, it is believed that nursing professionals can play a key role in the health management of the people by taking good care of their role in our society.

This study was an intervention study in core fundamental nursing education using a structured multimedia, and it was confirmed that core fundamental nursing training and evaluation should be essential and sustained through various approaches to learning methods. In order to cultivate the knowledge, skills, and attitudes required of nursing professionals, the ability to cope with situations that fits the flow of the health care environment in the field of nursing education will be needed. In addition, it is important for all health care workers to know the importance of core basic nursing skills and to form a mutually cooperative relationship for proficient nursing professional performance. Thus, it will be possible to play a pivotal role in human health management by producing competent nurses who can provide not only skilled skills but also integrated nursing in the clinical field.

This study was conducted on two nursing college students, and was an attempt to confirm the effect of mental health using structured multimedia on the self-efficacy, stress and performance confidence of nursing students. As a result of the study, it was confirmed that education using structured multimedia improves the self-efficacy and performance confidence of nursing students, who are future nursing professionals, and reduces stress. From the results of this study, it can be seen that education using structured multimedia has a positive effect on working as a nurse with high performance confidence in skill skills in nursing students after employment, so it is essential education.

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