CONTINUING EDUCATION

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Development and Evaluation of Simulation-Problem–Based Learning for Sex Education

Miok Kim, PhD, Minho Shin, PhD

Nurses often encounter clients with sexual problems. A sexual problem is complicated and affects the quality of the client's life, and proper care requires the nurse to understand a variety of sex-related issues. Therefore, effective sex education for nursing students is necessary to prepare them for potential challenges from the client's sexual problems. In this study, we developed a simulation-problem–based sex education program for nursing students. The program immerses the students in a sex-related clinical situation to train them with nursing assessment, intervention skills, patient safety, patient privacy, and communication skills. To evaluate the effect of the program on the student's sexual knowledge and attitude, we provided the experimental group with simulation-problem–based sex education program along with traditional lectures, whereas the control group received only lectures. As a result, there were statistically significant differences in the improvement of knowledge ($P < .05$) and attitude ($P < .05$) of the two groups. The results show that the designed program effectively promotes nursing students' sexual knowledge and sexual attitude, and the simulation-problem–based learning is a practical and systematic approach to the sex education of nursing students.

KEY WORDS: Nursing students, Problem-based learning, Sex education, Simulation

Nurses should be able to sensitively respond to a patient's sexual health issues. In clinics, they take the role of manager, educator, and counselor regarding a patient's sexual problems in all medical fields. As such, they must be knowledgeable about sexual problems and also comfortable with sex-related communication. Therefore, it is necessary for the students to resolve sexual identity and to provide positive sex-related communication. They must be flexible and confident toward gender roles and sexual attitudes. Once they establish sexual identity and sound knowledge and attitudes regarding sex, they can provide sex counseling, with a correct understanding of sex-related clinical situations, and can conduct appropriate nursing interventions for patients.

Although most nurses recognize the importance of assessment and intervention for the patient's sexual health, they experience difficulties in integrating it with nursing practices.[1,2] Lack of knowledge and experience in sexual problems and sex-related counseling is one of the most important reasons why healthcare providers do not discuss sexual problems with their patients.[3,4] According to Kim and Nam,[3] only 43.2% had no discomfort during sex-related questioning. Considering that medical students felt comfortable answering patients' sex-related questions after participating in a workshop on patients' sexual problems,[4] differentiated training on sexual-healthcare must be available to healthcare providers.

In order to improve the way nurses provide sexual health interventions to patients, their knowledge and attitudes must be evaluated.[5] The nurses must assess their sex-related awareness and if necessary receive training in sensitivity toward sexual issues and in the goals of improving patients' sexual health. Sex education for nursing students must promote their sexual health as well as the patient's. In addition to lecture-based education, a practical and efficient method is necessary to help students in handling patients' sexual problems in actual clinical settings.

Problem-based learning (PBL) is a learning method in which students identify problems from given scenarios and acquire knowledge, techniques, and attitudes necessary for similar clinical situations.[6] This is an alternative to the lecture-based method, which has its limitations in flexibly coping with rapid changes in practical nursing and cultivating self-led learning and problem-solving abilities.[7] Furthermore, simulation-based learning (SBL) has the advantage for the educator to freely plan the learning through various clinical scenarios prepared for specific education goals. The SBL helps students identify their strengths and weaknesses and motivate them in learning as they build self-confidence in their clinical competency through simulated training.[8] Also, it has been reported[9] that the awareness of communication technique,[10] clinical decision making, and general health conditions[11,12]

Author Affiliations: Department of Nursing, Namseoul University, Chunahn, Choongnam (Dr Kim); and Department of Computer Engineering, Myongji University, Cheoingu, Yongin (Dr Shin), Republic of Korea.

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Corresponding author: Minho Shin, PhD, Department of Computer Engineering, Myongji University, 116 Myongji-ro, Cheoingu, Yongin 449-728, Republic of Korea (mhshin@mju.ac.kr).

contribute to enhancing the capabilities of health professionals. The simulation-problem–based learning (S-PBL), which is a combined model of the two learning methods discussed previously, is widely applied in many academic fields including the study of nursing.[13] It is hypothesized that this educational strategy would not only improve students' ability to deal with patients' sexual health, but also help develop correct sexual knowledge and attitudes through the simulation of clinical situations in which various sex-related problems can be assessed and managed with the process of analyzing, judging, and solving.

This study was intended to evaluate sexual health knowledge and provide sex education to nursing students using the S-PBL.[13] The educational effect of this method is evaluated.

METHODS

Research Design

This study is a pretest and posttest design for the effect of S-PBL for sex education using a standard patient.

Hypotheses

This study was intended to identify the effect of S-PBL–based sex education on sex-role perception, sexual knowledge, and sexual attitude for college nursing students.

The research hypotheses for this study are as follows:

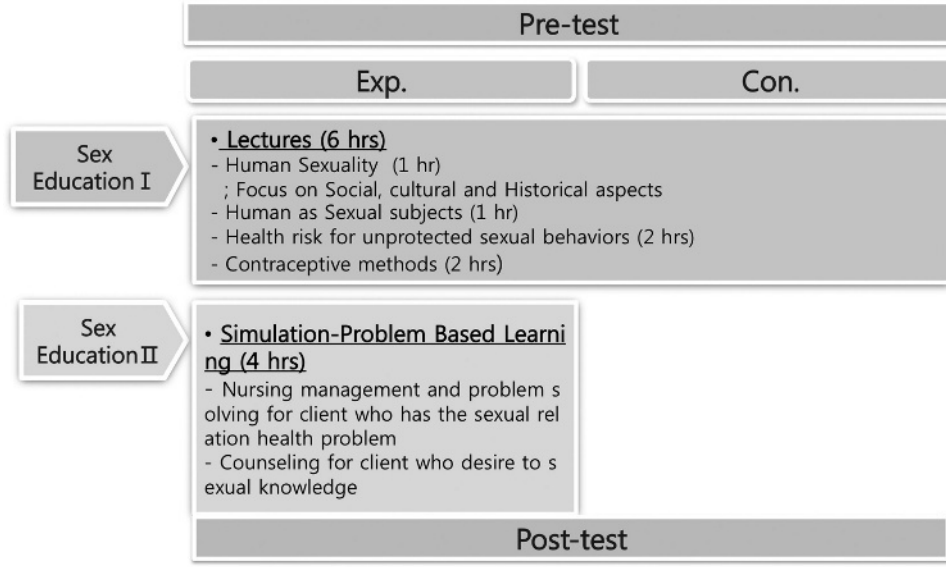
1. Students in the experimental group will show increased flexibility in gender role from pretest to posttest measurements than will the control group.
2. Students in the experimental group will show increased sexual knowledge from pretest to posttest measurements than will the control group.
3. Students in the experimental group will show an increased positive attitudes from pretest to posttest measurements than will the control group.

Participants

The sample consisted of 47 nursing students who met the following conditions: (1) they agreed with the purpose of the study and their participation, and (2) they had passed the class in women's health nursing.

The sample size needed for 2-tailed t test was calculated using the power analysis designed by Cohen.[14] We obtained 26 in each group as the proper sample size, for a significance level (α) of .05, a power ($1 - \beta$) of 0.80, and a large effect (d) of 0.8. A large effect was chosen by considering the prior work[8] that measured the effect of simulation-based training for obstetric nursing.

At the end of the program, to verify the validity of the sample size, we conducted power analysis by Cohen[14] with



· Exp.=Experimental group, Con.= Control group
· Pre-test: before program (Gender role perception, Sexual knowledge, and Sexual Attitude)
· Sex education I: Lectures (for all participants)
· Sex education II: Simulation-Problem Based Learning for Sex Education (for experimental group)
· Post-test: after program (Gender role perception, Sexual knowledge, and Sexual Attitude)

FIGURE 1. Design and contents of sex education program.

the results of the study and obtained effect sizes of 0.75 (gender role), 1.14 (sexual knowledge), and 1.11 (sexual attitude). When we performed post hoc test with a significance level of .05, we obtained actual power of 0.70 (gender role), 0.96 (sexual knowledge), and 0.96 (sexual attitude), which confirm that our sample size is valid, and the chosen large effect size of 0.8 was partially adequate.

Study Design

Senior nursing students were evenly divided at random into the experimental group and control group (January 7–9, 2015). The sex education program consisted of Session 1 (lecture) and Session 2 (S-PBL). Both the groups attended Session 1, which is a 6-hour lecture on human sexuality, humans as sexual subjects, health risks for unprotected sexual behaviors, and contraceptive methods. The experimental group additionally attended session 2, which is an S-PBL program. In this session, students formed groups of six to seven students. Each group performed a PBL for identifying the problem and solution for patients with ectopic pregnancy through group discussion. In addition, each student received an SBL on the nursing care of clients with spontaneous abortion and sexually transmitted disease (STD) so that the students had indirect experience of sexual problems caused by unplanned and unsafe sexual behavior (Figure 1).

Development of the Simulation-Problem-based Learning Program

We developed one PBL package and two simulation scenarios focusing on demonstrating important clinical events and nursing skills in obstetric and gynecological nursing. The PBL involves students into a group discussion on the problem identification and resolution for an ER patient with ectopic pregnancy. The two scenarios reflect two representative types of obstetrical nursing: nursing care for women with spontaneous abortion under unplanned pregnant (Scenario 1) and for women with STDs, especially pelvic inflammatory diseases (Scenario 2). Each scenario is designed to reveal the trainee's ability to assess the patient's health status and to identify medical problems and the trainee's clinical skills and attitudes for psychological and emotional nursing care. Evaluation items for each scenario are designed accordingly. Figures 2 and 3 describe the outline of the designed S-PBL program.

For each scenario, we constructed a module template, based on which the simulation program is conducted. A module template is composed of module outline, algorithm, checklist, and debriefing. Module outline consists of the training theme, program operation (number of trainees, time, and place), scenario outline and client information, prerequisite nursing skills and knowledge, possible nursing diagnosis, educational goals, and necessary equipment and tools. The algorithm comprises the content of the scenario, which describes the client's medical conditions, his/her behaviors and verbal reactions, and expected interventions to be performed by the trainee. Standard patients will ask questions such as "Can an STD cause infertility?" "How long does it take to get back to normal?" "What should I be careful about?" and "I am not sure what to do for safe sex," and nursing students should provide education and consultation to them. We used a hybrid method (Noelle 575 human simulator with standard patient; Gaumard Scientific, Miami, FL) to gain enough perception of nursing care for women with spontaneous abortion under unplanned pregnant (Scenario 1), and for women with STDs, especially pelvic inflammatory diseases (Scenario 2).

Checklist enlists the evaluation items to be used by the instructor to assess the trainee's nursing skills and attitudes based on Kim and Shin[8]; for example, whether the trainee inquires the client by open questions; whether the trainee

Kim is a 22-years-old female, visiting an ER with her boyfriend for moderate low abdominal pain. Her menstrual cycle was regular, 28 days, but she had no period for the last 8^{+3} weeks, and the last coital history was 3 days before. Currently she has scanty vaginal bleeding, and the urine test showed HCG positive. She has the history of Lt. oopoorectomy for Lt. Ovarian cyst, and she is concerned about possible pregnancy.

1. Discuss possible medical diagnosis on Kim. Why the usual menstrual cycle, last coital history, and past history is important?
2. Provide the full assessment for the problem identification for Kim, and list necessary lab test and explain why (What should the nurse additionally assess about the client?)
3. List nursing problems for Kim, and propose a resolution for each nursing problem.
4. What kind of psychological response is expected from Kim and her boyfriend? And what is your desirable attitude as a sexual healthcare provider?

FIGURE 2. The PBL package for S-PBL for sex education.

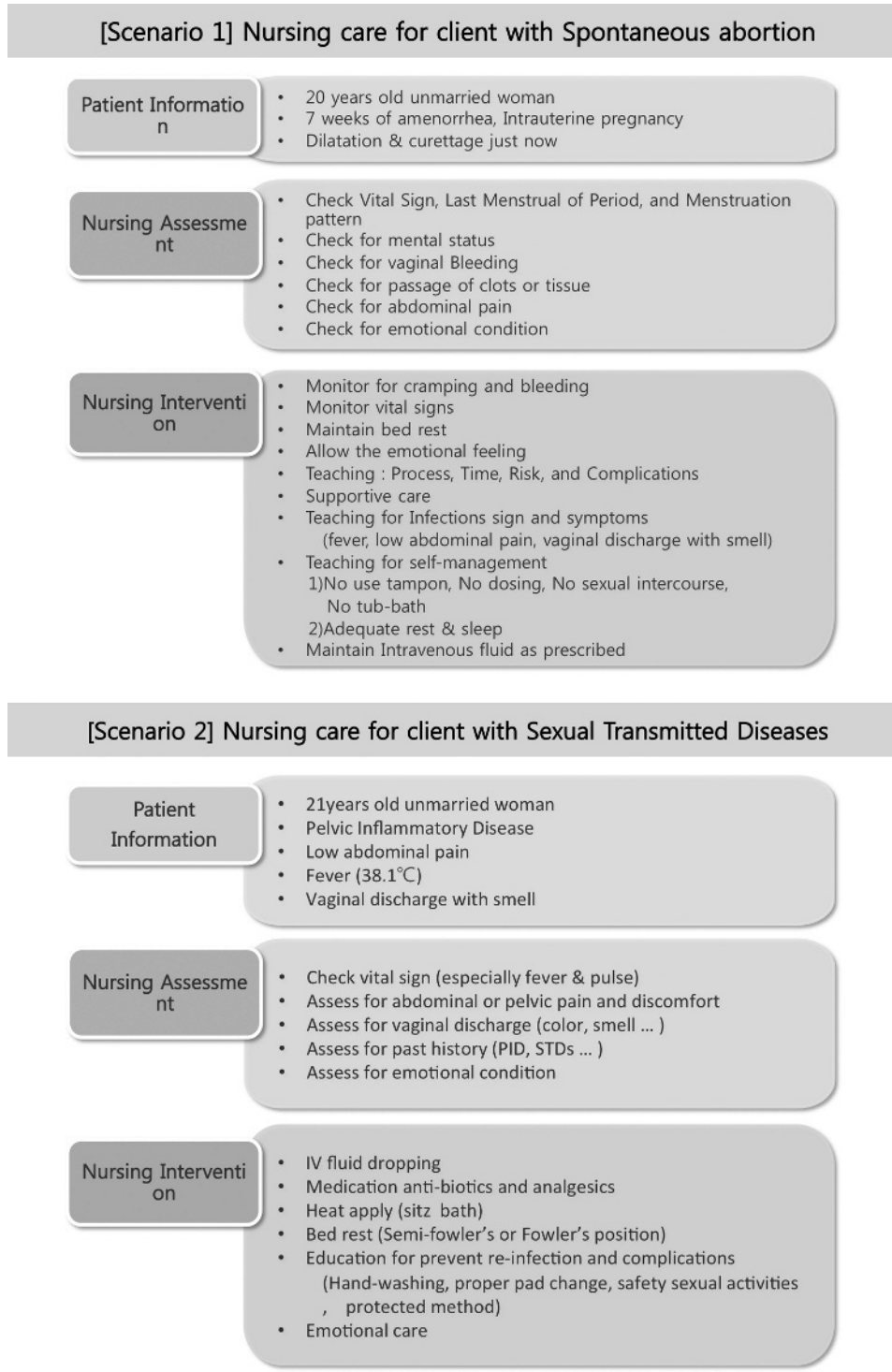


FIGURE 3. Outline of the simulation scenarios for S-PBL for sex education.

identifies the client's health status and performs appropriate care to address any identified problems; whether the trainee, with calm and patience, waits and encourages the client who is under emotional crisis; whether the trainee provides psychological and emotional care to relieve the client's anxiety; and whether the trainee respects the client's privacy while

making the client's bed and sorting clothes. In this study, there existed 12 evaluation items and four domains that consist of nursing assessment, nursing intervention, patient safety and privacy, and communication to be evaluated in each scenario. For each evaluation item, the instructor indicates whether the trainee performed the expected action and whether it was performed adequately (called *nonaction*, *partially adequately*, *fully adequately*).

Debriefing is a period during which trainees reflect about what happened during the simulation and what the implication of these incidents was. A debriefing consists of description, analysis, and application, as proposed by Fanning and Gaba.[15] In the description phase, students share their feelings for having indirect experience of sexual problems in the simulation and any discomfort in communicating with clients about sexual problems, and attempt to gain an overall perspective.

In the analysis phase, trainees analyze the correctness of performed actions via systematic verification and recognize and judge their actions by comparing with a real clinical setting. They also analyze strengths and weaknesses of their knowledge, skills, and attitude in resolving sexual problems and review the additional knowledge, skills, and attitude necessary for the prospective sexual health caregiver.

In the application phase, students reflect on elements that are meaningful and important to them among what they newly understood through the simulation, and discuss what kind of prejudices they had, what changed, and ethics needed for nursing students to handle clients' sexual problems. Students also exchanged ideas on the elements that should be added to the sex education program in the future. After debriefing, students viewed their performance videos for self-reflection.

The development of the S-PBL program was supervised by a nursing professor with expertise in simulations, and the scenarios were developed by revising and improving a preliminary module devised by a pilot study.

Application of the Simulation-Problem-based Learning Program

The S-PBL program helps students inspect perception and attitude toward sex and helps them to improve their skills, knowledge, and attitudes. During the program, students solved problems found in actual cases, based on the lectures given in Session 1 and other nursing theory classes.

The S-PBL program was carried out for a total of 2 days with two student cohorts. Each cohort consisted of 12 to 13 students and sessions lasted approximately 4 hours, led by two instructors; one instructor ran the simulation and evaluated the students, while the other instructor assisted. For consistency between the evaluators, the instructors had prediscussion time and reached an agreement on the evaluation process and the criteria.

The S-PBL program was composed of four sections: orientation, group discussion, simulation, and debriefing.

In the orientation, we explained the simulation procedure, scenarios, and simulation-based test procedure (15 minutes) and evaluated the students' knowledge about fundamental theories on sexual health (15 minutes).

In the group discussion, students formed groups of six or seven and conducted PBL discussions to address the patient's problem. Then they were trained for two simulation scenarios, practices, and counseling using a simulator or role playing. Two instructors facilitated the discussion and skill training. This section lasted 60 minutes.

In the simulation section, each student performed problem resolutions using hybrid methods. The student performed one scenario randomly chosen from the two scenarios provided in the group discussion section. Using the predefined checklist, the instructor evaluated the student's nursing skills for sexual health. Each student took 10 to 15 minutes for the test, and the section took about 90 minutes in total.

In the debriefing section, all the students gathered in one place and shared their experiences by presentations and discussions. Instructors provided the explanation of the simulation, analyzed the students' responses to the problems, and advised. The section lasted 60 minutes.

Outcome Measures

Gender-role perception was measured by the Sex-Role Orientation[16] and Sex-Role Ideology Scale,[17] translated and modified by Lee and Chung.[18] The gender-role perception scale consists of 15 items scored on a 5-point Likert scale ranging from 1 (*not at all*) to 5 (*very much*), with higher scores indicating conservative and fixed gender-role perception. Cronbach's α was .83 in a previous study[19] and .89 in this study. We measured sexual knowledge with the scale developed by Choi and Ha.[20] It consisted of 40 items in seven domains asking about the structure and function of the reproductive system, conception and contraception, artificial abortion, STDs, sexuality, and masturbation. It consists of a 2-point scale (1 for correct, 0 for incorrect or do not know), with higher scores indicating higher sexual knowledge. Cronbach's α was .74 in this study and .82 in the original study.[20] Sexual attitude was measured by the Sexual Attitude Scale by Bae.[21] The Sexual Attitude Scale contains 16 items scored on a 5-point Likert scale ranging from 1 (*very much*) to 5 (*not at all*), with higher scores indicating positive sexual attitude. Cronbach's α was .70 in a previous study[21] and .72 in this study.

Data Analysis

For analysis, students were divided into two groups based on assignment to the experimental and control groups. The homogeneity of the two groups was analyzed using χ^2 test

and analysis of variance. We performed *t* test for the differences between pretest and posttest in two groups. Data were analyzed using SPSS version 18.0, for Windows (IBM, Armonk, NY).

Ethical Considerations

The study was approved by the institutional review board of Namseoul University in Korea (approval no. NSU-141209-1). The primary author explained the study and participation procedures, as well as that the results of the study would not be publicized or used except for the research purpose, private information would not be revealed and participants would remain anonymous, and that they could refuse or drop out of the study at any time. After this information was provided, each participant's written consent was obtained. For purposes of ethical consideration, we also provided the control group with S-PBL session after the posttest.

Limitations

The limitation of this study is the convenience sampling from one nursing school, limiting generalization of this study to a broader population.

RESULTS

Participants' Characteristics

The experimental and control groups showed similar general characteristics. The two groups had no differences in sex, age, parents, sibling, present dating experience, last experience of sex education, source of sexual-related information, and experience of sexual behaviors ($P > .05$), and there was also no difference in gender-role perception, sexual knowledge, and sexual attitude before the program ($P > .05$). However, a difference was found in past dating experience ($P < .05$) (Table 1).

Table 1. Homogeneity of the Two Groups on General Characteristics (N = 47)

		Experimental Group (n = 25)		Control Group (n = 22)			
		n (%)	Mean (SD)	n (%)	Mean (SD)	χ^2/F	*P*
Sex	Male	8 (32.0)		5 (22.7)		0.803	.478
	Female	17 (68.0)		17 (77.3)			
Age, y			22.36 (1.97)		22.48 (2.59)	−0.141	.888
Dating experience (past)	Yes	11 (44.0)		16 (72.7)		3.951	.047
	No	14 (56.0)		6 (27.3)			
Dating experience (present)	Yes	11 (44.0)		8 (36.4)		0.283	.595
	No	14 (56.0)		14 (63.6)			
Parent	Yes	22 (88.0)		21 (95.5)		0.835	.361
	No	3 (12.0)		1 (4.5)			
Siblings	Yes	20 (80.0)		18 (81.8)		0.025	.874
	No	5 (20.0)		4 (18.2)			
Last experience of sex education	Elementary school	9 (36.0)		4 (18.2)		1.873	.599
	Middle school	7 (28.0)		8 (36.4)			
	High school	7 (28.0)		8 (36.4)			
	Over college	2 (8.0)		2 (9.1)			
Source of sexual related information	Family	Yes 10 (40.0)		14 (63.6)		2.616	.106
		No 15 (60.0)		8 (36.4)			
	Friends	Yes 25 (100.0)		21 (95.5)			
		No 0 (0.0)		1 (4.5)			
	Sex education	Yes 19 (76.0)		17 (77.3)			
		No 6 (24.0)		5 (22.7)			
	Mass media	Yes 24 (96.0)		22 (100.0)			
		No 1 (4.0)		0 (0.0)			
Level of experience of sexual behaviors			1.65 (0.42)		1.83 (0.38)	−1.536	.132

Table 2. Group Differences in Gender-Role Perception, Sexual Knowledge, and Sexual Attitude (n = 47)

		Experimental Group (n = 25)	Control Group (n = 22)		
		Mean (SD)	Mean (SD)	*t*	*P*
Gender Role Perception	Pretest	4.38 (0.50)	4.09 (0.64)	1.767	.084
	Posttest	4.64 (0.30)	4.37 (0.42)	2.528	.015
	Difference	0.25 (0.54)	0.28 (0.78)	−0.146	.884
Sexual knowledge	Pretest	0.83 (0.08)	0.83 (0.09)	0.035	.972
	Posttest	0.92 (0.06)	0.84 (0.08)	3.690	.001
	Difference	0.08 (0.08)	0.00 (0.13)	2.492	.016
Sexual attitude	Pretest	3.66 (0.26)	3.63 (0.28)	0.350	.728
	Posttest	3.79 (0.25)	3.54 (0.20)	3.606	.001
	Difference	0.12 (0.30)	−0.09 (0.34)	2.272	.028

The Effect of the Simulation-Problem-based Learning for Sex Education

Testing the three hypotheses, we found that the S-PBL for sex education was effective for two: in increasing sexual knowledge ($P < .05$) and improving sexual attitude ($P < .05$) for the experimental group compared with the control group. However, our first hypothesis, "the experimental group will show more flexibility in gender-role perception than will the control group," was not supported ($P = .884$) (Table 2).

DISCUSSION

The goal of this study was to provide education to inspect the sex-related awareness and attitude of each individual student and to enable future nurses to take on the role of educator and counselor for patients with sexual problems in clinical settings.

First, this study expected positive change in the student's gender-role perception by S-PBL. However, there was no significant difference in the degree of gender-role perception between the experimental group and the control group. This result shows that the testing method of this study was not enough to change the student's gender values. This is not surprising because gender-role perception is formed through social growth over time. Factors affecting gender-role perception are known to include cultural, political, historical, and socioeconomical values in each group of ethics.[22,23]

Simple understanding of sex-related topics is not sufficient. Bloom[24] reported that the quality of education can be guaranteed only when it contains six cognitive learning processes in which knowledge is applied, analyzed, summarized, and evaluated. Based on this, the experimental group in this research could perceive the importance of planned and responsible sexual behaviors by applying the knowledge learned from the lecture through the process of comprehending and solving the patient's sex-related problems. The program also provided an opportunity for the students to reflect on perception and attitudes toward sexual problems and to promote improvement in sex-related knowledge by responding to the patient's questions, encouraging self-management in the future, and providing education about contraceptive methods. The debriefing section completed the process by analyzing, summarizing, and evaluating their learning. The results showed significant difference between the experimental group and the control group in the degree of change in sex-related knowledge before and after the sessions, which shows that S-PBL for sex education was effective.

In this study, sexual attitudes of the experimental group changed positively after the S-PBL program. On the other hand, sexual attitudes of the control group changed negatively after the sex education, and thus, there was a statistically significant difference in the degree of sexual attitude between the experimental and control groups before and after the experiment. The negative change of sexual attitude in the control group is attributed to the limitations in lecture-based sex education. Therefore, there is a need for nonlecture sex education for effective sex education.

During the group discussion section, the students could integrate their knowledge, technique, and attitude regarding sexual problems of patients with ectopic pregnancy. The results showed that the students had a good opportunity to analyze health risks for unprotected sexual behaviors, which had been covered during the lecture, and to actualize the understanding of nursing management. Furthermore, the clinical experience of patients with sexual problems was realized by communicating with and educating the subjects during the SBL. During the debriefing, the students were able to freely share their opinions on the degree of discomfort in having sex-related communications with the patients and what they have felt from indirect experience of sexual problems. The students also discussed their individual strengths and weaknesses in nursing assessment and intervention, and patient education in solving sexual health problems, in

addition to knowledge, attitude, and skills that they must additionally acquire as future healthcare providers.

Students also discussed how their individual perceptions of sex were changed by the program and what components must be added in the future. In particular, the students emphasized that the realistic simulation made them better understand what can be caused by risky sexual behaviors than lecture-based education. They also reported that providing education to actual patients can better actualize knowledge about planned and safe sexual behavior. The students reported that the process of nursing patients during the simulation helped them understand the importance of sexual responsibility. They reported strong feelings that sex education is necessary.

There is a need for nursing students to develop flexible gender-role perception and positive sexual attitudes in order to behave with sensitivity toward the sexual problems of their patients. Also, positive attitudes displayed by the nurses is important because it not only changes the nurse's own behavior but also encourages behavioral change in patients, which enhances the nurses' role as health educators and change promoters in helping patients maintain a healthy life.[25] Despite the controversy on the effectiveness of sex education on the reduction of sexual activity and promotion of safe sex, sex education has had a positive impact on sexual behaviors such as delay of first sexual intercourse, decreased frequency of sexual intercourse, decreased number of sexual partners, usage of condoms and contraceptives, reduction of pregnancy rates or risks of STDs, and others.[26] Therefore, sex education that includes a wide range of information and scientific information must be conducted, and sex education for nursing students must not be limited to the transfer of knowledge but instead enable the students to develop clinical competency for use in the clinical setting. To promote such education, there is a need for continuous focus on efficient training methods and teaching strategies.

CONCLUSIONS

Correct sexual perceptions not only becomes a basis for a healthy lifestyle for nursing students but also is an important factor in developing professional nurses who are able to provide sexual healthcare for future patients. This study used S-PBL for sex education to improve the nursing students' gender-role perception, sex-related knowledge, and sexual attitude. The results showed that the program improved their sex-related knowledge and their attitude toward sex.

Because sex education must sensitively reflect social changes and be in accordance with the educational needs of the recipient, the contents and the efficiency of the method of application must be reviewed according to the needs of the subject. Because university is the time for the formation of positive sexual identities, there is a primary need for the nursing students, in particular, to have correct sex-related knowledge and attitude both for themselves and the sexual healthcare of their future patients. To this end, better educational outcomes can be expected from effective teaching methods that not only allow students to acquire information but also integrate nursing techniques and improve awareness and sensitivity. This ability to actively cope with clinical situations will facilitate improved patient outcomes.

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