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Effects of Blended Learning on Nursing Students' Clinical Competence, Clinical Judgment, and Skill Performance Ability

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Abstract: This study applied blending learning that combined online theoretical learning and offline practical education and examined its effects on the clinical competence, clinical judgment, and skill performance ability of nursing students in dealing with patients having complex nursing issues. A one-group pre- and post-test quasi-experimental research design was used. The participants comprised 87 fourth-year nursing students enrolled in a simulation practice course: 22 men and 75 women. Data were analyzed using SAS 9.2. The general characteristics, clinical competence, clinical judgment, and skill performance ability were analyzed using real numbers, percentages, mean, and standard deviation. The differences in scores for clinical competence, clinical judgment, and skill performance ability before and after the blended learning course were analyzed by conducting t-test. The integrated course was conducted for eight weeks for fourth-year nursing students, with the e-learning module delivered over five weeks and offline practical education conducted for three weeks. Clinical competence (t=4.63, p=<0.0001) appeared improvement after the blended learning course, with the difference being statistically significant. Clinical judgment and skill performance ability also improved after the blended learning course, with the differences being statistically significant (t=17.99, p=<0.0001; t=11.03, p=<0.0001). According to the results of this study, a blended learning approach that combines online and offline education is deemed an appropriate teaching-learning mode in improving the clinical competence, clinical judgment and skill performance ability of nursing students.

Keywords: Blended Learning, Clinical Competence, Clinical Judgment, Skill Performance Ability

1. Introduction

1.1 Necessity

Modern scientific and technological development and advancements in information and communications technology have allowed the conduct of various education programs through the e-learning mode using computers and the internet, with blended learning being a commonly used educational strategy. Blended learning is a teaching-learning method that combines traditional offline in-person education and online digital education[1].

Currently, the teaching approach that is predominantly used in modern universities is traditional lecture-style classes. However, this teaching approach has limitations when it comes to education that is intended to change attitudes, promote creative thinking, and encourage identity formation and behavioral change[2].

University requires collaborative learning and competency-based education that fosters learners'

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problem-solving ability and competencies to perform tasks and roles proficiently in academics, occupation, and life fields[3]. Various teaching-learning methods have been used to meet this educational need.

Blended learning is well-known as a structural strategy that maximizes the effectiveness of education by combining the advantages of online learning (i.e., overcoming the limitations of physical space and time) and offline education appropriately[2].

Nursing education requires both clinical practice and classroom lectures given the nature of the curriculum. Thus, students would find it difficult to achieve their learning objectives with one-time, in-person learning during regular class hours. In addition, it would also be difficult to effectively achieve learning objectives with respect to nursing care for patients with complex acute issues, which would be challenging for undergraduate students to handle.

However, the experience of providing nursing care to patients with acute, complex issues through comprehensive awareness of the disease based on theoretical knowledge and translation of this knowledge into clinical practice resulted in positive learning outcomes[4].

Considering the recent changes in the hospital environment where many patients have acute and complex nursing issues, it is necessary to introduce a learning method that can provide theoretical knowledge prior to practical education and enable the application of this theoretical knowledge in clinical practice[5].

In light of these developments, studies have been conducted recently to examine the effectiveness of a blended learning approach that utilizes the advantages of online and offline learning.

Hsu and Hsieh[6] reported that collaborative learning of online contents in a blended learning environment improved learners' metacognition and self-directed learning, thus increasing academic achievements in a nursing ethics course.

Students of a women's health nursing course who underwent blended learning demonstrated significantly higher academic achievements and higher self-directed learning ability than those who underwent in-person education[7]. Nursing students' metacognition improved when they underwent blended learning[6][8]. Choi et al.[5] reported that the clinical skills of third-year nursing students improved after implementation of a hybrid education model that combined online contents collaborative learning, offline clinical lab, and clinical practice. Studies on applying blended learning in clinical education rather than just theoretical courses and examining its impact on clinical nursing competence remain insufficient.

Therefore, this study applied a blended learning program that combined online content learning and offline practical education with respect to nursing care of patients with complex nursing issues to examine its impact on the clinical competence, clinical judgment, and skill performance ability of nursing students. Through this study, the researchers aim to provide the basic data necessary for developing an effective teaching-learning mode for clinical education on urgent and complex nursing issues.

1.2 Purpose

The purpose of this study was to implement blended learning that combined online theoretical learning and offline practical education with respect to nursing care of patients with complex nursing issues and to analyze its effects on nursing students' clinical competence, clinical judgment, and skill performance ability. In addition, the study aimed to evaluate the possibility of extended application of blended learning as a teaching-learning mode.

1.3 Hypotheses

Hypothesis 1: Nursing students' clinical competence improves after undergoing online-offline blended learning.

Hypothesis 2: Nursing students' clinical judgment improves after undergoing online-offline blended learning.

Hypothesis 3: Nursing students' skill performance ability improves after undergoing online-offline blended learning.

2. Theoretical Background

Nursing education aims to nurture and produce professional nurses with excellent clinical competence based on scientific nursing knowledge[9].

Nursing students must acquire various clinical skills, including the ability to identify nursing problems and interventions, through theoretical and clinical education to enhance their clinical competence[10].

In recent times, there has been a rise in demand for professional and competent nurses capable of handling a myriad of diseases and complex nursing situations. Therefore, structured problem solving and clinical judgment skills are further emphasized when interacting with patients. Clinical practice involves a series of nursing activities including problem identification, interpretation, intervention, and evaluation, all of which require accurate clinical judgment; thus, students must be able to provide quality nursing care based on rapid and accurate judgment of clinical presentations and manifestations in patients[11].

Critical thinking refers to the cognitive process used to analyze self-knowledge, and clinical judgment is defined as the cognition and metacognition process used to analyze knowledge in a unique patient situation in a clinical setting. Clinical judgment manifests cognitive, psychomotor, and affective processes through performance and behavior[12].

Despite the availability of clinically sufficient evidence and data, undergraduate nursing students tend to make inappropriate clinical judgments and ineffective communication about a patient's status as their reasoning and application skills are still not fully developed[13]. This clinical issue can directly threaten patient safety[14]. Consequently, there is a need to provide education for the development of clinical judgment required in nursing practice during the undergraduate nursing program.

Considering the recent changes in the hospital environment where a major proportion of patients have acute and complex nursing issues, it is necessary to introduce a learning method that can provide theoretical knowledge prior to practical education and enable the application of this knowledge in clinical practice[5].

Therefore, this study aimed to implement blended learning that combined the advantages of online and offline education and examine its effects on nursing students' clinical competence, clinical judgment, and skill performance ability. The researchers aim to provide the basic data necessary to develop an effective teaching-learning mode that is imperative in clinical education with respect to nursing care for patients with acute and complex nursing issues.

3. Methods

3.1 Design

This quasi-experimental study used a one group pretest-posttest design to analyze how nursing

students' clinical competence, clinical judgment, and skill performance ability were influenced by a blended learning approach that combined online theoretical learning and offline clinical education concerning nursing care of patients with complex nursing issues. The present study was performed with a single group because online-offline blended learning was provided to the students enrolled in an integrated practice course; therefore, it was not possible to create a separate control group.

3.2 Participants

The study participants included fourth-year nursing students who had registered for the integrated practice course. A total of 87 students who voluntarily consented to participate in the study were selected. The sample size was chosen using G*power 3.1 based on the assumptions of a significance level (α) for two-tailed testing of .05, a power (1-β) of .8, and an effect size (d) of .61.

3.3 Ethical Considerations

The purpose and methodology of the research and the confidentiality and anonymity of participation were explained to the participants. Researchers provided sufficient verbal explanation that participation in the survey and the research results would not influence the grades of the students and that there would be no penalty if participants refused to participate or withdrew from the study, which they could do at any time. A written informed consent was obtained from all participants after they were verbally assured that participation in the survey.

3.4 Study Tools

3.4.1 Clinical Competence

This study utilized Choi's version[15] of Clinical Competence Scale based on Schwirian's[16]. This tool comprised 45 items and included five practice items, and items regarding nursing processes, nursing skills, education and cooperative relationships, interpersonal relationships and communication, and professional development. Each item was rated on a five-point Likert scale, with total scores ranging from 45 to 225. Higher scores showed higher clinical competence. In this study, the Cronbach's α was .9199.

3.4.2 Clinical Judgment

To evaluate clinical judgment in blended learning, this study utilized an amended and improved clinical judgment tool that was originally developed by Laster[17] and modified by Shim[18]. This tool covers four areas and includes 11 items. Each item is rated on a four-point scale with the total points ranging from 11 to 44. Higher points showed higher clinical judgment. In this study, the Cronbach's alpha for the reliability of the tool was α = .7118.

3.4.3 Skill Performance Ability

In this study, transfusion therapy care in the simulation scenario was evaluated based on the evaluation protocol for essential nursing fundamentals developed by the Korean Accreditation Board of Nursing Education[19]. The total score ranges from 0 to 100, with higher scores indicating higher skill performance ability.

3.5 Online-Offline Blended Learning

The integrated simulation practice course was an eight-week course for fourth-year students

encompassing five weeks of online learning and three weeks of offline lectures. There was a total of 30 hours of class time, with four hours of class conducted every week except the last week when it was two hours only. Nursing case studies consisted of situations where patients reported complex issues in a simple situation with pain and dyspnea as the main presenting symptoms. The case scenario was selected based on the participants' level of theoretical education. Online lectures consisted of orientation, theoretical knowledge about nursing cases, communication, group discussions for clinical reasoning and submission of the nursing process for each case study, and videos on nursing skills. Offline lectures were conducted in the practice room after online classes and consisted of skill practice, simulation practice, reflective report, and evaluation for each nursing case [Table 1].

[Table 1] Online-Offline Blended Learning

Type	Week	Contents
Online learning	1	Orientation and pre-test
	2 ~ 5	Case-study: case analysis, clinical judgment, team discussion, nursing process Nursing skill practice: skill video, skill checklist
Offline learning	6 ~ 7	Laboratory introduction Skill practice Nursing simulation practice Reflective learning
	8	Evaluation and Post-test

3.6 Data Collection

This study was performed during March–June 2020, and participants comprised 87 fourth-year students. This study objectives were explained to the participants; they were informed that their responses would be anonymous and that they could withdraw at any time. A written informed consent was obtained from all participants. Surveys were administered before and after they underwent the online-offline blended learning course. The blended learning combined online theoretical learning and offline practical education was an eight-week course for fourth-year students encompassing five weeks of online learning and three weeks of offline lectures.

3.7 Data Analysis

All data were analyzed using SAS 9.2. The general characteristics, clinical competence, clinical judgment, and skill performance ability were analyzed using real numbers, percentages, mean, and standard deviation. The differences in scores for clinical competence, clinical judgment, and skill performance ability before and after the blended learning course were analyzed by conducting t-test.

4. Results

4.1 Characteristics of Participants

The general characteristics are reported in [Table 2]. 41 of the 87 participants were aged 21 or below (47.13%). There were 75 females (86.20%) and 22 males (13.80%). Most students indicated that their personality was positive (67.82%, 59 people). Fifty-eight students (66.67%) responded that they effectively adapt to changes in the situation or environment, whereas 4 (4.60%) said they are not adaptive. A total of 49 students (56.32%) rated their satisfaction with university life as moderate, and

38 (43.68%) said they were "satisfied." The survey found that 53 students (60.92%) were satisfied with nursing as their major, and 46 students (52.87%) were satisfied with clinical practice.

[Table 2] General Characteristics

Categories		N(%)
Age(years)	≤21	41(47.13)
	22	29(33.33)
	≥23	17(19.55)
Gender	Female	75(86.20)
	Male	22(13.80)
Personality	Positive	59(67.82)
	Middle	27(31.03)
	Negative	1(1.15)
Adaptation to the situation and environmental changes	Very well	58(66.67)
	Moderate	25(28.74)
	Not	4(4.60)
Satisfaction with college life	Satisfaction	38(43.68)
	Moderate	49(56.32)
	Not	-
Satisfaction with nursing major	Satisfaction	53(60.92)
	Moderate	34(39.08)
	Not	-
Satisfaction with clinical practice	Satisfaction	46(52.87)
	Moderate	40(45.98)
	Not	1(1.15)

4.2 Differences in Clinical Competence, Clinical Judgment, and Skill Performance Ability Scores

A paired sample t-test was used to examine the differences in the scores for clinical competence, clinical judgment, and skill performance ability before and after the blended learning course [Table 3]. Sub-categories of clinical competence, including nursing process (t=2.48, p=.0151), nursing skill (t=2.97, p=.0039), education/cooperative relationship (t=2.93, p=.0044), interpersonal relationship/communication (t=4.33, p=<.0001), and professional development (t=4.15, p=<.0001), had statistically significant differences. The score for total clinical competence increased from 3.75 (before learning) to 3.90 (after learning), with the difference being statistically significant (t=4.63, p=<.0001). The scores for clinical competence and its subcategories were higher after blended learning than before. Therefore, hypothesis 1 that nursing students' clinical competence improves after undergoing online-offline blended learning was supported.

The score for clinical judgment improved from 2.54 (before blended learning) to 3.10 (after blended learning) with the difference being statistically significant (t=17.99, p=<.0001). Therefore, hypothesis

2 that nursing students' clinical judgment improves after undergoing blended learning was supported.

The score for skill performance ability increased from 72.56 (before blended learning) to 87.01 (after blended learning) with the difference being statistically significant (t=11.03, p=<.0001). Therefore, hypothesis 3 that nursing students' skill performance ability improves after undergoing blended learning was supported.

[Table 3] Differences in clinical competence, clinical judgment, and skill performance ability scores

Variables		Pre-test M±SD	Post-test M±SD	t	p
Clinical Performance	Nursing Process	3.69±0.43	3.79±0.50	2.48	.0151
	Nursing Skills	3.81±0.50	3.95±0.52	2.97	.0039
	Education/Cooperative Relationships	3.81±0.47	3.92±0.49	2.93	.0044
	Interpersonal Relationships/Communication	3.73±0.50	3.97±0.56	4.33	<.0001
	Professional Development	3.73±0.50	3.92±0.53	4.15	<.0001
	Total	3.75±0.43	3.90±0.46	4.63	<.0001
Clinical Judgment		2.54±0.20	3.10±0.27	17.99	<.0001
Skill Performance Ability		72.56±10.16	87.01±10.24	11.03	<.0001

5. Discussion

The participants' pre-test clinical performance score was 3.75 in this study, compared to 3.29 points in Cho & Chae's study of second- and third-year nursing students[20] and 3.25 points in Lee & Gu's study of second-year nursing students[21]. In addition, participants scored 3.71 points in Lee & Park's study in which third-year nursing students accounted for more than 60%[22] and 3.70 points in Lee et al.'s study of fourth-year students[23]. These findings are similar to the students' clinical competence scores before blended learning in this study. It is presumed that nursing students in higher years of education had accumulated experience through lectures and clinical practice and achieved higher scores for clinical competence.

This study targeted fourth-year nursing students who are expected to graduate. The students' clinical competence improved to 3.90 points after the online-offline blended learning course, and this increase was higher than the results from Lee et al.'s study[23]. The students achieved improvement in all areas of clinical competence including nursing process, nursing skill, education/cooperative relationship, interpersonal relationship/communication, and professional development after undergoing the blended learning program.

Choi et al.'s study[5] reported that a six-week blended learning course of online collaborative learning, lab education, and clinical practice improved practice performance ability, which was consistent with findings in this study. Kim's study[7] found that the experimental group that received blended learning combining online and face-to-face education had a statistically significant improvement in self-directed learning ability than the control group that received face-to-face learning only. The participants showed improvements in all three subcategories of self-directed learning ability,

namely learning plan, learning performance, and learning evaluation.

Park & Choi's study[24] also reported that the experimental group that received blended learning had significant improvement in academic performance on blood transfusion skills than the control group that underwent face-to-face self-practice. Therefore, this finding also appears to support the results of this study.

The results of this study are expected to be the outcome of blended learning that combined online education on nursing case studies, which promoted collaboration and communication between team members, and offline labs, which promoted direct nursing performance and reflection through simulations. In addition, the students were able to repeatedly watch videos on nursing knowledge or nursing skills at any time during online learning and this factor is considered to have led to more positive learning effects than traditional face-to-face learning. It is concluded that the learners achieved greater academic performance in all areas of clinical competency after the online-offline blended learning program because they actively integrated their own nursing knowledge and skills to resolve a patient's problems in any situation.

The study participants' clinical judgment score significantly increased from 2.54 points before blended learning to 3.10 points afterward. A direct comparison is difficult due to insufficient research on the effectiveness of blended learning on clinical judgment in nursing. However, in Cho's study[8], nursing students' metacognition improved significantly after a blended learning method was implemented in foundational nursing clinical education.

Metacognition in education refers to a student's ability to recognize their cognitive knowledge level and control and manage knowledge activities[20]. Studies have found that a higher level of metacognition and learning flow resulted in better problem-solving skills[25]. Gagnon et al.'s study[26] comparing online and face-to-face education reported that online education had greater impact on stimulating learning motivation in students with the desire to acquire knowledge. Han's study[27] found that the intrinsic motivation of nursing students was positively correlated with e-learning strategies and learning satisfaction in a blended e-learning environment.

In this study, the learning motivation of nursing students was influenced more by the online module than the offline classes, which led to active participation and smooth communication among team members. This finding suggests that nursing students improved their clinical judgment by recognizing their cognitive level, controlling their knowledge activities, analyzing problems based on the patient's situation, and finding solutions.

Implementing blended learning significantly enhances nursing students' ethical values. Nursing students' clinical judgment improved after the implementation of a blended learning program incorporating various learning methods[28]. The participants in this study were able to make positive decisions about nursing activities and prioritize tasks by sufficiently discussing a patient's nursing problems through online learning before direct interaction with the patient offline.

Lee's study[29] found that the experimental group that received online-offline blended learning had a significantly higher level of self-efficacy and knowledge about blood pressure measurement than the control group that received face-to-face learning.

McCutcheon et al.'s study[30] conducted a systemic review on the effectiveness of clinical skills learning in an undergraduate nursing program. The study reported that online or blended learning can be as effective as classic face-to-face learning but research examining the effectiveness of blended learning is insufficient. In this study, the students' skill performance ability significantly improved after blended learning. Therefore, this study is meaningful in that it verified the effectiveness of blended learning on skills learning, which has traditionally been delivered through classic face-to-face learning.

In this study, the five weeks of online group discussion on nursing patient cases promoted learners' participation more effectively than the offline discussions. It is believed that the students were able to

self-assess cognitive ability through active participation and control knowledge activities. It is difficult for nursing students to directly experience patients who have complex nursing issues during clinical placements. After five weeks of online learning, students had three weeks of offline learning. During the offline learning sessions, students had the opportunity to directly experience the clinical situation through simulation and reflect upon it. Thus, blended learning combining online and offline approaches appeared to improve the nursing students' clinical competence, clinical judgment, and skill performance ability.

The study results show that online-offline blended learning can be an appropriate teaching method to improve nursing students' clinical competence and clinical judgment. In addition, this study confirmed the effectiveness of blended learning on skills learning, which has traditionally been delivered through classic face-to-face learning, as evidenced by the improvement in the nursing students' skill performance ability. This was a single group study with students from an anonymous university. Therefore, generalization of the study results should be done with caution. Further studies that compare the various learning effects of an online-offline blended learning model and the learning effects according to the offline and online learning duration are necessary and recommended.

6. Conclusion

The researchers hope to provide the basic data necessary to develop an effective teaching-learning method that is imperative in clinical education with respect to nursing care for patients with acute and complex nursing issues. The research design used was a one-group pre- and post-test quasi-experimental research. The participants comprised 87 fourth-year nursing students enrolled in a simulation course: 22 men and 75 women. Data were analyzed using SAS 9.2. The integrated course was conducted for eight weeks for fourth-year nursing students, with the e-learning module delivered over five weeks and offline practical education conducted for three weeks. Clinical competence ($t=4.63$, $p=<0.0001$) showed improvement after the blended learning course, with the difference being statistically significant. Clinical judgment and skill performance ability also improved after the blended learning course, with the differences being statistically significant ($t=17.99$, $p=<0.0001$; $t=11.03$, $p=<0.0001$).

Blended learning combining online and offline approaches appeared an appropriate teaching-learning method to improve nursing students' clinical competence, clinical judgment, and skills performance ability. This was a single group study with students from an anonymous university, then generalization of the study results should be done with caution. Further studies that compare the learning effects according to the offline and online learning duration are necessary and recommended.

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