

# IMPLEMENTATION OF THE BLENDED LEARNING METHOD TO ENHANCE CLINICAL REASONING AMONG NURSING STUDENTS

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## ABSTRACT

Clinical reasoning has an important role in nursing care. Therefore, an appropriate learning model is needed to produce great clinical reasoning among nursing students. The blended learning method is a flexible and technology-based learning model that has the potential to improve nursing students' clinical psychomotor skills and overall performance. This study aims to determine the effect of the blended learning method on the clinical reasoning ability of nursing students. This was a quasi-experimental study that used a pretest-posttest design and a control group. The number of samples was 35 respondents in each group. The samples were recruited using a simple random sampling method. The intervention was conducted for 14 weeks in the intervention group. Clinical reasoning was measured using the Clinical Reasoning Assessment Tools (CRAT). Data were then analyzed using the Mann-Whitney test. There were differences in the clinical reasoning ability between the experimental group ( $p < 0.001$ ) and the control group ( $p = 0.128$ ). A positive effect was found between the blended learning method and clinical reasoning ability among nursing students. Thus, a flexible learning process can provide repetition and continuity of the learning process and improve the students' critical thinking processes.

Keywords: Blended learning; clinical reasoning; nursing student



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## INTRODUCTION

Nursing care consists of actions that provide a sense of security, comfort, and effective care in overcoming nursing problems (Huang, Huang, Lee-Hsieh, & Cheng, 2018). Therefore, nurses would also need to have clinical reasoning skills to overcome comprehensive nursing problems and provide professional nursing care (Andersson, Klang, & Petersson, 2012). Clinical reasoning skills are needed for nurses to understand and identify the patient's condition, establish the patient's nursing diagnosis, and determine the appropriate nursing interventions to implement (Forsberg, Ziegert, Hult, & Fors, 2014). Great clinical reasoning is important as it will affect the comfort and prognosis during patient care (Shellenbarger & Robb, 2015).

Clinical reasoning is the main factor in the accuracy of establishing a nursing diagnosis (Paans, Sermeus, Nieweg, Krijnen, & van der Schans, 2012). According to a previous study in Indonesia, the accuracy in establishing nursing diagnosis among nurses was moderate (64%) (Trisno,

Nursalam, & Triharini, 2020). Diagnostic errors may be caused by a lack of clinical reasoning (World Health Organization, 2016). Moreover, poor clinical reasoning could lead to difficulty in understanding the patient's situation and adverse events (Jessee, 2018). The inability of students to identify and prioritize patient nursing problems, determine nursing interventions, and make clinical decisions would cause them to fail to provide nursing care (Mohammadi-Shahboulaghi, Khankeh, & HosseinZadeh, 2021). Therefore, clinical reasoning is vital for equipping nursing students with the skills needed to solve complex patient nursing problems (Hong, Lee, Jang, & Lee, 2021).

Nursing education plays a significant role in improving the students' quality and ability to understand the patient's clinical condition (Jamshidi, Molazem, Sharif, Torabizadeh, & Kalyani, 2016). Ideally, a nurse candidate who is still a beginner should be able to provide professional care (Fukada, 2018). However, a study in Indonesia found that 48% of the nursing students involved in the study had

competent clinical reasoning skills and 34% were in the advanced beginner category (Arisudhana, Anggayani, Kadiwanu, & Cahyanti, 2019). Therefore, improving the clinical reasoning ability among nursing students is essential (Forsberg et al., 2014).

The ability to conduct clinical reasoning should be shaped by the nursing education process. Clinical reasoning is an intellectual process used to understand a patient's health problem, which consists of analyzing the situation, formulating initial assumptions, gathering and processing information, making judgments, and reviewing decisions. This model is known as the cognitive approach. Cognitive models tend to improve clinical reasoning abilities. The clinical reasoning process also links classroom knowledge to clinical practice (Sadhuwong, Koraneekij, & Natakatoong, 2016).

Various learning methods have been applied in the nursing learning process. However, practical skill performance with peer learning models has not been able to improve the students' clinical reasoning effectively (Wighus & Bjørk, 2018). A recent study found that traditional learning methods resulted in inadequate knowledge and low clinical reasoning scores among nursing students (Sinclair-Bennett, 2019). In addition, traditional learning methods also lack the flexibility of instructor-generated concepts and no option of learning the lecture repeatedly (Odhaib, 2018). Thus, the combination of learning methods along with the integration of technology in the blended learning method in nursing education required further study.

Blended learning is a method that combines conventional learning with online learning methods by utilizing various multimedia platforms, such as videos (Wright, 2017, Vojtesek & Hutak, 2019). Educational videos could help students to improve their psychomotor clinical skills (Forbes et al., 2016). A previous study found that the video-based learning method may improve nursing students' performance, self-confidence, and satisfaction compared with traditional methods (Forbes et al., 2016; Holland et al., 2013). Previous quasi-experiment research of the blended learning model integrated situated multimedia lessons with the cognitive apprenticeship method and found that this enhanced the clinical reasoning skills of nursing students (Sadhuwong et al., 2016).

With the era of the Industrial Revolution 4.0 and its emphasis on technology, nursing higher education must be able to adapt by investigating the effectiveness of blended learning models on the clinical reasoning abilities of nursing students. Thus, this study aims to determine the effectiveness of the blended learning model on changes in the clinical reasoning abilities of nursing students.

## METHOD

### Study Design

This was a quasi-experimental study with a pretest-posttest and control group design. The subjects in each group were matched (on a particular variable) (Fraenkel, Wallen, & Hyun, 2011).

### Study Sample

The population in this study were nursing students at STIKES Bina Usada Bali. This study used a simple random sampling technique. The inclusion criteria were students who completed the medical surgical nursing course level 1, had a minimum grade point average (GPA) of 3, and were second-grade nursing students. While students who refused to be a respondent were excluded. The number of samples in this

study was 35 for each group. The samples were assigned randomly using a simple random sampling method to the experimental and control groups.

### Instruments

The data were collected in this study by using a demographic data questionnaire and a Clinical Reasoning Assessment Tool (CRAT). The demographic data questionnaire consists of gender and GPA. The CRAT was developed by Arisudhana & Puspawati in 2018 and consists of twenty-five cases (vignettes) with the highest composition consisting of diagnoses and data supporting the diagnosis. The assessment score was 0-3, where a score of 0 would mean the student had a dispersed knowledge structure, a score of 1 meant an elaborated causal network, a score of 2 is defined as an encapsulation knowledge structure, and a score of 3 would mean an illness script knowledge structure (Arisudhana & Puspawati, 2019). The maximum score on the instrument tabulation is 75, and the lowest score is 25. The validity and reliability test was conducted on the CRAT instrument. The validity test results showed that the CRAT instrument had good and stable validity with an accuracy value of 72%. The CRAT was also stable in the reliability test, with a Cronbach alpha value of 0.821 (Arisudhana et al., 2019).

### Intervention

The blended learning method used in this study was an enriched virtual learning method. In this model, educational content was delivered through online meetings. Face-to-face offline meetings were only held when needed and were regarded as a supplement to the online meeting (Siyamta, 2015). The experimental group received a blended learning intervention with an enriched virtual method for 14 lectures that were held once a week (100 minutes of theory and 170 minutes of practice). The blended learning method used in this study was a modification of the procedure proposed by Stein and Graham (Stein & Graham, 2014). The intervention group received the following blended learning intervention steps:

- Interactive lecture.* The respondents would have access to their 100-minute-long lecture material that they can repeat at any time. The video lectures provided various features of interaction to complement the content delivered through auditory and visual media.
- Examples and practice activities.* The respondents obtained practice material through an illness script-based video with a duration of 50 minutes that they can repeat at any time.
- Demonstration.* The respondents did a practicum project by compiling a 60-minute nursing care analysis video. The students performed vignette analyses, determined nursing interventions, and practiced their skills by using phantom displays.
- Self-assessment and self-reflection.* This session was conducted in the laboratory with 60-minute sharing sessions. In this session, the students compared their performance against the set standards. By conducting some self-reflection, the student could make in-depth judgments about the learning process, their motivations, beliefs, plans, and outcomes.

Meanwhile, the control group received a face-to-face conventional learning method with interactive problem-based learning (100 minutes) and laboratory practice (170 minutes).

### Data Collection

Before the data collection began, the enumerators were provided information about the research objectives, the principle of anonymity, and volunteered to participate in this

study. The prospective respondents in this study signed an informed consent form without including their identities (anonymity). All respondents obtained a coding number on the questionnaire sheet and provided their informed consent. The data collection in both groups was conducted using a paper-based method and was done separately at different times. This was done to prevent the respondents from the intervention and control groups to exchange any information about this study. The pre-test and post-test were conducted in January 2020 and September 2020, respectively.

The respondents in both groups received the same treatment by prioritizing the principle of justice. Both groups filled out a questionnaire with respondent data, such as age, GPA, and the CRAT questionnaire with 25 statements. After filling out the pretest questionnaire, the experimental group received a BL learning model intervention, and the control group followed a traditional learning session for 14 weeks. The posttest was conducted offline on the 15th week, with the same procedure as the pretest.

**Data Analysis**

Both univariate and bivariate analyses were done by using the SPSS 20 program. The univariate test was performed to determine the respondent's characteristic data such as gender and GPA. A Mann-Whitney test was used to examine the effect of the blended learning method on the clinical reasoning ability of nursing students.

**Ethical Consideration**

The research protocol was reviewed through the health research ethics committee of STIKES Bina Usada Bali and was declared ethically worthy based on the ethical approval number: 362/EA/KEPK-BUB-2020.

**RESULTS**

The research was conducted by providing intervention in the form of a hybrid or blended learning model to the nursing students. The learning model applied was in line with the Bali local government policy on face-to-face restrictions in the campus area. The face-to-face learning process in this study

was conducted with a proportion of 20% of the entire face-to-face process. The learning activities on campus were carried out by following the health protocols set by the government during the COVID-19 pandemic. The following section will present the findings of this research.

Table 1 showed that the number of female students dominated in each group (88.5% in the control group and 86% in the experimental group). Meanwhile, the mean of GPA in the control group and experimental group were 3.55 and 3.66, respectively.

**Table 1. Respondent characteristics (n = 70)**

Variable	Control group		Experimental group	
	f (%)	Mean ± SD	f (%)	Mean ± SD
<b>Gender</b>				
Male	4 (11.5)		5 (14)	
Female	31 (88.5)		30 (86)	
GPA		3.55 ± 0.18		3.66 ± 0.24

Table 2 showed the Shapiro-Wilk test results for the normality test. The p-value of pre-test and post test score between intervention and control groups were <0.05. Thus, the data were declared as not normally distributed. This indicates the need to use nonparametric tests in statistical tests in this study.

**Table 2. Variable normality test (n = 70)**

Variable	Shapiro-Wilk		
	Group	df	p-value
Pre-intervention	Experiment	35	0.002
	Control	35	0.005
Post-intervention	Experiment	35	0.040
	Control	35	0.031

According to Table 3, there was no significant difference in the pretest scores between the experimental and control groups (p >0.05). However, there was a significant difference in posttest scores between the experimental group and control group (p <0.05).

**Table 3. The difference between the levels of clinical reasoning of nursing students on medical-surgical nursing problems (n = 70)**

Clinical reasoning	Group	n	Median	Min-Max	p-value
Pre-intervention	Experiment	35	40	35-51	0.264
	Control	35	40	35-47	
Post-intervention	Experiment	35	54	47-63	0.000
	Control	35	42	35-46	

As shown in Table 4, the p-value in the experimental group was said to be significant with a p-value of <0.001 (p <0.05). Meanwhile, the p-value in the control group is 0.069 (p >0.05), which means that the intervention is not significantly significant. The results of the comparison test between the pre-post differences between the groups resulted in a p-value of 0.000. This suggests that blended learning affects the level of clinical reasoning of nursing students in the medical-surgical nursing course.

**Table 4. The effect of blended learning on clinical reasoning among nursing students (n = 70)**

Group	Z	p-value
<b>Experiment</b>		
Pre-intervention	-5.092	0.000
Post-intervention		

**Table 4. The effect of blended learning on clinical reasoning among nursing students (n = 70) (continue)**

Group	Z	p-value
<b>Control</b>		
Pre-intervention	-1.523	0.128
Post-intervention		

**DISCUSSION**

There was a very significant increase in clinical reasoning ability in the experimental group compared to the control group. This suggests that the blended learning (BL) model could successfully assist students to interpret information and conduct case analyses, thereby increasing their critical thinking skills. Previous research has also found that the application of the BL model has a positive impact on students' problem-solving and decision-making skills (Makhdoom,

Khoshhal, Algaidi, Heissam, & Zolaly, 2013). Moreover, the results of this study are in line with the research findings of Tsai & Tang (2017) who found that BL positively affects students' problem-solving skills.

To solve nursing problems, students will need to go through the clinical reasoning process, which includes analyzing the patient's situation through a comprehensive cognitive process (formal and informal thinking strategies) and evaluating the patient's health information to consider an alternative therapy (Barratt, 2018; Simmons, 2010). According to several previous studies' findings, BL can improve students' clinical reasoning skills by helping students to transition faster from memorizing simple knowledge to being able to provide a more comprehensive level of analysis (Gouifrane et al., 2020). This method also allows students to develop their logical thinking and hone their reasoning skills (Giraldo-Garcia, Roy, & Alotebi, 2015). Improving the students' clinical reasoning skills has also made it easier for students to understand the clinical condition of patients (Choi & Kim, 2018).

Additionally, BL significantly improves nursing students' skills in the diagnosis process (Bösner, Pickert, & Stibane, 2015). Another study found that the BL model was effective in helping health students explore the patient's medical history, physical examination, medical and nursing knowledge, and patient education models. Therefore, it can enrich the students' cognition of the clinical reasoning process (Raharjo & Suparmi, 2021).

As students can combine online and offline literacy methods, BL is more flexible and efficient than conventional learning methods. The students also used video-based visualization to enhance their knowledge and skills needed in clinical practice. According to Hunter & Arthur's (2016) research findings, the virtual case learning system motivated and stimulated students to improve their clinical reasoning. A study in Indonesia found that during the COVID-19 pandemic, most of the teaching materials were provided through visual delivery methods (24%), text (21%), and audiovisuals (20%) (Haryanti et al., 2022). An efficiency study that compared the BL method with conventional methods in nursing education also proved that 68% of students preferred the BL model and that it contributed to the increase in the students' scores (Shang & Liu, 2018). BL can be implemented by watching videos, conducting quizzes, and reading articles (Kang & Seomun, 2018). Moreover, the BL method is the best alternative for improving nursing students' learning outcomes (Rowe, Frantz, & Bozalek, 2012).

Clinical reasoning in nursing students is a dynamic process (Yazdani & Abardeh, 2018) that is influenced by psychological, social, cultural, and contextual factors (Sedgwick, Grigg, Dersch, Hall, & Lethbridge, 2014). Technology can be one of the factors that can influence clinical reasoning and BL is flexible in its application (Lewin, Singh, Bateman, & Glover, 2009). Technology has been so helpful in the advancement of education. However, cognitive development does not always correlate with technological development. Each technology has its advantages and disadvantages. Therefore, educators and students need to be able to create a conducive learning atmosphere with the BL model.

This research investigated how technology as a learning medium can help students to create a more effective and efficient learning atmosphere. Through the ease of accessing information online, students can access lecture materials

anywhere and anytime. The limitation of this study was that students may ignore the material given through the video and plagiarism may occur in the analysis of the self-reflection section.

## CONCLUSION AND RECOMMENDATION

The study found there was an effect of using the blended learning method on the clinical reasoning ability of nursing students. This research recommends future studies to investigate other BL models to explore student learning strategies, reading materials, or other processes that can impact different learning outcomes. Moreover, the development of clinical reasoning measuring instruments based on Carper's known pattern of nursing is needed.

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