



Effectiveness of knowledge and skills after online simulation interventions and blended learning are given

Reghula Maryeti Sandra^{1*}, Ahsan², Laily Yuliatun²

¹ Nursing Master's Program, Nursing Department, Faculty of Health Sciences, Brawijaya University, Malang, Indonesia

² Nursing Master's Study Program, Nursing Department, Faculty of Health Sciences, Brawijaya University, Malang, Indonesia

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*) corresponding author

Reghula Maryeti Sandra, S.Kep.,Ners

Nursing of Master's Program, Nursing
Department, Faculty of Health Sciences,
Brawijaya University, Malang, Indonesia

Email: reghulasandra@student.ub.ac.id
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ABSTRACT

In the 4.0 industrial revolution era, clinical learning has been developed through online learning and blended learning. There needs to be an analysis of the effectiveness of this learning method on nursing students. This study aimed To determine the effectiveness of online and blended method training in improving knowledge and skills of Cardiopulmonary Resuscitation (CPR) in nursing students. The study design of this study is quasi experimental, where the groups are non-randomized into group A and group B and selected randomly. The educational intervention included a theoretical session on CPR and demonstration plus hands-on practice. Nurses' knowledge was measured using a self-administered questionnaire pre- and post-intervention, and a checklist form for assessing skills. Data were analyzed using repeated measure analysis univariate, bivariate and multivariate analysis. The results showed that the knowledge score in group A was 1.35 ± 0.93 which was higher than the increase in the knowledge score in group B of 1.15 ± 0.93 . And skills in group A of 3.70 ± 2.67 are lower than the increase in the skill score of group B of 5.00 ± 1.89 . Obtained a p-value greater than 5% ($0.228 > 0.050$) indicating that simultaneously there was an insignificant difference between the 2. It can be concluded that both methods are equally effective in increasing the variable scores.

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INTRODUCTION

The high rate of cardiac arrest cases, nursing students require special education and skills. There needs to be special training, such as on Cardiopulmonary Resuscitation (CPR). Training is an education obtained to increase the knowledge and skills in carrying out tasks and functions that can increase the performance of workers in hospitals. In treating patients with emergency conditions, both medical and non-medical workers in the front line of hospitals must adapt to the Standard Operating Procedures (SOP). Apart from that, every medical service provider must have the capability to carry out Cardiopulmonary Resuscitation (CPR)(Sulistyorini,

2020). The role of nurses in undergoing CPR for cardiac arrest patients up to the arrival of the medical team in the location of the event becomes the key to the success of the patient's survival(Tíscar-González et al., 2020).

Thus, it is crucial to develop the readiness of nursing students to undergo BLS as they have the obligation to master it(Dwi et al., 2020). Nursing students participate in administering BLS that is required by patients through clinical learning that will then be applied to patients(Ramadhan, 2021). Then, in the 4.0 industrial revolution era, clinical learning has been developed through online learning and blended learning. There needs to be an analysis of the effectiveness of this learning method on

nursing students. If the online learning and blended learning system is effective, students will be able to better apply the knowledge.

Learning effectiveness is an assessment that concerns the degree of success of a learning process. It can also be measured by seeing the students' motivation for the learning activities (Hidayah et al., 2021). The ineffectiveness of learning methods is an issue that must be faced in the education sector. The ineffectiveness of learning methods is caused by the difficulties of students in understanding the knowledge delivered, their difficulties in applying the knowledge, the lack of motivation in learning, or the lack of interest in the learning process (Utami, 2019). These learning ineffectiveness cause students to fail in applying the knowledge delivered by the educators. Their mental health may also be disturbed due to stress as they cannot understand the learning process well. Apart from that, students also experience retardedness in obtaining knowledge (Kusnayat et al., 2020).

Then, previous research on the effectiveness of online learning was conducted by Monica & Fitriawati (2021). The results of the research showed that online learning that used the Zoom application was already effective. Many features in Zoom made learning more interesting. Apart from that, the students can experience the understanding and acceptance delivered by the lecturers. Next, study Astuti & Jannah (2022) stated that BHD training during a pandemic through virtual can indeed be an alternative to reduce contact with many people, but in terms of weakness, the skills of participants have not been measured properly because the props used do not use panthom CPR. This is in line with the research presented by Nugroho (2021) who also conducted BHD training through zoom media which stated that this method had a positive impact on participants' knowledge and minimized meetings with many people, but had shortcomings in assessing participants' skills. It should be noted that implementing online practice is still very difficult.

The research that will be conducted using online learning and blended learning methods for CPR training for adults is at Brawijaya University (UB), students are expected to have emergency competence through technology, especially in managing CPR for adults 1 helper as a provision for nursing students in handling accident patients wherever they are.

OBJECTIVE

The aim of this study was to determine the effectiveness of online learning and blended learning methods in increasing knowledge and skills of Cardiopulmonary Resuscitation (CPR) in nursing students.

METHODS

Design

The study design of this study is a quasi experimental two group pre- and post-test design was used, where the groups are into group A and group B, and selected randomly.

Sample

In this study, there were 2 different groups, so that for the calculation of the sample there were 20 respondents per group. So that the total respondents for the 2 groups are 40 respondents with 20 respondents each doing CPR with

online learning training and 20 respondents for doing CPR with blended learning training.

Study instrument

The instruments in this study were a questionnaire which was used to measure knowledge and an observation sheet in the form of a checklist which was used as a measure of the respondents' skills in performing CPR on adults with 1 helper. The question indicators in the questionnaire are: the definition of Basic Life Support, indications of Basic Life Support, the purpose of Basic Life Support, Cardiopulmonary Resuscitation (CPR) actions and implementation of Cardiopulmonary Resuscitation (CPR). To measure the skills of the respondents, researchers used an observation sheet. The components of observation used were the accuracy of identifying victims, the accuracy of performing cycles 1 and 2 of Cardiopulmonary Resuscitation (CPR), the accuracy of how to use the AED, and the accuracy of continuing compressions.

The questionnaire about the knowledge test about basic life support was tested for validity using a computer using a product moment person with r table = 0.308 and was declared valid. Then the results of the reliability test on the question of the level of knowledge of basic life support obtained Cronbach's alpha value of 0.902, which means the questionnaire is feasible to use.

Data collection instruments and techniques

The researcher determined a team/trained instructor to assist the training process with online learning and blended learning methods in performing Cardiopulmonary Resuscitation (CPR) for adults with 1 helper, namely an instructor who already has a MasterClass Basic Life Support (BLS) certificate. After that, the researcher submitted an application for an ethics permit at the Faculty of Health Sciences, Universitas Brawijaya, after being declared to have passed the ethical test and a certificate of ethics was issued, the researcher submitted an application for a research permit to the Faculty of Health Sciences directed to the research site and coordinated with the research site. Researchers contacted students with A grades one by one using whatsapp, when researchers contacted students, researchers asked students if they were willing to be respondents,

Students who are selected as respondents will be included in the whatsapp group, then the researcher will share the rundown of the implementation and explain the aims and objectives of the research activities. The sample uses random sampling technique. Where for the division of research groups using a randomly drawn system using rolled paper. So there are 20 respondents for group A (Online Learning) and 20 respondents for group B (Blended Learning). The researcher gave a pre-test questionnaire related to knowledge of Cardiopulmonary Resuscitation (CPR) and attendance which was made to be filled out by the respondent. Then for the pre-test of skills, an assessment is directly carried out by the instructor.

Data Analysis

Data were analyzed using SPSS IBM version 25. Nursing students' demographic characteristics, knowledge and skill scores were analyzed using descriptive statistics (percentage and mean [SD] as appropriate). Before analyzing the data, the researcher conducted a normality and homogeneity test of

the data. The data is declared normal if the p-value > 0.05 with the Shapiro Wilk test with 40 respondents. The results of the homogeneity test of the data were declared homogeneous if the p-value was > 0.05. Pretest and posttest data on the dependent variable: the increase in knowledge and skills on an interval scale (numerical scale of two pairs of groups) was tested using a paired t test with a Confidence Interval of 95%. The homogeneity test of the data used by the researcher is Levene's test. This test is a requirement before performing other tests, for example t test and multivariate Anova. This test is used to ensure that the data group does come from the same sample. The results of the normality test of the knowledge variable data showed that the p value>0.05 and the skill variable p>0.05 so that all the dependent variable data were normally distributed.

RESULTS

Background characteristics of the nurses

As shown in Table 1, in group A 10% of respondents are 20 years old, 75% are 21 years old, and 15% are 22 years old, while in group B 15% of respondents are 20 years old, 60% are 21 years old, and 25% are aged 22 years. The gender of the respondents in group A was 100% female, while in group B the respondents were 5% male and 95% female. all respondents get sources of information about BLS through teachers in group A and group B each 100%.

Differences in Knowledge of Cardiopulmonary Resuscitation (CPR) Before and After Group A (Online Learning) and Group B (Blended Learning).

As show in table 2 From the results of the analysis of the paired sample t test, the average value of knowledge in group A before the online learning treatment was 11.70 (SD

= 1.261) and after the online learning treatment was 13.00 (SD = 1.414) with a difference -1.30, the difference in value indicates that there is an increase in knowledge of the respondents after receiving online learning training. While the p value shows 0.000 (p value <0.05), so it can be concluded that there is a significant difference between knowledge in performing CPR on nursing students in group A (Online Learning) before and after being given online learning training. in group B the blended learning treatment was 11.95 (SD=1.234) and after the blended learning treatment 13.15 (SD=1.322) with a difference of -1.20, The difference in values indicates that there is an increase in knowledge of the respondents after receiving online learning training. While the p value shows 0.000 (p value <0.05), so it can be concluded that there is a significant difference between knowledge in performing CPR on nursing students in group A before and after being given online learning training.

Table 1. Characteristics of the nursing student (N= 40)

	Group A (n 20)	Group B (n 20)
Age in groups		
20 years old	10%	15%
21 years old	75%	60%
22 years old	15%	25%
Gender ^b		
Male	0%	5%
female	100%	95%
Resources		
Teacher	100%	100%
Health workers	0%	0%
Newspapers	0%	0%
Magazine	0%	0%
TV	0%	0%
Radio	0%	0%
Internet	0%	0%

Table 2. Test of Knowledge Differences in Performing CPR in Groups A and B Before and After Training

	Mean (SD)	N	P Value	95% CI of the Difference
Pretest Knowledge Group A (Online Learning)	11.70 (1,261)	20	0.000	-1.30 ((-1.705) - (-.895))
Posttest Knowledge Group A (Online Learning)	13.00 (1,414)			
Pretest Knowledge Group B (Blended Learning)	11.95 (1.234)	20	0.000	-1.20 ((-1.645) - (-.755))
Posttest Knowledge Group B (Blended Learning)	13.15 (1.322)			

Differences in Cardiopulmonary Resuscitation (CPR) Skills Before and After Group A (Online Learning) and Group B (Blended Learning)

The results of the analysis of the paired sample t test obtained that the average skill score in group A before the online learning treatment was 7.25 (SD = 1.970) and after the online learning treatment was 10.90 (SD = 2.553) with a difference of -3.65, the difference This value indicates that there is an increase in the skills of the respondents after receiving online learning training. While the p value shows 0.000 (p value <0.05), so it can be concluded that there is a significant difference between skills in performing CPR on nursing students in group A (Online Learning) before and after being given online learning training. In group B before the blended learning treatment was 7.60 (SD = 1.875) and after the blended learning treatment was 12.60 (SD = 1.667) with a difference of -5.00, The difference in values indicates that there is an increase in the skills of the respondents after

receiving online learning training. While the p value shows 0.000 (p value <0.05), so it can be concluded that there is a significant difference between skills in performing CPR on nursing students in group B (Blended Learning).

Comparison of Group A (Online Learning) and Group B (Blended Learning) on Increased Cardiopulmonary Resuscitation (CPR) Knowledge and Skills

As show in table 4 descriptively, it can be seen that the increase in the knowledge score in group A (Online Learning) is 1.35±0.93 which is higher than the increase in the knowledge score in group B (Blended Learning) by 1.15±0.93. And skills in group A (Online Learning) of 3.70±2.67 are lower than the increase in the skill score of group B (Blended Learning) of 5.00±1.89.

Table 3. Different Skills Test in Performing CPR in Groups A and B Before and After Training

	<i>Mean (SD)</i>	<i>N</i>	<i>P Value</i>	<i>95% CI of the Difference</i>
Pretest Skill Group A (Online Learning)	7.25 (1970)	20	0.000	-3.65 ((-4.932)-(-2.368))
Posttest Skill Group A (Online Learning)	10.90 (2,553)			
Pretest Skill Group B (Blended Learning)	7.60 (1,875)	20	0.000	-5.00 ((-5.885)-(-4.115))
Posttest Skill Group B (Blended Learning)	12.60 (1,667)			

Table 4 Multivariate ANOVA. Test Results

Variable	Group	mean	Std. Deviation
Knowledge	A (Online)	1,350	0,933
	B (Blended)	1,150	0,933
Skills	A (Online)	3,700	2,697
	B (Blended)	5,000	1,892

Table 5 Multivariate ANOVA. Test Results

Effect		F	P-Value
Group	Pillai's Trace	1,539	0,228
	Wilks' Lambda	1,539	0,228
	Hotelling's Trace	1,539	0,228
	Roy's Largest Root	1,539	0,228

Table 5 is a multivariate test to compare between group A (Online Learning) and group B (Blended Learning) on the variables studied simultaneously. From the table, it is found that a p-value greater than 5% ($0.228 > 0.050$) indicates that there is an insignificant difference simultaneously between 2 groups on increasing the number of knowledge and skills. Then continued the comparison test between groups on each variable with the results in table 6 as follows.

Table 6. Intergroup comparison test

Variable	F	P-Value
Knowledge	0.459	0.502
Skills	3.114	0.086

In the test of increasing knowledge, it shows that there is an insignificant average difference between groups with a p-value greater than 5% ($0.502 > 0.050$), in table 5.16 it can be seen that the average increase in knowledge of group A (Online Learning) is slightly higher. from increasing knowledge of group B (Blended Learning). In the skill improvement test, it shows that there is an insignificant average difference between groups with a p-value greater than 5% ($0.086 > 0.050$), in table 5.16 it can be seen that the average skill improvement in group B (Blended Learning) is slightly higher. from improving the skills of group A (Online Learning).

DISCUSSION

Factors that can affect the level of knowledge of respondents include age, education, experience, environment and sources of information obtained. The results of this study indicate that there is an increase in knowledge in group A and group B after being given training with online and blended methods with p value = 0.000. Research result Purwaamijaya et al (2021), stated that the online learning method does make learning easier, however,

the effectiveness of the online learning method is strongly influenced by the various challenges that must be faced so that students can continue to study well in difficult situations like this. This online learning method is expected to facilitate learning so that the material presented can be easily understood through improving the quality of online learning platforms and increasing the capacity and discipline of lecturers as their commitment as teaching staff.

The results of this study are also reinforced by Satyarini & Setyaningsih (2022) who said there was an effect of the effectiveness of online learning on student learning participation in online learning on students, indicating that student learning participation is not only influenced by the teaching and learning process itself but is also influenced by environmental factors in which students participate in online learning, the availability of data quotas, and internet stability. network, the character of the lecturer felt by the students. The results of this study provide feedback for lecturers to be more communicative with students both formally and informally as well as develop the positive character of lecturers by providing equal motivation, opportunities, and opportunities. trust in students when interacting and communicating (Satyarini & Setyaningsih, 2022).

The results of this study are also in line with Moon & Hyun (2019) who stated that they investigated the effects of a CPR mixed learning program, and confirmed that by integrating video in the form of CPR instruction, it was effective in increasing CPR knowledge. (Moon & Hyun, 2019). Changes in respondents' knowledge in the form of increasing data obtained before and after CPR training with the blended learning method. In this study, group B underwent CPR training through blended learning. They had a slightly lower CPR knowledge score than group A with the online learning treatment. Although the score obtained is slightly lower, blended learning is still quite effective in increasing knowledge about CPR. The results of this study are also reinforced by Castillo et al (2018) which evaluates the effectiveness of blended learning in BLS by assessing several individual aspects, including the results of increased knowledge as a result (Castillo et al., 2018).

Factors that can affect the level of knowledge of respondents include age, education, experience, social, environment and sources of information obtained. The age of the respondents in group A in this study was 21 years, 15 people (75.0%), group B, in this study, the most dominant being 21 years old, with 12 people (60.0%). As explained in the theory that a person's age greatly affects a person's grasping power and mindset, the more mature the age will also develop the capture power and mindset, so that the knowledge gained is getting better (Ramadhanti et al., 2019). In this study, respondents in group A and group B are regular 7th semester students of the Faculty of Health, Universitas Brawijaya so that in terms of education factors also affect the increase in knowledge. (Retnaningsih, 2016) Knowledge is very closely related to education where it is hoped that someone with higher education will have wider knowledge. In addition to education, respondents also get experience in

an emergency nursing lesson obtained in semester 5, where as explained in the theory, knowledge can be obtained from personal experience or the experience of others.(Yuliana, 2017).

The environment also affects the knowledge of respondents as explained in the theory that the environment affects the process of entering knowledge into individuals who are in that environment (Budiman and Riyanto, 2013 in(Retnaningsih, 2016)). Where in one class of respondents consists of 106 students who of course exchange ideas with each other to gain knowledge. According to Yuliana (2017) Information obtained from both formal and non-formal education can provide short-term knowledge (immediatee impact), resulting in changes and increased knowledge. Advances in technology provide a variety of mass media that can affect people's knowledge of new information. Communication facilities such as television, radio, newspapers, magazines, counseling, and others have a major influence on the formation of people's opinions and beliefs. The source of information obtained in group A in this study was the most dominant in obtaining information through teachers and health workers as many as 10 respondents.

The results of this study indicate that there is an increase in skills in group A and group B after being given training with online and blended methods with p value = 0.000. Research resultNapp et al (2020)shows that preparing BLS instructors with online training is more effective than face-to-face training in class(Napp et al., 2020). The success of the CPR procedure is supported by complete and good training facilities through online training because the advantages are more practical, and professionals feel more flexible to use. Online training is an effective method for teaching and learning skills where BLS students are able to apply BLS procedures accurately during CPR simulations(Lactona & Suryanto, 2021). Research resultBirkun et al (2019)which evaluates the effectiveness of blended learning in BLS training by assessing several aspects, one of which is an increase in skill scores(Birkun et al., 2019). In the training process, respondents received material through blended learning, namely theoretical material through online media (zoom) with lecture methods, questions and answers, watching videos and practical material by conducting live simulations. The use of the direct simulation method is considered capable of having a positive impact on improving skills(Jamil & Merisdawati, 2022).

Factors that can affect the skill level of respondents include motivation, experience and expertise. Respondents have the motivation to be able to do CPR by agreeing as respondents to take part in the study, hopefully they are able to do better CPR. The respondents learned about CPR skills during semester 5 and is an experience for all respondents in understanding the practice of skills about CPR. In these skills, respondents certainly increase their expertise in performing CPR, the expertise gained by respondents through training that was applied during the research, as explained byNingtyas, (2018)that expertise is the ability (ability) from within the individual and affects the internal attribution.

Factors that affect the effectiveness of respondents' knowledge and skills include goals, students, situations and instructors. The results of this study indicate that both online learning and blended learning methods are equally effective in increasing the scores of the knowledge and skills variables, but the difference is not significant because the average increase in the skills scores of the online and blended groups is not too much different. Research resultLapitan et al (2021)explain the effectiveness of online and blended learning because after they get learning using

videos or learning through zoom media, students can repeatedly watch videos at any time to understand the learning(Lapitan et al., 2021). But of course there are differences in the results of each method. Study by Lim, Morris, and Kupritz (2007) inKeskin & Yurdugül (2020), which compares blended and online, learning methods in terms of learning outcomes, it was found that there was no significant difference between the groups meaning that the two methods were equally effective in improving students' knowledge and skills.(Keskin & Yurdugül, 2020).

The purpose of the research is optimal, this research is to see the effectiveness of a training with 2 types of learning methods. Respondents in this study were all students with emergency nursing courses who had an A grade, and the condition of the respondents at the time of the study was healthy and well. However, when the research took place, most of the respondents did not activate the camera, so that the researcher could not monitor whether the respondents were following the research with discipline. A conducive situation will increase high concentration power, in group A (Online Learning) the training situation is not well planned, where respondents take part in training while outside the home or in transportation. The instructors in this study were very professional and had a BLS MasterClass certificate.

CONCLUSION

The results show that there is no significant difference in the increase in the skill and knowledge variable scores between the online group and the Blended group. It can be concluded that both methods are equally effective in increasing the score of the variable, the skill variable is slightly higher in the Blended group, but slightly higher for the online group for knowledge.

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ETHICAL CONSIDERATIONS

The content and methods of this study were approved by the Health Research Ethics Committee Faculty of Health Sciences Universitas Brawijaya (Protocol Number: 20F171210058). The study procedures and purpose were explained, and nurses' participation was entirely voluntary. Informed written consent was obtained. All personal information obtained from the nurses was kept confidential, and data security was ensured.

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