Virtual Reality Effectivity To Increase Self-Efficacy In Suction Skill Among Nursing Student: Quasi Experiment Study

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Abstract

Virtual reality is a technology-based learning media designed to increase student self-efficacy in performing nursing skills, one of which is suctioning. However, virtual reality has yet to be tested for its effectiveness. This study aims to determine virtual reality learning media's effectiveness in increasing student self-efficacy in performing suction nursing actions. This study used a quasi-experiment method with a one-group pre-test post-test design approach. The population in this study were 191 active students of the Faculty of Nursing, Universitas Padjadjaran. The sampling technique used was purposive sampling and obtained a sample of 68 people by the inclusion and exclusion criteria. The instrument used was a self-efficacy questionnaire developed from Bandura's theory and consisted of 35 statement items. Selected respondents filled out the pre-test and were then given an intervention by performing suction nursing actions using virtual reality after completing the post-test. Data were analyzed using the non-parametric Wilcoxon signed rank test because the data were not normally distributed. After being given the intervention, there was an increase in student self-efficacy in performing suction nursing actions, as evidenced by an increase in the median in the post-test results (113.5) compared to the pre-test results (102). The test results on the Wilcoxon signed rank test showed that the p-value showed a significant difference in self-efficacy after using virtual reality learning media ($p = 0.00$). Virtual reality learning media can increase student self-efficacy in performing suction nursing actions.

Keywords: Laboratory skills; self-efficacy; suction; virtual reality.

Introduction

Nurses as one of the health workers have three domains of competence, namely cognitive (knowledge), affective and psychomotor (skills) (Sihombing, 2020). Nursing is one of the professions where in determining actions must have skills and be based on science (Ahmad, Anwar, & Suleman, 2020). The skills possessed by each nurse can always be trained and developed so that the nurse can become an expert or professional in their field. These skills can be developed through a continuous learning and training process since the education period (Meilina & Bernarto, 2021) by using learning media that can support nursing students' clinical skills. Along with the development of new learning media, the health education system began to include interactive and technology-based learning media such as learning videos, 3D simulators, and virtual reality (VR) (Zhao, Xu, Jiang, & Ding, 2020).

Virtual reality is a technology-based learning media that has the potential to improve nursing students' skills. Virtual reality is a technology that makes it possible to explore a real artificial 3-dimensional world generated by a computer in real time. In learning, virtual reality provides experience by providing simulated scenes for students (Zhao et al., 2020). In 2021, Yu et al. conducted research and found that learning using virtual reality in Korea was proven to be able to expand the practical experience of nursing students and increase self-efficacy and learning satisfaction (Yu, Yang, Ku, & Mann, 2021). Simulation with virtual reality will provide active learning opportunities for students by imitating nursing actions that help students gain clinical experience efficiently to develop skills (Franklin, Sideras, Dodd, & Hutson, 2020).

In the learning process, nursing students learn various kinds of material, one of which is primary assessment which consists of assessing airway, breathing, circulation, disability, and exposure (Nuranita, 2019). The nursing problem related to airway is airway obstruction, which is a disorder that occurs due to the accumulation of excess secretions so that it can block the airway. One of the actions commonly taken to overcome this problem is suction (Widiyanto & Hudijono, 2013). Suction is a method of suctioning secretions or fluids or foreign objects carried out by inserting a suction catheter tube through the nose, mouth, or ETT tube (Husada, 2015). To be able to perform suction nursing actions well, contributing factors include knowledge, attitudes and self-efficacy.

In performing suction nursing actions, self-efficacy is an evaluation of students regarding their ability or competence to perform a task and overcome obstacles. Self-efficacy is an individual's belief in their ability to organize and achieve certain results and goals (Nurkholis, Miarsyah, & Indrayanti, 2018). These beliefs affect how to think, motivate themselves and also act. Self-efficacy begins to be owned by nurses since in the world of education where students are equipped with knowledge and skills in the laboratory.

Laboratory practice is one way to improve the skills of nursing students to have good self-efficacy in performing suction nursing actions. Laboratory practice is a skill training activity for nursing students with the aim of preparing nursing students to be ready with their clinical skills (Megawati & Hartono, 2017). One study showed that students face difficulties when applying knowledge and theories learned in class to clinical situations (Lee & Sim, 2020). Another study found that students often appear less confident in clinical practice because the situations they imagine during learning do not align with the real world (Jamshidi, Molazem, Sharif, Torabizadeh, & Kalyani, 2016).

The Faculty of Nursing, Universitas Padjadjaran has a virtual laboratory facility in which there are technology-based learning media, namely virtual reality and 3-dimensional simulators to support the learning process, especially the skills of performing nursing actions in the laboratory. Virtual reality learning media can be utilized by nursing students repeatedly without damaging objects because they are only visual objects (Musril, Jasmienti, & Hurrahman, 2020). However, the effectiveness of virtual reality learning media available at the Faculty of Nursing, Universitas Padjadjaran has not been tested. The purpose of this study was to determine the effectiveness of using virtual reality learning media on increasing student

self-efficacy in performing suction nursing actions.

Research Methods

This study used a quasi-experiment method with a one group pre-test post-test design approach. This design was chosen to determine the effectiveness of the intervention given to the sample. The variable in this study is self-efficacy. This research was conducted at the Faculty of Nursing, Universitas Padjadjaran on December 21-29, 2022.

The population in this study were the active students of the Faculty of Nursing, Universitas Padjadjaran, Jatinangor campus, class of 2022, total population amount 191 persons. The sampling technique used was purposive sampling and a sample of 68 people was obtained with the inclusion criteria that had never practiced suctioning both online and offline and the exclusion criteria had a history of vertigo, had a tendency to experience motion sickness, and had a myopia ≥ 2 diopters.

The instrument used is a self-efficacy questionnaire developed from Bandura's theory and consists of 35 valid statement items that have been consulted through professional judgment and have been tested for reliability and obtained a Cronbach Alpha test value of 0.918. This questionnaire uses a Likert scale consisting of 4 answer choices with a maximum score of 140 and a minimum score of 35. Other instruments used in this study are demographic data instruments consisting of age, gender, experience using virtual reality respondents and minus eye vision problems in respondents.

This study uses virtual reality suction nursing actions to measure self-efficacy. The researcher contacted the head of the class of 2022 and asked for help distributing the respondent criteria questionnaire to be filled in. Next, the researcher contacted the selected respondents and invited them to come to the virtual laboratory facility. The researcher explained about the research including the implementation, objectives and benefits of the research to be carried out. Then the researcher asked for the respondent's consent to participate as a respondent in this study and signed an informed consent sheet. For

prospective respondents who are not willing to be invited to go home. Respondents who were willing to participate in the study then filled out the pre-test. Researchers provide and explain the use of virtual reality learning media suction nursing actions to respondents. Then the respondent is given an intervention in the form of performing suction nursing actions using virtual reality for approximately 15 minutes. The researcher invited the respondent to rest, gave a drink and asked if there were any complaints felt by the respondent. After that the respondent filled out the post-test. The intervention was only given once.

As a prerequisite test, a normality test was conducted to determine the distribution of data using the Kolmogorov-Smirnov test. If the data is normally distributed, it will be tested with the Paired t-test which is used to test the mean difference between two measurement results in the same group. If the data is not normally distributed, the test used is the Wilcoxon signed rank test. Wilcoxon signed rank test shows whether there is a difference/ increase in the average score of the pre-test and post-test obtained. After the test, it was found that the data was not normally distributed where Sig. 0.034 (Sig. <0.05) so the data was analyzed using a non-parametric test, namely the Wilcoxon signed rank test.

This research has obtained ethical permission from the Research Ethics Commission of Universitas Padjadjaran with registration number 1005/UN6.KEP/ EC/2022. The researcher informed the respondents of the benefits of this study, where the benefits were that the respondents received material and experience to learn suction nursing actions. Another benefit is also the development of nursing learning media. Researchers did not provide treatment that could harm or endanger respondents in this study. Researchers also pay attention to the safety aspects of respondents by selecting respondents according to the inclusion and exclusion criteria. Respondents are welcome to rest if they feel tired, nauseous, dizzy and others when using virtual reality learning media.

Results

Characteristics of Respondents

The characteristics of the respondents were mostly female, as many as 59 people (86.8%) while nine people (13.2%) were male. The age of respondents in the range of 17-20 years where most of them are 18 years old as many as 33 people (48.5%) and 19 years old as many as 25 people (36.8%). Most respondents do not have experience using virtual reality as many as 57 people (83.8%) and do not have visual impairment as many as 41 people (60.3%) (Table. 1).

Table. 1 Frequency Distribution of Respondents Based on Age, Gender and Experience Using Virtual Reality (n=68)

Demographic Data	Frequency (n)	Percentage (%)
Age		
17	**4**	**5.9**
18	**33**	**48.5**
19	**25**	**36.8**
20	**6**	**8.8**
Gender		
Male	**9**	**13.2**
Female	**69**	**86.8**
Wxperiance with virtual reality		
Ever	**11**	**16.2**
Never	**57**	**83.8**
Visual Impairment		
Minus Eyes	**27**	**39.7**
Normal Eyes	**41**	**60.3**

Study Outcome

After the intervention, there was an increase in student self-efficacy in performing suction nursing actions as evidenced by an increase in the median in the post-test results (113.5) compared to the pre-test results (102) with an average increase of 11.5 points. The test results on the Wilcoxon signed rank test showed that the p value showed a significant difference ($p = 0.00$). From these results it can be conclude that the use of virtual reality learning media increases student self-efficacy in performing suction nursing actions significantly (Table 2).

Table 2. Changes in Student Self-Efficacy in Performing Suction Nursing Actions through the Use of Virtual Reality Learning Media (n=68)

Variable	Min	Max	Median	SD	p Value
Pre-test	**82**	**135**	**102**	**10.542**	**0.00**
Post-test	**89**	**138**	**113.5**	**12.370**	

There are differences in the improvement of pre-test and post-test results in each data group, but researchers have limitations so they do not conduct a different test on each data group (Table 3).

Table 3. Student Self-Efficacy in Performing Suction Nursing Actions through the Use of Virtual Reality Learning Media (n=68)

Demographic Data	Frequency (n)	Median Pre-test	Median Post-test
Age			
17	**4**	**108**	**112.5**
18	**33**	**100**	**113**
19	**25**	**102**	**114**
20	**6**	**104**	**112.5**
Gender			
Male	**9**	**103**	**124**
Female	**59**	**101**	**112**
Wxperiance with virtual reality			
Ever	**11**	**103**	**117**
Never	**57**	**101**	**110**
Visual Impairment			
Minus Eyes	**27**	**102**	**109**
Normal Eyes	**41**	**102**	**115**

Discussion

This study was conducted to determine whether there is an increase in student self-efficacy after the use of virtual reality learning media for suction nursing actions. The results of the analysis show that the use of virtual reality learning media is proven to increase student self-efficacy in performing suction nursing actions. This is in line with research conducted by Francis et al. in 2020 where the use of virtual reality for training in lectures was shown to increase student self-efficacy (Francis, Bernard, Nowak, Daniel, & Bernard, 2020). The results of this study strengthen the evidence of previous research that virtual reality is an effective learning media to increase student self-efficacy in performing nursing actions.

The results of the analysis of this study indicate the effectiveness of virtual reality as a learning medium with an increase in self-efficacy results after being given the intervention. These results are in accordance with previous research which found that learning using virtual reality in Korea was proven to be able to expand the practical experience of nursing students and increase self-efficacy and learning satisfaction (Yu et al., 2021). The use of virtual reality learning media can assist students in practicing practical skills in the laboratory.

Virtual reality can be a learning media to train nursing students' practical skills. However, a nurse in taking action besides having skills must also be based on knowledge (Ahmad et al., 2020) so that they can provide quality nursing services accompanied by professional attitudes and behavior. In addition to practicing practical skills in the laboratory, virtual reality learning media can also increase knowledge and train student communication in carrying out nursing actions.

There are differences in the improvement of pre-test and post-test results in each data group, but researchers have limitations so they do not conduct a different test. This study only used one intervention group and no control group for comparison. However, the results of this study can be used as recommendations for nursing education in applying new learning media such as technology-based learning media to improve student learning outcomes, especially in practicing skills.

Conclusion

The results of this study indicate that virtual reality learning media can increase student self-efficacy in performing suction nursing

actions. This can be a recommendation for the world of nursing education to use virtual reality in academic activities as a learning medium to train skills in the laboratory. This virtual reality learning media can be utilized by nursing students repeatedly without damaging the object because it is only a visual object. Further research with the Randomized Controlled Trial method related to the use of virtual reality as a learning medium needs to be done to determine the true effectiveness of virtual reality. Researchers have limitations so they do not conduct a different test, so further research is needed to determine the difference in increasing self-efficacy in each data group by conducting a different test to strengthen the results of this study.

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