

Nursing Student Reactions in Conducting Nursing Practicum Learning Using Virtual Reality Simulation

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Abstract The pandemic period forces many changes, including achieving competencies in practical learning in the laboratory. Simulation-based education (SBE) provides learners with experiences in real patient care environments, where they can safely practice making decisions and providing care without causing harm. Virtual Reality Simulation (VRS) is a virtual simulation practice method that can increase nursing students' enthusiasm for learning. This study aims to determine undergraduate students' reaction to implementing post-appendectomy wound care practicum using Virtual Reality Simulation in the Faculty of Nursing, Universitas Indonesia. This study used a quasi-experimental design to determine the students' reactions when using VRS for the first time. A user reaction questionnaire was used after testing its validity and reliability. The questionnaire contains 24 items that consist of 11 positive questions and 13 negative questions. The sample in this study was 30 undergraduate nursing students in semesters II and IV. The results of this study indicate that the respondents were enthusiastic about doing a practicum using VRS for post-appendectomy wound care. The post-practicum questionnaire survey results evidenced this study: 53.3% of the respondents were enthusiastic, and 46.7% were not enthusiastic; the cut-off point was 91.2. The nursing students enthusiastically conducted a post-appendectomy wound care practicum using VRS.

This study recommends that VRS be further developed and tested using a larger sample size.

Keywords Enthusiasm, Nursing Students, Practicum, Reaction, Virtual Reality Simulation

1. Introduction

Information and communication technology (ICT) has undergone a very drastic change, including shifting the learning curriculum to a combination of conventional and online pathways and referred to as blended learning [1,2]. Blended learning is applied to various fields, including nursing education [3]. In nursing education, a new, practical approach is presented to improve the cognitive development of nursing students. This approach uses technologies such as augmented reality (AR) and virtual reality (VR) simulation [4]. Nursing learning has been implemented using a learning model accompanied by laboratory-based methods such as practical demonstrations and simulations [5]. Practical simulations are an effective teaching and learning strategy in nursing [6].

Simulation-based education (SBE) provides learners with experience in real patient care environments where

they can safely practice making decisions and providing care without causing harm [7]. Technology-based simulations generate VR [8]. Rourke [9] found that the knowledge of students who conducted practicum with Virtual Reality Simulation (VRS) was the same as those who did conventionally. Other research stated that implementing VRS and conventional methods generated the same levels of knowledge and skills [5].

VRS is one of the learning methods considered effective and efficient, especially in improving soft skills [10]. Choi, et al. [10] argued that a VRS-based training simulation system was developed to increase the knowledge of nasogastric tube (NGT) installation. VRS can be used as a simulation method in nursing education. Similarly, Samosorn, et al. [11] found that using VRS in airway management practicum could increase students' knowledge of airway management.

VRS on suction in the tracheostomy and peristomal skin care effectively taught nursing students' skills and knowledge in the short term [12]. VRS significantly increased enthusiasm about learning clinical virtual simulations in nursing education [13]. VRS also increased nursing students' satisfaction with their learning experiences [14]. However, VRS studies with a quasi-experimental design also found the effectiveness of virtual patient-based social learning [15], the effect of neonatal gamification programs in nursing students [16], and pediatric seizure management [17].

Research on VRS in nursing education in Indonesia has not been popular, leaving a gap in the literature related to VRS. As a result, the researchers aim to determine the reaction of regular undergraduate students to implementing post-appendectomy wound care practicum using VRS in the Faculty of Nursing, Universitas Indonesia.

2. Methods

2.1. Research Design

The total of 30 samples in this study was semester 2nd and semester 4th students of the Faculty of Nursing, Universitas Indonesia. This study used a quasi-experimental design to determine the students' reactions when doing a post-appendectomy wound care practicum using VRS for the first time. The study design and method followed the previous studies [15-17]. The survey response data were collected on 20 – 24 July 2020 at the E6 general laboratory building at the Faculty of Health Sciences, Universitas Indonesia, Depok, Indonesia. Data collection was carried out in this study for two consecutive weeks on the respondents, both in the control and intervention groups. The data collection process commenced after the instrument passed the ethical examination by the Faculty of Nursing Ethics Committee, Universitas Indonesia. The researchers described which protocol would be followed for each student regarding wound care and VR tools according to preferences. It may

be possible to anticipate confusion in operating VR and wound care steps.

2.2. Variables and Measurement Items

The Independent variable in this study was virtual reality simulation using the user reaction survey by Butt, et al. [7]. The dependent variable was students of the Faculty of Nursing, Universitas Indonesia. The instrument used in this study was a 24-item questionnaire (see Table 1) on user reaction, which consisted of 11 positive questions and 13 negative questions. The respondents gave the questionnaire after conducting a post-appendectomy wound care practicum using VRS. The questionnaire was first tested for its validity and reliability before being used in the study by Cronbach's Alpha 0,859 considered highly reliable [18]. Descriptive statistics include the number and percentage of students who performed VRS trials in nursing. All variables were analyzed using SPSS Statistics 23.

2.3. Ethical and Legal Issues

The institutional review board approved this study of the Faculty of Nursing, Universitas Indonesia (IRB approval no., SK-253/UN2.F12.D1.2.1/ETIK 2020). The requirement for informed consent was waived because subjects participated in the examination as a scheduled part of the educational curriculum.

3. Results

There were 30 respondents enrolled in this study (see Table 2). Most of the respondents in this study were female (23 students, 76.7%), with only seven (23.3%) male respondents making up the minority. Of all the respondents, 20 students (66.7%) were in their 4th semester and started their first academic year in 2018, and 10 other students (33.3%) were in their 2nd semester and started their first academic year in 2019. The ages of the respondents are detailed as follows: 15 students (50%) were aged 20 years old, 14 students (46.7%) were 19 years old, and one student (3.3%) was 18 years old.

Based on the data on the respondents' responses to the post-practicum reaction questionnaire (see Table 3), 53.3% of the respondents were enthusiastic, and 46.7% were not enthusiastic. The cut-off point value was 91.2, meaning the mean value > 91.2 respondents were enthusiastic after doing VRS Wound Care practicum post appendectomy surgery. This study used a questionnaire on the post-practicum reaction that had been adjusted to the VRS material needed for post-appendectomy wound care. The questionnaire contains 24 questions and statements and takes measurements using four measuring scales, namely "strongly disagree", "disagree", "agree", and "strongly agree". From these results, it can be concluded that using VRS in post-appendectomy wound care practicum made the respondents enthusiastic.

Table 1. Questionnaire items of Motivation Dimension to Choose Learning Method (Wound Care) using Virtual Reality Simulation (VRS)

No.	Items	References
1	Compared with normal learning (conventional), I am more interested in learning method using VR	
2	When the case given related to the practicum, I am sure I can finish it using VR	
3	I think that I will get better score if using learning system with VR method due to easier to be understood and interesting	
4	I am sure I can understand learning materials using VR	
5	My learning skill is best when using VR compared with other students	
6	I prefer learning using VR because this is a new thing	
7	Practicum material using VR is benefit for me	
8	Practicum material using VR is very interesting for me	
9	I think that practicum material using VR can be applied in other practicum material	
10	I like practicum learning using VR	
11	I am feeling nervous during practice using VR that make me difficult to remember the materials that I have learned	
12	I am feeling sad and guilty during practice using VR	Authors
13	I am not confidence during practice using VR	
14	I am afraid that I cannot use VR	
15	Before practice using VR, I have learned by collecting information from book or valid references	
16	When I am learning a topic using VR, I am trying to apply and match it together	
17	When learning materials using VR, I am trying to relate the things that I have read with what I have known	
18	It is difficult for me to remember materials that I have learned before practicum using VR	
19	I am confident, I have learned practicum materials before I practice using VR	
20	I am improving my skill by more practice using VR	
21	I keep learning till the end in using VR although the content of VR materials are boring for me	
22	I am thinking the things that need to do in learning using VR	
23	Determining what things that needed during learning is thing that I do before start learning	
24	I am sure that I will have a good score if I am learning diligently	

Table 2. Demographic Characteristics of the Respondents

Variable	Frequency	Percentage (%)
Gender		
Male	7	23.3
Female	23	76.7
Academic Year to Start College Education		
2019	10	33.3
2018	20	66.7
Age		
20	15	50
19	14	46.7
18	1	3.3

Table 3. Respondents' Reactions after Post-Appendectomy Wound Care Practicum

Variable	Frequency	Percentage	Mean
Enthusiasm	16	53.3	> 91.2
Lack of Enthusiasm	14	46.7	

4. Discussion

4.1. Findings

The analysis results in this study show that the respondents were enthusiastic after practicing post-operative wound care using VRS. This study is in line with other studies, which stated that the use of VR tested in the research was accepted by the students, in which case the students were enthusiastic and excited about practicing virtually [19]. Keiser and Turkelson [20] stated that students who learned using VR found that it enabled them to interact directly with the patients and reduced self-confidence when treating them. VRS increased student satisfaction and helped professors teach, especially in health education [14].

This study shows the level of enthusiasm of the respondents after conducting a post-appendectomy wound care practicum using VRS. The respondents who were involved in this study showed enthusiasm, as shown by the results of the user reaction questionnaire survey 91.2% of the respondents had filled in at the time of the study and by

the respondents' expressions when doing the practicum using VRS. Based on the post-practicum user reaction questionnaire results, the respondents were happy using VR, were not bored, forgot time while practicing, and felt involved in the learning process.

The VRS for the post-appendectomy wound care practicum was developed quickly, starting in February and ending in June, costing approximately ninety million rupiahs in total. Compared to conventional learning systems for basic nursing practicum courses, this VR method will be much more efficient because it will reduce the consumable costs usually used in practicums with conventional learning methods. As stated by Butt et al., the learning method that uses VRS media is more cost-effective [7].

The purpose of using VR in practicum is to increase students' enthusiasm for learning, especially in nursing. In contrast, in a pandemic situation like today, students must undertake the learning process online. With this VR-based practicum, it is hoped that students will be enthusiastic about carrying out the learning process. They will feel more interested and challenged in doing the practicum because they can explore the situation and environment in VR as if they are in a real hospital location. VR in the field of education, especially nursing, will include a lot of nursing content that can be accessed by students, such as those practicing therapeutic communication skills and other skills related to the world of nursing. VR can also enhance the learning achievement of students by study application of health communication learned model [21].

Along with the development of technology science and the current pandemic situation, we are faced with the choice of implementing a learning system with existing technology systems. The system is especially true in the world of nursing education. In a situation like this pandemic, face-to-face practical learning cannot be directly applied at the hospital. However, by using VRS, nursing students can still experience practices in an atmosphere like that in a hospital or a campus laboratory. The VR system tested in this study ran well and was accepted by students. Nevertheless, before carrying out a practicum using VRS, we must first test the readiness of the equipment and content to be used, including the effects of using the VRS tool.

4.2. Limitations and Suggestion

This study has a small sample size and short intervention time. The results of this study indicate that respondents are enthusiastic about the VRS-based wound on nursing practicum learning system, starting from patient identification, determining diagnosis, and preparing tools to change dressings on wounds. The respondents' enthusiasm can be seen when they are excited and want to know more about operating VRS while learning. The VRS can increase students' desire to learn in nursing practicum

courses because it is more interesting, modern, and practical. However, they gain the same knowledge when studying practicum without using VRS.

In the current pandemic situation, VRS-based learning as an alternative for students to carry out nursing practicums is very suitable. Because with VR-based wound care practices, students do not need to come directly to the laboratory together, or even students can carry out practical work directly in their respective homes while still being monitored by lecturers through zoom meetings. VRS can also be used as a tool for students' practical exams. This VRS can also be used not only for students who will do practicum but also by hospitals that will conduct tests on their nurses or can even be used by nurses who will teach patients or their families to perform independent wound care while at home. Thus, this study recommends that the application of VRS needs to be further developed and tested on a larger sample size.

5. Conclusions

Along with the development of technology science and the current pandemic situation, we are faced with the choice of implementing a learning system by utilizing existing technology systems, especially in the world of nursing education. A practical learning system that cannot be done directly at the hospital location or a face-to-face learning system in a situation like this cannot be done. So that by using the VRS, nursing students can still experience practice in an atmosphere like in a direct hospital or a campus laboratory. The VR system tested in this study went well and was accepted by students. However, before carrying out a practicum using VRS, we must test the readiness of the equipment and content to be used, including the effects of using the VRS tool. Hence, this study recommends that the application of VRS needs to be further developed and tested on a larger number of samples.

Authors' Contributions

Conceptualization: LOAR, DG, KY
 Data curation: DG, SI, MFV, SAT
 Formal analysis: LOAR, KY, SI, MFV, SAT, FFR
 Funding acquisition: LOAR, DG.
 Methodology: LOAR, DG, KY, FFR
 Visualization: SI, MFV, SAT.
 Writing-original draft: AF, DG, SI, SAT
 Writing-review & editing: AF, DG, SI, MFV, SAT

Conflict of Interest

No potential conflict of interest relevant to this article was reported.

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Data Availability

Data files are available from Harvard Data verse:

<https://doi.org/10.7910/DVN/RQKFJ8>

Dataset 1. Data processing results of User Reaction survey

<https://dataverse.harvard.edu/file.xhtml?fileId=5112708&version=1.0>

Dataset 2. Post test Score of questioners all of groups

<https://dataverse.harvard.edu/file.xhtml?fileId=5112706&version=1.0>

Dataset 3. Output test validity and reliability reaction survey

<https://dataverse.harvard.edu/file.xhtml?fileId=5112707&version=1.0>

Dataset 4. User reaction survey VR Questionnaire

<https://dataverse.harvard.edu/file.xhtml?fileId=5112709&version=1.0>

Supplementary Materials

Data files are available from Harvard Data verse:

<https://doi.org/10.7910/DVN/RQKFJ8>

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Dataset 4. User reaction survey VR Questioner

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REFERENCES

- [1] C.-Y. Chang, C.-L. Lai, and G.-J. Hwang, "Trends and research issues of mobile learning studies in nursing education: A review of academic publications from 1971 to 2016," *Computers & Education*, vol. 116, pp. 28-48, 2018/01/01/ 2018, doi: <https://doi.org/10.1016/j.compedu.2017.09.001>.
- [2] B. Bruggeman, A. Garone, K. Struyven, B. Pynoo, and J. Tondeur, "Exploring university teachers' online education during COVID-19: Tensions between enthusiasm and stress," *Computers and Education Open*, vol. 3, p. 100095, 2022/12/01/ 2022, doi: <https://doi.org/10.1016/j.caeo.2022.100095>.
- [3] J. Y. S. Chung, W. H. C. Li, A. T. Cheung, L. L. K. Ho, and J. O. K. Chung, "Efficacy of a blended learning programme in enhancing the communication skill competence and self-efficacy of nursing students in conducting clinical handovers: a randomised controlled trial," *BMC medical education*, vol. 22, no. 1, pp. 1-10, 2022.
- [4] C. L. Foronda *et al.*, "Virtually Nursing: Emerging Technologies in Nursing Education," (in eng), *Nurse Educ*, vol. 42, no. 1, pp. 14-17, Jan/Feb 2017, doi: [10.1097/nne.0000000000000295](https://doi.org/10.1097/nne.0000000000000295).
- [5] S. J. Smith, S. Farra, D. L. Ulrich, E. Hodgson, S. Nicely, and W. Matcham, "Learning and Retention Using Virtual Reality in a Decontamination Simulation," (in eng), *Nurs Educ Perspect*, vol. 37, no. 4, pp. 210-214, Jul/Aug 2016, doi: [10.1097/01.Nep.0000000000000035](https://doi.org/10.1097/01.Nep.0000000000000035).
- [6] M. Rababa, D. Bani-Hamad, and A. A. Hayajneh, "The effectiveness of branching simulations in improving nurses' knowledge, attitudes, practice, and decision-making related to sepsis assessment and management," *Nurse Education Today*, vol. 110, p. 105270, 2022/03/01/ 2022, doi: <https://doi.org/10.1016/j.nedt.2022.105270>.
- [7] A. L. Butt, S. Kardong-Edgren, and A. Ellertson, "Using Game-Based Virtual Reality with Haptics for Skill Acquisition," *Clinical Simulation in Nursing*, vol. 16, pp. 25-32, 2018/03/01/ 2018, doi: <https://doi.org/10.1016/j.ecns.2017.09.010>.
- [8] J. Hirt and T. Beer, "Use and impact of virtual reality simulation in dementia care education: A scoping review," (in eng), *Nurse Educ Today*, vol. 84, p. 104207, Jan 2020, doi: [10.1016/j.nedt.2019.104207](https://doi.org/10.1016/j.nedt.2019.104207).
- [9] S. Rourke, "How does virtual reality simulation compare to simulated practice in the acquisition of clinical psychomotor skills for pre-registration student nurses? A systematic review," (in eng), *Int J Nurs Stud*, vol. 102, p. 103466, Feb 2020, doi: [10.1016/j.ijnurstu.2019.103466](https://doi.org/10.1016/j.ijnurstu.2019.103466).
- [10] K.-S. Choi, X. He, V. C.-L. Chiang, and Z. Deng, "A virtual reality based simulator for learning nasogastric tube placement," *Computers in Biology and Medicine*, vol. 57, pp. 103-115, 2015/02/01/ 2015, doi: <https://doi.org/10.1016/j.compbiomed.2014.12.006>.
- [11] A. B. Samosorn, G. E. Gilbert, E. B. Bauman, J. Khine, and D. McGonigle, "Teaching Airway Insertion Skills to Nursing Faculty and Students Using Virtual Reality: A Pilot Study," *Clinical Simulation in Nursing*, vol. 39, pp. 18-26, 2020/02/01/ 2020, doi: <https://doi.org/10.1016/j.ecns.2019.10.004>.
- [12] S. B. Bayram and N. Caliskan, "Effect of a game-based virtual reality phone application on tracheostomy care education for nursing students: A randomized controlled trial," (in eng), *Nurse Educ Today*, vol. 79, pp. 25-31, Aug 2019, doi: [10.1016/j.nedt.2019.05.010](https://doi.org/10.1016/j.nedt.2019.05.010).
- [13] M. L. Manning, D. Jack, L. Wheeler, C. Okupniak, and M. Pogorzelska-Maziarz, "Effect of a virtual simulated participant experience on antibiotic stewardship knowledge among pre-licensure baccalaureate nursing students: A pilot study," *Nurse Education Today*, vol. 113, p. 105362, 2022.
- [14] J. M. Padilha, P. P. Machado, A. Ribeiro, J. Ramos, and P. Costa, "Clinical Virtual Simulation in Nursing Education: Randomized Controlled Trial," *J Med Internet Res*, vol. 21, no. 3, p. e11529, 2019/03/18 2019, doi: [10.2196/11529](https://doi.org/10.2196/11529).
- [15] G.-J. Hwang, C.-Y. Chang, and H. Ogata, "The effectiveness of the virtual patient-based social learning approach in undergraduate nursing education: A quasi-experimental study," *Nurse Education Today*, vol. 108, p. 105164, 2022/01/01/ 2022, doi: <https://doi.org/10.1016/j.nedt.2021.105164>.
- [16] S.-Y. Yang and Y.-H. Oh, "The effects of neonatal resuscitation gamification program using immersive virtual reality: A quasi-experimental study," *Nurse Education Today*, vol. 117, p. 105464, 2022/10/01/ 2022, doi: <https://doi.org/10.1016/j.nedt.2022.105464>.
- [17] M.-L. Wu, L.-F. Chao, and X. Xiao, "A pediatric seizure management virtual reality simulator for nursing students: A quasi-experimental design," *Nurse Education Today*, p. 105550, 2022/09/14/ 2022, doi: <https://doi.org/10.1016/j.nedt.2022.105550>.
- [18] D. Rindskopf, "Reliability: Measurement," in *International Encyclopedia of the Social & Behavioral Sciences (Second Edition)*, J. D. Wright Ed. Oxford: Elsevier, 2015, pp. 248-252.
- [19] A. Balasopoulou *et al.*, "A molecular epidemiological analysis of adenoviruses from excess conjunctivitis cases," *BMC Ophthalmology*, vol. 17, no. 1, p. 51, 2017/04/24 2017, doi: [10.1186/s12886-017-0447-x](https://doi.org/10.1186/s12886-017-0447-x).
- [20] M. M. Keiser and C. Turkelson, "Using Simulation to Evaluate Clinical Performance and Reasoning in Adult-Geriatric Acute Care Nurse Practitioner Students," (in eng), *J Nurs Educ*, vol. 58, no. 10, pp. 599-603, Oct 1 2019, doi: [10.3928/01484834-20190923-08](https://doi.org/10.3928/01484834-20190923-08).
- [21] F. F. Rahman, S. Noorbaya, F. Haris, and H. Johan, "Health communication model based on character education to improve university student achievement in midwifery," in *Proceedings of the 2020 8th International Conference on Information and Education Technology*, 2020, pp. 226-230, doi: [10.1145/3395245.3396429](https://doi.org/10.1145/3395245.3396429).