



THE EFFECT OF IMMERSIVE VIRTUAL REALITY SIMULATION IN CONDUCTING POSTPARTUM PHYSICAL EXAMINATIONS FOR NURSING STUDENTS

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ABSTRACT

Postpartum maternal examination is a mandatory procedure performed on women who have given birth; failure to perform this examination can lead to the risk of long-term complications. Therefore, it is important for education providers to ensure the quality of nursing graduates by equipping students with an understanding of detection and screening skills, particularly in postpartum maternal physical examination. The aim of this study is to design, implement, and analyze the results of students' experiences in using virtual reality to gain an immersive understanding of postpartum physical examination techniques in maternity nursing. This research method uses a one-group pre-test post-test experimental design with a random sampling technique on 20 nursing students. The virtual reality (VR) media developed for this study passed a black-box test with 100% functionality. Product validity testing was also conducted by content experts and media experts, with results meeting valid criteria. User experience was evaluated using the User Experience Questionnaire (UEQ) among 20 respondents. Results showed that 56% of respondents rated the experience as "Very Good" and 44% as "Good." This development indicates that VR is highly effective in creating an immersive and independent nursing practice environment, providing benefits and bridging the gap between skill-laboratory practice and the skills students gain during clinical practice. There's a clear benefit from implementing virtual reality for postpartum physical examination training among nursing students with clear significant improvement in skills.

Keywords: knowledge; postpartum; skill physical examination; virtual reality

PENDAHULUAN

Technological developments in the 21st century have had a significant impact on the health sector and society as a whole, influencing and affecting various aspects of life. It should be noted that rapid advancements in information sources and communication technology particularly in the health and education sectors have driven a shift from conventional teaching methods to more creative and innovative strategies (Chang 2022) (Li et al. 2026). The development of procedural skills is fundamental to nursing practice at the diploma, bachelor's, and professional levels. Therefore, students must demonstrate their competencies by evaluating the gaps between their theoretical knowledge and real-world practice based on performance evaluations. Consequently, new strategies are needed to address these competency gaps by incorporating innovative learning media into the educational environment (Prasetyo 2024) (L et al. 2025).

In current modern era, advanced learning technologies are essential for meeting the needs of healthcare services by providing learning methods that keep up with the ever-changing and innovative nature of healthcare (Adams et al. 2025). Awareness of the important role of modern information technology is highly relevant in the field of nursing, where the integration of technology has the potential to transform teaching methods and prepare future students to face real-world challenges in clinical practice (Chen et al. 2025). In addition, as a valuable educational approach grounded in

scientific evidence and proven effectiveness, virtual reality can be used to facilitate and encourage student engagement. Virtual reality has proven effective for nursing students in enhancing their knowledge and promoting independent learning regarding anesthetic procedures and anesthesiology. The learning experience offered is highly immersive and real-world-oriented. Therefore, this virtual reality method can be further explored for clinical procedures that provide tangible benefits and bridge the gap between campus theory and real-world practice (Lin 2025).

The application, the purpose of this research can be done to determine the benefits of applying virtual reality methods in nursing learning which have benefits for forming and improving independent learning abilities for nursing students, especially in actions that are not directly obtained by students in real life, so it is necessary for teaching staff to prepare innovative learning techniques for students to face the complexity of trends. Therefore, faculty members must develop innovative teaching techniques to help students navigate the complexities of these trends. Changing models of learning and healthcare delivery must be addressed to ensure that students can master the skills and knowledge relevant to health technologies that are evolving with the times (History 2024) (Shaik 2022).

Virtual reality is a tool that allows users to interact with a simulated virtual environment using VR devices and headsets; using this technology, users feel as if they are actually inside that three-dimensional world. When using virtual reality (VR), users can see, hear, and interact with the virtual environment and fully immerse themselves in the simulated scenario (Dunlop et al. 2024). The use of virtual reality technology can facilitate physical examinations of postpartum mothers in a realistic environment and can serve as a learning tool for students—particularly male students who may not have the same opportunities to gain the same competencies as female students (Kurniawati et al. 2023) (Rachmatullah and Sukihananto 2020). Thus, the importance of this virtual reality method lies in enabling students to perform these procedures through immersive detection with the aid of virtual reality to identify symptoms or health issues experienced by postpartum mothers. This is done by collecting comprehensive data in accordance with the globally recommended “head-to-toe” physical examination standards, which have been clinically tested and proven effective in preventing postpartum complications (Nichla et al. 2024).

METHOD

This research study used a quasi-experimental design, with the virtual reality simulation teaching method as the independent variable and the postpartum physical examination procedure as the dependent variable. This study addressed students’ learning challenges and enhanced their comprehension of the learning experience and their perceptions of postpartum physical examination skills through an immersive approach. We recruited a model to act as a patient and provide a demonstration of the postpartum physical examination using a VR platform, along with additional explanations. This VR method was administered to a population of students who met the inclusion criteria using a random sampling technique. Participants met the inclusion criteria: first-time postpartum physical examination participants, nursing students, and male.

Procedure

This research procedure was carried out in three stages: the pre-teaching stage, the teaching stage using the VR method, and the post-teaching stage. During the pre-teaching stage, we demonstrated how to perform a postpartum physical examination on a mannequin while the student participants observed. Next, during the VR-based teaching stage, the students observed the physical examination performed in real-time on a patient or model using VR technology, with the aim of helping them immersively understand the process of a postpartum physical examination on a real patient. Finally, in the post-instruction stage, the students were evaluated regarding their experience with this teaching method through a User Experience Questionnaire (UEQ). This study employed quantitative techniques, including questionnaire data and focus group interviews, to collect data regarding students’ learning experiences and perceptions of instruction using VR media. Data analysis in this

study utilized a student learning experience questionnaire, with scores calculated according to standard procedures.

RESULT

The subjects of this study were 20 nursing students who participated in the study as students who received treatment using the virtual reality method, in accordance with the study's guidelines.

Table 1.

Respondent characteristics (n = 20)

Categoric	Respondent characteristics	f	%
Age	15 years	8	40
	16 years	10	50
	17 years	2	10
Semester	2nd semester	9	45
	4nd semester	11	55

Tabel 2.

Student Satisfaction Score (n = 20)

Student Satisfaction Score (n = 20)					Paired Sampel Test Sig (2-tailed)
VR User Experience	Kategorik	f	%	Normality test	
Pre Test	Very good	0	0	0.004	0.000
	Good	8	40		
	adequate	12	60		
	Poor	0	0		
	Very poor	0	0		
Post Test	Very good	11	56	0.037	
	Good	9	44		
	adequate	0	0		
	Poor	0	0		
	Very poor	0	0		
					Wilcoxon Asymp Sig (2-teailed)
Pre Test – Post Test				0.392	0.000

Table 1, the respondents in this study were college students categorized by age and semester level. There were 8 (40%) students aged 15, 10 (50%) aged 16, and 2 (10%) aged 17. In terms of academic semester, there were 9 students in their second semester and 11 students in their fourth semester.

Table 2, based on the study results involving 20 respondents, the use of virtual reality (VR)-based learning media demonstrated a positive improvement in students' learning experience and knowledge regarding the physical examination of postpartum mothers. Prior to the intervention, most respondents were categorized as fair (60%), whereas after the intervention, all respondents achieved good to very good categories, with 56% classified as very good and 44% as good. These findings indicate that VR-based learning is an effective and innovative educational medium for enhancing students' learning outcomes and understanding of postpartum physical examination skills. Based on the results of the normality test on the pre-test and post-test data, the data were found to be non-normal; therefore, a Wilcoxon test ($p = 0.000, < 0.05$) was conducted to compare the pre-test and post-test results, revealing a statistically significant difference between the conditions before and after the virtual reality intervention.

DISCUSSION

According to the results of a study conducted among nursing students through a questionnaire survey and interviews with respondents, half of the students believe that VR learning techniques are very helpful for students who do not have the opportunity to practice; these techniques help them overcome the difficulties they face in mastering the competencies required for postpartum physical examinations of mothers and provide additional information on performing these procedures in an

immersive manner, following the correct and realistic steps.

Some students reported that they were able to gain realistic learning experiences despite only using VR to practice postpartum physical examination techniques on female patients in this study. Therefore, in the future, VR could assist students who do not have access to patients by allowing them to use this VR technology to meet the competency requirements for postpartum physical examination skills. This study aligns with research on improving critical thinking competencies among female students in science education related to the Virtual Laboratory Science Investigation (VLSI) learning model, which found that this method can enhance science education and bridge the limitations of traditional laboratories (History 2024).

In addition, this study aligns with research on the development of Mixed Reality (MR) laboratory facilities for simulating mechanical engineering practices for educators, which has been shown to be highly effective in learning, easy to use, and to enhance evidence-based, relevant, and long-term beneficial learning materials (Imansyah and Putri 2025). Furthermore, this study is in line with research that applied virtual reality (VR) methods to medical students, the benefits of which have already been evaluated. The results of implementing this VR learning method indicate that VR is highly beneficial for practicing chest tube insertion techniques and improves students' technical skills and confidence in learning these procedures (Knobovitch et al. 2025).

Based on the results of the above study, the use of virtual reality technology as a medium for laboratory practical training in the health field has been shown to have a positive and effective impact, particularly in situations with various limitations—such as a limited number of practical tools, lack of access to real patients, and limited time available for hands-on training with patients in clinical settings. The application of virtual reality is a form of modified learning method capable of addressing these challenges by providing a more interactive, safe, and flexible learning experience. Through this virtual reality-based simulation medium, students can practice repeatedly without posing any risk to patients, thereby optimizing the learning process (Bodur et al. 2024).

In addition, virtual reality technology creates an immersive learning experience, allowing students to feel as though they are in a realistic clinical situation (Hasyim et al. 2025). This realistic learning method enhances students' engagement, concentration, and confidence as they learn each step of the examination procedure (Kusteja, Susanti, and Aprianti 2024). Thanks to this innovative learning method which features 3D (three-dimensional) visualization that allows for direct interaction with virtual objects, as well as feedback received during simulations students find it easier to grasp concepts that were previously taught only through theory and laboratory practicals using phantoms and theoretical instruction (Devi et al. 2025) (Jaya et al. 2023).

This study shows that the use of virtual reality bridges the gap between theoretical knowledge and practical skills, particularly in performing health examinations. With this method, students not only understand concepts and procedures conceptually, but are also able to develop their psychomotor skills through systematic and repetitive practice in a virtual-realistic environment (Lin 2025). As such, the use of virtual reality as a means to enhance students' competencies prior to real-world patient practice, as well as to provide them with foundational knowledge before entering clinical settings. This approach is expected to improve students' competence, procedural accuracy, and the quality of their practical skills in future healthcare services (Kurniawati et al. 2023) (Asmirajanti, Mira, and Wahyu 2024). Therefore, virtual reality can be considered an effective learning innovation to compliment conventional teaching methods, particularly in health education, which demands a balance between knowledge mastery, clinical skills, and patient safety (Rachmatullah and Sukihananto 2020) (Nichla et al. 2024).

This study was conducted in the context of postpartum physical examinations of female patients. The students stated that this VR-based learning tool helped them overcome the difficulties they experienced in learning postpartum physical examination techniques, with 56% rating it as “Very Good” and 44% as “Good.” In addition to the interview results, the students participant reported high satisfaction with this VR-based learning tool, stating that they were “very satisfied” and that it was “suitable for use” to support their learning. The students also noted that it helped them memorize the procedures for postpartum physical examinations in an immersive manner when applied to patients meeting the relevant clinical criteria. Furthermore, the students’ experiences and perceptions regarding the use of this VR tool indicated that it enhanced their understanding and provided greater insights. This study makes an important contribution to the development of educational technology and offers insights for higher education institutions in implementing VR technology to facilitate more effective and engaging learning experiences for students (Menhard 2022).

CONCLUSION

The use of virtual reality (VR) has proven effective as a learning method that responds to the digital era. In this study, VR was used to facilitate nursing students’ learning of physical examinations of postpartum mothers. VR helps overcome limitations in opportunities for clinical practice, enhancing students’ understanding, skills, and confidence through an immersive learning experience. All respondents gave positive evaluations of this learning tool, with 56% rating it as “very good” and 44% as “good.” Interview results also indicated a high level of satisfaction with this immersive learning method. These findings are consistent with previous studies showing that VR is an effective learning tool for improving practical competencies in the healthcare field.

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