

The Integration of Virtual Reality and OSCE: Design and Preliminary Feasibility Study of a Lightweight Digital Platform in Surgical Nursing

Xu Jiayang^{1, 2, *}

¹Health College, Hebei Oriental University, Langfang, China

²Medical Technology College, Yanbian Prefecture Applied Education Research Institute, Yanbian, China

Email address:

2215882877@qq.com (Xu Jiayang)

*Corresponding author

Abstract

Objective: To design and preliminarily implement a digital, objective structured clinical examination (OSCE) teaching platform based on lightweight virtual reality (VR) technology, evaluate its feasibility and application efficacy in surgical nursing education, and explore effective approaches for digital teaching under resource-constrained conditions. **Method:** A convenience sampling method was employed to recruit 89 nursing undergraduates. A lightweight VR-OSCE teaching platform was developed using an open-source platform (e.g., Second Life), adopting a technical approach combining open-source software, standalone VR headsets, and cloud-based deployment. The platform incorporated virtual teaching scenarios for laparoscopic cholecystectomy, subtotal thyroidectomy, and appendectomy, along with standardized OSCE-based paperless assessment and learning record management functions. Post-intervention, comprehensive evaluation was conducted through platform usability assessments, teaching satisfaction surveys, self-assessments of learning outcomes, and clinical competency evaluations. **Results:** ① Surgical nursing course performance: The theoretical assessment score (84.52 ± 7.63) and OSCE clinical competency score (86.74 ± 7.21) in the experimental group were significantly higher than those in the control group (76.18 ± 8.92 and 78.35 ± 8.46), respectively, with statistically significant differences ($P < 0.001$). ② Clinical reasoning ability: As evaluated using the Nursing Clinical Reasoning Ability Scale, the experimental group scored significantly higher than the control group ($P < 0.05$). ③ Satisfaction with the teaching platform: The overall satisfaction score in the experimental group was 9.08 ± 0.85 , significantly higher than that of the control group (7.62 ± 1.03 ; $P < 0.001$), with a greater proportion of students reporting that the platform made surgical procedures more intuitive (41.57% vs. 13.48%) and learning more convenient (37.08% vs. 8.99%). ④ System usability: All dimensions of platform usability scores exceeded 8.4, including system stability (8.76 ± 0.93), operational ease (8.94 ± 0.88), image clarity (8.42 ± 0.97), interaction fluency (8.63 ± 0.91), and richness of learning resources (8.85 ± 0.86). ⑤ Self-assessment of learning outcomes: The proportions of participants in the experimental group who reported significant improvements in aseptic technique skills, surgical collaboration ability, and postoperative observation skills were 88.76%, 86.52%, and 77.53%, respectively, all significantly higher than those in the control group ($P < 0.05$). Additionally, digital assessment scores on the platform showed a significant positive correlation with traditional OSCE scores ($r = 0.754$, $P < 0.01$). **Conclusion:** This lightweight VR-OSCE digital teaching platform effectively delivers the core instructional functions of VR-OSCE, demonstrating excellent feasibility, usability, and teaching efficacy in surgical nursing education,

thereby providing a practical foundation for the widespread adoption of digital teaching methodologies.

Keywords

Lightweight Virtual Reality-objectively Structured Clinical Examination (VR-OSCE) Platform, Digital Teaching, Surgical Nursing