ENHANCING CLINICAL JUDGMENT IN NURSING STUDENTS THROUGH DELIBERATE PRACTICE AND VIRTUAL REALITY SIMULATION

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Introduction

In today's rapidly evolving healthcare landscape, the challenge lies in equipping nursing students with theoretical knowledge and ensuring they possess the practical skills essential for real-world clinical scenarios. Traditional didactic methods, though foundational, often fall short in preparing students for the unpredictable nature of clinical settings. Consequently, there's a pressing need for innovative teaching methodologies that seamlessly merge theory with practice.

While VR simulation has revolutionized healthcare education with its immersive experiences, the concept of deliberate practice suggests that focused, repetitive training, paired with immediate feedback, can significantly enhance skill acquisition. This study explores the synergistic potential of integrating deliberate practice with VR simulation, aiming to assess its impact on enhancing key NCLEX competencies among second-year Registered Nursing students. By merging the cutting-edge technology of VR with the proven methodology of deliberate practice, this research endeavors to chart a new course in nursing education that promises a harmonized blend of theory and tangible clinical acumen.

Objectives

- **Assessment of Integrated Training:** To evaluate the efficacy of combining deliberate practice with Virtual Reality (VR) simulation in enhancing the clinical judgment and skills of second-year Registered Nursing students.
- **Competency Enhancement:** To determine the impact of this combined approach on students' performance in critical NCLEX competency areas, namely Health Promotion and Maintenance, Physiological Integrity, Psychosocial Integrity, and Safe & Effective Care.
- **Comparison with VR-only Approach:** To contrast the performance outcomes of students exposed to deliberate practice combined with VR simulation against those who undergo VR simulation training alone.
- **Validation of Clinical Judgment:** To explore the potential of VR, especially when coupled with deliberate practice, as a toolset for validating and measuring student clinical judgment.
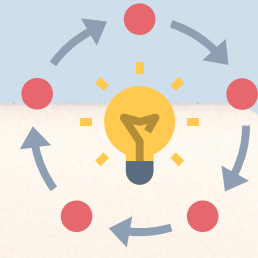
Methods

- **Study Design:** A randomized controlled trial was employed to compare the impact of deliberate practice coupled with VR simulation against a control group exposed to only VR simulation.
- **Participants:** Eighty second-year Registered Nursing students participated in the study. They were randomly allocated into two groups:
- **Intervention Group (n=40):** Students exposed to deliberate practice exercises followed by VR simulation.
- **Control Group (n=40):** Students who engaged only in VR simulation.
- **Apparatus:** The Oxford Medical Simulation's virtual reality platform was utilized for the study. This platform was chosen due to its comprehensive literature-supported feedback system, designed by a team of nursing and physician educators in line with international standards of practice.
- **Procedure:** All participants undertook a single VR simulation scenario, with an average completion time of 30 minutes. Before the VR simulation, the intervention group engaged in deliberate practice sessions designed to enhance their clinical decision-making skills. The control group did not participate in these sessions.
- **Data Collection and Analysis:** The Oxford Medical Simulation (OMS) system automatically generated feedback and performance scores. This system's feedback mechanism, based on comprehensive literature searches and best-practice guidance, provided evaluations of scenarios rooted in the actions or inactions of learners. The feedback algorithms of OMS are standardized, objective, and devoid of faculty bias, ensuring consistency in feedback and scoring across participants. The scores were then subjected to statistical analysis to determine significant differences in clinical judgment and performance between the two groups.

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Results

A comparative analysis between the intervention group (deliberate practice combined with VR simulation) and the control group (VR simulation alone) yielded the following key findings:

NCLEX Competencies Performance

- Health Promotion and Maintenance: The intervention group demonstrated a notable performance increase, scoring 24.8% higher than the control group.
- Physiological Integrity: Students in the intervention group outperformed the control group by 24%.
- Psychosocial Integrity: A significant advantage was seen in the intervention group, with a performance enhancement of 27.6% over the control group.
- Safe & Effective Care: The deliberate practice and VR combination resulted in a 20.8% higher score for the intervention group compared to the control.

Overall Clinical Judgment:

- Analysis suggested that the intervention group, having benefited from the deliberate practice sessions, displayed a more refined clinical judgment in the VR scenarios compared to their counterparts in the control group.

Feedback Consistency:

- The Oxford Medical Simulation's feedback system exhibited high reliability, with feedback and scoring demonstrating 100% consistency in test-retest reliability, internal consistency, and inter-rater reliability. This ensured that the comparative results were based on a consistent evaluation metric across all participants.
- The results consistently demonstrated the superiority of the combined approach of deliberate practice and VR simulation in enhancing multiple dimensions of clinical competence among second-year Registered Nursing students.

Limitations

- **Sample Size:** Based on 80 participants, the study's findings might not be generalizable to all nursing students or diverse educational settings. A larger sample could offer more comprehensive insights.
- **Single Virtual Reality Platform:** The exclusive use of Oxford Medical Simulation's virtual reality system might mean that results are specific to this platform's design and feedback algorithms. Outcomes might differ with other VR systems.
- **Geographical and Institutional Concentration:** If participants were drawn mainly from one institution or region, this could limit the broader applicability of findings. Variabilities in educational backgrounds, cultural nuances, and institutional methodologies might influence outcomes.
- **Short-Term Assessment:** This study emphasizes immediate performance outcomes without delving into long-term retention or skill transferability to real clinical settings. The persistence of observed improvements over time remains uncertain.
- **Feedback Mechanism:** Despite the standardized feedback from the OMS system, the intricacies of clinical judgment might not be entirely captured. Real-world clinical scenarios can present nuances the platform's evaluation metrics may not represent wholly.
- **Intervention Specificity:** The study design makes it challenging to discern the individual contribution of VR and deliberate practice to the observed outcomes. Future studies might benefit from additional control groups that distinctly separate these variables.
- **Technological Familiarity:** Differences in participants' previous VR exposure or technological proficiency might influence their performance, potentially introducing variability in results.
- **Exclusion of Concurrent Educational Strategies:** The study's focus on VR and deliberate practice might not account for the influence of other concurrent educational strategies or interventions the participants might be exposed to.

Conclusions

The findings from this study strongly support the hypothesis that integrating deliberate practice with Virtual Reality (VR) simulation can significantly enhance clinical competencies among second-year Registered Nursing students. The consistent improvement observed across multiple NCLEX competency areas for the intervention group underscores the potential benefits of such a combined educational strategy.

The marked enhancement in areas like Health Promotion and Maintenance, Physiological Integrity, Psychosocial Integrity, and Safe & Effective Care reaffirms the importance of experiential, focused training in complementing the immersive experiences offered by VR. This synergy between structured, repetitive training and cutting-edge technological immersion appears to provide a comprehensive approach to building refined clinical judgment.

For the healthcare simulation community, these findings could have broader implications. The integration of deliberate practice into VR simulation paradigms might be a pivotal step in further bridging the gap between theoretical knowledge and tangible clinical acumen. As healthcare education continues to evolve, harnessing the combined power of established training methodologies with innovative technologies could be the key to producing healthcare professionals who are not only knowledgeable but also skilled, confident, and adept at navigating the complexities of real-world clinical scenarios.

Recommendations

- **Expand Sample Diversity:** Future research should aim for a diverse participant pool, drawing from multiple institutions and regions, to ensure that findings are widely applicable across various educational settings and cultural backgrounds.
- **Evaluate Multiple VR Platforms:** To ensure a comprehensive understanding of the potential of VR in nursing education, subsequent studies should explore and compare multiple VR platforms, analyzing their specific features, feedback mechanisms, and overall efficacy.
- **Longitudinal Studies:** To gauge the long-term impact of deliberate practice combined with VR on clinical skills retention and real-world applicability, longitudinal studies tracking participants over extended periods are recommended.
- **Refined Study Design:** Future studies could benefit from more nuanced experimental designs that dissect the individual contributions of VR and deliberate practice. This would provide clearer insights into the relative benefits of each educational strategy.
- **Integration with Current Curricula:** Educational institutions should consider integrating VR simulations and deliberate practice into their standard curricula. The benefits observed suggest that such an approach could significantly enhance student preparedness for real-world clinical scenarios.
- **Ongoing Technological Training:** Given the potential variability in technological proficiency among students, institutions should offer regular training sessions to ensure all students can efficiently utilize and benefit from VR platforms.
- **Collaboration with VR Developers:** Close collaborations between educational institutions and VR developers can lead to the creation of tailored simulations that cater specifically to the identified needs and challenges within nursing education.
- **Broaden Research Scope:** Extend research to explore the combined benefits of deliberate practice and VR simulation in other areas of healthcare education beyond nursing to understand its potential impact on various healthcare professions.
- **Ethical Considerations:** As with all research involving human subjects, future studies should thoroughly address all ethical considerations, ensuring participants' well-being and data privacy.
- **Feedback Enhancements:** Given the potential nuances missed by standardized feedback systems, future VR platforms should incorporate advanced AI and machine learning algorithms capable of capturing and evaluating intricate clinical judgments and decisions.