Virtual Reality Cleanroom Suite Introduction Video on Students' Knowledge and Confidence during USP 797 Simulations

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Background & Objectives

- Use of virtual reality (VR) simulation as a teaching tool is gaining popularity due its potential influence on students.[1]
- Kane-Gill and colleagues recommend creative incorporation of VR into pharmacy education.[2]
- Objective: This study aims to assess the impact of an introductory VR simulation video prior to second-year students USP 797 cleanroom in-person activity on their knowledge and confidence.

Methods

- During this cross-sectional study, participants were provided a pre-survey with knowledge and confidence assessment, then randomized into two groups.
- The control group was provided standard course materials while the VR group was additionally provided a VR simulation. (Figure 1)
- Data analysis was performed with SPSS 28.0.1.1. The total knowledge assessment scores (10 points) and confidence (scale of 0-100) were scored and displayed with means and standard deviations.
- Each knowledge question was categorized as binary (correct and incorrect), then presented as percentage of students who correctly answered each question.
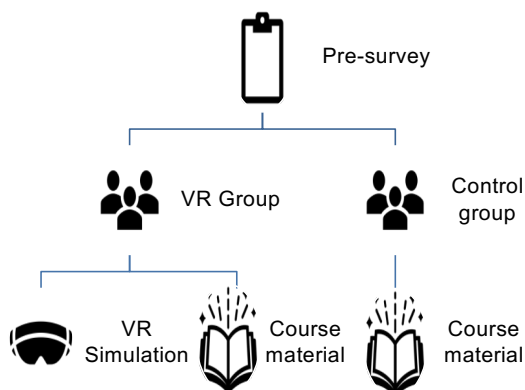

Figure 1. Participant Cohorts and materials

Results

- Of the 98 students completing the class activity, 19 consented to the study. After randomization, each group was majority female, 57.1% for the VR group (n=7) and 66.7% the control group (n=12). Majority reported no cleanroom experience prior to the study, 100% and 83.3%, respectively.
- Students assigned to the VR group demonstrated improvement in 8 knowledge questions, whereas the control group cohort improved on 6 questions. Due to the limited enrollment, comparison statistics could not be reliably determined (Table 1).
- VR group reported lower pre-assessment confidence than that of the control group; however, self-reported confidence was similar after the classroom activity (Table 2).

Table 1: Student knowledge assessment comparison

	VR Group		Control Group	
	Pre-knowledge assessment (n=7)	Post-knowledge assessment (n=4)	Pre-knowledge assessment (n=12)	Post-knowledge assessment (n=5)
Q1	100%	100%	100%	100%
Q2	42.9%	75%	58.3%	100%
Q3	42.9%	50%	33.3%	80%
Q4	28.6%	100%	91.7%	100%
Q5	14.3%	100%	41.7%	20%
Q6	42.9%	100%	58.3%	100%
Q7	85.7%	75%	91.7%	100%
Q8	57.1%	100%	50%	80%
Q9	85.7%	100%	100%	100%
Q10	57.1%	75%	75%	20%
Total Knowledge score Mean (SD)	6.33 (0.8) n=7	8 (1.2) n=4	7 (0.7) n=12	8 (0.7) n=5

Virtual Reality Training video:

https://youtu.be/sejhdWy_Usw

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Results

Table 2: Student self-reported confidence comparison on a score of 0-100

Mean (SD)	VR Group		Control Group	
	Pre-assessment Confidence (n=6)	Post-assessment Confidence (n=4)	Pre-assessment Confidence (n=12)	Post-assessment Confidence (n=5)
1. Garb appropriately to USP 797 standards	26.17 (33.2)	81.75 (12.8)	42.58 (24.1)	81 (21.3)
2. Prepare the primary engineering control	12.5 (18.9)	58 (42.1)	36.82 (25.6)	63.2 (37.9)
3. Sterile compounding technique	33 (25.3)	76 (16.4)	50.33 (28.3)	80 (23)
4. Final preparation visual inspection and verification	30 (25.3)	83 (4.7)	47.83 (31.1)	85.4 (20)

SD= Standard Deviation, VR = virtual reality

Discussion & Limitations

- All students showed growth in knowledge and confidence in their respective groups.
- No comparison data or predictive statements can be drawn due to a low sample.
- Additional data collection in future groups is warranted.
- The use of VR as a teaching tool should be further explored while considering this study's limitations.

Implications

- Implementation of the virtual reality technology is a feasible teaching tool utilized to introduce students to the cleanroom prior to their in-class activity.
- Future larger studies may distinguish between standard teaching tools and virtual reality tools.

References

1- Hoffman H, Vu D. Virtual reality: teaching tool of the twenty-first century?. *Acad Med*. 1997;72(12):1076-1081. doi:10.1097/00001888-199712000-00018

2- Kane-Gill SL, Smithburger PL. Transitioning knowledge gained from simulation to pharmacy practice. Am J Pharm Educ. 2011 Dec 15;75(10):210. doi: 10.5688/ajpe7510210. PMID: 22345729; PMCID: PMC3279027.