

# Virtual and Augmented Reality for Clinical Pharmacy & Community Health Education

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## Objectives

To enhance students' overall learning experience by implementing immersive virtual reality (VR) and augmented reality (AR) for teaching disease knowledge, clinical practice, and patient consultation skills.

## Summary of Work

Students	Number of Students	Year of Study	AR	VR	Background	Period
Pharmacy	54	3	Yes	Yes	Conducted in a 3 units pharmacy course : PHAR 3413	Fall 2018
All Faculty of Medicine disciplines + Social Work	135	1 - 4	Yes	N/A	Conducted in 4 Service-learning preparatory training workshops	Summer 2018

Modules	1	2	3	4
AR	Post Stroke : Patient's Health Background	Post Stroke : Patient's Medication Pattern	COPD : Patient's Health Background	COPD* : Patient's Medication <i>*Chronic Obstructive Pulmonary Disease</i>
VR	Heart Failure	Thromboembolic Disorder	ST-Elevation Myocardial Infarction	

Implementation	AR	VR
Content Viewing	 <p>AR viewing in Service-learning training workshop</p>  <p>AR viewing in pharmacy course</p> <p>Students had to download an AR scanning app on their mobile devices to scan and view augmented items on printed or projected photos. The items included audios, texts, drugs photos, and patient health information for students to investigate and discuss with peers.</p>	 <p>360 degrees video</p> <p>Instead of using head mounted devices for watching VR videos. We modified virtual reality viewing format to 360 degrees spherical videos for students to watch on computers before class.</p>

## VR - Results & Findings

Pharmacy year 3 students were the only group to experience VR learning activities. We observed significant improvement on their' learning outcome according to their pre (n=38) and post (n=33) learning self evaluation.

<b>+4.6%</b>	<b>+27%</b>	<b>+20.5%</b>	<b>+21.8%</b>
Claimed the modules supported authentic learning	Understanding of heart failure	Understanding of Thromboembolic Disorder	Confident to provide consultation to patients

## AR - Results & Findings

We observed unsatisfactory responses of using AR for learning from the students. Furthermore, we only asked the workshop students to conduct a retrospective AR evaluation while asked the pharmacy students to conduct a pre and post course AR evaluation.

Students attended the workshops (n=135)	<b>41.7%</b>	<b>44.7%</b>	<b>62%</b>
	Claimed AR was useful for case discussion with peers	Were satisfied with the use of AR in workshops	Were positive on using AR for teaching & learning activities
Pharmacy students Pre (n=50) Post (n=44)	<b>-16%</b>	<b>-27%</b>	<b>-18%</b>
	Disagreed that AR was useful to enhance learning	Disagreed AR supports authentic learning	Disagreed AR develops an immersive learning experience
			<b>+4%</b>
			Improved confidence to give a consultation to a post stroke patient

*\*Many complained the technical issues on using the mobile app in lecture hall and technical issues while scanning projected photos*

## Conclusion

We have learned from students' feedback and responses on using both technologies for teaching and learning activities. Improvements on content and technical aspects are necessary for betterment when we apply the same implements in the future.