



## Improving Skill Development for Paramedics through Mixed Media Visualisation via 3D Printing and an Augmented Reality App

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### **Abstract**

Evidence suggests that employers believe that higher education graduates have skill gaps; employers are also not convinced that higher education is using approaches to learning and teaching that will efficiently resolve these gaps. Further reports indicate that universities need to develop and leverage brain power and skills with our hands, thereby supporting development of new technologies that change day-to-day living. Visualisation technologies are vital teaching tools for students on their way to being paramedics, in that they can use visualisation to practice, by running procedures with virtual patients. The use of visualisation in teaching is a key means of improving learning and graduate outcomes, particularly as this approach supports the development of practical skills (i.e. performed with our hands). For this project, selected students were provided with traditional 2D images and video, 3D printed instruments and a mobile phone augmented reality game simulation application that they can use to practice skills. To assist in immersion and accuracy a 1:1 scale replication of the actual physical tools (a 3D printed Laryngoscope with Mac Blade and Magill Forceps) was produced. Through the addition of augmented reality markers, these physical models can be tracked and simulated in the virtual game environment. Outcomes of the project show an increase in skill level in placing and elevating the laryngoscope for students that trained with the 3D printed tools and AR app. Future work will look at enhancing the visualisation with virtual reality and stereoscopic imagery, as well as extending to other institutions and other skills.

### **Citation**

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## BACKGROUND

### CQUUNIVERSITY BACHELOR OF PARAMEDIC SCIENCE OVERVIEW

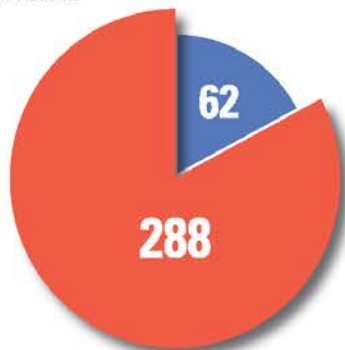
- » Designed to equip students with the skills to become a Paramedic. They develop foundation knowledge in sciences, human body systems, study and research skills and paramedic practice.
- » The program is three years full time with each year broken down into the following focus areas: Pre Clinical, Transition to Clinical and Clinical.



- » High number of Distance Education students

### STUDENT BREAKDOWN 2014

- Internal
- Distance

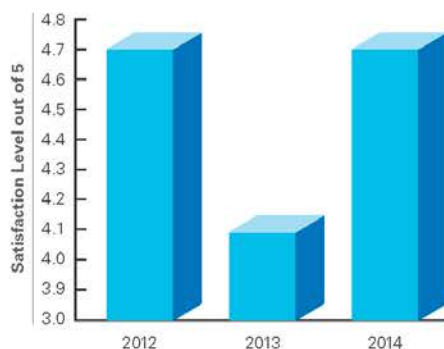


### PROCEDURES AND SKILLS IN PARAMEDIC PRACTICE

- » Students develop an understanding of paramedic care through investigation of the underpinning theory and practice of procedural applications in the discipline.
- » Knowledge and skills are developed through a series of coursework exercises and practical laboratory sessions as well as a one week Residential for distance students.

## PROBLEM

### COURSE EVALUATION



*'I believe that because this course is a 'skills' learning course, that there should be a way for us to actually get more time doing skills. I feel that as distance students we are at a severe disadvantage because we spend 5 days doing them in the middle of term and then don't do them again until we hit our placement.'*

*'There is no substitution for experience. Could the school look into either some kind of software or equipment that we could be supplied with so that we can at least go through the motions of doing the skills?'*

*'I believe that my confidence in performing the procedures and skills could have been improved with a little more 'hands-on' time.'*

*'I feel as an external that I am missing out – they do scenarios every week, I did one or two during res school.'*

*'Studying by distance you can read the skills and kinda do scenarios but it's hard to get feedback and to know if what you're doing is still right.'*

## PURPOSE

To provide more 'hands on' skill practice to students, as well as increase overall skill acquisition and retention, focusing on Laryngoscopy.

## PROPOSED INTERVENTION

- » 3D printed Laryngoscope and Magill Forceps provided to Distance Students ahead of the week 8 residential school.
- » Smartphone/Tablet application developed for Augmented Reality training.
- » Students use app and printed items to practice foreign object removal on a virtual 3D patient during semester.
- » App helps students develop correct technique through visual and auditory feedback: as the procedure is completed (red/green areas and notification noises).



## RESEARCH METHOD

- » 3D objects sent to a random subset of student cohort.
- » Pre-test performed on all students prior to residential school to assess skill competency.
- » Standard training provided to all students.
- » Intermediate test performed on all students to assess skills level.
- » Non-selected students provided with extra training using tools during residential school.
- » Post-test for final skills level.



## EXPECTED RESULTS

- » Students using the 3D objects and app to perform better on the pre-test.
- » Selected students will require less 'time on task' teaching at the Residential school.
- » Overall improvement for all students in the Post-Test for final skills level.

RESEARCH in association with

