

# HAVING ISSUES WITH THE REAL WORLD? WHY NOT TRY THE VIRTUAL?

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## BACKGROUND

Some of the challenges associated with conducting large undergraduate laboratories are the costs of materials and demonstrators, inadequate instrumentation and time restrictions. Students are often rushed through the laboratories and do not have the opportunity to carry out all aspects of a practical nor to reflect and assess the significance of the data they are collecting. This generally leads to a lack of understanding of the techniques used and an inability to link theory to the experimental underpinnings which are the essence of laboratory classes.

## DESCRIPTION AND AIMS

In order to provide students with a more satisfactory and engaging laboratory experience, we have designed a virtual laboratory (vLab) to teach the use of molecular techniques. These techniques analyse genetic changes that lead to disease using PCR, gel electrophoresis and the mapping of family pedigrees. The lesson was designed using the Smart Sparrow Adaptive eLearning Platform which is able to monitor the student's interaction in real time to offer them remediation based on their specific individual interaction and provide us with information about individual student's progress and areas of common misconceptions. The aim of the research is to determine whether integration of vLabs can be used to improve students' understanding of theory, experimental design and for them to gain technical skills. It seeks to determine whether the adaptive feedback provides sufficient support and guidance for students to be more independent learners.

## DESIGN AND METHODS

The lesson was deployed to 950 science and 300 medicine students at the University of New South Wales. The vLab was complemented with the real lab for the science students while the medicine students only experienced the vLab. The effectiveness of the vLab was measured using directed questionnaires with a five tiered Likert scale and by closely analysing the progression through the vLab using the analytics tool in the Platform.

## RESULTS

The majority of all the students found the vLab to be a positive experience. It allowed them to understand the techniques covered in the lesson more thoroughly, revised their understanding of PCR from the lectures and enabled them to practice the experiment using the simulations without the fear of failure. The students also indicated they enjoyed being able to carry out the vLab at their own pace and the instant feedback they received for questions. About 50% of the medical students stated that they would also like to have hands-on experience with these labs.

## CONCLUSIONS

Current data suggests that students' learning and satisfaction can be augmented by having a blended approach that combines the authentic wet lab experience with the support of the vLab. Having a basic understanding of the techniques before attempting the wet lab allows them to perform more effectively and confidently in the real lab. Therefore, vLabs should be integrated with the real labs where possible.

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