

# ANALYSIS OF STUDENT BEHAVIOURAL PATTERNS IN THE USE OF A VIRTUAL LABORATORY: A COMPARISON OF COHORTS FROM TWO DIFFERENT DISCIPLINES

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## BACKGROUND

Virtual laboratories are learning tools that are used to prepare students for downstream “live” laboratory tasks. They are intended to provide students with computer-simulated experimental experiences to support and enrich the learning experience in the corresponding real-life situations. However, prior research in this area in regard to student learning styles using virtual labs and between different cohorts is limited.

## AIMS

To analyse online data retrieved from a virtual pharmacology laboratory module used by science and pharmacy student cohorts in order to determine how students engage with the module.

## DATA COLLECTION

We collected detailed information regarding student interactions with the virtual lab experience, which was analysed and then compared across the two cohorts.

## DESIGN AND METHODS

The virtual pharmacology laboratory was based on experiments that tested the effects of increasing drug concentrations on muscle tissue contraction to determine drug potency. Students worked in groups of three, with pharmacy students in first semester (53 groups) and science students in second semester (55 groups). Students completed the task within practical class time, but without instruction by the academics or tutors present in the session. In addition to recording the time taken to complete the module, the online computer server also recorded all mouse-click events that occurred in real-time, such as selection and use of equipment, preparing drug solutions and constructing graphical plots. The two cohorts were compared on the time taken to complete the module (one-way ANOVA), and on the frequencies of errors committed by students during the module (two-way Fisher's exact test).

## RESULTS

Science students completed the overall task within a significantly shorter duration than pharmacy students. However, pharmacy students acquired individual key objectives using the correct experimental approach, while science students tended to exploit shortcuts to achieve these objectives. Errors committed by students included incorrect use of laboratory equipment (pipettors, organ baths), inappropriate preparation of materials needed to generate expected outcomes (drug solutions and diluents), and failure to adhere to the standard protocol that should be utilised to obtain plots and pharmacological data. These errors were generally significantly more frequent in the science cohort as compared to their pharmacy counterparts.

## CONCLUSIONS

Science students are willing to take shortcuts to complete virtual laboratory tasks, whereas pharmacy students are more methodical and less likely to take risks in their approach. In the coming semesters, we aim to show these data to the science students as an informed teaching practice guide, in order to enhance our teaching of practical-based material.

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