Virtual laboratories as an extension of practical training in pharmacology

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Introduction. Substantial increases in student-to-staff ratios combined with restricted timetabling for laboratory practical classes have the potential to impact upon student learning. Preparing students for these sessions using a Virtual Laboratory Practical Class (VLPC) that closely emulates the real life practical may be an effective, modern method of increasing student learning of critical practical skills and more efficient and timely completion of tasks.

Aims. To design and test a VLPC for teaching organ-bath-based practicals to second year undergraduate pharmacology students.

Methods. The VLPC was developed using Javascript Sproutcore framework to generate a web-based application supported by commonly used internet browsers. The program requires students to (1) prepare serial drug dilutions, (2) measure drug-induced smooth muscle contraction in an organ bath apparatus, and (3) plot and analyse the acquired data and then submit their resultant work online. Students were divided into two groups, of which only one was provided access to the VLPC before the real laboratory session. Surveys were conducted to gauge student perception and understanding of the laboratory experiment, and performance data were collected by measuring student completion times during the live task.

Results. Students exposed to the VLPC reported a small but significant ($P<0.05$) increase in their confidence in successfully completing the live practical experiment. There was a significant improvement in the performance of student groups containing members who completed the VLPC prior to the live lab class, where a reduced mean time ($P<0.005$) and a decreased variance in student completion times were both observed.

Discussion. The data collected thus far indicate that the VLPC may be an effective remedial or standardizing tool by increasing student awareness, confidence and performance when engaging in practical laboratory experimentation. Future direction will be geared towards new modules that include different experiments with significantly enhanced graphical and intuitive properties.