

Learning gains of students in differing delivery modes of physiology laboratory classes

Kay Colthorpe, Yit Chiun Lim, Louise Ainscough and Stephen Anderson

School of Biomedical Sciences, Faculty of Medicine, The University of Queensland, St Lucia Queensland 4072, Australia.

Laboratory class teaching is considered a central component of science education, as it provides opportunities for students to both reinforce their content knowledge and to develop skills in scientific reasoning and methodologies. The onset of the COVID-19 pandemic shifted much of university teaching online, with the reduction in face-to-face laboratory classes having a significant impact on physiology education. As the pandemic progressed, Australian educators were encouraged to return to face-to-face delivery. However, many students are unable or unwilling to attend campuses. In response, many laboratory classes are being delivered in dual modes, with some students having face-to-face classes while others are accessing equivalent classes online. Each mode presents unique challenges to teaching and learning, particularly when attempts are made to replicate laboratory classes in each mode. This study evaluated students' perceptions of the learning gains they achieved from laboratory classes in alternate delivery modes.

Consenting second year biomedical science students undertaking 'Systems Physiology' enrolled either in an internal (n=341) or external (n=117) delivery mode. The course has an established blended design, with theoretical content delivered online in 10 topic modules, each supported by a 2hr 'lectorial'. Theoretical content was assessed in three online quizzes and an end-of-semester examination. The course also incorporated a series of inquiry-based laboratory classes (Colthorpe et al, 2017) delivered either face-to-face (internal mode) or online via zoom (external mode). For laboratory assessment, students worked in small groups to produce an annotated bibliography and to design and present an experiment proposal. Internal students undertook their experiment and analysed the data, whereas external students analysed experimental data generated by students in a previous year. All students then completed an individual laboratory report based on their analysis. Through open-ended questions, students were asked to identify the learning gains they achieved from the laboratory classes. Their responses were subjected to a deductive thematic analysis (Braun & Clarke, 2006) against a framework designed by Brinson (2015).

Students in internal mode reported that they gained practical skills in manipulative techniques and data acquisition, gained an appreciation of the inquiry process and developed communication skills in scientific presentations more often than those in external mode. In contrast, students in the external mode more frequently reported that they gained inquiry skills, specifically in the formulation of aims and hypotheses. Despite these differences, the academic performance of students in each mode did not differ across all laboratory assessment tasks. These findings suggest that different class delivery modes present unique opportunities for student learning. Although students appear to cope well with the differing delivery modes, those studying in external mode may need targeted support to assist development of specific skills.

Contact email : k.colthorpe@uq.edu.au