



Laboratory practical experience: an innovative and distinctive approach to student learning

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Abstract: *One major problem identified a few years ago among our biological science students was a general lack of good practical laboratory skills. Although teaching laboratories were offered during their undergraduate programs, not all students were fully achieving the practical competency required later on in their studies and/or in their career as scientists. An analysis of the way they were trained in undergraduate laboratories identified a few issues, such as the pair/group organisation or the lack of a sustained and repeated exposure to practical exercises that could be related to this lack of competency. To solve these issues and provide undergraduate science students with good practical and theoretical laboratory skills, the authors have developed and implemented at Griffith University an innovative "competency-based" laboratory course which is offered to 2nd year students enrolled in different programs including Bachelors of Science, Biomedical Science, Biomolecular Science and Forensic Science. This course is based on the full "hands on" approach where students are exposed individually and more intensely to a variety of practical exercises in selected disciplines within the biological science arena, including biochemistry, molecular biology, cell biology and microbiology. Students attend a set of scheduled laboratory sessions per week and their progress, from one exercise to the next, is dependent on students being judged to be competent at performing the exercise. Students have time to repeat laboratory exercises until the required competency is achieved, although, this has to be achieved within set notified time frames.*

To enhance students' ability to successfully complete each lab session we advise the students to prepare for classes by reading the background material in the lab manual and the relevant sections of the recommended text and any other recommended resource material. However, despite these recommendations, only a small percentage of students arrive at the labs prepared, while the majority are completely unprepared. The students, who prepare before coming to the lab, display better comprehension of the exercises but still lack familiarity with procedural expectations. Once they are in the lab, students are faced by many challenges, including the so called "cognitive dissonance", simply too much information and focus on too many tasks, from correctly performing the required tasks to the understanding of the principles behind the procedures they are using.

To ensure students are appropriately prepared for classes, we are developing an interactive pre-laboratory resources tool. This tool is primarily a collection of visual and audio presentations directly related to the laboratory experiments and covers both practical and safety related concepts. Theoretical principles of the experiments are also presented along with a short selection of questions to test comprehension prior to attendance. These tests are linked to Gradebook and participation in laboratories is permitted only on completion of the appropriate prelab. By presenting information relevant to laboratory sessions in a flexible learning format prior to participation, it is expected that student learning outcomes will improve and that they will engage in more active, deeper learning which will allow them to transfer knowledge gained in class to professional life skills.