



New Ideas for Motivating and Engaging Science Undergraduates in a Context-Based Learning Environment: Enhancing the Transition From University Classroom to Professional Practice.

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Abstract: *Textbook-based instruction with a strong focus on comprehensive coverage of content delivered in a traditional lecture format has been the mainstay of most undergraduate medical microbiology teaching approaches. Laboratory classes, when conducted, are often an add-on and as such students view as disparate what should be integrated components. In developing a capstone unit in the Medical Laboratory Science program at QUT we have implemented a number of strategies which have bridged the gap between the lecture 'content' experience and the practice of medical microbiology. As a result we have seen not only a transformation in the learning experiences of our students, but in the way we teach as well. To begin with, the objective is not to cover every aspect of content, but to ensure that the students connect in such a way that they are both informed and engaged. Underpinning this strategy is the development and refinement of critical thinking and complex reasoning skills to a high degree. Both are important for these capstone students if they are to successfully transition into professional clinical practice, industry or research where such skills are not only highly valued, but an integral part of daily work practices.*

A formal lecture format where facts are conveyed in a one-dimensional way has been replaced by an informal tutorial-style setting where students are encouraged both to answer questions and to ask questions related to the topic under discussion and to the case scenario(s) which are posed. Case scenarios reinforce and challenge the student's fundamental knowledge and understanding of medical microbiology while promoting critical-thinking and complex reasoning skills. One novel approach is the use of a "role playing exercise" where students assume the role of a general practitioner and the lecturer is a patient in their consulting room. This exercise explores both the key concept of patient presentation and reinforces the role and importance of the diagnostic microbiologist in infectious disease diagnosis. As part of this active learning engagement, students compile a Report Form and in doing so not only sleuth out the identity of the disease-causing agent, but provide recommendations for patient management and further follow-up. Instructor feedback is embedded into the Report Form so that the student can be provided with immediate feedback on their progress. Technology integration is also a valuable part of a context-based learning environment, especially since the workplace is technology-driven. We are developing an electronic resource of digital images/video which visually replicates many of the media, reagents, equipment and techniques used in a routine microbiology laboratory.

In our approach, learning experiences are scaffolded upon the "lecture-laboratory continuum". This integration is supported by a "Learning and Teaching Guide" which is part of the student's instructional toolkit. Underpinning the pedagogy is an emphasis on developing skills and attributes directly applicable to the workplace (e.g., pathology or research laboratories) or career pathways (e.g., postgraduate medicine) of these particular students. Many of the strategies used successfully in our approach could be readily translated to other science streams