

Conceptualising Immunology: Using a Flipped Classroom Approach to Enhance Student Engagement and Learning

Background and Aims: In a traditional Pharmacology lecture course, students are exposed to new information and theories in class which they are then required to conceptualise and apply during independent study time. This is not a pedagogically sound approach to learning as it encourages students to be passive note takers during lectures and often leads to a surface or strategic approach to learning if they are unable to grasp the complexities of the underpinning concepts on their own (1). The flipped classroom switches this format around to enable students to acquire new facts in their own time and be supported in exploring the relevance of their learning through peer and tutor-led class exercises (2). The approach was first pioneered in American High Schools as a means for students to learn in a way and at a pace that was meaningful and relevant to the individual. The potential for this in Higher Education was recognised and piloted in the teaching of physics with dramatic improvements in both student engagement and learning as determined by benchmarking tests (3). Observations that our own students were struggling with the ability to conceptualise the 'bigger picture' when given a series of lectures on the immune system, led us investigate this alternative teaching format.

Summary of work: The flipped approach was adopted for a core 7-lecture unit being taught to 170 2nd year Pharmacy and Pharmacology UG students. Video recordings of the factual content were made available to students prior to the class, to work through at their own pace, along with a range of online self-test quizzes and exercises. In class, students completed case study based exercises in small groups, enabling them to discuss and apply the knowledge they had gained. Class discussions highlighted the key learning points and addressed any questions or misconceptions. Each weekly case study built upon the last, so by the end of the unit topic 1 had been covered 7 times, topic 2, 6 times and so forth. 4 students were recruited on an e-learning project to review the online materials and provide specific feedback on threshold concepts which then helped to inform the design of the case studies. The students also researched further resources setting up a Facebook study group for the unit.

Outcomes: An in-class survey midway through the teaching and another at the end revealed that 85% of students preferred the flipped teaching format over traditional lectures with the main advantage being the ability to learn and scaffold the material as they went along, highlighting how each lecture interconnected with the previous ones. Although the overall impact on the average exam mark was small, it was evident from the structuring and detail in their answers of a much clearer conceptual understanding of the topic.

Discussion and conclusion: Using the flipped approach has resulted in an enhanced engagement of students with the material and with their learning. Classes are more interactive and the students have demonstrated a much deeper approach to learning through the ability to share their knowledge in peer discussions and have developed the ability to apply their knowledge to pathological and pharmacological scenarios. Given that the approach was developed in physics the extension and transferability of this approach to other topics and disciplines is clearly evident.

References:

1. Race, P. (2007). *The Lecturer's Toolkit*. London, Routledge pp 4-5.
2. Tucker, B. (2012). *The Flipped Classroom*. <http://educationnext.org/the-flippedclassroom/>
3. Bates, S. & Galloway, R. (2012). The inverted classroom in a large enrolment introductory physics

course: A case study.
http://www.heacademy.ac.uk/assets/documents/stemconference/PhysicalSciences/Simon_Bates_Ross_Galloway.pdf