INTEGRATED, CONCISE, MOBILE AND INTERACTIVE: ADAPTING E-LEARNING MODULES TO DIFFERENT DISCIPLINES AND CONTEXTS

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ABSTRACT

We have developed a series of online modules to support students, implemented in physics, mathematics and chemistry, with cohorts from first to third year. Usage analytics, surveys and interviews show that students actively engage with these resources. Our online modules utilise HTML5 to provide interactive elements, video, imagery, text, audio and formative quizzes in an integrated, concise and mobile format. We had a variety of reasons for implementing these modules based on the needs of our disciplines and students. We all recognised the availability and effectiveness of simulations and animations within our disciplines, and the efficacy of short activities incorporated into courses to provide formative assessment and feedback. We also recognised the ubiquity of internet-capable devices in students' habits, and so made our resources viewable on a range of devices (phone, tablet, computer), able to be used whenever and wherever students have the inclination to do some study.

The first implementation, in physics, was for preparation for classes with an emphasis on active learning. The vast majority of students actively engaged with these resources, which were linked to a small amount of bonus assessment. Students indicated substantially higher levels of preparation using these modules than with previous interventions, including assessed preparation based on reading textbooks. The clear preference of students to use their smartphone or other device in preference to reference books drove us to develop a similar quick reference resource to use while in the lab. In extending to other situations, we have applied what we have learned, adopted components, and adapted to the specifics suited to each situation. In mathematics, interactive simulations have been used to highlight the relationship between the behaviour of the physical systems that ordinary differential equations (ODEs) describe and different graphical representations of the equations' solutions. Students are able to change parameters and see the solutions evolve in time. Presented in multi-panel format for simultaneous viewing, these visualisations have proved to be valued by students as helping to gain understanding of the target topics. In chemistry, existing high-quality web-based animations/simulations have been integrated into modules that have been structured to promote self-directed learning, adopting a design template proven to engage students.

Students are choosing to utilise these resources that we have developed for a variety of university science andmathematics courses. Designed for initial use as introductions to content (either as preparation for class, remedial revision, or extension activities), the modules are being used extensively by students as aids in the lead-up to assessments.

We plan to develop more modules to facilitate the learning and development of students within our disciplines, and to support other STEM academics developing similar modules. Our presentation will overview our design, show data indicating how students engage with the online activities, and students' behaviours and comments in response to these modules.

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