

Enabling student-engaged learning in a tutorial environment

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IATL academic fellowship - Interim report

Aims and overview.

The aims of the project were to introduce the use of eLearning approaches within a tutorial environment, to enhance student engagement and enable inclusivity. The School of Life Sciences already has a uniquely high contact time tutorial system throughout all three year groups, but we felt that it could be further developed to incorporate our skills in employing computational learning methods. The objectives were to:

1. Allow assessment of where eLearning technologies are beneficial and where they are not
2. Embed an eLearning approach in tutorials, through identification of where technology-content delivery best benefits the learning outcomes
3. Increase interactivity amongst students within tutor groups
4. Enable staff to dynamically assess student comprehension and thus maintain engagement for the whole tutorial
5. Involve students in the running of teaching by gaining their input and ideas (students as producers)

Following IATL feedback of our project we have paid special attention to disseminating the findings. So far we have done this in Academic and Teaching Life Sciences meetings, and will also do this at the Teaching and Learning Showcase in the Spring term 2015.

Project management and defining the project team.



The teaching team was Miriam Gifford, Kevin Moffat, Lorenzo Frigerio, and David Roper (who took over Jim Beynon's tutorial group since Jim retired to Emeritus Professor at Warwick in Oct 2014). In total the tutorial groups consisted of 20 2nd year UG students.

Parm Jootla (who replaced Ruth Bradley as our eLearning specialist) and Rob Love (both SLS ITS) agreed to provide technical advice and hardware delivery/setup (hardware and ITS time is paid for by SLS). We also had advice from SLS Educational Strategy Officer Rebecca Freeman (replaced by Annunziata Videtta in Jan 2015).

Recruitment of teaching assistant time was critical to enable delivery of this project and, after interview, we decided on a team consisting of a recently graduated student from Life Sciences (Semina Ploumakis – left in photo) and one eLearning technical specialist (Dr. Judith Brown – right in photo) who had also taught tutorials in Life Sciences. This gave us scope to develop eLearning content whilst also developing it with direct input from a student who had gone through our system.

The project team met weekly from July-Sept as content was being developed by Judith and Semina, and then biweekly from Oct-Jan as content was delivered to students. We particularly project-planned the hardware roll-out (scheduled for the first day of term) and to the first tutorial using them (where Judith/Semina/Parm rotated around the four teaching offices to offer advice and trouble-shoot where necessary). We set goals (take the four existing 'research led' tutorials (where student groups rotate around the four academic teachers) and a paper deconstruction tutorial (which all Y2 students take) and adapt them using eLearning methods.

At the student-facing end the project was managed via our Moodle system, using a dedicated eTutorials module that students and project staff were enrolled in. The students used this to access material, submit work and communicate with each other, the staff and the content.

Determining the optimal hardware and delivering this with training to the students.

After consultation within the project group by our IT team, iPads (16GB iPad Air with wifi connection) were chosen as the delivery device of choice as they had proved to be better at delivering a consistent and quality usage experience across staff who had trialled them. The iPad were better in terms of long term support, whereas some of the competing devices would have a shorter shelf life as other manufacturers do not allow them to be updated regularly and as fully as Apple. We also found the quality of the hardware was better, more durable and more resistance to damage with small knocks. We investigated devices that had styluses and decided that they did not offer a better experience, plus the added danger of the pen going missing was a negative factor. Inside tutor offices wall-mounted TV screens (Sharp 42LD266K/46LD266K) were installed (paid for by SLS). To connect to the screens current spec Apple TV's were deployed since they allowed easy connection to the screen during tutorials (paid for by SLS). The cost of connecting with other types of devices was found to be significantly greater. We will monitor device usefulness as the project continues and make a recommendation as to which devices are likely to offer best value to students at the end of the project, in consultation with our ITS team on support matters.

Within SLS we already have infrastructure in place to manage applications on iPads and to configure and send software, updates and settings remotely. This meant there was already good knowledge in the team to exploit the potential of the device. Upon consultation the project team a number of apps were pre-installed on the iPads. These included subject specific apps for 3D molecular visualisation (e.e. pyMOL) and genomics (e.g. Talking Glossary of Genetic Terms, Human Genome) as well as more general apps for document reading and sharing (e.g. Evernote, Adobe Reader), viewing Flash content on the web (Puffin browser) and interactivity (e.g. Nearpod). A full list of apps with descriptions was developed by Semina, Judith and Parm: see our project web page http://www2.warwick.ac.uk/fac/cross_fac/iatl/funding/fundedprojects/fellowships/beynon/appreviews/.

We paid particular attention to the induction of iPads for students. This was scheduled for the first day of term via communication in Moodle, to give students the most time possible to get accustomed to their new devices. The IT team set up a presentation on how the devices worked and used an Apple TV to allow a live demonstration to take place. We also encouraged the students to try connecting and mirroring their devices so that they were confident and happy to use the technology. We subsequently set up two open drop-in sessions so that they could come and ask questions or bring up any issues that they had found (however these were not needed since the setup was very smooth).

eTutorial content design and delivery.

Four distinct interactive tutorials were designed for four different tutors and the materials were delivered via Moodle. Students rotated around the four tutorials. At the first tutorial there was no assessment (common with other Y2 students) since it allows students to understand what is expected of them and what learning outcomes they can expect. For tutorial slots 2 and 3 students submit a followup assignment via Moodle (~1,500 words of answers/text) (feedback and graded in Moodle), and for tutorial slot 4 students are given feedback and a grade based on their tutorial participation ("flipped classroom model").

***Drosophila melanogaster* developmental genetics (Moffat)**

This involved developing an eBook on the subject of “Ethanol Intoxication in *Drosophila melanogaster*” with students as co-authors. This was to describe the use of the fruit fly *Drosophila melanogaster* as a model system for studying ethanol induced behaviours and based on the theory, experimental procedures and findings from the publication "Arouser Reveals a Role for Synapse Number in the Regulation of Ethanol Sensitivity" by Eddison et al. Neuron (2011). Some book chapters and subchapters contained preparatory materials, including videos and animations, for the students to use prior to the tutorial. Students were asked to produce either a subchapter or to contribute to the glossary or conclusion for their assessed activity. Warwick's Academic Technology team installed a Moodle plug-in for converting the Moodle book into an e-book (EPUB) format compatible with e-book readers such as iBooks for iPad.



Students prepared in advance of the tutorial by viewing online information and videos, reading sections from a subject specific app, and using a worksheet to take them through the process of exploring an online genomic browser. They were then able to work efficiently with this material during the tutorial, led by the tutor.

Genome Wide Association Studies (Gifford)

Apps were chosen to help students to understand how genome wide association studies have contributed to the development of personalised medicine. These apps include: 'The Talking Glossary of Genetic Terms', 'HumanGenome', and 'The human genome at ten'. A worksheet was also created on how to use the GWAS catalog. Students were encouraged to explore numerical data in the tutorial by dynamically exploring the GWAS catalog.



Organelle dynamics (Frigerio)



The aim was to develop an interactive multimedia presentation generated by the iPad app, Nearpod, to describe the functionality of the endoplasmic reticulum and how it is able to maintain its shape. Nearpod allows the tutor to control the iPad content of the session, enabling learning to be clearly focused. In order to increase interactivity and collect feedback to assess learning, polls, quizzes, open-ended questions and the option to sketch on the PowerPoint presentation during the tutorial were added.

Drug discovery (Roper)

The aim was to help students understand the various factors involved in antimicrobial drug discovery. Learning resources consisted predominately of informative videos but the 'Translational Research Solutions' app by Sigma Aldrich was also added which describes the key developmental processes involved in drug discovery and highlights reagents relevant for this research. A 3D modelling app, PyMOL, was implemented to visualise and interact with molecular structures both on the large video screen and on the iPads.



Paper deconstruction (All Y2)

An existing tutorial helping students to explore scientific literature was adapted with the use of online youtube videos and annotation helped to make this material more accessible to students with a variety of different learning styles.

Feedback from the project so far – staff and students.

We will carry out a complete analysis of the feedback for the final report, but here include a brief summary. We are very excited by the positive learning outcomes so far, both from a student perspective and from the staff involved.

Online web-forms were created to get rapid feedback from students for each of the four rotation tutorials specifically, and we also set up a feedback page for staff teaching the paper deconstruction tutorial that all students attended. As a group we have met and discussed this tutorial-specific feedback (Appendix 1). Overall the iPads and apps were of high positive value for all four tutorials and there was a correlation between whether students felt that they (i) understood the tutorial better, (ii) had improved performance, (iii) enjoyed the tutorial more. Students used a diversity of learning materials and appreciated the material/apps as well as the iPad itself. Feedback suggests that use of an iPad is a positive benefit, but that this could be replaced with another device if needed; students did not see the value in sharing one iPad (and neither did staff, this defeats the objective of personalised learning). In discussions, each of the teaching staff found that they enjoyed delivering the tutorials more, could see more precisely how each student was doing, and found that they could assess students more clearly in assignments. There was still a broad range of grades for assignments, but this was in line with student performance across their degree.

We also set up a focus group lunch and obtained feedback on a wider range of questions (summary in Appendix 2). Both the iPads and apps were found to have a very positive impact on student engagement, student learning and students as producers (as was the iPad trial itself).

Timescale and Milestone deliverables with comments.

- **July 2014:** Teaching assistant hired – **complete.**
- **July 2014:** Digichamps: To feed student ideas into the tutorials. This engagement is ongoing as expected, and was strengthened by having a past SLS student involved in the project - **complete.**
- **October 2014:** Release iPads to Y2 UGs in four tutor groups – **complete.**
- **December 2014:** Carry out tutorials (Oct-Dec), with regular feedback from program participants and to the SLS SSLC and staff UG teaching meetings – **complete.**
- **December 2014:** Teaching assistant to adapt program based on feedback and work on Y1 tutorials – the content and ideas have been incorporated into Moodle as we have progressed - **complete.**
- **December 2014:** Feedback from participants to be gathered in focus group style environment – **complete.**

- **May 2015:** Tutorials and feedback continue for second term.

- **June 2015: OUTPUT:** Final reporting and future development plans – in planning stage (e.g. at Teaching and Learning Showcase). We are also about to discuss future plans with IATL and SLS.

- **June 2015: OUTPUT:** Plan to publish findings in the Bioscience Education journal.