

## **Enhancing education using technology**

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### **Background**

This case study describes the value of educational technology and a blended learning approach for enhancing learning outcomes and engagement in undergraduate bioscience degree programmes, and draws on a number of research studies and innovations in the classroom. Use of educational technology is increasing rapidly within Higher Education Institutions but there are many factors to consider when embedding it within curricula and this case study attempts to highlight both the pedagogic advantages of these approaches alongside the challenges students, teachers and institutions may face.

The applicant's work in this area began in 2007 with a HEA funded study on the effectiveness of combining podcasts and mobile assessment (Morris, 2010a) and has expanded into a variety of areas including multimedia resources, virtual learning environments, mobile learning using tablet computers, social media, student voting handsets and video feedback. All work has been thoroughly researched using pedagogic literature, resources from HEA / JISC and practitioner feedback. This case study highlights some of the key findings from using technology with students in a wide variety of learning scenarios.

### **Reasons for introducing this teaching method**

The applicant has deployed educational technology solutions at a variety of levels within the Faculty of Biological Sciences, from individual tutorials with students, through to Faculty-wide implementations. The underlying principle for all uses of technology has been to enhance the student learning experience and provide opportunities for deeper learning, interaction, collaboration and effective feedback (Chickering & Gamson, 1987). With increases in class sizes, the applicant has been searching for effective mechanisms to personalise the learning experience and maintain the strong partnerships between learners and teachers that are essential for effective learning. The applicant is also keen to exploit students' increasing familiarity with technology and mobile devices in social contexts, and harness that in learning situations.

### **Lecturer perspective**

In one-to-one tutorials, technology (in the form of an audio recorder or tablet computer) has proven to be highly beneficial for capturing audio recordings of discussions about draft dissertation or feedback on assignments. These recordings can be immediately sent to the student for later review. In tutorials and practical classes, tablet computers have proven successful for preparing students (building on Knapp et al., 2009), engaging students in deep learning by exploring 3d models of brains, collecting and analysing data and discussing and annotating diagrams. In lectures, audio recordings, lecture capture tools and student voting handsets have proven successful for making effective use of face-to-face contact, freeing students up from slavishly copying down every word heard, to actually listening, thinking, interacting, discussing and obtaining feedback on understanding. In private study, online multimedia resources, tablet computers, social media, interactive quizzes and video feedback have proven successful for supporting students' diverse ways of learning, engendering interest and curiosity about the subject and providing useful and timely feedback on assignments.

Additionally, many of these innovations have been supported by pedagogic studies to provide evidence of effectiveness on student engagement and learning. For example, the study of podcasts and mobile assessments showed that student performance in an examination increased by 6% when provided with educational technology (Morris, 2010a). A study of the impact of online multimedia resources (e.g. video lectures, narration, PowerPoint and weblinks) on student performance also showed significant increases (Morris, 2010b). A study of students' uses of a tablet computer showed very high engagement with the device for learning, use of a wide range of educational tools to enhance learning and significant changes in study behaviour (Morris, 2012). A study investigating lecture capture tools showed that 98% of students valued lecture recordings and interactivity in lectures (Bell et al., 2011). Faculty-wide implementations of virtual learning environment and student voting handsets have been successful, with students enjoying enhanced learning resources, interactivity and feedback on their knowledge (Morris, 2008; Morris, 2010c). The applicant has also led the implementation of lecture audio recordings within the department. A recent survey showed that 94% of students felt that lecture audio recordings were important/very important to their studies (unpublished data).

### **Students' perspective**

Students regularly comment on the quality of the applicant's learning resources, use of technology and innovative approach to teaching. Comments from students indicate that resources assist them with understanding and revision, including *"audio recordings of the lectures have been invaluable to me during my revision as they have allowed me to make full notes for revision purposes, as well as aiding my understanding of the more difficult material"*, and illustrate the value of educational technology in practical classes, for example *"I really enjoyed the neuroanatomy practical class as I felt the use of iPads cleverly appealed to the students whilst allowing us to revise in a new and effective ways"*. Participants in the tablet device research study (Morris et al., 2012) described profound changes in their study behaviour *"Revolutionary, this has changed the way I approach a class, I feel totally prepared as, I get the lecture slides without having to print them, take notes, record, reference and if necessary look things up, all in the palm of my hand... WOW"*. Students also comment on the value of the blended learning approach, understanding how additional resources are contributing to their overall learning experience, for example *"Very engaging, the lecturer seems to really care about what we learnt and how prepared we were for the exams. Many ways of learning helped vary how to learn e.g. Podcasts, using Twitter, another version of the lecture slides, and plenty of questions"*. The applicant was voted the most Innovative Teacher 2011 by students in the Leeds University Union Student Choice Awards.

### **Issues**

Technology is taking an increasingly important role in Higher Education and can enhance student learning opportunities dramatically. Use of technology is becoming much more of an expectation for Higher Education students, and institutions are increasingly aware of the need to respond to students' expectations where it is in the best interests of learning. However, technology provides many challenges for institutions, teachers and students, particularly in the areas of IT competence, rapid pace of change, pedagogic advantage and time investment (see Morris 2010b for a full discussion). Teachers must continually review their learning outcomes and consider the most effective ways for students to achieve these – appropriate use of technology can often prove beneficial provided that it is clearly embedded within the curriculum, explained to students and offers real learning opportunities. Institutions need to be agile enough to respond to new technologies but reflective about their

pedagogic advantages, only investing heavily in solutions which will provide significant learning opportunities for large numbers of students. Technology can result in exclusion for learners who do not have access to necessary hardware or who have special educational needs, and institutions and teachers need to be constantly vigilant about these issues (see <http://www.jisctechdis.ac.uk/> for a full discussion).

## Benefits

Technology has many potential benefits for Higher Education learners. It offers new ways to access resources, interact with learning objects and other learners, reflect on learning and test knowledge and understanding. Technology offers ways for learners to make more effective use of their time and geographical location and it can be hugely beneficial for students with special educational needs. Technology has proven benefits for enhancing students' academic performance, engagement and study behaviours (Morris, 2010a, Morris 2012).

## Reflections

Whilst technology enhanced learning and a blended learning approach are potentially hugely beneficial to students' learning, they can also be detrimental if deployed inappropriately or without proper consideration or understanding. Individual teachers are best placed to determine which technologies or approaches are most suited to their teaching style, learning outcomes or course, in partnership with their student cohort. Institutions have the difficult task of encouraging teachers to discover the pedagogical advantages of technology enhanced learning, providing an appropriate suite of tools for teachers to deploy and providing an excellent and consistent student experience for their learners (see Sharpe et al., 2006 for a full discussion).

## References

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