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University Teachers' Pedagogical Practices in Using Technology-Enhanced Learning: strategies to integrate haptic technologies into undergraduate teaching

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Background

Previous research into the uptake of ICT by teachers in schools has shown that there is often a tension between teachers' traditional practices and the approaches to incorporating new technologies (TEL) within a conventional course (Webb and Cox, 2004). In higher education, the adoption of TEL is often even more constrained because of the requirements to cover many degree topics, teach large student cohorts, meet strict deadlines and for university teachers to keep up with their research as well as teaching commitments. Although there have been many initiatives in HE to adopt TEL since the mid 1970s and to research its effects on the HE curriculum, (e.g. Cox and Lewis, 1978, Laurillard, 1993, Reynolds et al., 2007) there have been relatively few which have focused on the impact on the curriculum delivery itself, its impact on university teachers' practices and how these interrelate with the technology development, the research methods and theories used. The purpose of the curriculum strand of the hapTEl project, funded by the ESRC/EPSRC's Teaching and Learning Research Programme's Technology Enhanced Learning Phase (see http://www.tlrp.org/tel/), involves developing and refining the dental curriculum and associated teaching strategies through a blended learning approach and identifying the pedagogies and pedagogical strategies which can incorporate TEL methods into undergraduate and post-graduate programmes in Dentistry. This paper reports on the results of the first main phase of the project and how the pedagogical strategies and attitudes of the clinical teachers have influenced the methods in which TEL (haptics) is used and the conventional teaching is adapted.

Research Questions

The hapTEL project (http://www.haptel.kcl.ac.uk) has a range of research goals which relate to the technical, curriculum and evaluation strands all of which contribute to the work of the project, however the specific focus of the TEL curriculum work reported in this paper is to address the following:
• To identify the pedagogies and pedagogical strategies which can incorporate TEL methods into the Dental undergraduate programmes;
• To develop cohesive pedagogical and institutional theoretical frameworks to incorporate the uses of 3D and haptic- TEL techniques which extend the affordances of the learners;
• To expand upon Entwistle's (2004) educational research framework and the project's research tools which can then be used by other researchers and curriculum developers to analyse the possible contribution of TEL to post-16 education of professionals.

Methods

Advanced simulation environments that include haptics and computer graphics offer a powerful and flexible medium for teaching that is especially suited to dental education because students can practice fine motor skills in a realistic environment without the ethical issues related to training on patients or on extracted teeth. Recent research into haptics which can provide a variety of feedback mechanisms (vision, touch, sound etc) has shown that these essential manipulative skills can be developed by students for a range of manual tasks (e.g. Visram. Elson and Reynolds, 2006).
The study involves 144 Year 1 university undergraduate dental students; 48 using the haptic devices in the haptic laboratory and the 96 remaining students using traditional phantom heads in the clinical laboratory. A series of pre and post-spatial reasoning, attitude and dental skills tests have been

administered to all students to assess the gross and fine motor skills of both cohorts of students before and after the course, together with video observations throughout the autumn term. Interviews, attitude tests and a focus group discussion are in progress with the teachers to identify their pedagogical reasoning and attitudes towards TEL in the undergraduate curriculum. Additional date being collected include the backgrounds of all the students, the other resources and teaching activities across the programme.

Frame

The analytical framework is based on Entwistle's model (2004) of the wide range of factors which might influence the delivering of a course, the teaching strategies of the teachers and the learning of the students. These include students' entry characteristics, how the course content is organised and what students are expected to learn and understand. This theory forms the foundation for the curriculum analysis and other relevant strand elements.

Research findings

The impact of the research strategies to date includes: rethinking the cohorts to take account of the revision of the timing of the courses, identifying the concepts and topics in which the use of haptics by the students would be most applicable, the implementation of conventional teaching strategies to both haptics and traditional contexts and revising the traditional teaching in the control group to reflect the haptic dental affordances provided for the experimental group. The ways in which these inform teachers' pedagogical reasoning and the implications for research theory, design and analysis will be presented at the conference.

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