Chapter 8.10
Screencasting for Mathematics Online Learning:
A Case Study of a First Year Operations Research Course at a Dual Delivery Mode Australian University

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ABSTRACT

This chapter presents a case study of technology integration to support student learning in a first year operations research course at a dual delivery mode university. The course is taken by on-campus and distance students at the same time. It is shown how both groups are treated the same in this course in terms of provision of course material, access to the course learning management system, and to screencasts of live classes and additional explanations. The only difference between the two groups is the on-campus students' ability to attend live face-to-face classes and to interact with the lecturer. The chapter demonstrates how screencasting is used effectively in online learning. Its objective is to share good practice of technology enhanced learning.

INTRODUCTION

Distance learning in mathematics has changed enormously in the last forty years or so, from an entirely paper-based, isolated student experience, to the provision of online multi-media learning objects and the encouragement of collaborative learning of students in different time zones scattered across the globe (Loch, Reushle, Jayne & Rowe, 2010). Technologies have become available now that were not even dreamt of in the past, with opportunities to use them in new and innovative ways to enhance student learning. This has also meant that the difference in study experience between on-campus and distance students is

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getting blurred, as even traditional universities with only face-to-face enrolments are embracing online education.

This chapter takes a case study approach, describing a first year operations research course at an Australian regional dual delivery mode university ("the university") in which various technological approaches were embedded to enhance the student experience. Some of these technologies are: web conferencing for one-on-one support, where students asking for help were walked through a problem by explaining on a shared whiteboard whilst talking; electronic assignment submission, including trials of digital note pens to enable students to electronically (hand-)write their assignments; and electronic marking of assignments with pen-enabled technology. In this chapter, we will discuss neither of those, but instead focus on screencasting, an asynchronous technology, to effectively support not only distance students but also on-campus students in first year mathematics. A screencast in this context is an audio and video screen capture recording of an instructor's oral and computer-based visual explanation, also capturing electronic writing, for example on a tablet PC. These screencasts are recordings of live lectures, or they are created in response to student enquiries on online discussion groups, or they are short recordings linked to the study material to explain topics students usually find difficult to understand.

The chapter will commence with a discussion of the value of and concerns with lecture recording for on-campus and distance students, summarizing what is now becoming quite an extensive literature base. By placing this in a mathematical context, the use of screencasting in mathematics learning is motivated. This is followed by an overview of where distance education started at the university, to where it is now. It will then describe in more detail the context of the course being investigated, and briefly outline the course material production environment which provides a basis for effective integration of multi-media learning objects. The three ways screencasting is used in the course are then demonstrated and discussed. The chapter will point out implications of technology enhanced teaching, for instance on lecturer workload and training requirements. The objective of this chapter is to share good practice of technology integrated online learning in mathematics, and encourage others who are moving towards online instruction to explore the presented techniques and to go beyond.

BACKGROUND

Traditionally, the lecture model is the most commonly used teaching approach in universities, and this is particularly true in the mathematical sciences. Most current mathematics lecturers would have studied mathematics through face to face lectures and this model is the one they are familiar and comfortable with. However, while lectures accomplish important and valuable purposes (Ayers, 2002), they may not fulfill "learning potential of typical students today", particularly from the Net Generation. These students want interactive approaches, using computers, but also with the lecturer and fellow students (McNeely, 2005). On the other hand, more flexible options should be investigated since many (Australian) university students are of mature age and combine studies with work and family commitments (Phillips, McNeill, Gosper, Woo, Preston & Green, 2007), and students' learning styles and approaches to learning vary (Britain, 2004; Clow, 1998), even between on-campus and distance students (Diaz & Cartnal, 1999).

There is agreement that lectures can be made more effective and accessible for students by recording them (Williams & Fardon, 2007; Laurillard, 1993). While some disciplines lend themselves to the recording of video, for mathematics, in particular, it is vital that the visual component of mathematical explanation is captured together with the lecturer's aural explanations as "writing