Chapter 1

Implementing Educational Technologies:
Capacity Building

Greg Plumb
RMIT University, Australia

ABSTRACT

This chapter explores some of the educational technology opportunities that are available and are likely to become available for providers of engineering education. It uses examples to discuss how some of these opportunities have been realised. It also discusses the challenges faced in implementing new methods of delivering courseware and challenges that may impede the adoption of new methods and may actually work in opposition if not met with adequate support. Framing this exploration are three overarching considerations: imitative or creative uses of technology, off-the-shelf educational products versus custom built products, and support for and resistance to educational technologies.

INTRODUCTION

The technologies and strategies discussed here will be:

- The use of video, and the provision of support for students using video (media annotation tools).
- The use of annotatable text to reduce the need for printing course materials.
- ePortfolios.
- Remote laboratories.
- Collaboration tools.
- Simulations and animations.
- Quizzing tools.
- Virtual reality environments.

BACKGROUND

General advances in technological capability (such as online video) and especially educational technology (such as learning management systems) provide opportunities for continuing advances

in education and the deployment of new and innovative educational models. Some of the opportunities now available in education generally, and in engineering education especially, include the provision of:

- **Flexible Delivery:** Such as learning by listening to video lectures, by reading texts, or by experimenting with simulations.
- **Improved Capabilities:** Such as annotation for pdf documents, media annotation tools for video and other media, and simulations of processes not available through the delivering University or not readily visible.
- **Interactivity:** Such as through enhancing feedback processes while reducing dependency on face-to-face contact where location and time is an essential constraint.
- **Asynchronous Delivery:** Such as through the use of discussion boards, recorded lectures, and videos for laboratory preparation.
- **Authentic Courseware:** Such as by using an ePortfolio to invite industry consultants into student feedback (a work-integrated-learning component), using a collaboration tool for direct consultation into industry.
- **Onshore/Offshore/Online Delivery:** Harmonisation (and equivalence) of courses delivered offshore or online with the same course delivered onshore.

Associated with these opportunities are challenges that must be addressed to achieve optimal outcomes. These challenges are related to the impact of change itself, but they are also a result of the dynamic nature of technological changes, and educational technologies themselves. The challenges centre around:

- **Assuming Students are Technology Capable:** Not all students have the technology capabilities that are sometimes assumed (just because they are young).
- **Compromised Pedagogy:** The delivery of material via educational technology does not ensure it is well delivered - instructional design support may need to be provided.
- **Distinguishing Real from Simulated Environments:** At times 'real' environments cannot be used and simulated environments have to be substituted. Simplified simulations may obscure important issues and falsely increase student confidence.
- **Understanding the Differences between Real and Simulated Environments:** The look and feel of simulated environments may offer only part of the 'real' experience.
- **Access Unreliability:** At times access to educational technology may be compromised by system or network failures. Backup strategies and procedures should be available.
- **Impacts of Technology Changes:** At times technology changes may have unexpected side effects on educational technology applications, compromising their functionality and requiring 'workarounds' that frustrate academics and students (technology changes such as software upgrades, new browsers ...).
- **Technology Failures:** The delivery of educational technology-driven courseware sometimes results in disappointing outcomes because the technical requirements are less well understood than is required; e.g. system speed or capacity may be inadequate, a particular browser may need to be used, a particular sound card may be needed, issues related to computer types and operating systems must be addressed.

Related Content

Peer Evaluation of Master Programs: Closing the Quality Circle of the CDIO Approach?
Peter Munkebo Hussmann, Anita Bisi, Johan Malmqvist, Birgitta Carlsson, Hilde Lysneand Anna-Karin Högfeldt (2012). *International Journal of Quality Assurance in Engineering and Technology Education (pp. 67-79).*
www.irma-international.org/article/peer-evaluation-master-programs/67133

Computational Methods and Technologies: Reflections on Their Impact on Design and Education
Ning Guand Michael J. Ostwald (2012). *Computational Design Methods and Technologies: Applications in CAD, CAM and CAE Education (pp. 412-419).*
www.irma-international.org/chapter/computational-methods-technologies/62960

CDIO as a Foundation for Program Accreditation/Certification in Portugal
António Manuel Cardoso Costa, Ângelo Manuel Silva Martinsand João Manuel Simões Rocha (2012). *International Journal of Quality Assurance in Engineering and Technology Education (pp. 23-33).*
www.irma-international.org/article/cdio-foundation-program-accreditation-certification/67129

Effectiveness of Problem-Based Learning Implementation
Savitri Bevinakoppa, Biplob Rayand Fariza Sabrina (2016). *International Journal of Quality Assurance in Engineering and Technology Education (pp. 46-58).*
www.irma-international.org/article/effectiveness-of-problem-based-learning-implementation/173763

Embedding Communication Skills in the Study of the Discipline
Katrina Falkner (2012). *New Media Communication Skills for Engineers and IT Professionals: Trans-National and Trans-Cultural Demands (pp. 94-114).*
www.irma-international.org/chapter/embedding-communication-skills-study-discipline/64009