

Bringing industry experience into the “classroom” via multimedia flash presentations

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***Abstract:** Providing appropriate context is vital for student learning. An excellent way of achieving this is via case studies of actual engineering projects conducted in industry. If students are exposed to actual engineering projects and the skills / knowledge that are required in order complete such projects, they are likely to be more motivated to learn the associated theory. One way of achieving this is to develop short multimedia presentations of industry case studies that highlight different aspects of engineering practice. The advantage of capturing the case studies in this format is that once they have been developed, they can be used repeatedly and in different contexts. This paper describes the process for developing such case studies and provides an example application in a second year environmental engineering course in the School of Civil, Environmental and Mining Engineering at the University of Adelaide.*

Introduction

Student engagement is widely recognized as being a key to student learning (Bowen, 2005; Carini et al., 2006). Providing an appropriate context within which learning is to occur is vital to achieving such engagement (Esche, 2002). An excellent way of providing context is via case studies of actual engineering projects conducted in industry. If students are exposed to actual engineering projects and the skills / knowledge that are required in order complete such projects, they are likely to be more motivated to learn the associated theory (Schachterle and Vinther, 1996). Consequently, there is a need to increase linkages between engineering theory and industrial practice (Mills and Treagust, 2003, King, 2008).

There are a number of ways of achieving this, including the requirement for work experience, the use of work integrated learning programs, the embedding of industry-based projects in degree programs, site visits and the use of guest lecturers (Foong and Guthrie, 2006, Thomas et al., 2006, Lay et al., 2008, Simcock et al., 2008). In this paper, another approach for increasing linkages between engineering theory and practice is introduced. This approach focuses on the use of online multimedia industry case studies that are linked with particular theoretical concepts.

First, the concept behind the online multimedia case studies is introduced, including the process for their development, followed by an example application in the second year course “Environmental Engineering and Sustainability II” in the School of Civil, Environmental and Mining Engineering at the University of Adelaide, before conclusions and recommendations are provided.

Development of Online Multimedia Industry Case Studies

Background

In this paper, it is proposed that one way of increasing the linkages between engineering theory and practice is via short (5-15 minute) multimedia presentations on case studies that highlight different aspects of engineering practice, both technical (e.g. stormwater system design, bridge construction, foundation design etc.) and generic (e.g. importance of communication skills, teamwork etc.). The advantage of capturing the case studies in this format is that once they have been developed, they

become a learning object and can be used repeatedly and in different contexts with minimal time and effort.

As discussed by Maier (2008a), the use of online multimedia flash presentations provides a means of engaging students in their learning (Figure 1). This is because they create an active learning environment and can provide the relevant context in which learning can take place. As shown in Figure 1, use of the online industry case studies is one way in which context can be presented using this approach, as they are an excellent means of illustrating the theory that is being presented to students with real examples from industry. This way students can see the relevance of the theory to real life engineering, thereby increasing interest in, as well as providing motivation for, learning the subject matter.

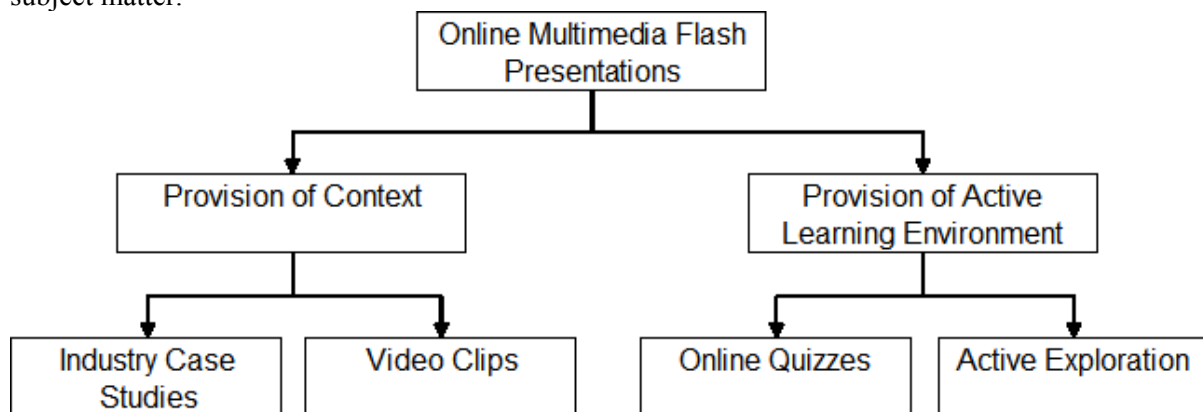


Figure 1: Ways in which multimedia flash presentations can be used to increase engagement (Maier, 2008b)

An example online environment for developing the online industry case studies, which was created using the Articulate® suite of software packages, is shown in Figure 2. As can be seen, students can navigate through the audio-narrated presentations by clicking on the slide titles in the left hand navigation bar (or, alternatively, the thumbnails, if the Thumbnails view is used) or using the controls (forwards, backwards, play/pause) at the bottom of the screen. The presenter is a practising engineer and the subject of the presentation is an actual engineering project, in this case the design of fishways at the barrages at the mouth of the River Murray in South Australia. Such a case study can then be linked with a similar online presentation made by the lecturer on the theory associated with the case study presented by industry.

Development Process

The process for the development of the online multimedia industry case studies is given in Figure 3. This process assumes that Articulate® or a similar software package is used to develop the multimedia flash presentations. Development of case studies in this format requires the industry partner to provide a set of powerpoint slides, a separate audio file for each slide and a photo of the industry presenter. This has the advantage that the imposition on the industry partner is minimal and that the development framework is modular, enabling changes to be made relatively easily.

The first step in the process outlined in Figure 3 involves identification of potential case study topics. In general, the lecturer knows what topics will be covered in a particular course and it is then a matter of passing the list of these topics to appropriate consultants and / or government departments, who can indicate whether they have worked on a relevant case study and if so, whether they would be interested in developing this project into an online industry case study. Once an industry partner has been identified and preliminary discussions about the case study have been held in order to develop a shared understanding of the presentation's purpose and focus, the industry partner can proceed with producing a set of preliminary powerpoint slides. These slides can then be reviewed by the lecturer to see if the key message of the presentation is aligned with the accompanying theory presented by the lecturer.

Fish Passage at the Goolwa and Tauwichee Barrages (06:26 / 06:36) | ATTACHMENTS

Carly Tozer

Outline | Thumbnails

1. Copyright Notice
2. Introduction
3. Feasibility Study
4. Hydrology Assessment
5. Fishway Options
6. Fishway Options
 7. Large Vertical Slot Goolwa 80%
 8. Rock Ramp 1.27 Tauwichee 30%
9. Economic Assessment
10. Recommended Options
11. Selected Options
12. Detailed Design
13. Summary

Stage 1: Feasibility Study

- Assess existing barrage structure
- Assess site hydrology

↓

- Assess suitability of different fishway types for each site

↓

- Assess effectiveness of fishway options
- Undertake economic study of fishway options

↓

- Recommend options for detailed design

Stage 2: Detailed Design

- Finalise fishway concept design

↓

- Develop construction drawings

↓

- Construct fishways
- Write operation and maintenance manual

SKM

articulate POWERED PRESENTATION

SLIDE 13 OF 13 PAUSED 00:11 / 00:21

Figure 2: Screenshot of example online industry case study

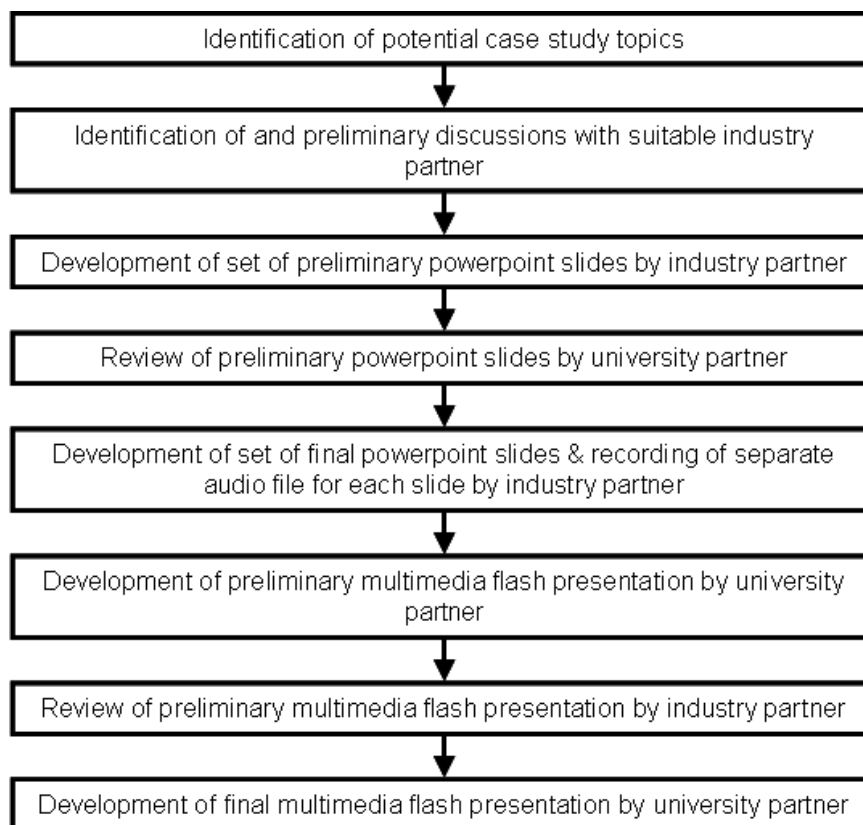


Figure 3: Process for development of online industry case studies

Once feedback has been provided to the industry partner, they can develop the final set of powerpoint slides and record the audio for each slide, which can then be sent to the university partner, along with the photo of the industry presenter, for processing. The draft multimedia online industry case study can then be reviewed by the industry partner before the presentation is finalised.

Case Study – Environmental Engineering and Sustainability II

Course context

Environmental Engineering and Sustainability II is a compulsory second year course for students taking the Civil & Structural, Civil & Environmental and Mining Engineering degree programs in the School of Civil, Environmental and Mining Engineering at the University of Adelaide. The course explores the relationship between engineers and river systems. The themes covered include the value of river systems, the modifications that have been made to river systems as a result of engineering activities, some of the negative impacts this has had, and continues to have, on our natural resources, as well as the role engineering plays in rehabilitating and managing these resources and ensuring the mistakes of the past will not be repeated by adopting sustainable planning and design practices.

Online industry case study development

A total of seven online industry case studies were developed for different curriculum areas of Environmental Engineering and Sustainability II using the approach outlined in Figure 3 (Table 1). In general, there was considerable enthusiasm and support from industry partners for the concept underlying the development of the case studies. In addition to supporting engineering education, many organisations also viewed the case studies as an opportunity to expose students to the type of work their organisations are involved in.

Table 1: Online industry case studies developed

| Industry Case Study | Industry Partner | Curriculum Area |
|---|-------------------------------|-------------------------------|
| Cox Creek erosion control | Australian Water Environments | Erosion control |
| River Murray barrages fish passage | Sinclair Knight Merz | Fish passage |
| Wimmera Malley pipeline project | Tonkin Consulting | Environmental flows |
| Cox creek nutrient reduction case study | Australian Water Environments | Water quality |
| Recycled water systems: Public health risk assessment | SA Health | Water quality |
| Hue water system | AusAid | Sustainable development |
| EINRIP road project case study | URS | Environmental decision-making |

Online industry case study implementation

Environmental Engineering and Sustainability II is based on the hybrid project based / just-in-time teaching approach introduced by Maier (2008a). Students work on a design project on river rehabilitation, which is supported by a number of just-in-time learning cycles consisting of online learning modules (see Maier, 2008b), online quizzes and face-to-face lectures (Figure 4). The online industry case studies form part of online learning units (LUs) on a particular topic, which also contain online flash presentations on relevant theoretical material developed by the lecturer, references to relevant sections of the lecture notes and online quizzes. The LUs are set up in the University of Adelaide learning management system MyUni, which is powered by Blackboard®. A screenshot of an example LU is shown in Figure 5, the focus of which is on Fish Passage. As can be seen, the LU consists of an online module (OM) on Fish Passage developed by the lecturer, an online industry case study (Figure 2), relevant information from the lecture notes and an online quiz.

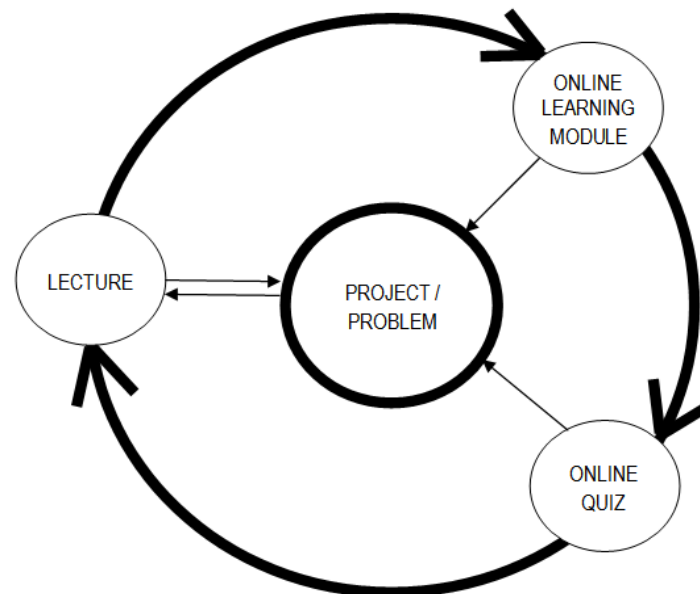


Figure 4: Conceptual framework for proposed hybrid project based / just-in-time teaching approach (Maier, 2008a)

Figure 5: Example learning unit

Student response

On the whole, student response to the online industry case studies was very positive, with comments such as the following about what the best aspects of the course are: “the case studies that are provided to help understand the importance of what is learnt”, “relates coursework to real life”, “learning things that will be useful and practical in the real world”, “real world examples in online modules” and “it ... gives us a feel for what real engineering will be like”. Responses to the student experience of learning and teaching (SELT) survey indicated that 90% of students thought that they were developing skills that were needed by professionals in their field, which was particularly pleasing given that the vast majority of students in the class are either Civil & Structural or Mining Engineering students, rather than Civil & Environmental Engineering students.

Conclusions and Recommendations

Making linkages between engineering theory and practice is important for student motivation and learning. The use of multimedia online industry case studies is one approach for achieving this, as it enables students to see the relevance of what they are learning in a real engineering context. The advantage of using online case studies is that they represent learning objects that can be used repeatedly and in different contexts. When applied to a second year environmental engineering course at the University of Adelaide, it met with a positive response from students.

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