Chapter 8
Using Digital Knowledge Maps to Integrate Technology into Pre-Service Teacher Education

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ABSTRACT
This chapter reports on the fostering of visual literacy skills through the integration of technology, specifically digital knowledge maps into a science communication course for 118 students at an Australian university. The aim of this action research is the enrichment of the existing course by fostering visual literacy and collaboration skills in students and integrating technology (i.e., C-maps tools for digital knowledge mapping) in order to prepare these future science teachers for the demands of the 21st century classroom. A mixed method research approach is employed for the data collection, which consists of three instruments: a survey, interviews, and student-generated artefacts. Findings indicate that students' feedback on the integration of this technology and visual literacy enrichment experience is by and large positive as it helps them with their effective use of information and communication technologies (Web 2.0 tools) and develop their collaboration and visual literacy skills.

INTRODUCTION
The integration of technology into university courses to promote collaborative learning and visual literacy can be instigated through different types of technologies. For science education and science communication, digital knowledge maps offer a technology that enables the visual representation of complex science topics. As the proliferation of Web 2.0 tools such as C-Map increases to promote collaborative, visual learning in tertiary classrooms, it is important to establish how educators use these new technologies to offer students opportunities to gain collaborative
and visual literacy skills. In this chapter, action research with an undergraduate cohort is provided to explore the use of digital knowledge mapping with the goal of nurturing visual literacy and collaboration skills while learning the required science content. The integration of new technologies, the impact on teaching and learning and the students’ perceptions of the digital knowledge mapping tool as discussed in this chapter may provide other educators with insights.

BACKGROUND

A New Generation of Learners

Higher Education Institutions the world over are gearing towards a new generation of learners, the so called ‘Net Generation’ often abbreviated to ‘Net Gen’. These young people were born around the time that Personal Computers (PCs) permeated society on a mass scale.

For example, by the time young people in America attend university (aged 21) they will have read only for about 5,000 hours but will have spent 10,000 hours on video games and talked another 10,000 hours on their mobile phones. By the time young people complete secondary school they will have watched 22,000 hours of television. By the time children reach primary school, they will have spent as much time inside watching TV, playing computer or video games as they will have spent time outside playing. A third of young people (31%) aged between 8 and 18 years have a Personal Computer (PC) in their home, more than half (54%) have a VCR or DVD player in their bedroom. PCs are mostly used to play games (57%), edit digital photos (45%), play DVDs (29%) or create photo slide shows (21%). The most popular websites visited by teenagers in the USA were those that enabled communication and picture sharing. Playing video games is now more popular than reading newspapers and magazine amongst the Net Generation of America (Bleed, 2005, p 3-5).

A fifth of all Net Gen children (20%) started to use computers when they were between 5 and 8 years old. By the time they had reached adolescence (16 to 18 years old) practically all Net Gen students were using computers, giving them ample opportunity to practice their technological abilities and develop their digital literacy skills. The early exposure to Information and Communication Technology (ICT) and their well developed technical skills through frequent use has also equipped this ‘Generation Next’ with a desire to move quickly on to the next activity, multi-tasking and a preference for non-text communications such as audio, video or graphics (Oblinger & Oblinger, 2005, p 2-5).

Howe and Strauss (2000, 2007) refer to young people born around the turn of the Millennium as the ‘Millennial Generation’ or plainly as ‘Millenials’. The researchers observed that millennial learners characteristically are enthralled by new devices and technologies. Millennials also display a preference for group activities and focus on outcomes (their grades or marks for assignments) and performance rather than the actual process of an activity. Their main goal is to accomplish the task quickly. Prensky (2010) called these young people ‘digital immigrants’ who are able to move seamlessly between the physical and virtual world. He concurs that they have a penchant for getting things ‘done’ and are prone to quickly shift their attention from one thing to another without bothering with boring tasks. Digital immigrants use technology to learn subject matter by finding, analysing and presenting content. They enjoy working with others and expect rapid messages exchanges in these collaborations.

It would be an overgeneralisation to assume that all Net Gen students are highly digital literate and possess the same well developed technological skills level. However, this cohort of students entering universities has a general mix of skills, knowledge and preferences which extends to their
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