THE POTENTIAL FOR E-LEARNING TECHNOLOGIES TO FACILITATE WORK BASED LEARNING FOR CONSTRUCTION MANAGEMENT STUDENTS - RESEARCHING THE NEXUS BETWEEN THEORY AND PRACTICE

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ABSTRACT

This project originates from a recent ALTC discipline based initiative which investigated issues and opportunities currently facing Construction Education in Australia (see http://www.altc.edu.au/resource-identification-teaching-construction-uon-2009). It addresses one of the report's recommendations, this being that university education at times does not support the professional requirements of Construction Management (CM). CM and Nursing students engage in practical placements and other Work Integrated Learning (WIL). These disciplines require "work ready" graduates who understand and can operate in "real world" contexts. Still in its initial stages, this project proposes to develop robust frameworks for the CM and Nursing disciplines that facilitate and encourage reflective learning during student industry/clinical placements. These frameworks will showcase to students how their university courses relate to each other and how the skills and competencies they acquire on campus and during their work based experiences meld together so they can graduate as CM and Nursing professionals. This paper highlights the preliminary findings and issues from this research project, including competency frameworks, student motivation and the logistics of managing and assessing students' industry experiences within e-portfolio platforms. It also reports on the resources and curriculum management

still to be developed. This paper further shows how seemingly unrelated disciplines (e.g. construction management and nursing) can engage in dialogue about their curricula and the use of e-learning technologies in managing and linking practical experiences.

Keywords: e-learning technologies, real world practices, Construction and Nursing disciplines, university education, student learning and WIL.

INTRODUCTION

This paper presents preliminary outcomes of a recently awarded Australian Learning and Teaching Council (ALTC) grant to the University of Newcastle, Australia to conduct a context study within the disciplines of Construction Management and Nursing. The project aims to make explicit connections between what is taught at university and students' work integrated learning. This will be done through a hierarchical framework of skills statements that map the competency requirements of relevant professional bodies to the learning outcomes of various undergraduate programs. The framework will assist students in making connections between these two domains. The project will also explore the opportunities that Web 2.0 environments provide. Web 2.0 tools, such as social networks and blogs, enable student-centred approaches to learning that also support development of e-portfolios. The project will investigate the opportunities presented by these Web 2.0 technologies and assess their potential to complement existing university and generic e-portfolio systems. In addition, it will investigate ways to embed these competency alignment frameworks within existing generic e-portfolio systems. As such, the project does not aim to re-invent e-portfolio systems but rather it identifies the opportunities inherent in these technologies which will best support reflective processes associated with WIL. It recognises and builds upon the investments many universities have already made in e-portfolios. The project identifies ways to make these existing e-portfolios more useful by guiding students in auditing and developing their skills in relation to work integrated learning (WIL).

BACKGROUND TO THE PROJECT

Rationale

WIL is the term used to describe educational activities that integrate theoretical learning with its application in a workplace, profession, career or future employment (Stephen Billett, 2001; Patrick, 2009). WIL is being made available for a broad range of undergraduate programs and can be recognised through assessment and credit. WIL experiences can be off or on campus, real or simulated, depending on the discipline area, but must involve clearly stated outcomes, assessment and consistent with quality teaching and learning (Stephen Billett, 2010). It is argued that CM students who participate in WIL are generally motivated by their experiences and demonstrate better teamwork and communication skills than those who do not (or have not yet) engaged in WIL. They have a better understanding of how to apply their knowledge in practice and of other complexities related to professional practice (Mills & Treagust, 2003). Students need opportunities to apply their conceptual knowledge so that it becomes grounded in the real world. Research has shown that when CM students start employment they frequently find it difficult to relate theory to practice and once they have been exposed to the workplace, they tend to modify their views (Williams, Sher, & Simmons, 2009). Consequently, it is crucial that students have opportunities to engage in WIL during their studies to make these connections.

In Australia, the principal method of developing nursing and construction management competence is through work placement experience. Construction management and nursing curricula are compliance and accreditation driven. It is therefore vital that workplace requirements are integrated with curricula. The CM accrediting bodies (AIB, AIBS, & AIQS, 2008) require students to engage in 520 hours of WIL whereas the Australian Nursing and Midwifery Council (ANMC, 2005) has proposed that a minimum of 800 clinical placement hours are required. The process of self-assessment is one of the methods of assessing the competence of an individual nursing practitioner and this is implemented within a quality improvement framework (Levett-Jones, Fahey, Parsons, & Mitchell, 2006). On the other hand, in construction management, reflective practice is embedded in the

professional development practices prescribed by the Chartered Institute of Building.

At the moment the quality control mechanisms for industrial placements prescribed by the Australian professional bodies that accredit CM degrees are loosely defined. Individual Universities interpret, administer and monitor WIL requirements in accordance with their own policies and have varying durations as shown in Figure 1. The outcomes of the current project will identify opportunities for encouraging and facilitating skills development and evidence gathering during work placement and after university, in line with lifelong learning practices.

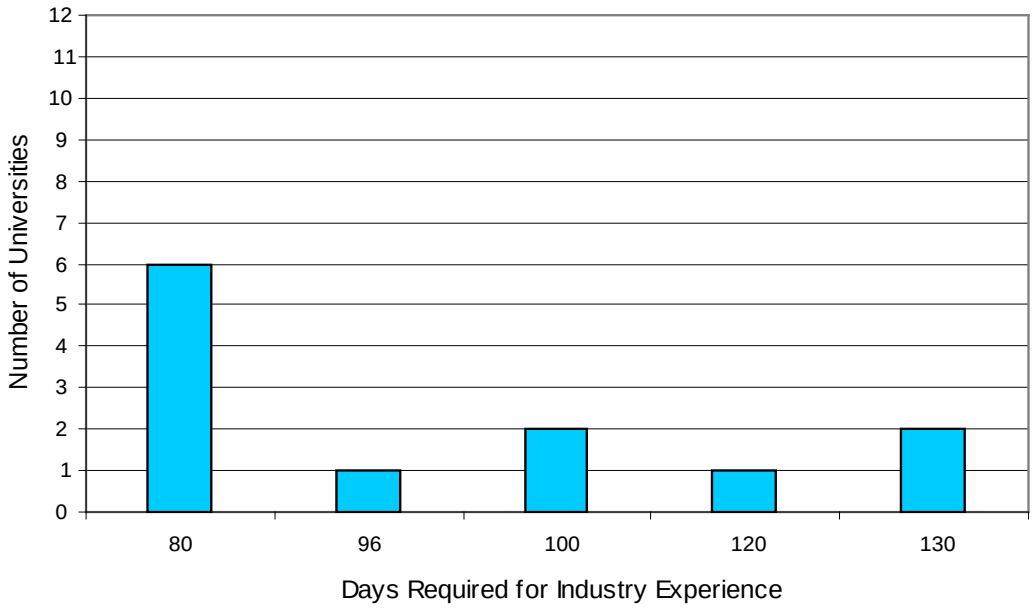

Figure 1: Industrial experience required by universities who offer CM (Feb 2008) (Source: University websites, program guides)

Managing WIL in Higher Education

The benefits of WIL for students are well recognised and have recently been documented in "the first large-scale scoping study of work integrated learning (WIL) in contemporary Australian higher education" (Patrick, 2009 et al. p.v). The other recent report on construction education in Australia (Williams et al 2009) has shown that CM students greatly value WIL. Teamwork, being given responsibility, and collaborative learning emerged as drivers promoting effective learning. However, this report also noted that those responsible for managing construction programs at Universities expressed reservations about industrial

experience and WIL (Williams et al., 2009). These reservations centre on the availability of placement opportunities for students during volatile economic times, and the resource implications of administering WIL (Williams et al., 2009). Some academics argue that, given the choice, it is debatable whether students would engage in industrial placements if these were not required by their degree program (Williams et al., 2009).

Recent studies relating to WIL in engineering have highlighted further concerns about linkages between programs, industry experience and assessment. Engineering graduates need to have strong communication and teamwork skills, but this is generally not the case (BIHECC, 2007). Currently, engineering students are graduating with good knowledge of fundamental engineering science and computer literacy, but they find it challenging to apply this in practice (Mills & Treagust, 2003). Similarly, Richardson, Kaider, Henschke & Jackling (2009) discuss the issues of assessing WIL in engineering programs. They state that "the underpinning cause for inadequate WIL assessment is a lack of understanding of the nature of learning in the work place" due to the ad hoc nature of learning in this situation (such as learning 'informally') (Richardson et al., 2009 p.338). It is evident from the WIL issues identified in the literature that industry expectations of learning from WIL need to be constantly monitored and discussed. Such discussions will highlight gaps between university and industry expectations and prompt remedial actions.

Stephen Billet from Griffith University has recently undertaken a National Teaching Fellowship through the (ALTC), which is entitled 'Curriculum and Pedagogic bases for effectively integrating practice-based experiences' to work towards addressing the WIL issues highlighted above. The fellowship consists of a review of WIL at 6 Universities in Australia. This Fellowship firstly aims to "identify and appraise curriculum and pedagogic principles and practices for integrating learning experiences in practice and university settings" across numerous disciplines (Stephen Billett, 2009 p.1). Secondly, it seeks to review curriculum in regards to educational importance in aligning the knowledge graduates need to work successfully in their professions (Stephen Billett, 2009). Thirdly, it seeks to align these curricula's with particular learning outcomes. The

outcome of these phases and curricula developments will provide more direction and organisation of WIL experiences within higher education (Stephen Billett, 2009). Along with the current study highlighted in this paper, the University of Newcastle is one of the universities involved in Billet's study and is contributing by surveying and analysing engineering and built environment students WIL experiences. This survey has recently been administered to construction management students.

DISCUSSION

In the following discussion, preliminary findings and issues from this current research project are considered.

Aligning the Disciplines - Competency Frameworks

The team conducted an initial review and analysis of the competency statements of the accreditation bodies' (AIB, AIQS, CIOB, and the Australian Nursing and Midwifery Council (ANMC)) skill requirement lists to work towards creating a framework to align curricula with work skills. The competencies and graduate professional qualities of these two disciplines were mapped and evaluated against each other. It was apparent that there was no uniform set of graduate attributes across the curricula and institutions. Consequently a textual analysis of competencies using *NVivo* (qualitative research software) was conducted. Through this evaluation the research team were able to identify core areas/synergies and discipline specific competencies. Generic synergies were identified within specific competency domains. These were; accurate data reporting, communication skills, management skills, research and reporting skills, self evaluation, health and safety knowledge, knowledge of ethics, knowledge of risk management, legal knowledge, up to date knowledge of the field - Industry and Institution changes.

Table 1 provides an overview of two of the core areas which emerged from this competency alignment work. The researchers extracted abbreviations of these competency definitions from all the professional bodies documentation and aligned these within each of the disciplines and the DEST competency framework for 'employability skills' (DEST, 2006).

NVivo Nodes' Key Competency Alignments Found	Construction Management	Nursing – Registered Nurse	Nursing - Midwifery	Government 'Employability skills framework' (DEST Skills framework 2006, p.10)	
				Employability Skills	**Key Competencies**
Communication – team communication, conflict resolution	Claims and dispute resolution – know the construction process - communication skills	Communication skills to plan nursing care with individuals and groups	Communication skills to facilitate decision making	*Communication*	*Communicating ideas and information*
	Communication skills – writing and oral	Communication - Relationship building skills	Communication - Developing effective communication strategies	*Teamwork*	*Working with others and in teams*
	Interpersonal skills –Teamwork	Team communication and collaboration skills	Professional conduct - Knowledge and responsibility of actions		
	Communication skills – leadership, Appraisal/evaluation	Evaluation skills - health outcomes			
Management/Leadership skills	Understanding building management	Management skills - Knowledge of systematic assessment procedures		*Problem Solving*	*Solve problems*
	Project planning and programming skills, procurement knowledge				*Plan and organise activities*

Table 2: Overview of aligninment of competency between the two disciplines and the DEST skills framework (DEST, 2006 p.10).

Another issue which emerged from this exercise was the extent to which definitions of competency requirements varied between professional bodies. For instance some statements consist of a hierarchy of how a skill will be obtained whilst others have very basic descriptors. This analysis of skill descriptors will be supplemented through the qualitative research stage of the project, as well as a review of program placement coordinators and students' views on issues in documenting their work based learning and competency achievements.

This discussion raises further questions as to how the alignment of the two disciplines and students related demonstration of their industry experience can be documented as a framework for the disciplines. One solution to aid this framework is the use of Web 2.0 and e-technology. Other solutions will emerge during the analysis of the data and a consideration of professional and academic requirements from the disciplines.

USING E-TECHNOLOGY TO MANAGE WORK BASED LEARNING?

E-technology to manage students learning has increasingly been studied and implemented by universities in the 21st Century, in particular the use of e-portfolios to document students' learning experiences (Ayala, 2006; Heinrich, Bhattacharya, & Rayudu, 2007; Reardon & Hartley, 2007). Generally an e-portfolio is an online program with links to additional Web 2.0 tools, such as social networking sites, to document learning, assessment and ultimately showcasing actors skills, progress and reflections (Ivanova, 2008; Schwartz, 2006). According to the Business Industry and Higher Education Collaboration Council (BIHECC, 2007 p.41) "one of the greatest strengths of (an e-portfolio) is that it provides a structured and cost-effective means to encourage students to manage their own career planning and skill development". However, generic e-portfolios provide little specific guidance on the skills (generic or discipline specific) that students need to develop. Here e-portfolios might be "seen by business and universities to be a practical method for graduates to explain and provide examples of their employability skills" (BIHECC, 2007 p.4) but there is little evidence of their successful use in this domain. Indeed, recommendation 7 of the BIHECC (BIHECC, 2007 p.6) report encourages "more effective integration of employability skills in student e-portfolios".

The Australian e-portfolio Project has conducted extensive research on e-portfolios and has reported on current levels of e-portfolio practice at Australian Universities. Part of this study included the documentation of WIL in e-portfolios. Ultimately this project aims to work towards implementing a university wide e-portfolio system (Hallam et al., 2008). Anderson, Rambotham and Tones (2009) have also reviewed e-portfolios use for nursing at QUT where they used the national competency standards as anchors for reflective narrative and evidence gathering. They analysed students' experiences of using e-portfolios to document their skills obtained. They found that the ANMC competency statements were of benefit in shaping learning and reflecting in Nursing and within the e-portfolio (Anderson et al., 2009). Similarly Li, Molyneaux & Botterill (2009) studied Engineering students use of the e-portfolio platform *Pebble PAD* to document their vacation employment. Their project involved creating detailed work experience evaluation profiles and embedding these on the e-portfolio platform so students can attach evidence of their work and relate this to the relevant competency (Li et al., 2009). They found that "in general, students regard this as a convenient and effective way to complete their work experience evaluation" (Li et al., 2009 p.398). Other benefits of using e-portfolios to document employment skills these authors identified were ascertaining gaps in skills learnt and improving employability (Li et al., 2009). On the other hand they identify an issue that students found the e-portfolio a burden if they missed the training session earlier in the year (Li et al., 2009). Other research similarly discusses this issue of lack of student motivation to use e-portfolios to document their work (Anderson et al., 2009; Eley, Fallon, Soar, Buikstra, & Hegney, 2009; Hallam et al., 2008; Miller & Morgaine, 2009).

The above discussion suggests that similar benefits for using e-portfolios to document industry experience can be applied to CM students. Nevertheless the logistics of managing and assessing students' industry experiences within e-portfolio platforms can be a complex process due to the issues highlighted earlier in regards to the lack of documentation of skills learned and students' ad hoc approach to learning when on practical placement. This skill documentation of the project is in progress and will be developed as a resource. This will include creating robust frameworks that encourage reflective learning during work based

activities; these frameworks will be discipline specific Continuing Professional Development (CPD) modules that link WIL and formal curricula. The project will demonstrate these through online resources on how these frameworks could be embedded into a generic, 'open sourced' e-portfolio platform, such as *PebblePAD* or *Mahara*.

Other resources produced from this project include; a design brief and specification for a resource on student competency standards/skills for CM and Nursing that will be readily transferable to other disciplines. Further, final reports will be produced which document the potential of e-portfolios to enhance industry practice and related theory and finally, online packages which provide teaching resources to support academics in engaging with WIL in their formal lessons.

CONCLUSION

This paper documents a current ALTC project investigating the facilitation of WIL in the CM and Nursing disciplines. Related WIL literature revealed that students' work based experiences in both disciplines are an integral part of their learning. Nevertheless, documenting these experiences and aligning competencies between the disciplines to create a framework was highlighted as problematic. Additional qualitative data will shed light on these issues and support solutions for facilitating reflective work integrated learning.

It can be further argued that both the CM and Nursing disciplines will benefit from using e-learning technologies to document students' work based learning. However, as the project develops, the challenges of using these e-technologies as primary facilitators for managing work based learning and for making connections between curricula and industry learning are yet to be established. These will emerge as the logistics of implementing these technologies are reviewed. These processes and findings will be documented in the resources developed by this project, which should ultimately improve the links between theory and practice for students.

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