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Investigating Lecturers' use of Learning Designs to Support Technology Enhanced Course Design

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Abstract: The effective integration of technology into teaching and learning has been a focus of universities and governments for the past decade. Yet progress towards this goal has been limited to date. Knowledge of how to integrate technology has become a necessity for university lecturers and effective models of support are needed to facilitate this often challenging process. However, little is known about how the individual lecturer designs and what methods of support might best help his or her knowledge of how to integrate technology. One reason that this area has been under-researched may be the inherent challenges in investigating design processes which are by their very nature difficult to observe. This paper describes a case study methodology designed to overcome these challenges in order to study lecturers' use of learning designs and the development of technological, pedagogical and content knowledge while designing a course (or unit of study).

Introduction

The effective integration of technology into teaching and learning has been a focus of universities and governments for the past decade. Within this context lecturers are challenged to create engaging, technology-enhanced, high quality learning experiences for their students while continuing to develop their own discipline knowledge and research activity. As pointed out by Conole (2006), despite what is seen as the potential of technology, current use falls short often only merely replicating current practice rather than truly exploring the possibilities a new technology has to offer. This sentiment was also noted by Ramsden when he declared "...we have yet to harvest most of the educational fruits of ICT" (Ramsden, 2003, p. 151) and Mishra & Kohler (2006) who have stated that the promise of digital technologies in higher education has "lagged far behind the vision." (p. 1018).

It is argued that lecturers need guidance to develop high quality learning experiences (Agostinho, Harper, Oliver, Hedberg, & Wills, 2007). Such guidance can be obtained from a number of sources, for example, teaching and learning units; educational literature and research; and best practice models. Each of these methods offers different pathways to information on how to develop more engaging and pedagogically sound activities.

The study described in this paper explores the use of one particular support mechanism, learning designs, to support lecturers' design practice and development of knowledge around this process. In order to do this, it was necessary to develop a methodology to study lecturers' design practices, an area largely neglected in the research into university teaching. Since design activities tend to be undertaken privately and may be scheduled sporadically in whatever time a lecturer has available prior to the teaching session, they are difficult to observe directly. Thus, the study had to develop appropriate data collection methods to overcome this challenge. This paper describes the purpose of the study, its context, the data collection and analysis methods used and presents some preliminary findings to indicate the types of findings that can be derived from this kind of study.

Lecturer's Design and Planning activities

While there is much research into formal models used and processes of instructional design, little is known about how individual lecturers plan their courses (Goodyear, 2005). One key series of studies by Stark et al. (1990) and Stark (2000) conducted between 1987 to 1990 looked to uncover teachers' planning processes, goals, and influences. Findings from a survey study (n=2311) indicated strong disciplinary influences on teaching goals when planning teaching and found that consideration of content was the most frequent starting place for lecturers in this process (Stark et al., 1990).

More recently, Bennett, Agostinho, Lockyer, Kosta, Jones, and Harper (2008) conducted a multiple case study investigation into the design practices of 32 university lecturers in Australia. Similar to Stark's findings, preliminary analysis of data from two of these lecturers' interviews found that selection of content was the first step in their design process. Considerations of broader curriculum and program progression were also found to be important influences on their design considerations.

These studies begin to shed light on the initial steps in the design process and influences on lecturer thinking. However, more in depth investigation of lecturer's design processes, knowledge development and support needs, particularly in the area of technology integration, was considered by the authors, to be in need of further investigation. Research into ICT supported teaching has, to date, often focused on implementations of specific tools and student perceptions of technology. Studies of this nature provide lecturers with little explicit pedagogical guidance on how and what to design in their own courses. This lack of consideration of pedagogy in much of the research on technology use has sparked continued calls for a more integrated consideration of pedagogy and technology.

One line of research that has looked to address this gap has used group design seminars to develop knowledge around technology integration (Koehler & Mishra, 2005; Koehler, Mishra, Hershey, & Peruski, 2004). This research has informed the development of a framework, Technological Pedagogical Content Knowledge (TPaCK or TPCK), and sparked numerous investigations into the development of TPaCK knowledge and application (e.g. The AACTE Committee on Innovation and Technology, 2008). This framework, which will be described later in the paper, provides a useful lens and will be used in this study to trace the development of design knowledge throughout the lecturer's design process.

Learning Designs as Supports

Learning designs have been presented as a possible support to the process of course/unit design, particularly within online environments (S. Bennett, Agostinho, & Lockyer, 2005; Oliver, 2007). Learning designs are representations of teaching practice which have been documented for sharing and reuse. There are a number of different learning design representations (see Agostinho, 2008 for an overview). The learning design representation used in this study (referred to as the LD Framework in recent publications) arose from a two year Australian University Teaching Council project which sought to collect and disseminate high quality, peer reviewed learning designs within the higher education community (see www.learningdesigns.uow.edu.au). These learning designs consist of a textual description of the learning activity as well as a diagrammatic representation (called the Learning Design Visual Sequence or LDVS), which visually depicts how the tasks, resources and supports are connected in a temporal sequence. A learning design can document at any level of granularity from a short teaching activity that may take an hour to a multi-year program (Agostinho, Oliver, Harper, Hedberg, & Wills, 2002). The development of the learning designs, including the categorisation of these learning designs into pedagogical strategies and the development of an evaluation framework can be found in Agostinho et al. (2007).

Further research into how these learning designs have been used by the university community in Australia has been conducted by Bennett, Agostinho & Lockyer (2005) and Agostinho (2006). Bennett et al.'s (2005) small-scale study of how lecturers might use learning designs as supports during their design process found that lecturers could reuse and adapt learning designs for their purposes. Additionally, Agostinho's (2006) exploratory study reported that the graphical component (LDVS) of the LD Framework, was often used as a talking point, communication device for pedagogical strategy and as a personal reflection tool.

The study described in this paper aims to build on these initial studies of the learning designs and respond to the identified need to further explore the processes and contexts surrounding design (see S. Bennett et al., 2005). In particular, it investigates how lecturers integrate learning designs as supports into their existing design and planning practices, while examining contextual influences and observing the development of more complex forms of knowledge around technology, pedagogy and content.

Methodology □

The methodology of this study aims to capture lecturers' planning activities and thinking throughout various phases in a course design's life cycle. However, the nature of academic work is multi-faceted consisting of research, teaching, administration and community service, which all place considerable demands on lecturers' time both within and outside of normal working hours. This issue is identified in the Australian study by Forgasz and Leder (2006) which followed the work patterns of 22 academics over a one-week period and found that 35% of work-related activities occurred outside of office hours. While there was no specific mention of design activities it is interesting to note that "participants were more likely to be engaged in preparing for teaching outside office hours than in office hours" (Forgasz & Leder, 2006, p. 12). Add to this the idiosyncratic nature of individual work patterns and tacit knowledge that lecturers' employ while designing and it becomes clear that naturalistic observation of a participant's design process (e.g., through shadowing) would be difficult and overly intrusive.

Therefore, in order to achieve depth of information while tracing the design process over time, a case study approach has been used in this investigation. The strength of a case study approach lies in answering "how" and "why" questions (Yin, 1994), enabling the investigation of processes (Merriam, 1988) and allowing the investigation of phenomena that is difficult to separate from context (Merriam, 1988; Yin, 1994). Additionally, since the activity of design and technology integration is embedded both in institutional and in disciplinary contexts, multiple case studies from a number of disciplines and institutional contexts were conducted to ensure that a range of perspectives on the phenomena could be included.

Participants were recruited through a series of invitations sent to email distribution lists of Australian professional organisations, which are focused on teaching and learning (e.g. ASCLITE, ODDLA). Two participants were recruited for Semester 1, 2009 (March – June 2009) and eight participants for Semester 2, 2009 (July – Oct 2009). In Semester 2, one participant dropped out of the study due to personal reasons leaving nine lecturers (4 male, 5 female) located at four different universities. In order to follow the design process as closely as possible, data was collected at seven points over the four design tracking phases (see Figure 4). The scheduled collection points were negotiated with participants in order to align with their individual design timelines. A more detailed account of the planned data collection activities for each phase follows.

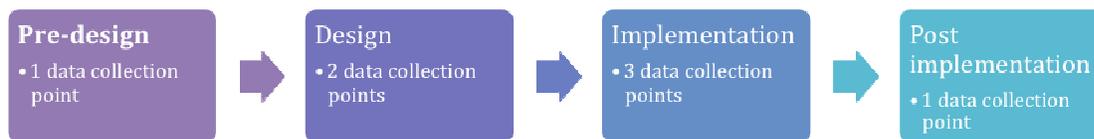


Figure 4 – Phases of Data Collection

Phase I – Pre-design

The pre-design phase data activities were conducted in advance of the teaching semester and aimed to collect information about the participants' previous approach to design, plans for the redesign, current design practices and any general contextual factors affecting the design of the course. This information was collected through a 45 minute 'design interview', a 20 minute participant guided 'webtour' of the online course space and collection of related course documentation.

The interview protocols for the 'design interview and 'webtour' were semi-structured. Semi-structured interviews were chosen as a method of data collection because they offered the necessary flexibility for extracting detailed

information while providing a basic structure to guide the data collection appropriately. Previous investigations by Stark et al. (1990), Stark (2000), Koehler et al. (2007) and Bennett et al. (2008) guided the development of the interview protocols for all phases of the study.

At the end of the pre-design meeting the researcher introduced the participants to the learning designs used in this study. This included an introduction to the learning design website (see www.learningdesigns.uow.edu.au), a brief overview of the LD Framework and provision of resources to support the participants understanding of the LD Framework. After the meeting, the researcher composed field notes and created a LDVS representation of the course in its initial form. The field notes, LDVS and collected documents were collected in order to enrich contextual information and provide alternate views of the course design.

Phase II – Design

The purpose of this phase was to gather information about how the lecturers worked with the learning designs and how they made design decisions. It was expected that the majority of design work would be completed during this phase and it was comprised of two data collection points. The first point was scheduled soon after the participant had selected a learning design and the second was scheduled sometime just before the teaching of the course.

At the first data collection point in this phase, the participant was asked to describe their thinking with regard to their choice of learning design, the ways that they intended to use and/or alter the learning design to meet their needs and their reasons for particular design decisions. The data was collected through a ‘design interview’ and collection of any related draft documents.

The second data collection point in this phase began with another ‘design interview’ which investigated the participant’s thoughts on the design in its state just prior to the commencement of teaching, the process of using the learning designs to create the course and the participant’s plans for implementing the design. A ‘webtour’ of the course website was also conducted in this meeting in order to reveal any changes made to the online space and learn more about the participant’s design decisions and reasoning. Finally, updated versions of course documents and artefacts were collected after the ‘webtour’ and an LDVS representation was produced by the researcher (first author) based on all data sources.

Phase III – Implementation

The third phase of the study followed any further developments in the design throughout the implementation. Three short tracking interviews (10-30 min) were arranged with each participant, one early, one mid, and one late semester. The tracking questions asked the participant to reflect on how the planned design was working (e.g. what was going well, what was concerning them) and discuss any alterations they may have made as they responded to needs throughout the semester.

Phase IV – Post- Implementation

The post-implementation phase consisted of the final data collection point. The purpose of this ‘design interview’ was to reflect on the experience of working with the learning designs, on the implementation of the design, on any student feedback received and on any planned changes for future iterations. The final ‘webtour’ was conducted with the participant, during which the researcher asked about changes to the course website and the reasons for those changes during the semester. Finally, any updated documentation was collected and a final LDVS was drawn.

Data Analysis Framework

Analysis of the data gathered in the study is being conducted in iterative cycles following the data collection phases. The main methods being used are qualitative content analysis and qualitative coding of emergent themes. Part of the analysis specifically focuses on lecturers’ knowledge in the areas of technology, pedagogy and content. Codes have been drawn from Mishra and Kohler’s (2006) description of Technological Pedagogical and Content Knowledge (TPaCK or TPCK) framework.

The framework builds on Shulman's (1986) concept of Pedagogical Content Knowledge (PCK), which suggested that teachers' knowledge needs to be more than just the knowledge of generic pedagogical methods (P) or the knowledge of content (C), but more importantly needs to include integrated Pedagogical Content Knowledge (PCK) which gives teachers the skills to match particular, pedagogies and approaches to specific content areas (see Figure 2). PCK as Shulman (1986) described, encompasses "the most regularly taught topics in one's subject area, the most useful forms of representation of those ideas, the most powerful analogies, illustrations, examples, explanations, and demonstrations...the ways of representing and formulating the subject that make it comprehensible to others" (p. 9).

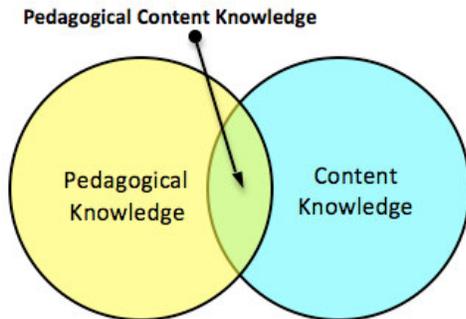


Figure 2: Pedagogical Content Knowledge (adapted from <http://www.tpack.org>)

Mishra and Kohler's (Koehler & Mishra, 2005; Mishra & Koehler, 2006) work adds in the knowledge of technology (T) and proposes that effective technology integration comes from the development and amalgamation of all three knowledge areas: technology, pedagogy and content. When the three knowledge areas are considered together, further overlapping, integrated knowledge areas are created (TC, TP, TCK) with Technological Pedagogical Content Knowledge (TPaCK) at the centre (see Figure 3). Koehler & Mishra (2005) argue that TPaCK, the knowledge of how a particular content area might best be taught, using the most appropriate technologies, is the key to effective technology integration.

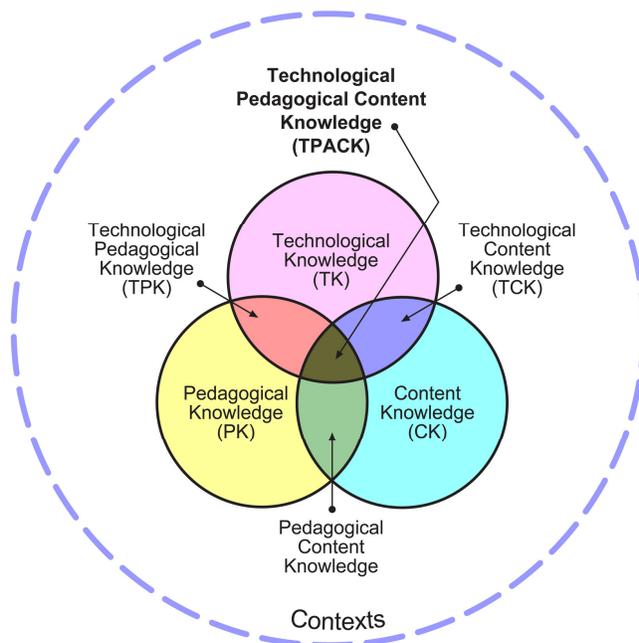


Figure 3: Technological Pedagogical Content Knowledge (from <http://www.tpack.org>)

The knowledge areas (T, P, C, TP, TC, PC, and TPC) of the TPaCK framework are used in this study to analyse the interview, document and artefact data and to map each of the knowledge areas throughout the design process. The

analysis, currently underway, is expected to reveal the relative dimensions and frequency of each knowledge area and trace changes throughout the study, while contextual factors and influences will be explored as themes emerge. The final stage of analysis will involve a cross-case comparison of the nine case studies, which will help build a rich picture of the lecturers' design processes.

Discussion

At the time of writing, the data collection for two cases has been completed using this methodology with seven cases still ongoing but substantially complete. Overall the methodology for data collection has worked well providing necessary depth in the initial design phases, when the majority of changes have occurred, while providing opportunities to learn about shifts during implementation. The post-implementation interviews, to date, have been very useful in gaining a holistic view of the participants experience after the frenzy of designing, teaching and marking has finished.

The individual nature and the effects of circumstance on the design process have created challenges in regards to scheduling and frequency of data collection points. Depending on the intensity of the participant's design timeline data collection points could be quite close together or spread apart. In some cases, adjustments to the number of data collection points have had to be made in order to fit an individual's design timeline and ensure that changes are captured in a timely manner.

Preliminary analysis has revealed a number of approaches to the use of the LD Framework, for example, some participants have closely adhered to the LD Framework they selected while others made more significant adaptations to fit their design context. The creative adaptation and use of the learning designs is particularly illustrated by one lecturer who even developed her own, Learning Design Visual Sequence (LDVS) and provided it to students as a scaffold to support their understanding of her course. In regards to the experience of using the LD Framework, participants from the two completed cases have both made comments in the post-implementation interview suggesting that the learning designs had a strong effect on their thinking, teaching and the connections they made for students. The next step in this study is to conduct an in depth analysis of the cases to try and uncover the nature of these changes and learn more about the contextualised design process.

Conclusion

The methodology of the study described in this paper aims to develop an in-depth understanding of nine lecturers' design practices and an understanding of how learning designs might support that practice. The experience of data collection has revealed rich examples detailing the influences, pressures and thinking involved in lecturers' design practice. While the 'messiness' of the design process means that some aspects have most certainly been missed, the frequency of the data collection points and depth within the cases is providing new insights.

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