2015

Investigating the role and impact of learning designs within University teachers' design work

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Investigating the Role and Impact of Learning Designs Within University Teachers' Design Work

A thesis submitted in fulfilment of the requirements

for the award of the degree

DOCTOR OF PHILOSOPHY

from

UNIVERSITY OF WOLLONGONG

by

Jennifer Jones, BA, MEd

SCHOOL OF EDUCATION

August 2015

ABSTRACT

Universities are increasingly concerned with providing a high-quality student experience; good teaching is a key component. The area of Learning Design aims to provide effective, high-quality models to support university teachers in achieving this goal. Research to date on Learning Designs has focused on the development of tools, technical standards, potential needs, and attitudes towards use, with few studies investigating university teachers' actual use of Learning Designs. Little is known, therefore, about how teachers apply Learning Designs to real design problems.

The purpose of this study was to explore how university teachers use Learning Designs as part of their routine design work with real students in naturalistic design contexts throughout a full cycle of planning, implementation, and review. Through rich case accounts and analysis of university teachers' work, this study provides new insights into the nature of design work supported by Learning Designs. This research is important because building and developing Learning Designs requires an understanding of their effective integration into the design process.

A multiple case study approach was used to provide a holistic, rich description of eight university teachers' design work and Learning Designs use for a semester-long undergraduate unit. The study was underpinned by a theoretical framework that conceptualises teachers' design work using concepts from design thinking and the Technological Pedagogical Content Knowledge framework to conceptualise teacher knowledge. Data was collected before, during, and after the semester using interviews, documents, stimulated recall, and researcher observations to provide a detailed picture of university teachers' work with Learning Designs. Each of the cases was analysed in multiple, iterative phases, resulting in eight rich case descriptions that reveal the key phases of design work and Learning Designs use.

Additionally, cross-case analyses were conducted to identify key characteristics of design thinking and practice and Learning Designs use across each of the design phases; the relationships between Learning Designs use and key case attributes; and impacts on university teachers' design work in the areas of technology, pedagogy, and content.

The findings show that the design processes using Learning Designs were student-focused, multi-phased, iterative, and ongoing throughout implementation. Participants used Learning Designs in four key ways: to benchmark their pedagogical practice; model and stimulate pedagogical ideas; guide design steps; and document and communicate design plans. Learning Designs acted variously as a framework for thinking and making design thinking visible, particularly for those who created design artefacts using Learning Design ideas and conceptualisations. Learning Design use was also reported to result in a greater awareness of links between the areas of pedagogy, content and technology providing a pattern of evidence supporting pedagogical content knowledge development for designers of new units and technological pedagogical content knowledge development for participants making changes to previously run units.

The results of this investigation provide new knowledge about university teachers' design work using Learning Designs, and their impacts before, during, and after teaching. The outcomes of this research provide evidence that can be used by university administrators, educational designers, university teachers, and Learning Designs tool developers. The complex and ongoing nature of participants' design work suggests that university teachers need tools to support design thinking throughout all stages of design work. This includes tools that will allow flexibility and openness for ongoing design work. The findings also point to a deeper role for Learning Designs in the support and development of university teachers' design thinking and knowledge integration than has previously been shown.

ACKNOWLEDGEMENTS

Much has happen over the time I have been working on this thesis, including getting married, moving house, having a gorgeous boy, and living overseas for six months. During all of these life events, my family, friends, and supervisors have supported and encouraged me. I thank you all.

Travelling back and forth between Canberra and Wollongong was a part of this PhD for a number of years and during this time I met many friends who helped to make this process more enjoyable. To my supervisors, Professor Sue Bennett and Professor Lori Lockyer, I would like to say thank you for your continued support, guidance, and care. I have been lucky to have two people as talented as you both to encourage me and keep me on the right track. Thank you for everything. In addition to my supervisors, I would like to thank Lisa, Linda, and Shirley for being great supports and "third supervisors". I also would like to say an extra thanks to Lisa and Sue for opening your homes to me, having a welcoming place to stay when I was away made the time away from home so much easier. I truly appreciate your generosity.

For their scholarship support, I would like to thank Janison Learning and Assessment Solutions and the Australian Research Council. This study would not have been possible without this funding. To my participants, who were all very busy people: the time and experiences you shared with me were very much appreciated. It was a pleasure to work with you all. Also to my editor Laura E. Goodin, thank you for your care and attention to detail and for leading me through the weird world of hyphens.

Finally, to all of my family and friends, I would like to say thank you for your patience, support, and encouragement. Rob, thank you for listening to ideas and continually cheering me on, I am very thankful and lucky to have a husband as supportive and caring as you. To my stepsons Tom, Geordie, Ben, and Felix, I would like to thank you for being wonderful young men, and being understanding of the time I spent "PhDing". To my son, Joshua, thank you for being the joy and inspiration that you are each and every day. Lastly, to my mom, grandma, and auntie, thank you for always giving me love, support and encouragement. I am inspired by and love you all.

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1 Introduction

1.1 Introduction

Higher education is situated within an increasingly dynamic environment, and universities must find ways to shift old patterns and innovate within this context. Universities worldwide have been under increasing pressure, through review and audit processes, to demonstrate that their teaching, research, and administrative work results in high-quality performance and outcomes (c.f., Tertiary Education Quality Standards Agency in Australia). University teachers are expected to deliver on these demands, requiring them to improve their knowledge and performance in multiple areas. Thus there is a need for effective mechanisms to support university teachers in developing and improving their teaching practice.

This study investigates one such support mechanism, Learning Designs, a collection of representations of pedagogical practices intended to support the sharing of these practices. The aim of this study was to investigate how university teachers' might reuse a Learning Design, with the goal of better understanding the roles Learning Designs might play and the impact it might have on university teachers' design thinking and knowledge.

This chapter outlines the purpose and intent of this study by first presenting its background, the research problem, and the questions that guided the investigation. Following this framing of the research context and problem is a description of the research strategy and discussion of the study's significance and limitations. The chapter concludes by defining key terms used within the thesis and providing an outline of the thesis structure.

1.2 Background to the study

While university teachers are experts in their fields of research and have been trained in their discipline areas, they often receive relatively little training in educational practices and design. With limited training, how do university teachers who wish to improve their teaching learn about and apply new pedagogical models and integrate technology into their teaching? Some supports are available, including university short courses on

teaching, access to advice from educational design professionals, and literature on teaching and learning (Bates, 2005; Biggs, 2003; Laurillard, 2002; Prosser & Trigwell, 1999; Ramsden, 2003). University teachers also learn about teaching from their own experiences and colleagues.

Another support mechanism, Learning Designs, aims to support teaching and learning through the sharing and reuse of high-quality designs. Individual Learning Designs are representations of teaching and learning activities that build on the idea that good design and good teaching are interrelated. Representations of these designs have emerged in several forms that present information in a variety of ways (e.g., textual, visual) and for different purposes. A number of researchers have brought together knowledge of these forms for comparison and discussion (Agostinho, 2008; Dalziel et al., 2013; Falconer & Littlejohn, 2006). Falconer and Littlejohn (2006) categorise Learning Designs into two main types. The first may be termed runnable designs (e.g., Learning Design languages and standards): they are computer-readable and focus on the capture, transfer, and implementation of designs within online systems. The second may be considered inspirational designs: they focus on creating human-readable formats for sharing. Inspirational Learning Designs have taken numerous forms, from case-study narratives to more-structured models such as the AUTC Learning Designs, Pedagogical Patterns, and Learning Design Lite. Within this study the AUTC Learning Design format is used (http://www.learningdesigns.uow.edu.au). This format includes both a textual and visual component in its description of a design. Additionally, it divides the key elements of a design into tasks, resources and supports (Oliver, Harper, Hedberg, Wills, & Agostinho, 2002). A full definition of AUTC Learning Designs as used in this thesis can be found in the definition of terms (section 1.7). While the focus of this study is on the AUTC Learning Design format, it is believed the findings will inform the development and research of Learning Designs more generally.

A primary aim of Learning Designs is to support the transfer of high-quality designs in higher education. The purpose of sharing practice through Learning Designs has been particularly advanced as a way to aid university teachers with the added challenges of moving to more online teaching (Conole, 2013; Goodyear, 2004; Oliver, 2007). The idea being that Learning Designs may provide examples of sound teaching and learning practice that are more practical, succinct and accessible than theoretical educational

texts or research. Given university teachers' increasing time pressures and fragmented work demands across all of their responsibilities (Ylijoki & Mäntylä, 2003), there seems to be a need for such a tool.

Since 1999 numerous initiatives, tools, and communities have developed, collected and shared Learning Designs (Dalziel et al., 2013). Agendas for ongoing research, development, and collection of Learning Designs are based on the assumption that university teachers can understand and apply them to their own design contexts and problems. However, this study's exploration of the literature found there has been almost no empirical research focused on university teachers' experiences in the use and application of Learning Designs. Investigations have generally focused on the potential reuse of Learning Designs (c.f., Botturi, 2005; Cameron, 2009; Falconer, Beetham, Oliver, Lockyer, & Littlejohn, 2007; Lucas, Masterman, Lee, & Gulc, 2006) and reuse applied to hypothetical design scenarios (c.f., Alvino, Asensio-Perez, Dimitriadis, & Hernandez-Leo, 2009; Botturi, 2005; Frizell, 2006; Verbert et al., 2012; Villasclaras-Fernández, Hernandez-Leo, Asensio-Perez, & Dimitriadis, 2013).

In fact, to date no studies have investigated how university teachers have reused Learning Designs within their usual design context, and only one study has investigated Learning Design reuse for an applied design problem (i.e., the design of a unit to be taught to real students). Additionally, no studies have followed Learning Design reuse through planning, implementation, and review of an applied design problem. Thus, the area of Learning Design is being developed and researched without a full understanding of the work university teachers do, as well as the realities and impacts of using a Learning Design within naturalistic contexts. This study sought to address this gap in the literature.

1.3 Research questions

This study was guided by the following broad research question: **How do university teachers use a Learning Design in the design and implementation of an undergraduate university unit?** This question focuses directly on the gap identified within the literature by investigating how university teachers used Learning Designs within their 'naturalistic' design contexts and work, and by exploring how this use

might affect university teachers' design thinking and knowledge. This broad question was addressed by more-specific investigation of two sub-questions.

Question 1: How do university teachers select and use a Learning Design as part of their design practice?

The first part of this question was concerned with the investigation of university teachers' selection of a Learning Design. In particular, the study focused on participants' key considerations when selecting a Learning Design, the elements of the Learning Design they used to aid their selection, the type of Learning Design they chose, and the key reasons they gave for selecting a particular design. The second part of the question focused on how participants used the Learning Design as a part of their 'naturalistic' design practice. This aspect of the study was concerned with discovering how participants used a Learning Design throughout their design work before, during, and after teaching. In particular, it guided the investigation of when, how, and for what purpose participants referred to the original Learning Design or used its ideas in their design work.

Question 2: How does the use of a Learning Design impact university teachers' design thinking and knowledge?

This second question sought to understand the observed and reported impacts of using a Learning Design on participants' design thinking and knowledge. To answer this question, teachers' work in creating a unit was conceptualised as 'design' work requiring 'design thinking'. Design thinking has been described by Razzouk and Shute (2012) "as an analytic and creative process that engages a person in opportunities to experiment, create and prototype models, gather feedback, and redesign" (p. 330) and is related to a set of design-thinking skills or characteristics that facilitate this process. This conceptualisation moves beyond simpler notions of teacher planning and preparation and has become increasingly used to describe the nature of university teachers' work (Beetham & Sharpe, 2013; Conole, 2013; Laurillard, 2012; Masterman, 2013). Within this study, university teachers are seen to draw on their knowledge base

as a resource for their design thinking, and in turn their teacher knowledge is further developed by their design experiences.

From this perspective, the Technological Pedagogical Content Knowledge (TPCK) framework (Mishra & Koehler, 2006) was used as a conceptualisation of teacher's knowledge to help answer this question. The TPCK framework builds on the discussions and conceptualisation of Pedagogical Content Knowledge, which sees teachers' knowledge development as the development of an integrated, rather than isolated, knowledge of pedagogy and content (Shulman, 1987; Shulman, 1986; Shulman & Shulman, 2004). This integrated form, Pedagogical Content Knowledge (PCK), is demonstrated not by knowledge of a particular content area or teaching strategy, but instead by a teacher's knowledge of the most effective pedagogical methods to teach particular content (Shulman, 1986). The TPCK framework adds the area of technology knowledge to this equation, suggesting that knowledge of appropriate tools and methods needed to teach specific content is integral to effective teaching in online environments (Mishra & Koehler, 2006).

This study mapped and analysed reported changes in participants' design practices and designed units using the TPCK framework to identify changes in the individual areas of technology, pedagogy, and content, as well as integrated knowledge areas, with a particular focus on PCK and TPCK as possible indicators of teachers' design-knowledge growth.

1.4 Significance of the study

The problem this study addresses is significant because effective design is the basis for high-quality learning experiences. The constant improvement of teaching, learning, and research are all foci of the modern university with pressures to achieve these outcomes building each year. Despite this, university teachers' design work is over looked and under-researched. The literature often focuses on design professionals or instructional-design processes modelled for teams and large projects. This is in contrast to the fact that most university teachers, whose primary expertise is in their own discipline, not in design, are designing their units largely on their own each semester.

Supporting university teachers' design work therefore requires knowledge of their processes and needs; however, there is limited empirical data about the design work of individual university teachers to guide support efforts. This may be partly due to the fact that design has only recently begun to be conceptualised as part of teaching in higher education and partly because it is difficult and time-consuming to investigate, as it is ill-defined, contextually embedded, and largely tacit in nature. Compounding the issue is the fact that research on Learning Designs to date has focused more on the users' perceived needs and preferences and has predominately explored the use of Learning Designs in controlled or workshop environments. There is no data on the selection and use of a Learning Design within 'naturalistic' design contexts or exploring the impact of using a Learning Design on university teachers' design and thinking. This creates a situation in which research not only separates Learning Designs from applied design contexts but works from limited knowledge of university teachers' design practices. This study begins to address these gaps in knowledge by investigating the selection and use of a Learning Design within naturalistic design contexts, and using research methods that explore this process over a full design cycle of planning, implementation, and review conducted for a unit of study.

This study adds significant new detail to an understanding of how university teachers might incorporate design supports, in particular Learning Designs, into their practice. The outcomes of this study expand the knowledge about Learning Designs from perceived needs and potential reuse to contextually embedded needs, use, and impacts on university teachers' design. It also provides guidance in the use of support models for university teachers by contributing to knowledge about university teachers' design processes, needs, and considerations in designing and implementing a unit of study. This could aid not only the development of Learning Designs and technical specifications, but also more generally professional development work targeting university teachers' design work.

Finally, this research offers important empirical evidence that provides a basis for conceptualising the role of design supports within university teachers' design thinking. In particular, it provides evidence of the role of Learning Designs as conceptual frameworks supporting ideation, visualisation, communication, and knowledge growth.

1.5 Research strategy

A qualitative research methodology, using multiple case studies was chosen for the purposes of this exploratory investigation of university teachers' use of a Learning Design during their design work. The aim was to provide a holistic view of the problem within both institutional and disciplinary contexts through detailed cases, which included rich, thick descriptions of the use of Learning Designs over time. A case-study approach enabled a holistic, in-depth investigation of these phenomena. The strength of a case-study approach lies in answering "how" and "why" questions (Yin, 2009) and allowing the investigation of phenomena that are difficult to separate from context (Merriam, 1998; Yin, 2009). The choice of a multiple case study design was motivated by the aim of obtaining insights from multiple contexts and perspectives that both provide examples of variance and added strength to commonalities. This aligns well with a key purpose of a multiple case study design, which is to gain further insights into a particular issue (Stake, 2000).

Eight cases were followed through the pre-implementation, implementation, and post-implementation design work for a single unit with a Learning Design selected by the participant. The cases were limited to participants who were planning to design and teach a unit in Semester 1 or 2 of 2009 and who were interested in working with a Learning Design to support this process. Within these cases, variation in university and disciplinary contexts were sought and efforts were made to recruit participants with varied prior teaching experience.

The data set included interviews, documents, visual representations, and field notes and was collected in three phases: Background and Pre-Semester Design Work, Implementation, and Post-Implementation. The Background and Pre-Semester Design Work phase of data collection was the most intensive and was further divided into three data-collection points. The key purpose of the research in this phase was to gather information about how university teachers work with Learning Designs and how design decisions are made. Additionally, the researcher looked to gain an understanding of participants' backgrounds, contexts, previous design practices, and design plans. The purpose of the second phase, the Implementation Phase, was to follow further developments in the design throughout the semester. The data was collected through

responses to a set of questions that asked participants to reflect on the design, alterations to the design made during teaching, and their processes and thinking as they responded to demands throughout the semester. The third phase of the study, the Post-Implementation Phase, took place after the unit of study had been taught. The purpose of this phase was to collect the participants' reflections on their experiences with the Learning Design, their design work, its implementation, and their plans for modifying the design for future offerings.

After the completion of the data collection, the data set of transcribed interviews, documents, visual representations, and researcher field notes was compiled and organised for analysis. The analysis of the data was conducted in iterative cycles following the general case-study analysis phases of data managing, reading and memoing, describing, classifying, interpreting, and representing and visualising (Creswell, 2007). Participants' design work phases were identified, and within each phase the design thinking, activities, considerations, Learning Design uses, and Learning Design impacts were compiled into two data-analysis matrices. The first matrix looked at the themes across the phases to identify key aspects of the participants' design work and Learning Design use within each phase. The second matrix presented key summary attributes (e.g., teaching experience, discipline, etc.) and themes for each case for comparative and relationship analysis. This second matrix was also used as the basis of the TPCK analysis, which mapped key impacts in the areas of technology, pedagogy, content, and integrated knowledge areas represented within the TPCK framework. These analyses produced the eight richly detailed individual case studies presented in Chapter 4 and the three cross-case analysis summaries presented in Chapter 5.

1.6 Scope and limitations of the study

This study is exploratory in nature and focused on university teachers' use of a Learning Design during their 'naturalistic' design work. The participants of interest were university teachers whose role included the design and teaching of a unit; design professionals (such as educational designers) were not sought to participate in the study. All participants were limited to the Australian university context and to those interested in applying a Learning Design to a unit they were both designing and teaching. The

investigation was limited to a small number of cases that could be explored in depth. It was beyond the scope of this particular study to determine what design practices or approaches result in better designs and ultimately better student-learning outcomes. Therefore, no attempt was made to evaluate the quality of the participants' designs. Rather, the focus was on the use and impact of a Learning Design on participants' design work and thinking.

Given the limited number of cases, broad generalisations cannot be made from the findings of this study. However, it is hoped that the rich description of the cases and the presentation of the cross-case themes and patterns will allow the reader to draw naturalistic generalisations. The limitations arising from the context, methodological approach, focus, and researcher influence are acknowledged and were taken into consideration where possible. A full discussion of the limitations of the study is contained in Chapter 6.

1.7 Definition of terms

Units – the individual components of study that contribute to a university qualification or degree. They are usually taught over the course of a semester, term, or teaching session (Open University Australia).

Program – "A sequence of study leading to the award of a qualification such as a bachelor degree, graduate diploma or certificate" (University of Queensland, n.d.).

University teacher – a general term referring to any academic within a university who has responsibilities for teaching, without regard to academic rank.

Learning Design – a general term encompassing any formalised representation of teaching and learning, textual and/or visual, used for the purpose of documenting and sharing teaching practice. A Learning Design can represent any level of granularity from a small activity that may take an hour to a multi-year program of study and can be presented as contextualised or generic (Oliver et al., 2002).

AUTC Learning Design - a Learning Design representation developed as part of a nationally funded project in Australia, which consists of a textual and visual description of the pedagogical design that includes a specific breakdown of the tasks, resources and supports within the design. A **task** is a specific activity in the learning experience (e.g., the problem, investigation, project, or role play) that students undertake to achieve a specific learning objective or set of learning objectives in the Learning Design (Oliver et al., 2002). A **resource** is any designed, sourced, or created material or reading used to build student knowledge necessary to achieve a task. Resources can be either in hard copy or electronic. Finally, **supports** are the "mechanisms provided to assist learners to engage with the tasks and resources" (Oliver et al., 2002, p. 2).

Learning Design Visual Sequence (LDVS) diagram – a visual representation showing the pedagogical flow of the Learning Design. The diagram consists of a temporal sequence of tasks along with the associated resources and supports. The diagram also includes the time frame and expected learning outcomes.

design thinking – the thinking, strategies, activities, knowledge, and skills that are reported and manifest within a persons' design work and processes. This is distinct from formal Design Thinking processes (below).

1.8 Structure of the thesis

This thesis consists of six chapters. This chapter has provided an overview of the problem studied, outlining its background, focus, and significance, and the research strategy used. Chapter 2 critically surveys the empirical research on university teachers' design work and use of Learning Designs. Chapter 3 describes the research paradigm, conceptual framework, procedures, and data analysis. The description of the research procedures includes an introduction to the case participants, data-collection instruments, and phases of the study. The chapter also discusses the quality of the study and role of the researcher. Chapter 4 presents the results of the study as eight individual case studies. Each of the individual cases follows the work involved in the design of a single unit or redesign of an activity within a unit. In Chapter 5, a cross-case analysis brings together the findings across the cases, drawing out themes, patterns, and interesting points of difference. The concluding chapter, Chapter 6, discusses the

findings in relation to the research questions investigated, their implications, the limitations of the study, and suggestions for further research. All supporting documents referred to within this thesis are in the appendices.

2 Literature Review

2.1 Introduction

This study aimed to gain a greater understanding of Learning Designs as support mechanisms for university teachers' design work in higher education. This chapter sets out to synthesise and critically review research into how university teachers design generally, and, more specifically, how Learning Designs have been used to support university teachers' design and teaching practice. This chapter is therefore organised into two main sections. The first section sets out what is known about the general design context and process in higher education. Evidence from the studies is discussed critically to identify the main findings and gaps, particularly to inform the methodology of the current study. The second section then focuses on the literature on Learning Designs. This section begins with a general introduction to Learning Designs, their development, and relevant conceptual work. The focus then narrows to review empirical research into the selection and use of Learning Designs, particularly by university teachers as designers in higher-education contexts. The chapter then concludes by summarising the key findings of the literature review, identifying the gaps that exist in the research, and explaining how this research addresses a specific gap in what is known about the use of Learning Designs.

2.2 University teachers' design work

This study aimed to explore and understand how Learning Designs might aid university teachers' usual unit-design work. To understand the nature of this work, the chapter begins with a review of literature into higher-education teachers' design processes, their context, and what has influenced them. To identify this empirical literature, a broad search of two research databases[1] was undertaken. This search employed sets of related "design"[2] terms paired with "university teacher"[3] terms to target studies. A subset of articles was selected for review based on a set of inclusion criteria: each article to be reviewed had to be an empirical study focused on university teachers' design of single

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1 Scopus and Web of Science

2 design* and plan*

3 higher education, tertiary, universit*, college*, post secondary and post-secondary

units. This excluded studies focused on the design of large multi-unit programs, design work done by educational-design professionals, and studies within primary-school, secondary-school, or non-accredited contexts. Research on the design of multi-unit programs was excluded due to its very different focus and context. Similarly, the design work of other educational professionals (e.g., school teachers, educational designers) was excluded because these groups of designers work within different contexts and have different training to university teachers.

This process found ten studies that investigated aspects of university teachers' design practice and influences. The studies spanned from 1984 to 2013 and were largely characterised by small-scale investigations that used reflective interviews or questionnaires as the primary means of collecting data. The design process and phases were under-investigated within the literature; however, studies frequently reported on both the context for design and the related design considerations. The studies typically used research methods that focused on discovering university teachers' design thinking and processes after design work had been completed. Most likely due to the largely tacit nature of the design process, no studies were found that used direct observation as a methodology. Most studies also relied on single data sources (e.g. interviews or questionnaires), with only two studies using additional data sources such as documents to provide alternate views and triangulate data. Finally, most of the studies sought to investigate previous design practices from a single point significantly separated in time from the act of design and often at a general level.

This "one off nature", separation from the task, and generalisation of design work practices has a number of possible limitations. First, recall of general practice may lead to loss in information about specific types of design work and/or result in a presentation of the best-case scenario. This may in turn lead to oversimplified, ideal views of design work that inadequately inform understandings about this process. Similarly, in studies where there is a large separation of time between the design activity and the reports by participants, participants' ability to accurately recall affects on the reliability of their recollections. Finally, design is a complex activity that takes place over an extended period, and therefore research focused on data collection from a single point may be missing its developmental changes and iterative phases.

The remainder of this section will discuss the investigation of design within these studies and their findings thematically. It will begin with a discussion of themes, drawing together findings about types of design work, design process, design support, influence of individual characteristics and beliefs, discipline, and other contextual factors influencing design.

2.2.1 Types of design work

The focus of individual university teachers' design work is often on the adjustment or redesign of established units rather than the design of new units (Bennett et al., 2011; Stark, 2000). A large three-phase study conducted from 1987 to 1990 found that much of the planning work done by the 2,311 American college teachers in the study consisted of fine-tuning (Stark, 2000). The routine nature of redesign and relative novelty of design from scratch has been confirmed in later research conducted with 30 Australian university teachers (Bennett et al., 2011). Therefore, the suggestion within the literature is that university teachers most commonly work on the redesign of units rather than on new units.

When designing individual units, university teachers tend to work on their own within a set of predetermined requirements. In an effort to determine the nature of design experiences in Australia, a study of 32 university teachers' design practices found that seven of the 30 participants (23.3%) had only designed individually, five (16.6%) had only designed in teams, and remaining 18 (60%) had experience designing both in teams and individually (Bennett et al., 2011). While participants most often had experience of both team and individual planning, further investigation revealed that these two types of planning were often associated with the type of design work being done: "team planning often occurred at a [program] level, with individuals often left to design their own units within an agreed overall structure and approach" (Bennett et al., 2011, p. 165). This division of the design work into the establishment of broad unit design goals, topics, etc. by a separate group is found elsewhere in the literature. For example, Hora and Ferrare (2013) and Roberts (1991) both mention design committees making decisions about content and unit goals before university teachers begin their more detailed design work. The suggestion within the literature, therefore, is that at the unit level most university teachers go about their work individually, but must adhere to

some predetermined elements. The implication for Learning Designs is that they would need to be flexible enough to allow university teachers to implement them within their institutions' design restrictions.

2.2.2 Design process and planning

The few studies that have directly asked university teachers about their design processes have focused on design starting points, key steps in the design process, and general design considerations. One study found that teachers did not follow or spend as much time on all the elements that would be considered within a professional instructional design cycle (ADDIE); in particular, they often "seem[ed] frequently to omit or neglect the phases of problem analysis and evaluation" (Hoogveld, Paas, Jochems, & Van Merriënboer, 2002, p. 303) in their design work. Instead of problem analysis, design work has commonly been found to start with the establishment of key macro elements, in particular content (Bennett et al., 2008; Powell & Shanker, 1982; Stark, 2000; Wolcott, 1993). Stark's (2000) study of 2,311 American college teachers identified teachers' common focuses or "steps" in their design process and usual starting place (Table 2.1). These findings show that the most common design steps were the selection of content, consideration of student characteristics, consideration of how students learn, setting of objectives, and selection of materials and activities (Stark, 2000). Many of these considerations have been mentioned in other studies, with student prior knowledge and characteristics being an early consideration within many reported processes (Bennett et al., 2008; Hoogveld et al., 2002; Hora & Ferrare, 2013; Roberts, 1991). Hora and Ferrare (2013) linked the consideration of students to both the choice of content and the unit structure. Wolcott (1993) found that the establishment of content was followed closely by the sequencing of the overall unit. While Stark (2000) identified the selection of content as university teachers' first step, she also indicated that "teachers seem to make decisions about instructional form in almost any order, as suits their individual style and whether they are routinely maintaining an old course or planning a new one" (Stark, 2000, p. 435).

Table 2.1: Steps University Teachers Take in Planning Units

	Step taken	*First step*
Select content	85%	46%
Consider student characteristics	69%	15%
Consider how students learn	67%	9%
Establish objectives based on own background	61%	16%
Select materials and activities	59%	6%
Examine previous student evaluations	42%	1%
Base objectives on external influences	35%	6%

Reproduced from Stark (2000, p. 419)

Those studies that report on the distribution of design activities indicate that the majority of planning decisions are made prior to the beginning of term (Powell & Shanker, 1982; Wolcott, 1993); however, design work and adjustments were reported in one study to continue into the semester (Powell & Shanker, 1982). Powell and Shanker (1982) suggested that the participant's pre-semester design work focused on "the broad outlines of the [unit]…, major activities of the students…[and] the [rough] design of each class period" (Powell & Shanker, 1982, p. 295); the detail of the early weeks was found to be more established, leaving the remaining design work to be completed in reference to how aspects of the unit were running throughout the semester. Further insights within the literature come from the identification of supports and influences on the design process and thinking, rather than detail regarding how university teachers design.

2.2.3 Design support

University teachers seek design support most commonly from colleagues, rather than central support units or educational literature. Investigations within this review asked participants where they generally received design support, and findings indicate that when planning units, "they seek little help from others. When they do, department colleagues are considered by far the most helpful source of advice, and often the only source" (p. 420) with less than one-third of the 2,311 college teachers indicating pedagogical training had any influence (Stark, 2000). This finding of general self-

reliance with collegial support is affirmed by a study of 195 nursing university teachers that found that "self" and "colleagues" were university teachers' strongest design process facilitators (Roberts, 1991). Conversely, findings suggest that central support units and pedagogical literature are underused and perhaps are not seen as able to significantly aid knowledge development (Henderson, 2005; Stark, 2000). While reasons for the underuse of these services are not provided in most studies, one explained that the university teacher, "did not believe that talks, workshops, and written material could provide more than awareness knowledge" (Henderson, 2005, p. 782). These findings along with the findings that university teachers' design work on units tends to largely be individual, point to a very solitary context for design work. A more recent Australian study found that more than 50% of their 32 participants referred to pedagogical literature and made use of central support units (Bennett et al., 2011). This difference may be the result of different contexts, or shift in attitudes towards professional development. However, as the participants of the study were all members of Australian professional associations focused on education and online learning topics, they most likely represented a group that is naturally more open to both the educational literature and professional development generally.

2.2.4 Influence of individual characteristics and beliefs

University teachers' characteristics and beliefs have not been shown to impact significantly on individuals' design practices. A natural assumption might be that differences in a university teacher's gender, employment level, employment type, or amount of teaching experience might produce differences in design and design practices. However, a large study of college teachers in the United States found these characteristics to be of little importance in relation to design practices and beliefs (Stark, 2000). No other studies within this literature have looked at the possible influence of gender, employment level, employment type, or amount of teaching experience; however, the influence of university teachers' beliefs has received some attention, with conflicting results. For example, a survey of 195 nursing lecturers found that their beliefs about teaching facilitated their design processes (Roberts, 1991), while a study of university teachers' conceptions of teaching and unit planning found that university teachers' espoused beliefs had little impact on their design thinking and planning (Eley, 2006). Overall, the findings are limited in the area of university teachers' characteristics

and mixed on the influence of their beliefs. While the studies do not strongly suggest that their individual characteristics influence design practice to a large degree, these areas warrant further investigation.

2.2.5 Discipline

Within the reviewed studies there is generally a focus on one or two discipline areas and a larger representation of science-based subjects (e.g., physics, nursing, maths, chemistry, psychology). The limited number of studies with cross-disciplinary data and widely varying methodological approaches make comparisons of possible disciplinary differences across studies difficult; however, two studies provide data across disciplines. Their findings are described and discussed below in relation to findings on more discipline specific studies.

While broader influences such as institution type, policies, mission statements and college association were found to make little difference in how university teachers' design, the influence of a university teacher's discipline has been shown to impact on design thinking and choices (Stark, 2000). In fact, in Stark's (2000) study of 2,311 college teachers discipline was found to exert the strongest influence on planning and was the highest predictor of university teachers' beliefs about education, design goals, and steps. Disciplinary differences in the goals and selection of content for units were also evidenced in these findings. For example, planners in some disciplines were found to be more likely to select content and activities early in the planning process, whereas those in other disciplines emphasised skills and focused on student characteristics and student preparation much more than content selection (Stark, 2000). Adding to these findings, observational data from a study of mathematics and physics university teachers found disciplinary differences in how university teachers' enacted plans and made use of various teaching methods, technologies, and interactions with students (Hora & Ferrare, 2013). The prominence of disciplinary considerations was also observed within an Australian study of two university teachers' design practices (Bennett et al., 2008). While these findings suggest discipline as the key predictor of design and teaching approach, other findings suggest that perhaps the activity or topic type is the greater predictor (Eley, 2006).

2.2.6 Other contextual factors

A number of unit characteristics are reported within the literature as factors restrictive to the design process. For example, factors that have been found to impact on perceived autonomy and pedagogical options included set unit goals or requirements (Bennett et al., 2011; Stark, 2000), content requirements (Bennett et al., 2011; Henderson, 2005; Roberts, 1991), teaching of multi-section or multi-campus offerings (Hora & Ferrare, 2013; Stark, 2000), type of teaching space (Roberts, 1991) and team teaching (Hora & Ferrare, 2013). Set curriculum elements established by textbook selection, accreditation requirements or previously approved documentation (e.g., unit outlines) have received the attention in the literature, and have been found to restrict both pedagogical options and teachers' sense of overall autonomy. However, in studies that reported on both the restrictions on and freedoms afforded to university teachers when designing, set curricula were not found to affect individual university teachers' autonomy to choose how to teach specific content or how to achieve particular unit goals (Bennett et al., 2011; Stark, 2000). This suggests that for most university teachers there is enough scope to experiment with new pedagogical designs such as Learning Designs, as long as key content and set goals were still achieved. Perhaps of greater impact on the possible implementation of pedagogical changes might be the factor of available time, which was reported as a constraint on both university teachers' design processes (Roberts, 1991; Stark, 2000) and attempts at pedagogical change (Henderson, 2005).

Unit level and student cohort have been investigated to determine the extent to which these factors might influence design practices. Both of these areas lend themselves to assumptions about their influence, though there has actually been little research investigating the extent of the influence on design or differences in practices when these factors change. Findings arising from two comparative surveys on the planning activities for introductory and advanced units found the influences and planning processes reported were essentially the same for the 288 respondents (Stark, 2000). The only differences were found in the disciplines of maths and English composition, which shifted from generic skill-building at the introductory level to a more knowledge-building in advanced units. Additionally, while student characteristics and student goals were found to be first on the list of design influences Stark (2000) and university

teachers have been shown to have student-centred design practices (Eley, 2006), the specifics of which student characteristics and how they might be taken into account have not been investigated in the literature.

Overall, studies of universities teachers' design work provide valuable insights into their design contexts including the relative novelty of new unit design, the often individual nature of unit design, and the potential influence of disciplinary thinking on design and teaching. There are also some findings on general design activities, typical starting points, and constraints to the design process. However, there is little insight into the detailed processes of design thinking from in-situ studies. For example, what are teachers' main design activities, influences, and supports as they move through different stages of their design process? Additionally, how and to what extent do factors such as disciplinary differences affect the ongoing design process, chosen pedagogical approach, or final design? Finally, the literature on design reveals no indications of how university teachers draw on and develop their knowledge in regards to specific knowledge areas. Given that teacher knowledge has been an important area of research, the lack of connection between design work and development of teacher knowledge is a significant omission.

2.3 Learning Designs

Within universities, there has been a shift to less didactic forms of learning and more collaborative, problem-based approaches; pushes for increased quality in teaching and learning; and an increase in the use of technology to support teaching and learning (Oliver, 2000). In this changing environment, there is a need for improved teaching and learning; however, for many university teachers there is a knowledge gap. University teachers are subject-matter experts and, typically, trained researchers. They are rarely educational experts, nor are they given much training in educational practices and the use of technology for educational purposes. Online technologies have created opportunities as well as a new and complex set of challenges in which university teachers are being asked both to improve the quality of their teaching and to shift their teaching to new pedagogical and technological contexts. The experience of most university teachers does not cover this new, expanded set of demands, particularly as much teaching knowledge relies on personal experiences of learning and teaching

approaches. In this changed context, university teachers need to build pedagogical expertise and learn to make use of the technological tools available to them while creating high-quality learning experiences.

The sharing of practice has been seen as one way that could help university teachers learn about pedagogical models, guide design work, and aid implementation of designs within technology-enhanced learning environments. For academics, sharing with colleagues was already a part of the informal learning process, and in teacher education, the sharing of formal teaching cases was used to spread pedagogical knowledge and aid design work (Shulman, 1986). Therefore, a tool to formalise the sharing of practice seemed an appropriate answer to this need within the higher-education context. As a result, Learning Designs emerged as a possible vehicle for the description, sharing, and reuse of quality designs. Learning Designs formats were developed to summarise key information and elements of successful practice, and act as design supports that could both expand on experiential learning and connect it to proven pedagogical practices (Dalziel et al., 2013).

While the broad goal of Learning Designs has been to share and facilitate practice, Learning Designs approaches have come from multiple directions in their attempt to answer multifaceted needs. This is evidenced by the various forms of Learning Designs that have emerged since 2001, which present information in a variety of ways (e.g., textual, visual, machine-readable). The various forms can be broadly grouped into two sometimes-overlapping foci, based on the initial intended reader of the design. First, runnable Learning Designs were focused on the sharing and reuse of designs that could be read and implemented by computers. This work focused heavily on the development of languages (EML), technical standards (IMS-LD), and tools (e.g., ReLoad, CopperCore) to enable the creation, capture, replication, and transfer of Learning Designs between various learning-management systems and software tools (see Koper & Tatterstall, 2005). Later, work moved to the automatic generation of these designs and their use by people, but at the time of the initial framing of this study in 2008 most of the work in the area of end-user interaction with these designs was yet to be done.

The second approach began by focusing on structured descriptions of teaching practice sometimes referred to as inspirational Learning Designs. The aim was to convey

pedagogical ideas, steps, and integrated tool use in a format that could be understood and adapted by people designing teaching. Work in this area focused on written representations (e.g., AUTC Learning Designs, Pedagogical Patterns and LdLite), collection facilities (e.g., Cloudworks, EnRoLE, AUTC Learning Design Website, e-Len Pattern Repository), and tools developed to document and plan practice (Pedagogical Planner, Phoebe). These two strands of learning-design work were not mutually exclusive, and tools such as LAMS attempted to bridge the gap between the two. In fact, the complexity of the problem led some to conclude that multiple representations would be needed for Learning Designs to be understood by different users (Falconer & Littlejohn, 2006).

Research agendas in the area have also targeted different focal problems in developing and using Learning Designs. For example, research has focused on the development of standards (c.f., Koper & Tatterstall, 2005), support tools (c.f., Alvino et al., 2009; Hernandez-Leo et al., 2011; Verbert et al., 2012), comparison and improvement of descriptions (c.f., Agostinho et al., 2009; Conole et al., 2008; Falconer & Littlejohn, 2006), visual representations (c.f., Agostinho, 2011; Botturi, 2005), the collection and cataloguing of Learning Designs (c.f., Buzza, Bean, Harrigan, & Carey, 2004; Conole & Culver, 2010), and the reuse of Learning Designs (c.f., Bennett, Agostinho, & Lockyer, 2005; Frizell, 2006; Verbert et al., 2012). It is this last area of research that is of most relevance to this study. Empirical literature in this area is examined in more detail in the following sections.

2.3.1 Empirical Learning Designs research

The strand of empirical research most relevant to this study focuses on how people, in particular university teachers, have selected and used Learning Designs. As with the literature search informing university teachers' design context and work, two methods were employed to identify the set of empirical research. First, the relevant databases were searched using sets of related "Learning Design"[4] terms, which included terms to capture Pedagogical Patterns, and paired with "university teacher"[5] search terms. The

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4 learning design* OR design pattern* OR pedagogical pattern

5 teacher* OR lecturer* OR instructor* OR academic* OR faculty OR practitioner*

results were then limited to higher-education research. The abstracts, methodology, and discussion of the resulting papers were then skimmed to determine if they met the criteria for inclusion. Papers were included in this review if they were empirical studies related to people's reuse of Learning Designs in higher education. This focus excluded any articles from the K-12 sector and studies of the automated use of Learning Designs without reference to university teachers' design work. This resulted in a set of related literature in peer-reviewed academic journals and conferences. Second, a process of expanding the identified literature was undertaken by following up citations and identifying key literature. Due to the nature of the field, it was decided that not all literature would come from academic journals or conference papers. Therefore, the criteria were expanded to include project reports by national teaching and learning funding bodies. This process identified 13 articles published between 2004 and 2013. The articles were then read, and their findings were grouped in relation to the stage of Learning Designs use investigated in each study (e.g., locate/search, select, reuse, implementation, and review). These stages were adapted from similar stages found in (Falconer et al., 2007). This process revealed that much of the research to date has been focused on the stages of locating/searching (3), selecting (5), and design reuse (7), with only one study reporting on the implementation and review of a reused design. A general description of the literature highlighting some of the key gaps is presented below, followed by a focus on findings related to attitudes towards the selection, sharing, and reuse of Learning Designs.

A common issue within the literature is the practice of basing findings on potential use or use of a Learning Design in hypothetical design scenarios, rather than application in real design contexts. For example, while there are seven studies of reuse, closer inspection reveals that, of these seven, five used hypothetical design scenarios and none followed the use of the Learning Designs through to implementation. The focus on potential use and design scenarios leads to a possible oversimplification of user needs and associated design processes, as there is a lack of real-world applications of the design scenarios. When this is compounded by the fact that many university teachers do not have the language to clearly express their own pedagogical activities, the findings provide an incomplete picture even of hypothetical use. This was clear in one

study of novice teachers' designs using Pedagogical Patterns[6]. In this study, when participants were asked how they thought they would implement the Pedagogical Pattern they had chosen, they did not make the expected connections between the chosen design and the hypothetical unit. Instead, the researchers "received a variety of answers from the participants. Some answers were general and did not distinctively apply to the course" (Frizell, 2006). It seems that within such hypothetical design scenarios participants may not be fully connecting to or thinking through the design problem as they would for unit design in the real world.

Research in the area has often been focused on participants with a high level of experience in education, technology, or Learning Design. For example, most participants within studies of inspirational Learning Designs have been educational professionals or part of Learning Designs collection projects (c.f., Agostinho, 2011; Bennett et al., 2005; Bennett, Lockyer, & Agostinho, 2004). Additionally, participants involved with runnable Learning Designs studies have often been computer-science or Learning Design specialists (c.f., Frizell, 2006; Verbert et al., 2012). Of those studies that clearly identify the characteristics of their participants, only two studies, Villasclaras-Fernández et al. (2013) and Alvino et al. (2009), investigated the design work and reuse of Learning Designs of participants who had expertise outside of these areas. Both studies focused on novice users' evaluation of a tool while applying a runnable Learning Design to a design scenario. The studies' findings suggest that novice designers can understand and apply runnable Learning Designs (Alvino et al., 2009; Villasclaras-Fernández et al., 2013), and in one case are further aided by the support of Pedagogical Patterns to make assessment decisions (Villasclaras-Fernández et al., 2013).

Finally, the focus of research on Learning Designs use has been on the initial planning stages, despite the fact that design work on a unit continues for much longer. As one design study found, pre-service teacher educators needed an average of 40 hours to

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[6] Pedagogical Patterns build on the work of Alexander et al. (1977) who described design patterns as solutions to recurring architectural problems. Alexander developed a structured format for describing these solutions which included a picture of the pattern, a short contextual description of the pattern, an extended explanation including the problem it addressed and references to related sub-patterns. Using a similar structure to describe and synthesise solutions to common teaching problems, Pedagogical Patterns transfer Alexander's ideas to recurring educational problems (see Goodyear, 2005; Goodyear & Retalis, 2010).

design a new unit (Hoogveld, Paas, & Jochems, 2003). As discussed above, design work is complex and little is known about how university teachers design. Yet, no study to date has investigated the reuse of a Learning Design through the stages of pre-implementation planning, implementation, and review. The overwhelming focus on the selection and potential reuse of a design leaves a significant gap in the knowledge about how university teachers might use these resources past the initial stages of design.

2.3.1.1 Attitudes towards sharing and reuse

Evidence points to an openness to the idea of sharing and reuse, but suggests that reuse in practice is often facilitated by personal networks. Studies from the UK and Australia presented findings suggesting that university teachers and curriculum designers were open to sharing and reuse (Cameron, 2009; Falconer et al., 2007; Lucas et al., 2006). In practice, however, the UK studies found that university teachers did not commonly search for or reuse teaching materials or Learning Designs from external sources (Falconer & Littlejohn, 2006; Lucas et al., 2006). The suggestion within these studies was that historical patterns of sharing amongst university teachers tended to be based on personal networks, and these networks may have provided a possible support for implementation or an informal knowledge of the person's known work. Findings from a study on the reuse of 36 role-play Learning Designs in Australia also point to the importance of personal introduction in discovering and reusing Learning Designs. The study compiled reports of Learning Designs use and found that educational designers played a particularly prominent role in discovering Learning Designs for reuse, in contrast to independent searches (i.e., through repository searches or search engines) (Wills & McDougall, 2009). The suggestion of all of these findings is that while sharing between known colleagues and associates is a fairly common practice, the act of searching out a new teaching model from an unknown source is not. That being said, the area of learning design was still new at the time of these studies, so perhaps the continued shifts toward more openness within education (e.g., open access, etc.) and development of online communities may have begun to impact on practices.

2.3.1.2 Selection elements and reasons

Research on elements needed for the selection of Learning Designs has focused on users' views of potential needs and focal points during selection. In one study,

university teachers and curriculum designers listed numerous potential needs involved in the selection and reuse of a Learning Design. These included detailed assessment information, feedback from students, differing design pathways, the design rationale, a designer's indication of confidence in the design, information about social interaction, detailed information about the timings of activities, and the ability to view additional detail on demand (Falconer & Littlejohn, 2006). While these findings provide starting points and indications of university teachers' needs, the removal from an actual design problem appears to result in lists of possibly desirable needs rather than needs that are essential in practice. This is a point also suggested by the researchers, who speculated that the list of users' wants may not reflect actual needs (Falconer & Littlejohn, 2006). In contrast, users selecting Learning Designs to apply to design problems provide a much shorter list of key foci during selection. Due to the differences in structure and presentation of various Learning Design types it is somewhat difficult to make direct comparisons. However, extrapolating to the generic function of individual elements reveals some common findings across the studies. In particular, findings indicate key selection foci including title, overview summary, and, when present, visual elements (Botturi, 2005; Frizell, 2006; Lucas et al., 2006). Additionally, in a study of novice designers' use of Pedagogical Patterns, an example section was found to be the most preferred element (Frizell, 2006). Perhaps, the examples helped these novice designers to contextualise the generic explanations within the pattern.

The reasons given for Learning Designs selection are generally consistent. Two studies provided users' potential and general reasons for selection, which were similar in nature. These reasons could be summarised as alignment of the Learning Designs' content, assessment, and teaching approach, with both users' professional knowledge of good pedagogy and student needs (Bennett et al., 2004; Falconer & Littlejohn, 2006). The only study to connect reasons for selection to a specific Learning Design selection activity and design problem involved novice designers. In this study, the novice designers looked for quality designs aligned with their pedagogical beliefs, general design context, design constraints and student needs (Frizell, 2006). The participants' reasons for their selections were similarly general, without specific connection to elements of the design problem, which suggests that perhaps specific reasons for design decisions are difficult to articulate.

Overall, results from the literature point to some key elements and general reasons for selection; however, further work looking at actual selection processes and reasoning would help to deepen understanding. In particular, such work could examine how these elements and processes might connect to design thinking, and which Learning Design elements might be needed to facilitate Learning Designs use for solutions to real design problems.

2.3.1.3 Reuse of Learning Designs

Inspirational Learning Design descriptions were aimed to create efficient and consistent representations and descriptions of learning activities for university teachers to read and apply to their own context. One issue within the field has been determining the degree of abstraction that such descriptions should adopt. Many Learning Design representations aimed to provide generic, relatively context-independent descriptions, with the belief that such generic descriptions would be easier for people to use. For example, building on concepts of Alexander et al.'s (1977) architectural design patterns, Pedagogical Patterns focused on distilling common solutions to specific teaching problems separate from a specific disciplinary context. In the case of the AUTC Learning Designs, two Learning Design forms were created at different levels of abstraction: contextualised "exemplars" and a subset of generic Learning Design "guides". Each contextualised Learning Design was created by the original designer and, while abstracted to a degree, contained many specific examples linked to the original design context. Generic versions of some of the contextualised Learning Designs were then further abstracted from the original designs to identify the essential components of the design and less context-bound examples of content types, etc. These generic forms were created with the assumption that more-abstract forms of the design could aid understanding and transfer it to other disciplines.

This set of assumptions is called into question by empirical findings from two studies. First, results based on users' feedback on three generic Learning Designs were that these generic forms lacked the necessary guidance for successful transfer of a design (Falconer & Littlejohn, 2006). Second, a study of the AUTC Learning Designs found that differing levels of abstraction were useful for different purposes (Bennett et al., 2004), with participants using the generic design for a broad overview and the

contextualised version for the detail of what the students would be doing. These findings suggest that more-contextualised Learning Designs may be necessary for transfer into actual teaching contexts. However, further research looking at uses of both generic and contextualised Learning Design forms might clarify their strengths, weaknesses and uses.

An early suggestion within the literature was that no one inspirational Learning Design representation was sufficient for successful reuse, and that multiple models would be necessary to convey a design (Falconer & Littlejohn, 2006). This suggestion has not been clearly supported by studies of specific Learning Designs. In fact, studies of both Pedagogical Patterns and AUTC Learning Designs have shown that university teachers can both understand and apply a Learning Design to a specific design problem (Bennett et al., 2005; Bennett et al., 2004; Frizell, 2006); moreover, reuse has been documented in multiple contexts (Wills & McDougall, 2009). Additionally, participants in the study of an AUTC Learning Design not only understood and adapted their chosen Learning Design to their context, they also maintained the main pedagogical structure of the design (Bennett et al., 2005). However, the relative ease of reuse may have been due to the fact that the participants in this study were Education faculty and knowledgeable pedagogues, or the fact that the Learning Design they chose had originated from the same discipline. These findings suggest that Learning Designs can be understood and applied to real design scenarios; however, questions remain about what role pedagogical expertise might play, and how distance from the Learning Design's original disciplinary context might impact on reuse in new contexts.

2.4 Chapter summary

Representations of teaching such as the AUTC Learning Designs have been suggested as possible supports to university teachers' unit design. In response to this idea efforts to collect and represent best-practice designs have involved the development of tools, repositories, and technical standards to aid the sharing and reuse of designs. The focus of this literature review was therefore to investigate what empirical research has been conducted into 1) university teachers' design practices and 2) how Learning Dessigns have been used by university teachers.

Research investigating university teachers' design processes has provided little information on the phases and steps involved in university teacher's work. Therefore, there is little guidance as to the overall process that university teachers use, and particularly the nature and patterns of their design thinking. The literature does suggest that design work for specific implementations of a unit is typically undertaken by a single university teacher with little formal support; that this design work continues during implementation; and that content requirements and set curriculum tend to be the main design restrictions. Factors such as university teachers' characteristics and beliefs, unit level, and student cohort have not been shown to be of any specific influence; however, these areas warrant further investigation. Particular attention is needed to explore how teacher knowledge acts as a resource teachers can draw on as they are designing, and how that knowledge is further developed by design experiences. Finally, the studies within the review tended to focus on science-based subjects. Within the literature, discipline was found to be the strongest predictor of initial design steps, goals, and approaches. However, findings, also suggest that context may be a bigger predictor than discipline. The suggestion for Learning Designs is that the role of discipline is unclear, and that the investigation of multiple disciplines and contexts would help to identify possible differences.

In the area of Learning Designs research, numerous studies have asked users to select a Learning Design for their purposes, identifying both key elements for selection and key elements for use. The broad findings indicate title, summary, and visual representation are important in aiding the selection process. Findings also indicate that when choosing designs for teaching, knowledge of the pedagogical quality fitness for student needs, pedagogical context, assessment needs, and content to be covered are important factors. However, it is not known whether all of these elements are necessary, which might be of the greatest importance, or how they might relate to a specific design problem or context.

A common focus of work has been on university teachers' impressions of Learning Designs' potential application (Botturi, 2005; Cameron, 2009; Falconer et al., 2007; Lucas et al., 2006 & Gulc, 2006) and hypothetical design scenarios (Alvino et al., 2009; Botturi, 2005; Falconer et al., 2007; Frizell, 2006; Verbert et al., 2012; Villasclaras-Fernández et al., 2013). Additionally, the primary aim of many studies investigating

Learning Designs use tends to be on the evaluation and usability assessment of a tool, rather than on understanding how the tool is being used within participants' design practices.

The reason design scenarios have been chosen to investigate the use of Learning Designs can probably be related to the fact that the full process is long, complex, and messy. However, hypothetical design scenarios do not have the same set of complex variables as real design problems, and remove participants from the realities of their usual contexts. Therefore, findings from these studies may present misleading results.

No studies within the literature have followed Learning Designs use through all its stages: selection, design, implementation, and review. Additionally, only one study within this review has looked at the application of Learning Designs to a real unit (Bennett et al., 2005; Bennett et al., 2004). While this single study provided findings beyond the potential application, showing that university teachers could understand and apply Learning Designs to a real unit, the scope was limited to early design work done during a workshop. This leaves unanswered a number of questions about not only how people might use a Learning Design throughout the entire design process, but also what the impact of using a Learning Design might be. Given the prevalence of studies in contexts other than university teachers in their usual design contexts and using hypothetical design problems, there seems to be a need for studies that provide a greater understanding of how university teachers might apply Learning Designs to real design problems in more naturalistic contexts.

A further aspect of this empirical literature is the lack of theoretical or conceptual framing. The research conducted to date has tended to be practically oriented in that it has sought to investigate teachers' practices and, evaluate tool use and user needs. Despite the fact that some conceptual frameworks have been suggested within the literature (e.g., Conole, Dyke, Oliver, & Seal, 2004; Koper & Bennett, 2008; Masterman, 2008), none of the studies located and reviewed included a specific theoretical framing. This reflects the practical nature of the field thus far and the need for further conceptual development and empirical research to test conceptualisations.

In sum, this literature review found that empirical studies into university teachers' design practices and use of Learning Designs has been limited. As a result, it is not known when or how university teachers use Learning Designs throughout their design work. Nor is it known what level of abstraction works best for university teachers or whether cross-discipline reuse is possible for non-expert users without additional support. What is needed is a deeper understanding of the nature of Learning Designs use for real design problems and in real contexts. The study described in this thesis addresses this need through an exploratory study investigating Learning Designs use (a) within more naturalistic design contexts, (b) through a full cycle of Learning Designs use: selection, design, implementation and review, (c) by university teachers with limited previous Learning Designs experience and from a variety of discipline backgrounds. This study also provides an opportunity to investigate teacher design thinking and teacher knowledge as key features of teacher design work, and to consider how useful these conceptions are in framing studies of teaching design. The next chapter will frame this study within its research paradigm and conceptual framework before moving on to explain the data procedures and analysis used to investigate participants Learning Designs use.

3 Methodology

3.1 Introduction

This chapter details the methodological approach, design, and procedures used to investigate university teachers' design practices. It begins by framing the study within a broad qualitative research paradigm and offers a justification for the use of a case-study design. It then details the research procedures, including the selection of case participants, data-collection instruments, and the procedures employed. Next, it outlines and discusses the data-analysis techniques. The chapter finishes by discussing the quality of the study and the role of the researcher.

3.2 Research paradigm

3.2.1 Qualitative research

Teaching is a complex social activity. Investigating university teachers' design practices requires research methods that can capture this complexity. Much of the empirical research on design work to date has used hypothetical design scenarios and artificial design contexts to investigate how design tasks might be undertaken, often with the aim of comparing the usefulness of design tools or approaches. These research approaches have used tasks of limited scope, usually focusing on a small component of the larger design process. This type of research tends to distance the participants from their real-world design context and their actual thinking and actions. In contrast, this study sought to investigate and learn about in-situ design processes used by university teachers. With this in mind, this study is well situated within the qualitative research tradition which lends itself to questions that intend to "capture the contextual richness of people's everyday lives" (Yin, 2009, pp. 2-3)

Qualitative research originated to answer questions about complex social activity. Quantitative methods are not well suited to early investigations of these complex contexts; this is particularly true of methods that look to control and manipulate rather than understand the problem at hand and the inherent richness present in more natural contexts. As Creswell (2007) argues, the choice of the qualitative research tradition brings with it a set of assumptions about the nature of reality, how knowledge is

discovered, and the relationship amongst methodological choices. These assumptions are further shaped by grounding this current research in a social-constructivist paradigm that rests on the ontological belief that participants construct multiple and interacting realities and that perceptions of reality change over time (Creswell, 2007; Mertens, 2009). There is also an emphasis on the interactive and situated nature of knowledge, which sees the researcher and participant as building knowledge and understanding together. As Mertens (2009) explains, "the inquirer and the inquired-into are interlocked in an interactive process; each influences the other" (p. 19).

The discovery of knowledge within this paradigm therefore rests on the social construction of meaning, which requires the researcher to maintain close and prolonged engagement with participants (Creswell, 2007) and adopt "a more personal, interactive mode of data collection" (Mertens, 2009, p. 14). This study took into consideration the key methodological characteristics of this research approach and paradigm. These included in particular, the adoption of a case-study approach with an emphasis on the investigation of the problem in its natural context; the use of multiple data sources and perspectives; extended opportunities to interact and socially construct knowledge; rich description; and reflection on the role of the researcher as the primary data-collection instrument. These are outlined below with specific reference to the problem being investigated. This study:

- Investigates the problem within its **natural context** by following each university teacher through all of the steps that they would take when designing a unit of study, including the post-implementation evaluation of that design, to uncover individual experiences, processes, contextual factors and perspectives that may provide insights to inform support strategies.
- Uses **multiple sources and perspectives** to strengthen and triangulate findings. For example, this research applied a multiple case study approach (discussed below), sought a diversified sample of participants, and employed multiple modes of data collection (observation, interviews, and documents).
- Chooses data-collection methods (such as semi-structured interviews) and research design methods (such as multiphase data collection) for the researcher and participant to **interact and socially construct knowledge** over a prolonged period, with the aim of deepening understanding and providing a **rich description**.

- Recognises and reflects on the role of the **researcher as the main data-collection instrument** and makes explicit the possible subjectivities and influences within the study.

3.3 Research design

Case-study research is characterised by its focus on a delimited system (Yin, 2009), though definitions differ in their emphasis. For example, some definitions emphasise the case study as a research process, some the case to be investigated and others the case as a written account (Merriam, 1998). Creswell's (2007) definition, which emphasises the intent of the case-study, aligns best with the purposes of this study. He states that the intent of case study research is, "to understand an issue or problem using a case as a specific illustration. Thus, case study research involves the study of an issue explored through one or more cases within a bounded system (i.e., a setting, a context)" (Creswell, 2007, p. 73). Further illustration of the intent of case-study research is described by Merriam (1998), who explains that case studies allow the researcher to "gain an in-depth understanding of the situation and meaning for those involved. The interest is in process rather than outcomes, in context rather than a specific variable, in discovery rather than confirmation" (p. 19). As a result, the strength of a case-study approach lies in answering the "how" and "why" questions and the investigation of phenomena that are difficult to separate from context (Merriam, 1998; Yin, 2009).

These characteristics and strengths lend themselves well to the investigation of the research questions of this study, which focus on discovering how university teachers use Learning Designs while conducting their design work within their usual design contexts and over naturalistic timelines. As has already been discussed, design work is a complex activity, and design work conducted within university teachers' usual work environments adds further layers of complexity. A case-study approach allowed the investigation to focus on this contextually embedded problem and, its elements and interconnections, which in turn allowed the researcher to investigate the problem in a way that provided rich detail to support the findings.

A case study conducted over a prolonged period of time provides opportunities to learn about longer-term processes and contextual influences that might be otherwise

unknown. Therefore, a multiple case study design that engaged with participants over a prolonged period of time was chosen to investigate Learning Designs use. While limitations of time impact on the depth of each individual case in comparison to a single-case investigation, the problem of Learning Designs use is better informed by the investigation of multiple cases. The strength of a multiple-case investigation of Learning Designs use is the opportunity to compare and contrast experiences of multiple participants; this fit with the intention to provide diverse insights into this under-researched problem. Additionally, multiple cases provided opportunities for differing perspectives on the design work and use of Learning Designs across a number of institutional and discipline contexts. They also allowed for possible insights into how gender, experience levels, and design type might factor into university teachers' design work. As Merriam (1998) contends, "the more cases included in a study, and the greater variation across the cases, the more compelling an interpretation is likely to be" (p. 40).

In sum, a case-study design allowed for in-depth investigation of Learning Designs use over time, and the investigation of multiple case studies allowed investigation of multiple perspectives and occurrences of this activity as embedded within different institutional and disciplinary contexts.

3.4 Conceptual framework

The questions of this study focus on the use of a Learning Design throughout university teachers' design processes and the associated impacts of this use. To address these foci, design thinking is used as a way to conceptualise what university teachers do and the Technological Pedagogical Content Knowledge (TPCK) framework (Mishra & Koehler, 2006) as a way of investigating and understanding the relationships between different forms of design knowledge.

Design thinking, which has grown out of work investigating how designers work and create (Cross, 2011; Razzouk & Shute, 2012), involves the skills, techniques, and approaches a designer uses in their work, and is often connected to specific processes aimed at building design-thinking skills. This concept has become a key way of thinking and creating within business and engineering; it has also been regarded as a

potentially powerful tool within education, in particular for the development of students' design-thinking skills (Razzouk & Shute, 2012). Additionally, the application of specific design thinking processes emphasising collaboration, creativity, prototyping, and iterative design cycles have been touted as a way to approach problem-solving in school environments (c.f., d.school; IDEO). They focus primarily on the development of students' design skills or the application of a particular design process to advance design thinking. What has received less attention is the investigation and conceptualisation of university teachers' work as design.

Recently, Laurillard (2012) has emphasised the importance of viewing teaching as a design science and stressed research on optimal designs for students' learning. Viewing university teachers' planning, preparation, and teaching as design provides insights into this sphere of their work. It takes account of the complex nature of design tasks and moves away from views of stepwise models of design processes. As Buchanan (1992) states, "design thinking and decision making is not actually a simple linear process and designers do not, in actual practice, follow a linear analysis and synthesis model" (p. 15). Coming from this perspective is the belief that the development of design skills requires support that goes beyond the application of a template, instead requiring active engagement with a model and a design problem. From this view, teachers' design work is seen as complex and Learning Designs are seen as models or patterns of successful practice.

Within this study, teachers' work is seen as design, and design is seen as a skill in which understandings and connections need to be made to ultimately improve the designed product – in this case the unit and/or activity being developed. Similar to early work within the area of architectural design, which aimed to discover what processes were evident in the work of architects (see Cross, 2011), this study looked to understand university teachers' work as design and Learning Designs as tools to support that work. To clarify, this study does not look to impose a specific design-thinking process on participants but rather to gain an understanding of the design thinking inherent within university teachers' work, the impact of a Learning Design on that thinking and the development of associated knowledge. That is not to say that the participants in this study might not display elements of a design-thinking process, which is of interest, but rather to say that the key conceptualisation is of university teachers' work as design.

This view leads to questions about how university teachers' design thinking and knowledge might develop. In higher education, little is known about how university teachers design (Goodyear, 2005) or how their design thinking and knowledge might develop. Therefore, to guide the conceptualisation of the research problem, the development of the data collection protocols, and the analysis within this study an appropriate framework that focused on both teacher knowledge and technology integration was needed. At the time of planning and implementing this study in 2008, there was limited theoretical work in conceptualising Learning Design and few frameworks had been used in conjunction with Learning Design research. Some work had been done using Activity Theory as a lens for understanding the possible role of Learning Designs in higher education (Conole, 2006). While this offered a way of conceptualising Learning Designs within an activity system, the focus of this study on the development of design thinking and the integration of technology into teaching called for a framework more specifically looking at teacher knowledge. A more recent framework, the Technological Pedagogical Content Knowledge (TPCK) framework, was which had been used to investigate teachers' design knowledge and integration, was considered to be a better fit for the aims of this study. TPCK's focus on the areas of technology, pedagogy and content knowledge provide a broad lens for investigating teacher knowledge foci and integration shifts (as described in detail below). These key foci were ideal for an exploratory study such as this one in which there were numerous unknown factors. As a result, TPCK was considered to be a strong base for building knowledge about teacher design and how that might be impacted on when using a Learning Design.

The TPCK framework was developed in response to a limitation of many investigations that attempted to look at teaching in technology. In these investigations pedagogy and technology were often considered as isolated entities. As pointed out by Mishra and Koehler (2006), "developing theory for educational technology is difficult because it requires a detailed understanding of complex relationships that are contextually bound" (Mishra & Koehler, 2006, p. 1018). Through their research focusing on university teachers' collaborative course design, Mishra and Koehler (2006) proposed that knowledge of technology integration could be better understood by building on Shulman's (1986) concept of Pedagogical Content Knowledge (PCK). Shulman's conceptualisation of PCK arose from discussions of teacher knowledge areas, which he

observed historically shifted between a content and a pedagogical focus but failed to consider both. These isolated foci served as partial definitions and measurements of teacher knowledge, the idea of which he discussed and developed over a number of years (c.f., Shulman, 1987; Shulman, 1986; Shulman & Shulman, 2004). As a concept of integrated knowledge, Pedagogical Content Knowledge (PCK) includes the knowledge of pedagogy, content, and the "intersection" of these two knowledge areas (Figure 3.1).

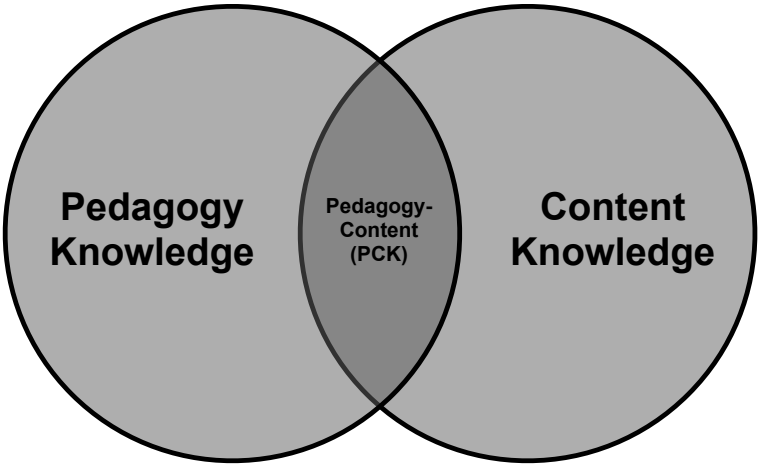

Figure 3.1: Pedagogical Content Knowledge

On the left of the figure is the first knowledge realm, pedagogical knowledge. This is the generic knowledge of teaching strategies, approaches, and theories. In higher education, this generic, decontextualised knowledge is often taught in teaching and learning units (Neumann, 2001). The knowledge sphere on the right, content knowledge, is the knowledge of a subject area: the knowledge of facts, theories, and ways of knowing within a discipline. For teachers, this includes not only deep understandings of a content area, but also the reasoning behind the knowledge and the possible counter-points to various knowledge stances (Shulman, 1986). Finally, the overlapping knowledge area in the middle is the blending and consideration of both pedagogical and content knowledge. This integrated form, Pedagogical Content Knowledge (PCK), is the knowledge of how to match particular pedagogies and approaches to specific content areas. It contains within it "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 in a

word, the ways of representing and formulating the subject that make it comprehensible to others" (Shulman, 1986, p. 9).

Building on this idea of an integrated knowledge being more indicative of knowledge growth for teachers, and recognising a similar isolated focus on technology within investigations of online learning, Mishra and Kohler's framework added technology to the PCK model, creating the Technological Pedagogical Content Knowledge (TPCK, also known as TPaCK) Framework (Figure 3.2). TPCK, which was put forward as a theoretical lens through which to analyse teachers' knowledge development, presents all three knowledge areas (P, C, T), the convergence of the three knowledge pairs (PC, TC, TP), and one knowledge triad (TPC). Descriptions of the areas of pedagogy, content, and pedagogical content knowledge remained as defined in Shulman's model. The new areas of Technology Knowledge, Technological Content Knowledge, Technological Pedagogical Knowledge, and Technological Pedagogical Content Knowledge are outlined briefly below.

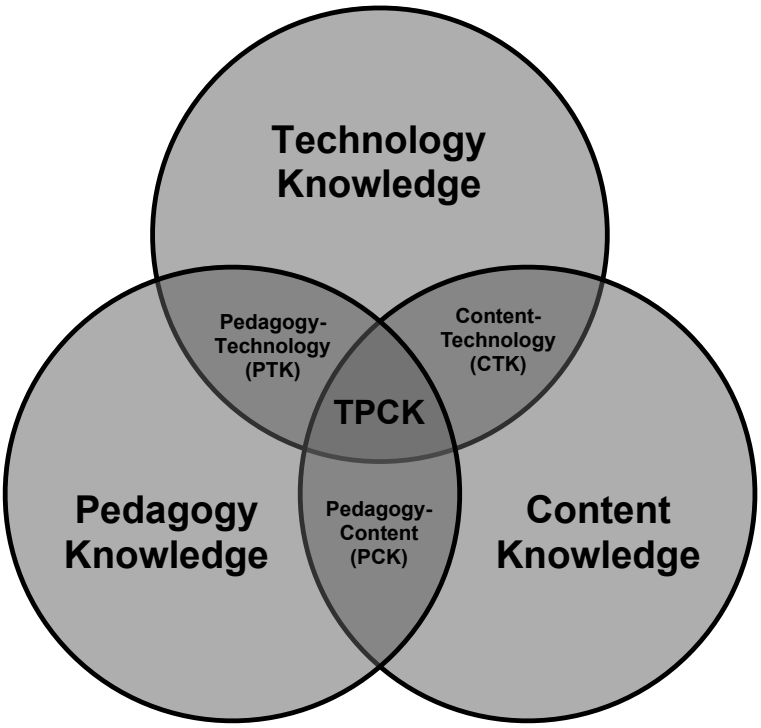

Figure 3.2: Technological Pedagogical Content Knowledge

First, the added Technology Knowledge sphere "broadly encompasses standard technologies such as books and chalk and blackboard, as well as more advanced

technologies such as the Internet and digital video, and the different modalities they provide for representing information" (Koehler, Mishra, & Yanya, 2007, p. 743). For the purposes of the present study, the definition of technology was narrowed to specifically focus on the “advanced” digital technologies used for teaching online. Therefore, the more “standard” teaching technologies such as books and whiteboards were not included within this definition.

Two new knowledge dyads, Technological Content Knowledge and Technological Pedagogical Knowledge were created. First, the area of technological content knowledge "involves understanding the manner in which technology and content are reciprocally related to each other" (Koehler et al., 2007); for example, the knowledge of how different technologies might transform, represent, and investigate the content of the field (Mishra & Koehler, 2006). The second new dyad, Technological Pedagogical Knowledge, includes knowledge appropriate to the pedagogical uses of various technology tools. This area represents a generic knowledge of the application of technology tools largely without the content-specific knowledge of that application. In universities, academic-development and educational-technology units might have specialists in this area. For the individual university teacher, generic workshops and other personal-development activities might aid in the development of this type of knowledge.

The final knowledge area, technological pedagogical content knowledge (TPCK), integrates all three knowledge areas. It is the knowledge of how a particular content area might be best taught, using the most appropriate technologies. Koehler and Mishra (2005) see this knowledge as the key to effective technology integration:

> Good teaching is not simply adding technology to the existing teaching and content domain. Rather, the introduction of technology causes the representation of new concepts and requires developing a sensitivity to the dynamic, transactional relationship between all three components suggested by the TPCK framework. (Koehler & Mishra, 2005)

Within this study TPCK was used as a framework to focus data collection and analyse the impacts of Learning Designs on university teachers’ reported and observed changes in participants’ design knowledge. While the majority of research on PCK and TPCK

has been done in the context of teacher education and schools, a few key studies in higher education using PCK (c.f., Fernandez-Balboa & Stiehl, 1995; Major & Palmer, 2006) and TPCK (c.f., Koehler, Mishra, Hershey, & Peruski, 2004; Koehler et al., 2007; Koehler & Mishra, 2005; Peruski & Mishra, 2004; Peruski, Mishra, & Koehler, 2007) have informed their application in the higher-education context. The conceptual framing, methodologies, instruments, and analytical knowledge gained from this previous work has been drawn on to guide the analysis of the findings from this study.

3.5 Research questions

This study was guided by the following broad research question: How do university teachers use a Learning Design in the design and implementation of an undergraduate university unit? This question was more specifically addressed by the investigation of two sub-questions:

1. How do university teachers select and use a Learning Design as part of their design practice?
2. How does the use of a Learning Design impact university teachers' design thinking and knowledge?

3.6 Research procedures

This section describes the ethical considerations, data-collection instruments, and procedures for this study. The aim of the methodology was to capture university teachers' design thinking leading up to, during, and just after the teaching of a unit. The data-collection activities occurred in Semester 1 and Semester 2 of the 2009 Australian academic year. This section begins by outlining the ethical considerations and participant recruitment for the cases. Next, it describes the data-collection instruments, and discuses the data-collection procedure that was used to track the design work within each case.

3.6.1 Ethical considerations

Ethics approval for this study was sought from the University of Wollongong Ethics Committee. A summary of the main ethical considerations was included within the ethics application and approval was granted in June of 2008 (Appendix A). Approval

was extended annually throughout the duration of the study. In addition to this approval, the researcher consulted with the ethics offices of each of the target institutions. Further details of how the ethical considerations were addressed throughout the study are provided below.

First, participants' involvement in the study was voluntary and contingent on the receipt of each participant's informed consent. Prior to data collection, each participant was sent a Project Information Sheet (see Appendix B), which provided an overview of the

- purpose of the study;
- the data-collection activities and timelines;
- approximate time commitment for participants;
- confidentiality procedures;
- data-management procedures;
- declaration that participation was voluntary and that the participant was free to leave the study at anytime;
- enumeration of and reasons for the honorarium that would be provided; and
- contacts for further information and the filing of any complaints.

The participants were asked to read the information sheet and seek clarification with the researcher about any aspect of the study. Each participant was then asked to sign the consent form (see Appendix C) if they wished to be involved in the study.

Second, the confidentiality of the data and privacy of the participants were maintained throughout the study. The names and other identifying details of participants were stored securely on password-protected computers. Pseudonyms were assigned to each participant within all publications and this thesis. In addition, institutional identifiers were removed from descriptions. Participants also checked the interview transcripts to correct errors or retract statements if they wished.

Third, while deeper design knowledge and awareness of possible support structures were seen as possible benefits of participation, it was also recognised that this study involved a significant time investment for participants. This time investment was made clear to participants before the start of data collection. Additionally, as a token of this time commitment, an honorarium was offered to each participant at the completion of the data-collection activities.

3.6.2 Cases

The aim of this study was to obtain detailed cases of design practice and Learning Designs use from a wide variety of individuals and contexts. Therefore, a purposeful sample representing maximum variation was sought. As Merriam (1998) points out, this method of sampling aims to identify "those who represent the widest possible range of the characteristics of interest for the study" (p. 63). While this method is not intended to be a representative sample, the logic behind collecting data from a varied sample of participants is that a varied sample allows more opportunities to observe the patterns and impact of a range of contextual factors, support structures, and rules on design work. The reasoning and strengths behind this strategy are further explained by Patton (1990):

> When selecting a small sample of great diversity, the data collection and analysis will yield two kinds of findings: (1) high-quality, detailed descriptions of each case, which are useful for documenting uniqueness, and (2) important shared patterns that cut across cases and derive their significance from having emerged out of heterogeneity. (p. 172)

Identification and selection of possible cases for this study began with targeted calls for participation. These calls were circulated through Australian professional organisations focused on teaching and learning in higher education. These included the *Higher Education Research and Development Society of Australasia* (HERDSA); the *Australasian Society for Computers In Learning In Tertiary Education* (ASCILITE); the *Australian Association for Research in Education* (AARE); and the *Open and Distance Learning Association of Australia* (ODLAA). Interested participants were asked to contact the researcher via email or phone for further information, at which time they received the Project Information Sheet and were given the opportunity to ask any questions they had about the project and their role. Three calls for participation were distributed through this mechanism (August, 2008; December, 2008; and March, 2009). Examples of these calls for participation are presented in Appendix D.

The calls for participation targeted participants that met a set of criteria that were developed both to aid identification of cases most relevant to the problem being

investigated (specifically teacher-designers) and to limit them by region and time period. Calls for participation specified that the potential case participants be:

- University teachers at a New South Wales (NSW) or Australian Capital Territory (ACT) university;
- Planning to design or redesign a unit scheduled to be taught in Semester 1 or 2, 2009;
- The primary designer and teacher of that unit; and
- Willing to use a Learning Design in the design or redesign of that unit.

The criteria, which helped to set the boundaries of each case as is suggested in the literature, were selected for several reasons. The first criterion aimed to identify a variety of cases from varied university contexts while limiting the cases to NSW and ACT universities, as this would allow the researcher to conduct site visits. Second, while each case aimed to follow Learning Designs use and design work and implementation experiences throughout a semester, the timeframe for data collection was limited to the 2009 academic year. Therefore, the inclusion of this second criterion in the calls for participation looked to narrow initial responses to this period. The third criterion aimed to narrow the cases to teacher-designers. This criterion helped to ensure that an Educational Designer or similar design professional was not primarily designing the units. While this is an avenue for alternate investigations, expert designers' use of Learning Designs was not the focus of this research. Additionally, because this study followed design work through the planning, implementation, and review of a specific semester-based unit offering, it was important that the participants would be teaching the unit they were designing. Finally, given the research questions' focus on the use of Learning Designs, it was necessary that the participants were willing to use a Learning Design to support their design work. This criterion may have limited the participants to those who were more open to exploring new ideas and approaches in their teaching; however, it was reasoned that this openness to new ideas would most likely also be a quality of Learning Designs users more generally.

After participants had expressed interest in the study, the aim was to select a sample that would not only meet these initial criteria but also show the greatest possible diversity across cases. The aim was to obtain diversity in discipline, institutional context, and experience levels while also maintaining a balance of genders, if possible. Across disciplines, the goal had been to find a balance of participants from three broad

groupings (the professions, the sciences, and the humanities). However, the original goal of having three cases from each of the three discipline groups was not achieved due to the pool of possible participants. Consequently, this criterion was adjusted with the aim of still obtaining a large variety across subject areas but without strict adherence to a balance across the three discipline groupings.

Initially, nine cases were selected for investigation; however, one participant left the study when he changed jobs. The characteristics of the remaining participants in the eight cases described in this study are shown in Table 3.1.

Table 3.1: Participants for Each Case

Participant pseudonym	Gender	Discipline	University #	Years lecturing
Daniel	M	Biochemistry	1 (NSW)	2.5
Scott	M	Communications	1 (NSW)	5
Mary	F	Education	1 (NSW)	9
Joanne	F	Information Technology	2 (NSW)	7
Emily	F	Languages	3 (ACT)	4
Nicole	F	Law	4 (ACT)	3.5
Marcus	M	Marketing	3 (ACT)	10
Alison and Lana	F	Veterinary Science	1 (NSW)	9 & 5

As the table shows, the participants ranged from having 2.5 years of lecturing experience to over 10 years, and came from biochemistry, communications, education, information technology, languages, law, marketing, and veterinary science. The gender balance favoured women, with only three of the cases being male designers. Finally, four different universities in the ACT and NSW were represented.

3.6.3 Data-collection instruments

This study used three data-collection techniques: semi-structured interviews, design documents, and researcher field notes. The data was collected at different points during a participant's design process and used to gain understanding of their design work over time. Additionally, the use of multiple data sources over multiple points allowed for opportunities to observe alternate perspectives and look for convergence of evidence (Yin, 2009). The following sections describe the data-collection instruments and how and when these instruments were used throughout the study.

3.6.3.1 Interviews

Interviews are a powerful way of collecting data in a participant's own words; they allow the researcher to discover what participants think is important, how they view the world, what cannot be observed and what has happened previously (Patton, 1990). For this study, interviews were deemed the most appropriate means of collecting data about participants' naturalistic design, as it would allow them to report on the unobservable thinking they employed during their design work. Paired with multiple data-collection points, interviews also allowed for the collection of participants' accounts of design work and changes over an extended period. This longer-term engagement captured Learning Designs use as an activity embedded within participants' usual work patterns, an approach unexplored within previous investigations.

Semi-structured interviews were the primary source of data for this study, and were conducted either face to face or by phone or Skype. Semi-structured interviews allow the researcher to "respond to the situation at hand, to the emerging worldview of the respondent, and to new ideas on the topic" (Merriam, 1998, p. 74). As was suggested by Merriam (1998), protocols were devised to guide each interview; they contained some structured and some open questions to leave space to further explore issues using probes. For each data-collection point, a specific interview protocol or set of protocols was developed to match the purposes of the specific phase and data-collection point (Appendix E -Appendix I). The development of the specific interview protocols was informed by previous investigations (Bennett et al., 2008; Koehler et al., 2007; Stark, 2000; Stark et al., 1990). Due to time constraints, a pilot study taking place over a full semester could not be conducted. Alternately, each type of interview protocol was tested with two university teachers to check the clarity and effectiveness of the questions, estimate the approximate the length of the interviews and provide an opportunity for the researcher to practice conducting the interviews. The pilot participants were interviewed about a unit they were designing and the use of their learning management system. After the pilot interviews, the participants were asked to provide feedback on the interview questions, format, and length. The researcher also summarised the interviews, reflected on the effectiveness of the questions, and looked for any necessary adjustments. The pilot interviews confirmed that, in general, the

questions were providing the kinds of data that were sought. Additionally, they highlighted two areas for adjustment. First, a minor change to the order of questions was made to facilitate the flow of the design interview. Second, it was identified that questions about the previous design needed to be tailored to each participant's design scenario. These questions were originally written assuming the participant had previously designed and taught their unit; however, this would not be the case for all participants. Therefore, for the study, the wording of these questions was adjusted depending on the participants' design context, for example, whether the participant was new to the unit or had designed and taught the unit before.

Three types of structured interview protocol were developed for this study: design interviews, 'web-tour' interviews, and tracking interviews. Design interviews lasted 30 to 60 minutes and contained both reflective and prospective questions about the design and implementation of the unit. Three design interviews were conducted before implementation and a final design interview was conducted post-implementation. Web-tour interviews were developed as stimulated-recall interviews in which the participant guided the researcher through the unit's learning-management system (LMS) site. Using the unit web site as a stimulus, the participant was prompted to talk about the organisation of the site, overview of resources, and tasks online, reasons for the use of different tools, and any changes that the participant had made or wanted to make. Finally, tracking interviews lasted 5 to 20 minutes and were to be conducted periodically during implementation of the unit. Tracking interviews focused on the participant(s) describing and reflecting on what was working well, the challenges of implementing the design, and their ideas on future adjustments.

3.6.3.2 Documents and design artefacts

Documents were used and collected with the purpose of verifying, enriching, and adding to the data obtained from the interviews. Merriam (1998) indicates that "the data found in documents…can furnish descriptive information, verify emerging hypotheses, advance new categories and hypotheses, offer historical understanding, [and] track change and development" (p. 125). Additionally, Yin (2009) indicates that the "most important use of documents is to corroborate and augment evidence from other sources" (p. 103). Documents were obtained from the participants, university

websites, and public websites, and were generated by the researcher at multiple points in the study. The main goals were to verify, add detail, or learn more about the design context and interview data. Table 3.2 shows the documents and design artefacts collected during this study, their source, and the intended purpose of each.

Table 3.2: Documents and Design Artefacts Collected

Document or design artefact	Source	Notes and purpose of collection
Unit outlines	Participants	Used to supplement, clarify, and verify descriptions of the design as well as provide context (e.g., unit history, institutional information).
Official university descriptions of the unit and program	University website or handbook	Used to verify design parameters, background, and context.
Professional body documents	Participants	Collected if participants referred to their use during design, and used to verify design parameters and context.
Design diagrams and design notes	Participants	Used to provide insights into individual design work and thinking.
Participant profiles, if available	Participant's university website	Used for biographical and background data about the participants.
Chosen Learning Design	Learning Design website	Used as a reference for the participant's chosen design, and comparison with the participant's design.
Visual representations of the participant's design	Researcher generated, member checked	Used to document the design at various stages as well as compare the design to the chosen Learning Design.
Website screenshots or screen captures	Participant's learning-management system site	Used to verify participants' technology use, site organisation, and other major elements within the site.

3.6.3.3 Field notes and observation

The researcher wrote field notes after each data-collection point. In these notes, the researcher recorded a summary of observations and reflections. As mentioned earlier, much design work is tacit, and therefore it was not the aim of this study to directly observe design work. Instead, the aim was to follow participants' design practices without overly influencing their usual design processes. Therefore, rather than describing design tasks, observations in this study described contextual and participant details. The researcher's reflective notes also recorded any issues regarding the interview protocol, key summary points, emerging ideas, interpretations, and areas to follow up in future interviews. These field notes were used to supplement the interview and documentary data to create a richer picture and add to the "holistic interpretation of the phenomenon being investigated" (Merriam, 1998, p. 111).

3.6.4 Data-collection procedure

The data-collection procedure aimed to capture the participants' design work, context, and influences from early design ideas to reflection on the implementation of the

design. To achieve this aim, data was collected over a period of several months, at multiple points before, during, and after a single semester. The data collection was divided into three phases – background and pre-semester design work, implementation, and post implementation – with the first being the most intensive. The data-collection points and their foci and timeframes are presented in Table 3.3. The specific timing of each data-collection point was determined in collaboration with each participant. These discussions of timings took into consideration the optimal time for data-collection in terms of participants' design activity, while being mindful of participants' schedules. The following section describes each of the data collection points outlined in the table in more detail.

Table 3.3: Data-Collection Procedure Overview

Data-collection phase	Data-collection point	Focus	Timeframe
1- Background and pre-semester design work			
	Background and plans	- Background - Previous design - Design plans and introduction to Learning Designs	1-6 months prior to implementation
	Learning Design selection & early design work	- Learning Design selection - Early design work	1-2 months before teaching
	Continued pre-semester design	- Continued design work - Pre-semester plan for the design	Within one week of the start of teaching
2 - Implementation			
	Tracking 1-3	- Implementation experiences, continued design work and changes to the design	Early, middle, and late semester
3 - Post Implementation			
	Post-implementation	- Reflection on design and implementation	After teaching was complete

3.6.4.1 Phase 1 –Background and pre-semester design work

Background and plans

The aim of the first data-collection point within this phase was to obtain background information about the participant, the unit to be (re)designed, and the plans the participant had for the unit. This data-collection point took place well in advance of the teaching semester, ideally before any major design work for the upcoming semester had been conducted. In some cases, the design interview and web-tour interview took place

on different days to fit into the participants' schedules and ensure participants had sufficient rest time, if interviews ran long. The following research activities occurred at this point:

- a semi-structured design interview was conducted with each participant;
- a semi-structured web-tour interview, if applicable, was conducted with each participant;
- the researcher introduced the each participant to the Learning Design website;
- the researcher collected relevant design documents from each participant (e.g., unit outlines, design notes, diagrams); and
- the researcher created field notes after each interview.

If the participant was designing a new unit or conducting a complete redesign of a unit, the unit thus did not have a previous unit outline or LMS site, and the unit-outline collection and web-tour interview were not included in the data collection for that participant.

The first design interview focused on obtaining information about the case's background as well as the participant's design plans. The protocol for this design interview (Appendix E) asked questions about:

- the participant(s) and his or her experience;
- the background to the unit being designed;
- how the unit had been originally designed or, in the case of new units, information about design work that had previously been done;
- what changes the participant made to the unit over time;
- how the participant used technology to teach the unit; and
- what goals, if any, the participant had for the Learning Design.

The stimulated-recall web-tour interview was also conducted if the unit had a previous LMS site. In this web-tour interview, the participant was asked to guide the researcher through the site, while articulating how it was used and the design decisions they had made. Questions about the site's organisation, tool use, content, and activities were asked in conjunction with conversational prompts to obtain more information when needed (Appendix E). Either screenshots of key site elements or a screen capture of the tour was also collected.

Next, the researcher introduced the Learning Design website[7] to the participant. This introduction to Learning Designs included an overview of the structure and range of Learning Designs available on the site and general information about how the site was organised and how the Learning Design Visual Sequence (LDVS) was structured. The purpose of this introduction was not to aid the participant in the selection of a Learning Design but to familiarise the participant with the site and its conventions so that the participant could more readily access the information available. The introduction to the Learning Designs site was recorded to aid the creation of field notes on the participants' queries and comments on this process. At the end of this introduction, participants were asked to independently go through the Learning Designs website and, if possible, select a Learning Design prior to the next data-collection point.

Finally, at the end of the meeting, the researcher requested copies of any related unit documents and artefacts (e.g., the previous unit outline, course-handbook information, unit description, university policies, professional-body documents, planning notes, diagrams, etc.).

Learning Design selection and early design work

The second data-collection point within the background and pre-teaching design work phase focused on obtaining information about how the participant selected a Learning Design and what design decisions had been made since the last meeting. This data-collection point took place soon after the selection of the Learning Design and usually occurred one to two months before the start of the semester. The following research activities were conducted in this phase:

- a semi-structured design interview was conducted with each participant;
- the researcher collected relevant design documents from each participant (e.g., unit outlines, design notes, diagrams); and
- the researcher created field notes after each interview.

The design interview protocol for this data-collection point (Appendix F) focused on the participant's Learning Design selection process, reasons for their choice of Learning

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Design, their initial design work, and how they had used the Learning Design to this point.

Continued pre-semester design

The final data collection point of this phase took place as close to the start of teaching as was possible, given the participant's schedule. The focus of this data collection was on the participant's continued design work leading up to the start of teaching; their planned design and their LMS site design. The following research activities occurred in this phase:

- a semi-structured design interview was conducted with each participant;
- a semi-structured web-tour interview was conducted with each participant;
- the researcher collected relevant design documents from each participant (e.g., unit outlines, design notes, diagrams);
- the researcher created field notes after each interview; and
- the researcher created a visual representation of the participant's planned design.

The interview protocol for this design interview (Appendix G) asked the participant how they made decisions about pedagogical structure, technology, resources, tasks, and assessments. Questions about the chosen Learning Design and the participant's plans for implementation were also posed.

In the web-tour interview, the participant was asked to guide the researcher through the unit website. The focus of the questions was on how the participant had made decisions about tools, tasks, and structure. The participant was also asked how the Learning Design had impacted this process and what plans they had for the site during the semester. During the web tour, the researcher used conversational prompts to probe for information as required.

After the web tour was completed, any unit outlines or other design documents were collected. Additionally, for whole-unit designs the researcher created a visual representation (i.e., LDVS of the planned design) to document the planned design before teaching.

3.6.4.2 Phase 2 – Implementation

The second phase of the study followed any ongoing design associated with the chosen Learning Design and its implementation. Perhaps because of time restrictions or an assumption based on some universities' models of online delivery, which required units to be fully designed prior to the start of teaching, the design work associated with this phase had not been previously investigated within the literature on the use of Learning Designs or design work in higher education. As a result, little was known about this phase beyond anecdotal knowledge.

To track the development and implementation of the planned design, a mechanism to record design changes and participant thinking was needed. Since the participants' design-work context was limited to Australian universities, it was known that these universities generally required development of a unit outline prior to teaching, and that the unit outline was considered to act as a binding statement of the learning objectives, content, and assessments within the unit (c.f., University of Wollongong, 2015). As a result, the expectation for this phase of the study was that changes to the macro design (e.g., at the unit outline level) would be minimal. From this understanding, a semi-structured tracking-interview protocol (Appendix H) was developed. The questions in the tracking interview focused on the participants' view of the progress and effectiveness of the design, what challenges participants were encountering, and any changes they had made to the design.

In order to learn of design and implementation issues as close as possible to the time they occurred, three tracking interviews were planned for regular intervals throughout the semester. The goal was to obtain an early, mid, and late account of the implementation and any ongoing work with the Learning Design.

The following research activities occurred in this phase:

- two or three semi-structured tracking interviews were conducted with each participant;
- the researcher collected relevant design documents from each participant (e.g., unit outlines, design notes, diagrams);
- the researcher created post-interview field notes; and

- in the case of activity designs, the researcher created a visual representation of the participant's planned design.

This tracking model worked well for participants who chose a Learning Design that they applied to all or most of the semester. For participants who chose to apply a Learning Design to an activity of shorter duration, adjustments needed to be made to both the timing and number of tracking interviews. In all cases of this type, the completion of the design for the specific Learning Design activity was not finished until just before the implementation of the activity. Since the tracking of the larger unit's design was secondary to the tracking of the specific Learning Design being applied, the resulting scheduling of these tracking interviews naturally revolved around the specific activity that participants were redesigning. This adjusted schedule ensured that all associated design information was captured as close to the implementation of the activity as possible. Given the adjusted timelines and, for some, the intensive nature of these implementations, this often resulted in fewer tracking interviews being conducted. In addition to these adjustments, the researcher added specific questions to tracking interviews to follow up on particular design activities, when applicable.

3.6.4.3 Phase 3 – Post-implementation

The final phase of the data collection aimed to acquire a holistic reflection and evaluation of the design and implementation as well as future design plans based on this experience. The literature did contain investigations of design work from this post-implementation perspective; however, none investigated both the design work and reflections on the implementation or investigated design plans based on such an experience. Additionally, as with the previous stage, no empirical literature on Learning Designs had investigated any aspect of this phase of design.

The following research activities occurred at this data collection point:

- a semi-structured design interview was conducted with each participant;
- a semi-structured web-tour interview was conducted with each participant;
- the researcher collected relevant design documents from each participant (e.g., unit outlines, design notes, diagrams);
- the researcher created field notes after each interview;

- the researcher created a draft LDVS of each participant's planned design;
- the researcher discussed the draft LDVS of each participant's planned design with them and adjusted the LDVS in response to clarifications; and
- the researcher and each participant jointly created a visual representation of their implemented design.

The data-collection point for this phase was scheduled after the completion of teaching. In some cases, as in the background and pre-teaching design-work interview, different components of the data collection in the final phase took place on different days to fit into participants' schedules or ensure participants had sufficient breaks.

In the design interview (Appendix I), the researcher asked the participant to reflect on the design's strengths and weaknesses, any changes made during the semester, and the participant's use of the Learning Design. The participant was also asked to discuss any future ideas or changes planned for the unit. Then a web-tour interview was conducted with the participant, during which the researcher asked about changes to the website and the reasons for those changes during the semester. Finally, any further documentation or artefacts were collected, including any relevant student feedback that the participant was willing to share.

3.7 Data analysis

The researcher analysed the complete data set in iterative cycles. The data collected is shown in Table 3.4.

Table 3.4: Data Collected

Phase	Data-collection point	Data collected	Nicole	Daniel	Emily	Scott	Joanne	Mary	Alison and Lana	Marcus
Phase 1 – Background and pre-semester design work										
	– Background and plans									
		Background information	X	X	X	X	X	X	X	X
		Design interview	X	X	X	X	X	X	X	X
		Documents	X	X	X	X	X	X	X	X
		Web-tour interview	X	X	N/A	X	N/A	X	X	X
	– Learning design selection and early design work									
		Interview	X	X	X	X	X	X	X	X
		Documents	X	X	X	X	X	X	X	X
	– Continued pre-semester design									
		Interview	X	X	X	X	X	X	X	X
		Web-tour interview	X	X	X	X	X	X		X
		Documents	X	X	X	X	X	X	X	X
		LDVS	X	X	X	X	X	X	X	X
Phase 2 – Implementation										
		Tracking interview 1	X	X	X	X	X	X	--	X
		Tracking interview 2	X	X	X	X	X	X	--	X
		Tracking interview 3	X	--	--	--	X	X	--	X
Phase 3 – Post-implementation										
		Interview	X	X	X	X	X	X	X	X
		Documents	X	X	--	X	--	X		X
		Web tour	X	X	X	X	X	X		X
		LDVS	X	X	X	X	X	X	X	X

The analytical approach and procedures employed in this study were primarily drawn from Creswell (2007) and Merriam (1998), with the goal being to build a rich picture of the participants' design work and their use of a Learning Design as a support to that process. While the analysis was conducted in phases more iterative than can be displayed in a table, Table 3.5 provides an overview of the analysis tasks undertaken with reference to Creswell's (2007) case-study analysis phases: data managing; reading and memoing; describing; classifying; interpreting; and representing and visualising. The following sections detail the tasks undertaken at each of these stages.

Table 3.5: Case-Study Data-Analysis Techniques

Techniques	Analysis activity
Data managing	
Create and organise files for data	- Transcribed all interviews - Checked the transcriptions (including member checking) - Drew visual representation (e.g., LDVS) - Converted visual representations to electronic format - Organised and converted all case documents to electronic format - Printed out all data sources and organised into case folders
Reading, memoing	
Read through text, make margin notes, form initial codes	- Read through case data to get a sense of the whole - Added reflections to the researcher's journal - Added initial codes and organising ideas to a master document (case template document) - Built preliminary themes based on initial memos and reflections
Describing	
Describe the case and its context	- Described the case at multiple levels - Case attributes - Case overview - Nine-point summary
Classifying	
Use categorical aggregation to establish themes or patterns	- Categorised data from cases - Further developed themes for cross-case analysis
Interpreting	
Use direct interpretation	- Examined cross-case matrix to identify patterns
Develop naturalistic generalisations	
Representing, visualising	
Present in-depth picture of the case (or cases) using narrative, tables, and figures	- Presented eight individual case narratives - Presented analysis of the Phase-Based Cross-Case Analysis Matrix - Presented analysis of the Case-Comparison Matrix - Presented further analysis of TPCK areas and associated Venn diagram

**Adapted from Creswell (2007), Data Analysis and Representation Table (p. 156-7)*

3.7.1 Data managing

According to Creswell (2007), data managing is the initial stage of data analysis. This process of creating and organising data files begins during data collection and continues into the data-analysis phase of a study. For each case, interview recordings were transcribed and member-checked, LDVS diagrams were drawn and converted to electronic format, and documents were collected. Then the data for each case was collated and organised into an electronic folder structure aligned with the data-

collection phases of the study. Within each case, the folders were labelled with the phase name and date of the data collection, and all collected documents were descriptively named. In addition to organising all data electronically, the case files, interview transcripts, unit outlines, design notes, web- tour screen shots, and web-tour transcripts were printed and organised into case binders as a backup and offline reference.

3.7.2 Reading and memoing

Once the data was organised, the researcher began reading through all the documents, interviews, field notes, and other associated case files to get a sense of each case as a whole. During this process, the researcher made reflective journal entries and marginal notes. Attention was paid to excerpts that related specifically to the research questions, particularly data that provided evidence of design thinking (including descriptions of process, decision-making, considerations, support, and previous experiences) and teacher knowledge (including content, pedagogy, and technology). Unanticipated ideas raised by participants or significant events not directly related to the research questions were also noted to ensure that emerging issues could also be captured. These notes were collated and categorised to create a set of initial themes. These initial themes were organised and recorded in a separate document. This was repeated with each case. After examining each case, the themes were compared and combined to form what Merriam (1998) calls a "primitive outline or classification system" (p. 181).

3.7.3 Describing

Next, the facts of each case were described in three ways: in an attributes document, a detailed case description, and a nine-point summary. The attributes document summarised the background data gathered on the participant, their design, and their institution (e.g., gender, institution type, years of teaching experience, discipline, unit being designed, years using technology in their teaching, etc.). After the creation of the attributes document, the researcher used the broad phase-based themes that had been developed as an organising framework for the production of case descriptions. The goal of the descriptions was to distil the information down into an easily readable, rich account of the case while maintaining the chronology of the participants' design work. Finally, the researcher identified descriptive case themes and further distilled each case

into case synopses. Throughout the creation of the cases and the nine-point summaries the cyclic process of summarising, memoing points of interest, and reflecting on what was emerging from the data continued. These analysis activities resulted in case descriptions that were later refined and presented as the individual cases in Chapter 4.

3.7.4 Classifying and interpreting

The next stage of analysis involved the development and interpretation of two cross-case comparison matrices. During the creation of both matrices, an openness to emergent themes or reorganisation of the themes was maintained; therefore themes were added, removed, and combined. These analysis activities resulted in the cross-case analysis in Chapter 5.

The first matrix built on earlier work on the case descriptions and case synopses, which had produced a number of preliminary themes. These themes were defined and further refined throughout the creation of this matrix, which tabulated the themes along with the case attributes for comparison and further analysis (Appendix J). Each matrix cell summarised specific data examples and researcher observations for each participant by theme or attribute. The themes included participants' Learning Design goals, aspects of selection, design considerations, Learning Design reference points, key design considerations, design work, Learning Design use at various stages, and a summary of the impacts of the Learning Design in the areas of technology, pedagogy, and content. The categorisation of the impacts, including impacts on design thinking, were mapped to the TPCK framework.

This matrix acted as a high-level summary of key case findings across themes and was first used to compare themes across cases in association with case attributes such as participants' teaching experience, discipline, type of design task (i.e., new design versus a change to a previous design), and scale of design (i.e., whole unit, module, a one- to two-week activity). Then, a further analysis of the technology, pedagogy, and content themes from this matrix was conducted. The reported and observed impacts in these areas (T, P, C), including the links between them (TP, TC, PC, and TPC) were mapped to a TPCK Venn diagram to aid the visualisation, further analysis, and presentation of the TPCK themes. The analysis of the Case-Comparison Matrix and the TPCK diagram

were then summarised and discussed Section 5.3 and Section 5.4 of the Cross-Case Analysis Chapter.

A second matrix, the Phase-Based Cross-Case Analysis Matrix (Appendix K), was developed to answer specific questions about how the participants both designed and used their Learning Design across the phases of the study. This matrix provided a more detailed view of participants' design work and Learning Designs within each phase of their design. It included a detailed categorisation of aspects of the participants' design work, such as their design thinking, creation of design artefacts, design considerations, Learning Design use and the impact of the Learning Design on their practices, linked to the phases and data-collection points within the study. This matrix also included a detailed categorisation of factors related to Learning Design selection and challenges to Learning Design use across the phases. The analysis of this table is presented phase by phase in Section 5.2.

3.7.5 Representing and interpreting

As mentioned above, the data was interpreted and represented in Chapters 4 and 5. Chapter 4 presents eight individual case studies in narrative format detailing the design work and use of a Learning Design throughout each participant's planning, implementation, and reflection on their design work. Each case presents a descriptive account of the case, chosen Learning Design, planned design, and implemented design incorporating the participant's own words, which were used to substantiate case findings and illustrate key points. Chapter 5 then presents the cross-case analysis, summarising and discussing the results regarding Learning Designs use and design thinking with reference to the Phase-Based Cross-Case Analysis Matrix. This is followed by a discussion of the relationships between key case attributes and Learning Designs use revealed within the Case-Comparison Matrix. Finally, the analysis of the impacts on the areas of technology, pedagogy, content, and related integrated knowledge areas (i.e., PCK and TPCK) is presented and discussed with particular focus on impacts to design thinking within each area.

3.8 Quality of the study

Issues of validity and reliability are confounded by their traditional uses in quantitative research (Creswell, 2007; Merriam, 1998; Yin, 2009). Assumptions from positivist research paradigms and quantitative research have resulted in some qualitative researchers shifting the terminology used to assess the quality of a study (Lincoln & Guba, 1985), while others reframe terms within the qualitative paradigm (Creswell, 2007). Merriam (1998) chooses to take on a mixed approach using a reconceptualisation of the terms “internal validity” and “external validity” and replacing “reliability” with Lincoln and Guba’s (1985) “dependability”. Merriam (1998) states that the dependability of a study’s results rests not in “the extent to which research findings can be replicated” (p. 205) but in "whether the results are consistent with the data collected" (p. 206). For the purposes of the following discussion, Merriam’s terms have been used.

To maintain the validity and dependability of a study, Creswell (2007) recommends researchers employ at least two of the following eight validation strategies: prolonged engagement and persistent observation in the field; triangulation using multiple data sources and methods; peer review or debriefing; negative-case analysis; clarification of researcher bias; member checks; rich, thick descriptions; and external audits. This list aligns well with Merriam’s (1998) strategies for ensuring internal validity, dependability, and external validity. The techniques employed in this study are displayed in Table 3.6 and described in the paragraphs below.

First, long-term engagement and persistent observation of the participants was a key component of the research design and procedures for this study. The methodology was designed for multiple data-collection points over a period of several months. This allowed the researcher to build a strong rapport with the participants, follow the design work, and observe changes in the participants’ contexts over time. This long-term engagement and observation also provided a depth and breadth to the data that allowed naturalistic generalisations to be made from the presented cases.

Table 3.6 Validation Techniques

Technique	How employed
Prolonged engagement and persistent observation	- Conducted a multi-phased data collection over a period of months. - Recorded research observations and journal entries over the entire period of the case.
Triangulation	- Used multiple data sources and methods.
Peer review or debriefing	- Discussed, published and presented methods, analysis and interpretations for feedback and input from multiple parties.
Clarification of researcher bias	- Recorded possible biases and influence on participants in the researcher's journal. - Described research paradigm, role, and possible bias in Chapter 3.
Member checks	- Presented transcripts and researcher-produced LDVSes to participants for correction and feedback.
Rich, thick descriptions	- Compiled detailed case summaries of uncontested data (Chapter 4).
External audits	- Described data-collection and analysis procedures in Chapter 3. - Provided key research documents and interview protocols in appendices.

Second, triangulation of multiple data sources (e.g., interviews, unit websites, unit outlines, selected Learning Designs, created LDVSes', unit descriptions, etc.) and multiple data-collection methods (design interviews, web-tour interviews, tracking interviews, document collection, and observations) were used to cross-check findings and uncover contradictions within the data.

Third, peer review and debriefing was conducted with supervisors, peers, and colleagues not connected with the study. The study's methods, analyses, and emerging findings were discussed and presented in a number of contexts. Additionally, multiple presentations and 'work in progress' papers (Appendix M) were written and presented to gain alternate perspectives and insights into the emerging case findings and uncover possible researcher biases.

Fourth, throughout all phases of the study's planning and implementation possible biases and researcher influences were also recorded and reflected on in the researcher's journal. To clarify the researcher's stance and possible biases within this study, the research paradigm has been outlined in Section 3.2 and the researcher's role, along with

any known biases and influences, has been described within in Section 3.9 (Role of the Researcher).

Fifth, member checks were conducted with both the interview transcripts and the visual representations created by the researcher to determine both the accuracy of the resources and, in the case of the visual representations, the interpretation of the participant's design.

Sixth, rich, thick descriptions of the eight case studies of uncontested data are presented in Chapter 4. The detail of these case studies, which include participant profiles, verbatim quotes, and context, are presented to allow the reader to assess the transferability of findings and make naturalistic generalisations.

Finally, external audits, or, as Merriam (1998) referred to them, audit trails, were engaged. For example, the data-collection and analysis procedures have been described within this chapter and key research documents, and interview protocols have been provided in the appendices.

3.9 Role of the researcher

The role of the researcher in qualitative research is by nature embedded within the study; therefore, it is important to both reflect on and disclose any prior experiences or biases the researcher may have (Creswell, 2007). The researcher conducting this study comes from a background of working both in language teaching as well as educational design and technology. It was an interest in teaching and integration of technology that drew the researcher to conduct the study. The researcher's experiences in learning, teaching, and supporting others with technology have influenced her perspectives and attitudes towards the use of technology in teaching and learning.

In this study, it was not the role of the researcher to provide design advice, but to introduce the participants to the type of guidance and information available via the Learning Designs and follow the participants' design work. Therefore, with the focus and data-collection methods of this study relying heavily on the researcher as the main data-collection instrument, it was deemed important that the researcher maintain a non-

participant role in the design work. Instead, the researcher focused on building rapport with the participants, and suspending preconceptions and expectations of technology use as much as possible. Perhaps the most difficult aspect of the role for the researcher was managing her inclination to aid the participants in their design work and technology integration, which had been the focus of her previous roles. Throughout the study, any expectations, biases, and interactions with participants that may have shaped data collection and analysis were reflected on in the researcher's journal and discussed with supervisors and/or peers for advice when needed.

3.10 Chapter Summary

This chapter outlined the research paradigm, research design, and data-collection and analysis procedures of the study. The study adopted a qualitative, multiple case study approach to maximise depth and variety in the data gathered about participants' design practices. Data was collected in the form of interviews, documents, and research observations from eight cases. The data-collection points captured the participants' pre-implementation, implementation, and post-implementation design practices and reflections over a number of months. The analysis of the data drew on Creswell's (2007) and Merriam's (1998) data-analysis procedures, and are described in reference to Creswell's case-study analysis phases of data managing; reading and memoing; describing; classifying; interpreting; and representing. The analysis sought to describe and uncover knowledge about participants' design work, integration of technology, and use of a Learning Design. The chapter finished with discussions of the researcher's role and considerations of quality when conducting the study.

The next two chapters present and discuss the results of this investigation. First, in Chapter 4, each of the eight cases is presented in a detailed narrative format that follows the participants' design before, during, and after teaching. Then, in Chapter 5, a cross-case analysis focuses on discussing key themes and patterns that arose across the phases and case attributes.

4 Results

4.1 Introduction

This chapter presents a narrative account of each of the eight cases in this investigation. Table 4.1 presents an overview of the cases in the order they are presented. It includes the participants' pseudonyms, the type of design work they undertook when using a Learning Design[8], their discipline, and the number of years they had been teaching in universities. The three cases that describe the design or complete redesign of a unit (i.e., Emily, Scott, Joanne) are presented first followed by the five cases where participants used the Learning Design to redesign parts of a previously taught unit.

Table 4.1: Cases

Case	Participant pseudonym	Design type	Discipline	University teaching
Case 1	Emily	New	Languages	4
Case 2	Scott	New	Communications	5
Case 3	Joanne	New	Information Technology	7
Case 4	Daniel	Adjustment	Biochemistry	2.5
Case 5	Nicole	Adjustment	Law	3.5
Case 6	Alison and Lana	Adjustment	Veterinary Science	9 and 5
Case 7	Mary	Adjustment	Education	9
Case 8	Marcus	Adjustment	Marketing	10+

Within this chapter, each case consists of five main sections:

- Background – This section provides a profile of the participant(s) in the case, information about the unit, the design context and details about participants' previous design work.
- Pre-semester design work – This section describes the participants' initial design goals prior to selecting a Learning Design, the selection process, their design work with the Learning Design, and their planned design prior to the start of teaching.

[8] In this chapter, "Learning Designs" refers to the AUTC collection of Learning Designs, which can be found at http://www.learningdesigns.uow.edu.au

- Implementation and further design – This section discusses any ongoing design work, changes to the designed unit or target activity and ongoing impacts of the Learning Design's use.
- Reflection – This section summarises participants' post-teaching review of their experience using a Learning Design and the impacts the participants reported on their design and thinking. It also presents the plans participants spoke of for future offerings of the design.
- Summary – This section provides an overview of the case as a whole.

4.2 Emily

4.2.1 Background

When data collection began, Emily was an associate lecturer at a research-intensive university in Australia, employed on a semester-by-semester contract. Emily taught Spanish and had four years of casual university teaching experience. She also had more than four years of experience teaching languages privately, in schools and for businesses. The previous semester had been Emily's first experience of using an LMS to support her teaching, though she said that she had used online technologies as a student and to support her private teaching in the past.

Emily was expecting to design two Spanish-language units for the upcoming semester and was initially unsure of which unit to which she wanted to apply a Learning Design. Her final decision came after consultation with her supervisor about the requirements in each of the units and the flexibility she had for making design changes. She chose to apply the Learning Design to a third-year Spanish unit, Spanish 3b, which she was co-teaching with two other lecturers. In this unit, each of the lecturers was responsible for a different module, which ran concurrently over the semester. Emily was coordinating the whole unit and had the freedom to completely redesign the grammar module. This case describes the design and implementation of the first offering of the redesigned module within the unit.

4.2.1.1 Previous Design Work and Context

The units within the Spanish program were well established and many of the design decisions had been made before Emily was hired as a casual lecturer. For example, the overall structure, assessment types, and topics had been set, along with the textbook. She said that most of the units within the program were designed around the chosen textbooks, which also clearly outlined learning activities and provided corresponding online materials, such as practice materials and test banks. Previously, after she had been assigned a unit, Emily said that she would begin her work by looking at the overall content to be covered, assessment types, and timings, and make the final decisions concerning how she was going to achieve the goals of the unit, including selection of specific textbook content and the creation of assessments and supplementary activities. She reported that she had drawn on support from colleagues and student feedback to help guide her decisions. Emily said she was not aware of any university rules specific to the design of units. However, she said she thought there were some rules about how the unit outline was written, so she had adapted someone else's unit outline for the units she taught.

Emily spoke of the process she had gone through the previous semester with a first-year unit, saying she had looked at the period available, the assessments and how they fit into the timeframe, and the chapters to be covered. Content and topics were determined by going through all of the chapters, looking at "the grammar and at the lexicon that [needed] to be covered...[and picking] out the salient ones" (Emily, Interview 1 (I-1)). She indicated that she would divide content and assessment into days and put them into a table that mapped what readings, required activities and supplementary activities were needed for each day. Emily said she did not actually write the assessment items until later in the semester because she felt it was important to know the group and tailor an "assessment that reflects [students'] abilities" (Emily, I-1). Finally, she reported that she did not feel that she used the university's LMS to its full capacity. She reported that she had used the tools mainly for distributing information and linking to the textbook's online resources and activities.

At the time of the first interview, Emily was teaching the grammar module of Spanish 3a, which preceded the unit that she was redesigning for Semester 2. For Spanish 3a,

Emily had not had the opportunity to change much of the design prior to teaching. She said the module was based on "a horrifying book" (Emily, I-1), which gave a very brief description of a grammar focus and then included a number of fill-in-the-blank exercises for students to do. Emily explained that the "students were bored to death" (Emily, I-1) and would not come to class prepared. They would just bring their book, open it and start to do the exercises. As the semester progressed, Emily had made what small adjustments she could to the unit by creating supplementary materials, further grammatical explanations, and exercises for discussion in class. Emily said she had also replaced homework items with continuous assessment in the form of mini-tests. This aligned with the way she described students needed to be learning:

> In language-learning, what you need is continuous learning because you have these building blocks, and if you don't [use continuous learning] there is an acquisition hurricane. If you don't recognise that then you won't be able to learn. (Emily, I-1)

She went on to say that the mini-tests fulfilled a number of purposes. They encouraged students to study throughout the semester, highlighted areas that needed more work, and had the convenient benefit of encouraging students to come to class.

4.2.2 Pre-semester design work

4.2.2.1 Design plans

Unlike Emily's previous design work at her university, for Spanish 3b she had been given the opportunity to completely redesign the grammar module. Though Emily had not taught Spanish 3b before, she explained that by teaching the preceding unit in Semester 1 she knew the context and expected student cohort (approximately 20 students). Emily said her design goal was to move away from rote memorisation and practice of individual grammar structures and refocus the module on learning practical ways of communicating.

She had not used a Learning Design before, but after being shown the Learning Design website in the first interview she indicated that she thought a Learning Design might help her to communicate ideas to the students and the teaching team. Emily also said that she had decided to try using a Learning Design because she was looking for ways to make the module more engaging and applied for the students.

4.2.2.2 Learning design selection

The selection of the Learning Design occurred five weeks before the semester started. Emily said she went through all of the Learning Design guides[9] and some of the exemplars, but preferred the guides. She indicated that for her, the exemplars did not have sufficient information and the guides appeared to be more practical. Emily looked through all of the guides and read through the whole design when selecting a Learning Design. She indicated that she got a good overview of the design from the LDVS, which she supplemented with details from the text description of tasks. Additionally, the implementation section helped her to narrow down the possibilities and determine the limitations of each Learning Design.

A number of factors influenced Emily's thinking while she was selecting a design, including content matter, student needs, pedagogical preferences, unit goals, connections within the unit and overall program goals. The Learning Design also needed to be practical and easy to understand; Emily said, "It has to be very pragmatic and it has to be very clear, because if I don't understand, my students won't understand" (Emily, Interview 2 (I-2)). Early in the process, Emily said she struggled:

> [It] was a bit of a rocky road because...in the beginning I looked at the different designs and I thought 'oh maybe this, maybe that' and I tried to imagine, but I had not yet thought about the [unit]. So I started talking to [the other two lecturers] because my [module] is part of a three-module [unit]. (Emily, I-2)

Emily said her initial choice had been *Review, Interpret, Construct, Justify,* and that she had begun planning using this Learning Design before meeting with the other lecturers and realising it would not work. The design had features she valued, but the focus on a research process did not align with her module's content, as "it's analytical, it's creative, it's co-operative, it's everything, but the problem's that the experimental part [doesn't fit]. You can't experiment with grammar" (Emily, I-2).

Emily's meeting with her co-lecturers had highlighted the limited time available, and the need to focus on students writing, as "[their] writing is quite bad, apparently, and

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9 Each of the five Learning Design Guides is based on one or more Exemplars. The Guides aimed to make it easier to implement at design by removing context-specific information about and providing "more direct assistance for implementing a particular kind of design" (LD Site, 22 April 2014).

what they need is help with the writing process. And they can't do it in both [the] other modules because they look at the content" (Emily, I-2). With this in mind, Emily went back to the guides and decided on *Explore, Describe, Apply* (Figure 4.1)

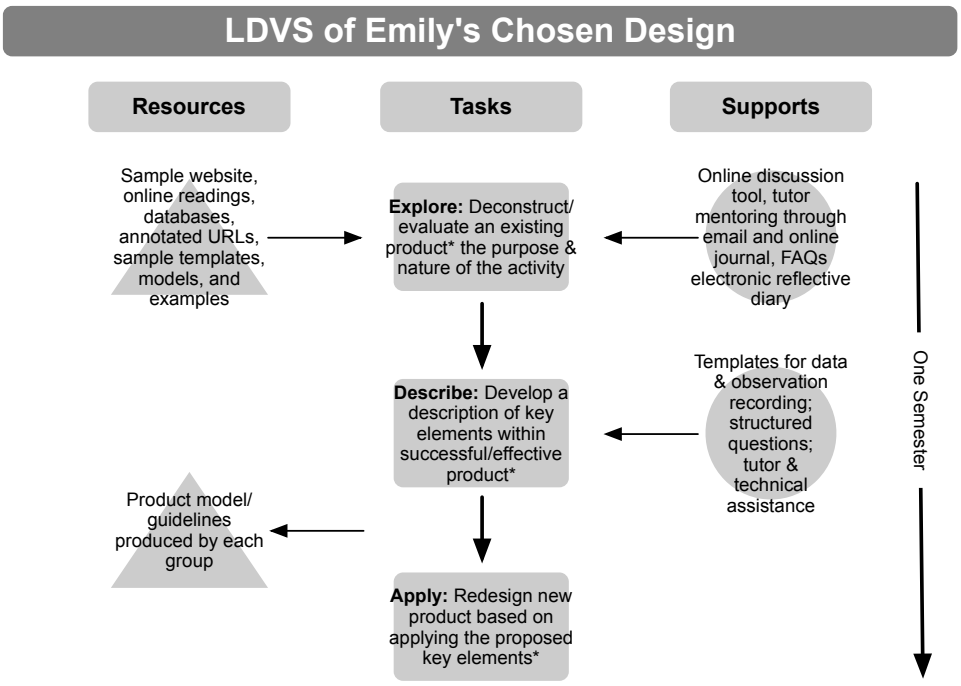


Figure 4.1: The LDVS of Emily's chosen Learning Design, *Explore, Describe, Apply* (Oliver & Herrington, 2002)

The *Explore, Describe, Apply* Learning Design is a problem-based Learning Design derived from a semester-long unit called *Teaching and Learning in Multimedia*. As the figure shows, the design takes students through three steps: they explore and evaluate a product; describe key elements for a successful product; and then apply their knowledge to design another product incorporating the key elements.

4.2.2.3 Design work

Early work

After choosing *Explore, Describe, Apply*, Emily indicated that her energies would first be on the completion of her Semester 1 teaching and preparation for an upcoming research conference, and then she would look to work on the redesign. That being said, she had done some preliminary work on the design just after selecting it.

Emily had drafted an overview of the stages for her unit on a single piece of paper. She reported that she had printed out the context and implementation sections of the Learning Design for reference. Her plan at this point was to have the students go through the cycle once for each of the major grammatical structures:

> They will have to go three times through this cycle because they will have to go through with each topic.... We explore these structures...which is also the analysis and then the next step will be...[to] describe the structure, which means we can try to use these structures, and the last [step] is a complete application to a short written text. (Emily, I-2)

Emily said the collaborative component of the design was still "a big question mark", and she had been considering options for designing it within the LMS:

> I would like to set up discussion groups...[so] they can prepare an article...so the written work will be collaborative in the beginning. I don't know how that's going to work because there is usually one who does the work and the others just watch or complain. (Emily, I-2)

In these early stages of her design, Emily talked about relying on her previous experience, student feedback, and colleagues as supports for her work. Emily commented that the Learning Designs were easy to understand, but required one to carefully envision the implementation, as "everything is there and the problem is that you really need to look at everything and imagine yourself implementing it" (Emily, I-2).

Later work

Several weeks later, Emily said that she had done some preliminary thinking about the unit during the conference and had spoken to other linguists for ideas. After her return

from the conference, she reported spending three intensive days working on the design. Her days included minimal breaks:

> I start at 8:30 [a.m.] and usually I leave here at 9 [p.m.]...I don't go for coffee and I don't go for lunch...I eat while I read...to me this is completely normal. This is how academia works, so I don't mind doing it for a couple of days. (Emily, Interview 3 (I-3))

The steps she took when designing involved speaking to her co-lecturers about what they were planning; creating a schedule for her module and coordinating the texts, activities, and assessments between the three modules; scheduling the main topics; creating the unit outline, considering connections and focus; and reading the whole Learning Design. Emily described some of her steps over those three days:

> First, I talked to...my two colleagues to find out what they were going to do. Then I did the schedule and went back and talked to them about the assessment bits and everything.... I knew which kind of argument structures I was going to use so I wrote those in and the next thing, I wrote the course outline. By writing the course description, it gave me a better idea of what actually I was going to do and by seeing what it had to feed into, so all the implications. Next, I [reread] the whole Learning Design module I was going to use. So I read absolutely everything and decided this was actually really good because of the problem-solving bit…. [The Learning Design] also reflects, to me, a natural cognitive process in learning and acquiring grammatical structures. (Emily, I-3)

Early in the interview Emily had spoken of being cautious about making too many specific decisions until she had met the students because she wanted to learn "how they work first" (Emily, I-3). Therefore, Emily said that she had not developed all of the content for each week, but had the "scope" of what she was going to do. She had also developed handouts to explain the Learning Design and what she expected of students at each stage. Emily said she felt happy that the structure of the module was cohesive and organised.

Emily indicated that she found the LDVS and Learning Design description of the steps useful in her design process, and liked the "visualisations, the diagrams, and the description of the three-step process and the learning outcomes" (Emily, I-3). She explained, though, that she felt frustrated at times by the suggested implementation and

repetitiveness of the text and initially found the Learning Design guide to be overly prescriptive:

> This is the first time I used a Learning Design and [it] felt like a prison. I felt completely bound, like, 'Oh, this is what they want you to do' and so I was trying to comply with everything and it just made me completely crazy because I said, 'I can't do this. It doesn't work. It's just not possible' – until I realised you don't have to do it by the book; you don't have to follow each and every step. So I just started picking and choosing – the main [ideas] are the interesting bit and everything else I really would like to do on my own. (Emily, I-3)

For additional support, Emily also looked at how other university language programs approached the teaching of argument, structure, and grammar.

Emily said she was not able to add as much of an online component to the design as she had originally anticipated. The LMS site was a shared site for the unit, with each of the co-lecturers adding to it as needed. Emily reported that there had been some resistance from her co-lecturers to her suggestion to use one site for the unit as a whole. She had hoped that she would be able to have the students write an *E-Journal* in the Application stage, as was outlined in the *Explore, Describe, Apply* Learning Design. However, in addition to discouragement from colleagues, Emily cited limited time, a lack of access to technology in the classroom, and an upcoming LMS change as factors in her decision to use the LMS in ways with which she was already familiar.

She indicated that she planned to use this semester as a trial to learn how the students worked in the new design, and had shifted her aspirations for improving the online components of the unit to future offerings:

> I thought that I could do much more.... Once I had the schedule I had identified the [language] structures and I had looked at the resources and everything, I realised that it was absolutely impossible to do...any *E-Journal* bit.... We just don't have the resources to do this, so I decided on something practical, feasible, like trialling. I'm trialling this now and the idea is if this works well, we could start first semester [next year]...and then in the second bit we could do all the [online] publishing work...because it needs a practical application and my practical application is…[getting the students] writing the texts for the other two modules. (Emily, I-3)

In the week before teaching started, Emily had not yet finished working on her part of the LMS site, but planned to use the site to distribute information and content (e.g., the unit guide, timetable, assessment information, weekly content, etc.), as well as the Learning Design description for the students.

4.2.2.4 Pre-semester planned design

Emily's chosen design and her pre-implementation plan are shown in Figure 4.2. As Emily had planned when she first chose the design, her application of the *Explore, Describe, Apply* cycle would occur over a shorter timeframe, and she planned to conduct and support the tasks face-to-face with some online resources and information rather than fully online.

In the chosen Learning Design (left hand side of Figure 4.2), each of the phases lasted several weeks and only one cycle was completed in a semester. In comparison, Emily's design spanned three weeks during which a particular grammatical structure was the focus. Emily planned to have students start the three-week block with an *Explore* step (the first task rectangle in the diagram on the right). In this step, students were to *Explore* the grammatical structure by reading and thinking about the theoretical explanations and/or example texts focused on highlighting the structure. Then each week in class, Emily planned to have the students go through the *Explore, Describe, Apply* cycle (shown within the dotted box on the right side of Figure 4.2). During the in-class cycle, students would work in groups to first discuss and break down the target structure. Then using a reading from the reading module, they would examine and describe the reasons that writers had used the grammatical structure they were currently focused on. Finally, the students would apply what they had learned by discussing how to use the structure. In the third week, Emily's plan was to have the students apply their knowledge to write a short, targeted text for assessment. This step is represented by the fifth task rectangle in the right diagram.

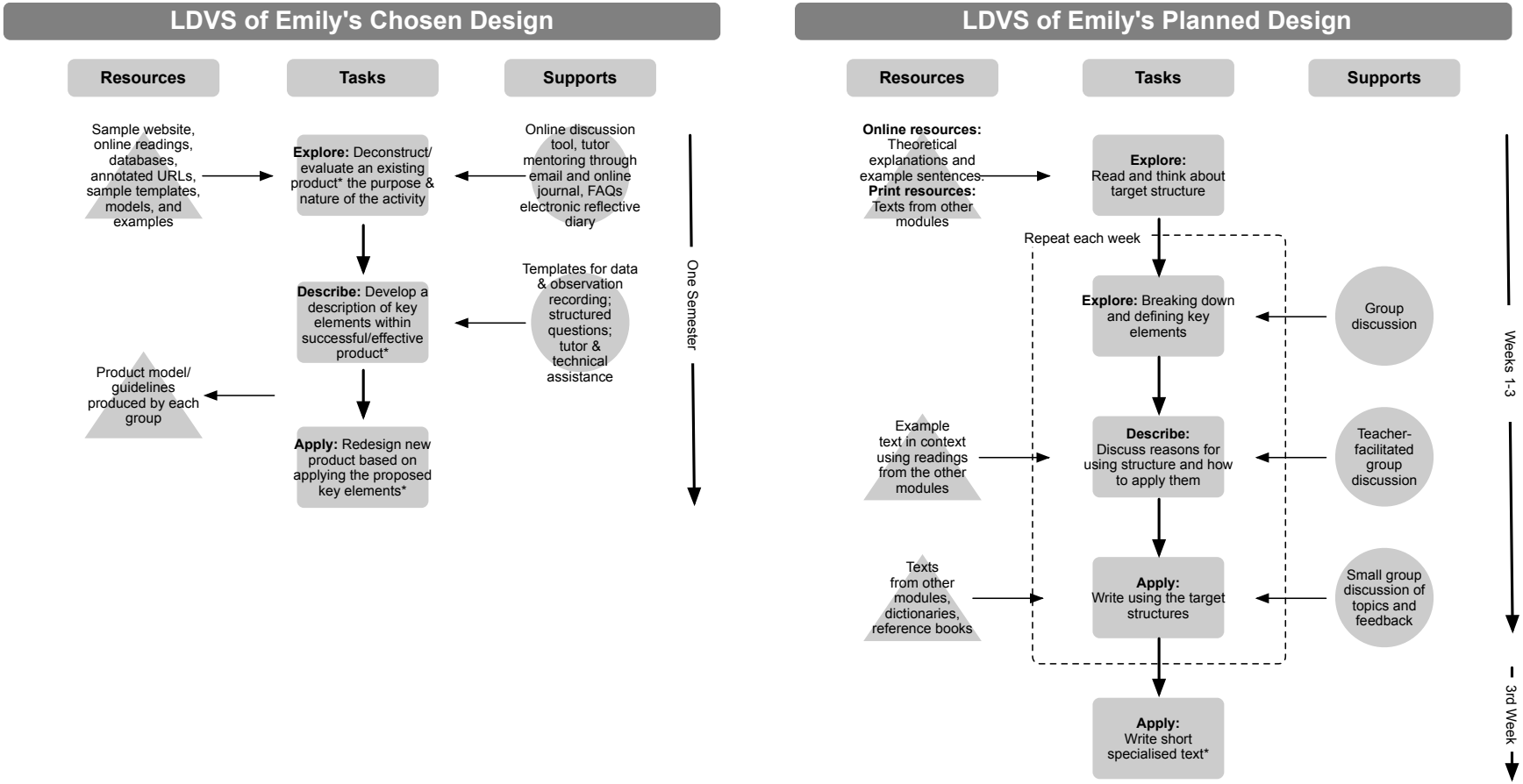


Figure 4.2: The LDVS of Emily's chosen and planned designs

4.2.3 Implementation and further design

The implementation of this module was challenged most by the students' initial resistance to the pedagogical changes and reluctance to do the necessary preparation work. This overshadowed more minor issues, such as difficulties in getting students to work in groups and use the online discussion board. Emily reflected that there had been three stages of students' acceptance and understanding of this Learning Design. The acceptance phases mirrored the three-week cycles. The first three weeks were met with strong resistance from the students, with Emily saying, "It was like, 'error, error, error, error message, we don't understand'" (Emily, Interview 5 (I-5)). In the next three-week cycle, the students began to apply themselves to this new style of learning, and in the third phase, Emily said they began to enjoy the learning process. As Emily summed up, "Students didn't want to accept it at first, and then they resigned themselves to doing it, and then they started liking it" (Emily, I-5).

The challenge for Emily was to try to find a way to stay true to the pedagogy that she wanted while managing student expectations. She explained that while she had made some similar changes to the preceding unit, the shift in this unit had the students well outside their comfort zone. The students were used to being given set grammar rules and fill-in-the-blank exercises that could be completed easily. Early in the implementation, Emily reported:

> They have not done the exercises. They come with the papers printed now and look at me with blank eyes and say 'We don't understand'.... They're very used to spoon-feeding, which I'm just not compromising on.... This is university and I think they are not gaining anything from [spoon-feeding]. I'll have to see. It's very discouraging, though. (Emily, Interview 4 (I-4))

Emily conceded that she was trying to cover a lot more material than these students were used to, but felt the workload was still not high. In fact, she said it was lower than what she required in her first-year unit.

Despite the early struggles, Emily resolved to continue working towards her ultimate goal:

> It's a long-term plan and I think if you want to make a program work well, you need to work on these plans. Anything you want to change is going to be difficult

> and you will find resistance to that because anything that requires effort is nowadays very difficult to get from students. (Emily, I-4)

By Week 9, Emily reported that students were used to the approach and doing more work. The implementation had been a bit like a negotiation, and over time, both parties had adjusted their expectations. She said, "I think we have reached almost an agreement [laughter]. This has been a very interesting learning agreement...for the students and myself. Overall, I think it has been really good" (Emily, I-5)

Throughout the implementation, Emily reported that she spoke to people in her network for support: "By talking to people my ideas get clarified and also I get critical feedback and I get ideas.... I just need to talk to people...more brains know more" (Emily, I-4). She also gained support from readings and referred to her printout of the Learning Design for guidance, "for the different steps of thinking on the way to the application because it feeds into so many other things, even into discussing literature" (Emily, Interview 6 (I-6)).

Emily spoke of how she had tried to discuss the ideas and concepts of the Learning Design with others but had mixed results. She said she talked to almost everyone she knew about what a good idea Learning Designs were and how using the Learning Design had been an interesting process for her. However, the person who was most interested in the Learning Design had been her son, a trained teacher, who she said "was much more interested in it than any higher-education person" (Emily, I-6). Emily had also tried to get the students to engage with the ideas of the Learning Design. She had provided students with both her adapted Learning Design documentation and the original Learning Design and said that she had also spoken to the students about the original Learning Design; however, she reported that the students had not been interested in it. The LDVS of Emily's implemented design compared to her planned design is shown in Figure 4.3.

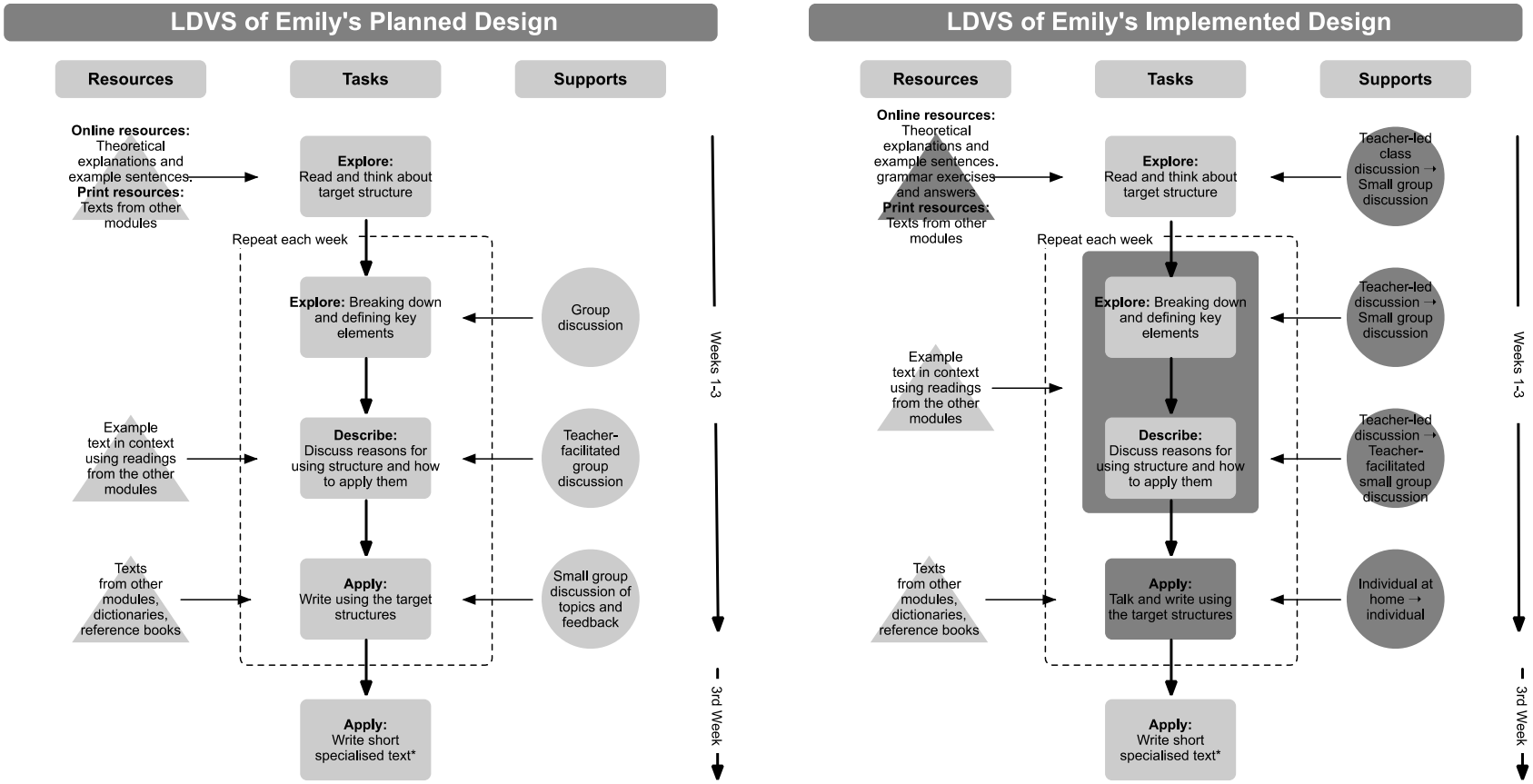


Figure 4.3: The LDVSes of Emily's planned design and implemented design

As she mentioned during the implementation, she had to make adjustments to facilitate the pedagogical transition for students; specifically, she made some changes to pacing and how she supported the tasks. She had expected that students would be able to work through a whole *Explore, Describe, Apply* cycle each week and that much of the discussion would be in peer groups rather than teacher-led. However, in practice Emily found that the students needed her to guide them through the process, particularly during the early weeks, and that the task took longer than expected. Emily said that this resulted in the *Explore* and *Describe* tasks becoming intertwined, often occurring simultaneously or in reverse order. The first dark grey box on the right side of Figure 4.3 indicates this change. Moreover, the extra time devoted to these steps reduced the in-class time for the *Apply* task, which was often left for students to complete at home. As the semester progressed, the students became more confident with the process, and Emily said there was a shift towards the originally planned supports. The description and arrows inside the support circles for the implemented LDVS indicate how these supports shifted from early to late semester (see right side of the figure).

Additional changes were made during the semester to the resources and structure of the LMS site based on feedback from students. Originally, Emily had organised the resources based on topics, keeping all the related material together with a weekly schedule for student reference. However, she reported that this was contrary to how the students said they thought about their studies, so she changed to a weekly organisation. Emily also changed the resources themselves. Each week she uploaded the overview of the focus structure, examples, and instructions for what the students were required to do. After the initial difficulties with the pedagogical change, students requested the addition of supplementary fill-in-the-blank grammar exercises, which were more in line with what they were used to. Emily added these, along with answers. Also, as the semester progressed, Emily said she reduced the amount of theory she included: "I turned my expectations down and gave them less theoretical explanations, less pages" (Emily, I-5). A final addition, midway through the semester, was a discussion board with sections for discussing the class work, providing feedback, and organising an end-of semester gathering. However, the discussion did not work as she had hoped:

> I wanted them to have online discussions about the topics. That never worked...that was a bit disappointing. I think it's because [this unit] used to be called 'grammar' and they just did their grammar-book exercises and ticked it and

> that was it and never, ever prepared anything and then they had the test at the end and that was it. (Emily, I-6)

4.2.4 Reflection

4.2.4.1 The design and the Learning Design

Emily chose a Learning Design guide that aligned with the ways she wanted to change the unit. When designing, she reported that she did not use everything from the Learning Design, just "the main structures in a way that would fit my own thinking" (Emily, I-6). Emily commented on the strength of the design:

> I think the strength lies in the structure – the biggest strength is that it allows multiple solutions to the problems; and that reflects language variation and reflects pragmatic strategies. (Emily, I-6)

She commented that the design had been effective in achieving her learning objective to engage students in problem-solving to deepen their grammatical understanding, as "they have all these rules in their minds, but they didn't understand why they were using them... That [goal], to a big extent, seemed to have worked" (Emily, I-6).

Student motivation impacted most on the implementation of the design. Emily felt that part of the motivation problem lay in the fact that this was a final-year unit:

> I couldn't implement it in the way that I would have wanted to, with much more activity from the students as groups, but I think it's because it's the last year. You need to start very, very early on – I have already started with the first year this time and they like it.... If you can show them that it's useful, then they will accept it. (Emily, I-6)

Although the students had found the pedagogical shift difficult, the informal feedback from students at the end of the unit had been encouraging:

> They said yes, that they disliked the amount of work they were expected to do, and that's what showed in the beginning specifically. But on the other hand they [said they] would have preferred to have grammar taught that way right from the beginning because they would understand.... So I think it's positive, overall it's very positive. (Emily, I-6)

Emily said that she had learned that being creative and flexible was important and that she had to move away from being too theoretical. She spoke about the early "tug-of-

war" that she had with the students, trying to get them to do the necessary work. In time this shifted, and "it was pretty nice because at the end they actually were able to discuss [the structures]" (Emily, I-6). Finally, she said that she had learned that it was possible to get students to engage by 'bribing' them with learning: "The bribe was showing them how useful it is and making it actually fun for them and giving them the opportunity to do something they would feel [was] worth doing" (Emily, I-6).

Reflecting on the effect of the Learning Design on the online components of the unit, Emily said it affected the design of the resources: "It definitely influenced the writing of the specific little papers I put on because I tried to make it in a way that they would be able to apply the steps to the text" (Emily, I-6). Emily felt that she had used technology in a slightly more integrated way, but that there was still "lots of room for improvement". She reported that the main barriers to doing more were "time and space, [and] a bit of willingness of the students" (Emily, I-6). Emily suggested that she had been able to do much more online with her first year students than this group of final year students; the latter group's lack of effort may have been due to their own expectations of what they would be expected to do.

4.2.4.2 Plans for the design

When talking about future offerings, Emily had several ideas for improvements. She said students needed a longer period of introduction to the design, so she planned to expand the introduction to two weeks, during which she would model, in class, what she wanted them to do. She also spoke of going through the *Explore, Describe, Apply* steps more slowly:

> I would give them a longer introduction.... I think my implementation was probably too theoretical in the beginning, and also I tried to apply three steps to every single topic, each class, and I think that was a bit of overkill. So maybe just stretch the topic out a bit and have more of a one class, first step, second class, second step and then the third class, the third step. (Emily, I-6)

She still had ideas of expanding the design over two semesters, with the final application step being an ongoing project; for example, an online newspaper. Emily also said she was looking forward to using the new LMS, which she expected would be more intuitive and allow for more interaction.

4.2.5 Summary

Emily was a casual lecturer who was relatively new to teaching in universities and was not aware of many of the university's rules affecting the design of units. She had teaching experience outside of higher education, but had only been working in universities for a short time. Most likely because she was a casual lecturer and because the program she taught into already had a well-established program, her design work to this point had been restricted to small adjustments to activities, though her responsibilities and freedoms with the units had been growing with each semester. The module she taught for this semester was part of an established unit that she had been given permission to redesign.

Emily approached the Learning Design looking for ideas and models to use in the module. She was drawn to the subset of eight guides that had been adapted from designs within the original set of 32 exemplars. Emily found the descriptive titles of these designs more appealing. She used the visual sequence in each design to give her an overview of the tasks and sequence, and read the text to explore the details. Selecting a Learning Design had been a struggle at the beginning because she felt she did not have enough information about the unit to decide, so she discussed the unit as a whole with her co-lecturers to get more insight. As she was deciding, she considered content matter, student needs, pedagogical preferences, unit goals, connections within the unit, and overall program goals.

Emily did most of her design work in an intensive three-day block. During this time, she planned the structure, spoke to her co-lecturers, and referred to the Learning Design. Emily found that she could not implement everything within the Learning Design, a point that had initially frustrated her, and instead chose the main elements of the design to adapt for her purposes. She planned to use the *Explore, Describe, Apply* cycle to support her students' learning of the three grammatical structures she was focusing on. This approach was very different to the previous approach, which focused mainly on the completion and discussion of grammatical fill-in-the-blank activities. Her pre-implementation design plan was for students to work through the cycle once each week,

in comparison to the original design in which students work through the cycle once during the semester.

The design's implementation was challenged most by the students' unfamiliarity with this learning approach. Their expectations were very different from Emily's, and this resulted in initial resistance. Both Emily and the students had to adjust their expectations for the design to work. However, as the weeks went on, Emily found that the students understood the process better and even began to enjoy it.

The experience of trialling this model taught Emily to be creative and flexible. For future offerings she said that she would like to add in more technology, begin with a longer introduction to the cycle, take the students through fewer cycles and perhaps expand the activities to a second semester. Emily had started to develop a vision for using this model throughout the program and had already started using the Learning Design ideas in her first year teaching.

4.3 Scott

4.3.1 Background

Scott was a communications lecturer at a regional Australian university. He had began working as a full-time lecturer five years previously after a career in the communications industry. While working in industry, Scott had also taught for 12 years part-time at a Technical and Further Education (TAFE) college. He had used the university's LMS to support his teaching for the past five years but preferred the face-to-face aspects of teaching.

For Semester 2, Scott was designing two closely related units, both focused on channel planning and advertising skills. While the content of these units overlapped, the pace, depth, and mode of delivery were to be tailored for student cohorts from two different programs. The case reported here focuses on Scott's design of a new second-year undergraduate, blended-mode offering that was to build on a first-semester unit in advertising. The need for this new unit had been determined in a recent program review. The main purpose of this new unit was to give students a greater understanding

of the buying, selling, and planning of various types of advertising media as well as an understanding of the associated media-agency roles and perspectives.

4.3.1.1 Previous design work and context

Scott discussed his approach to design by describing how he had designed other units and learning activities in the past. He explained the guiding philosophy for the program and his teaching:

> I think it's described mostly as 'situated learning', and that basically means that...we involve the students in practical use of the theory through project materials, where they have to actually apply the theory [to] delivering the answer to the project. (Scott, I-1)

The program in which Scott taught used a problem-based learning approach in many of its units; Scott said he felt this approach was well aligned with the goals and outcomes of the subject areas he taught. His design ideas for problem-based learning were primarily drawn from books, colleagues, presentations, and other units in the program. For example, Scott reported that he used other unit outlines and assessments from units in the program as models for his own units.

In his previous design work, he said that the pedagogical approach of the overall degree program, the industry requirements, student's workplace needs, and the learning goals of the unit had been focal points for his design decisions. Content was usually strictly guided by requirements specified through the Professional Association's education committee, with Scott saying that "They have determined...the unit areas they need to be covered and...we develop up from that...[ensuring we are] delivering those things" (Scott, I-1). There was more freedom in determining how to teach the content; however, the consideration of industry needs was still strong:

> There is a high level of problem-solving within it. It's authenticated learning, because we actually base it on what the industry wants and feed the industry into it. [The students] use the tools of the industry to assist them in that learning, and we add to that some exposure by bringing in industry people to address particular topics, and of course the brief that [students] get comes from the industry as well. (Scott, I-1)

This quote illustrates how connected Scott's design process was to industry needs and the importance Scott placed on providing students with experiences that mirrored workplace practice. He said that he used his own industry experience to aid his design and consider what knowledge, resources, and skills a student would need to have to accomplish a similar task in the workplace.

As the unit examined in this study was a new unit, Scott discussed his use of the LMS in relation to other units he had taught. He said that he usually set up an LMS site for the unit as well as a number of student project sites. Within the unit's LMS site, he posted the unit outline, lecture notes, resources, and assignment information and discussion points. The group sites acted as private group workspaces where groups could store documents and collaborate on projects. In both the unit site and the group project sites there were a number of tools available for communicating (e.g., announcements, email, discussion, chat room), sharing resources (e.g., links, files), and creating (e.g., wiki). For the blended-mode units he taught, Scott reported that there usually was not a lot of activity in the sites. He said that he thought this was because the students preferred to do most work face-to-face.

4.3.2 Pre-semester design work

4.3.2.1 Design plans

Channel Planning was a new unit, which followed on from the unit that Scott was currently teaching; Scott spoke of three potential challenges to his design and implementation. First, he said he felt time would be a challenge with the design of this new unit, and he commented that he might only be "one week ahead of the presentation, because unfortunately I don't have the luxury of having six months to write it up and then test it before I present it" (Scott, I-1). Second, he anticipated that the logistics of getting the industry software set up, finding the best way to integrate it into the assignment, and training students to use it was going to be a challenge. Finally, Scott said that he thought the most challenging part of the design process would be finding a way to maintain momentum and student engagement in the process, particularly in the second half of the unit.

As a starting point, Scott had the planning documents that had been created during the recent program review that outlined the objectives and required content. Scott said his next steps would be to do the thinking behind the creation of the unit outline, which would include deciding on the learning program, any workshop activities, prescribed texts, pass/fail requirements, assessment items, and the optimal design for the learning activities. His design goals were focused on establishing connections both within the unit and to industry applications of knowledge:

> So what I have to do...now is design the subject...to step the contents from the point of introduction of this phase...to its end conclusion and [make] sure that I can both achieve those objectives and have students participating.... [so that] they actually come out at the end of it with the ability to apply that knowledge, should they go into the industry. (Scott, I-1)

Scott said the design for the unit would be modelled on other units he had taught, and ideas for the unit had been "rolling around and rolling around...at all strange places and times" (Scott, I-1).

4.3.2.2 Learning Design selection

During the background interview, Scott said he had had little exposure to the idea of Learning Designs. At that time, he was mainly looking for validation and expansion of his own knowledge of teaching problem-based learning, saying "What I'm really trying to do is make sure that...I'm following the right, the best way to do it through the problem-based learning process" (Scott, I-1). However, he indicated initially that the idea of having to choose a Learning Design to apply to his unit seemed restrictive: "This is really putting me in the box...like actually following a formula" (Scott, I-1).

Two weeks later Scott recounted his selection of a Learning Design and preliminary design work. He said he began looking for a Learning Design by looking at the list of exemplars on the Learning Design site, scanning through the topics, and searching for key terms in the titles. When reading a specific design, Scott said he focused on the designer's voice section, which contained the description of the tasks, resources, and supports as well as the LDVS diagram. He said this gave him a sense of the tasks, outcomes, and assessment for the design. Since he wanted to learn more about problem-based learning, Scott largely focused on these types of Learning Designs.

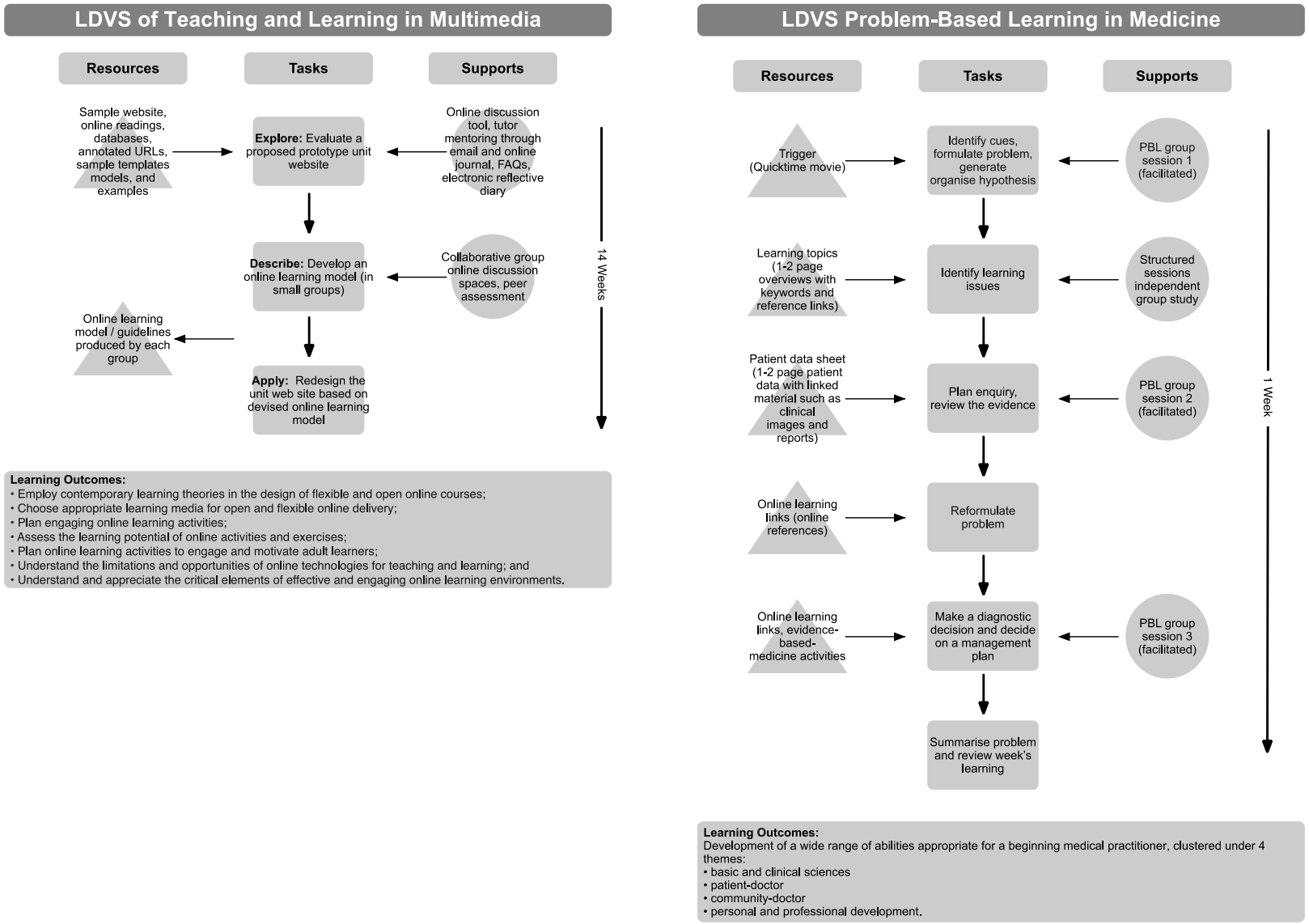


Figure 4.4: The LDVSes of Scott's chosen designs: *Teaching and Learning in Multimedia* (Herrington & Oliver, 2002) and *Problem-Based Learning in Medicine* (Ryan, 2002)

Scott identified two designs, *Teaching and Learning in Multimedia* and *Problem-Based Learning in Medicine* (Figure 4.4 above), because they both aligned with what he was trying to do with his students. First, *Teaching and Learning in Multimedia's* longer time frame for the problem and role-playing aspects aligned well with the fact that Scott wanted students to "take on the role of the planner and set about working out a solution to the [media] brief [by] drawing in information...[and] answering the brief in a set manner" (Scott, I-2). Then, he said it was the repetition of problems in time-sensitive situations in the *Problem-Based Learning in Medicine* design that aligned with what he was trying to do:

> So I guess there's a certain degree of learning by repetition at the same time as learning by solving the problem and...like the media planner a doctor doesn't have a lot of time to think. [Doctors have] got to have a good knowledge to be able to rapidly respond because of [their] circumstances in practice. (Scott, I-2)

Because both designs aligned with elements of his context, task foci, and pedagogy, Scott was reluctant to choose just one design. Therefore, initially he decided to read and draw ideas from both of the designs.

Scott reported that he had had a quick read of each design. He said that most of the work he had done had involved thinking and reflection during spare moments (e.g., during his 40-minute commute to work). He had not put "pen to paper", but he had thought about the unit outline and what he needed to adapt. He described how the Learning Designs had helped him at this stage:

> It's helped me clarify it a bit.... I've got to work out in the sequence of the steps and stairs...how I take [the students] through from the beginning.... So I suppose what reading these two so far has done is give me a ladder for the beginning, the ladder of the way to work my way...through the thing. I suppose I would've struggled along and brought this out somehow with a bit of chat with my educational designer downstairs...but these have been helpful from having a look of how somebody else has done it...they're good exhibits of how it could be done. (Scott, I-2)

This quote shows that while his overall plan had not changed, the Learning Design had helped him to clarify his design, simplify his design process, and provide him with example implementations to draw on.

4.3.2.3 Design Work

After he had selected the Learning Design, the time demands of teaching Semester 1 units had caused Scott to fall behind on the design of his Semester 2 units. He commented, "The wheels have fallen off everything at the moment...I'm so far behind I feel I am going to meet myself coming through the door at any moment" (Scott, I-2). Once Semester 1 finished, he was able to spend more time on the design of his units.

While both Learning Designs had influenced him, Scott said that *Teaching and Learning in Multimedia* had aligned most to what he wanted to do and had been the primary reference for his design work. He reported that he had gone back to the Learning Design site several times over the first few weeks of the semester break and had spent a lot of time thinking about how he would use the design in his context. He said, "I suppose what I was doing was reading what they were saying and just [letting] it roll around in my mind as to how I could apply the thought process into this [unit]" (Scott, I-2). When referring to the Learning Design, Scott said that he focused on the text of the Learning Design more than the diagram. In addition, he also spoke about referring to books about problem-based learning and having discussions with colleagues.

After Scott's early work with the Learning Designs, he said that he did not often refer to the Learning Design site, although he did go back to look for examples of problems that were similar to his own. He also used discussions with an educational designer and his colleagues along with his initial considerations of the Learning Designs, to support his design process. He used the Learning Design and other supports in much the same way. His use of the Learning Design provides an example; he first considered ideas from the Learning Design, spent time reflecting on the ideas, decided what he wanted to try, and then, when designing, consulted the Learning Design to clarify details.

Key design considerations for Scott were the professional-body requirements and the university's objectives for the unit:

> I had a combination of the [university-approved] guideline of what the objectives of the [unit] had to be...the first study schedule that I wrote which had all these

> steps in it which would meet that and what the [professional body] had agreed to...and then I had to turn that into real-life opportunity. (Scott, I-3)

Scott's decisions were also guided by other objectives and requirements, such as the professional body's determination of the unit's content, broader program goals, and industry needs. The importance of connecting to industry is illustrated in how he spoke about the first assessment, which integrated an industry-specific tool:

> Part of the objective of the [program] that we offer is to have the students what we call 'work ready'...so assignment one [is] designed deliberately to immerse them in the idea of using [an industry] tool, to solve a related industry problem. (Scott, I-3)

With the objectives and industry requirements in mind, Scott said he came up with three steps for the students to go through that would answer each of the objectives for the unit. During this process, Scott used an internal dialogue to think through what would accomplish his goals:

> I then said, 'Well, how am I going to bring all these things together so that I can actually get these people involved and achieve these steps? How do I get them involved in strategic planning?'.... 'So what are the elements in strategic planning?' (Scott, I-3)

Scott designed each step using this questioning process to help him consider options and identify necessary resources and supports for the students. For the content of the unit, Scott drew together a range of resources including traditional textbooks, trade magazines, professional body documents, and authentic materials from an industry partner agency. While making these choices, he spoke to an educational consultant from the professional body about sourcing content and resources.

Scott set up his LMS site much as he had in the previous semester, and did not think the Learning Design influenced how he designed the unit's LMS site. He included announcements, email, and discussion boards to communicate with students; a wiki for the organisation of teams and team sign up; a resources area for uploading lectures and resources; and a calendar for students. Referring to the setup of the LMS site, Scott said:

> Basically, it's sort of just lurking there because the university's objective is to drive as much as we can through the [LMS] as possible. I was thinking in the [unit] 'How can I use it in any better way than just an electronic filing cabinet?' I

> offer [students] the opportunity to put up project sites if they want a project site for their particular team and I'll happily build that for them if they want that. (Scott, I-3)

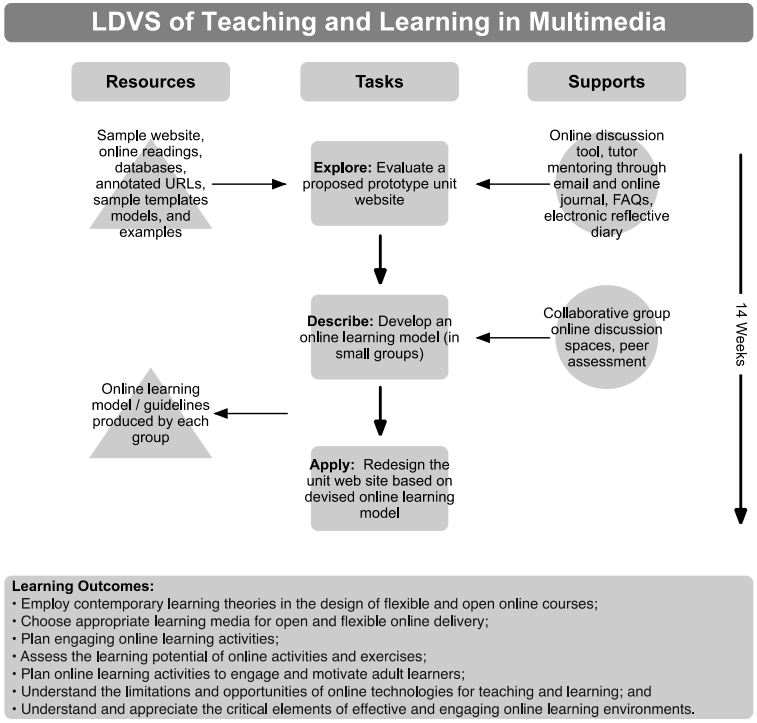
Scott said that students would not be required to put things on the unit's site and that the general pattern in other units had been that they asked questions in the face-to-face environment rather than in the forum. Scott said the online components were "a bit...one-way", and though he had wanted more resources and interaction in the online environment, there was not enough time to achieve this.

4.3.2.4 Pre-semester planned design

Speaking of his pre-implementation design work, Scott said that he had spent at least 40 hours just getting to the point where the unit outline was completed. He also indicated that he still had a number of design activities to do during the semester, in particular to design student tasks for the second half of the semester. While Scott's design for his unit was not complete, he had decided on the overall structure, activities, and assessment points.

Throughout his design work Scott referred to a number of Learning Designs, with *Teaching and Learning in Multimedia* being his primary reference (left side of Figure 4.5). The *Teaching and Learning in Multimedia* design came from multimedia development in the field of education. In this design, students took on the role of a multimedia developer and worked through a single problem in three phases over the course of one semester. In the *Explore* phase, they evaluated an example website; in the *Describe* phase they created a set of recommendations for website development; and finally in the *Apply* phase they redesigned the original website. These steps are represented by the three task rectangles in the diagram on the left side.

In Scott's planned design, students would work on one main problem, responding to an advertising brief; however, to give students experience of both the buying and selling perspectives of this problem, he planned to break it into three sub-problems and have students act in both roles. The Learning Design Visual Sequence of Scott's unit is shown on the right side of Figure 4.5. In each sub-problem, students went through an *Explore, Describe, Apply* process. For ease of identification, these task foci have been



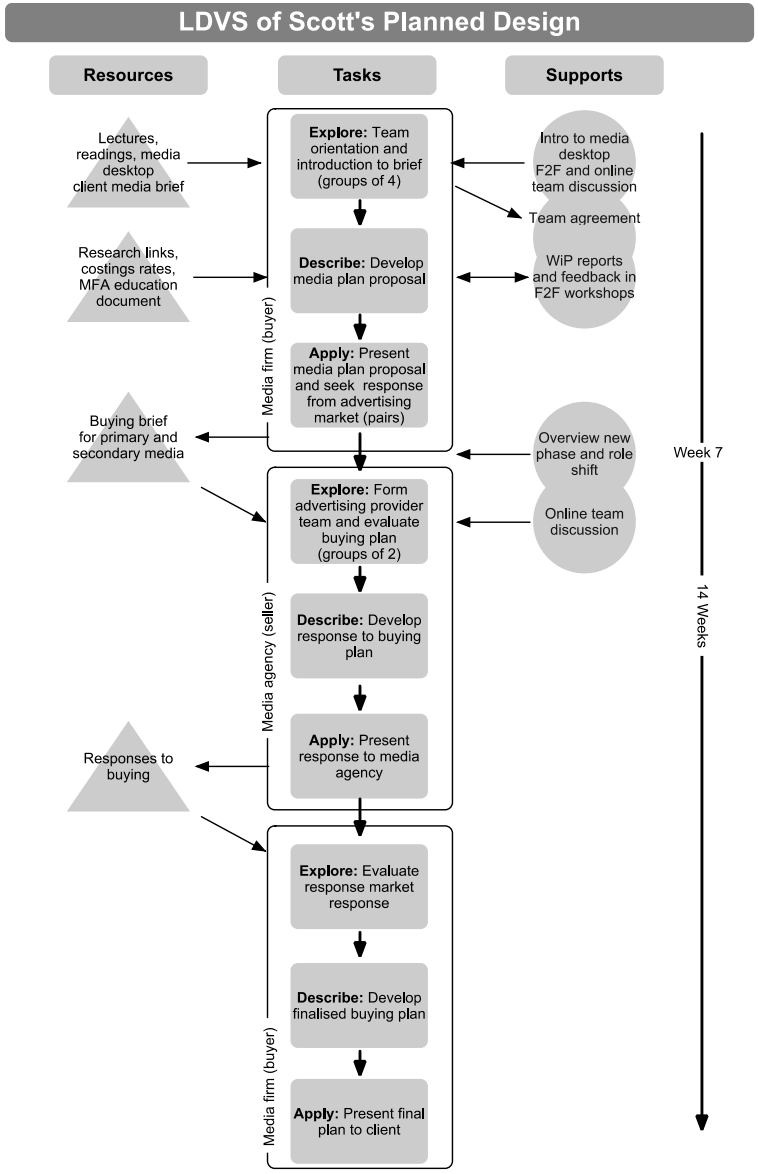


Figure 4.5: The LDVSes Scott's chosen design, *Teaching and Learning in Multimedia* (Herrington & Oliver, 2002), and his planned design

indicated within the task rectangles in his planned design, and the role associated with the tasks has been included in the box enclosing each *Explore, Describe Apply* process.

The first sub-problem had students' acting in the role of a media firm. It began with an orientation to a client's media brief (first *Explore* task on the right side of the diagram) from which they developed a proposal (*Describe*) and presented it to an advertising provider (*Apply*). This would complete the first sub-problem and was the most developed part of Scott's design at this stage. The final two phases, which required the students to switch roles, were less developed and contained content that Scott had not taught before.

In the second sub-problem, the students would switch to a media seller role. In this role, each team would focus on different media types and develop a response to one of the media agency's (i.e., buyers) buying plans. Finally, in the third sub-problem students would return to their original roles to evaluate the responses and finalise the buying plan before presenting it to the client. Scott said this would give students experience using the industry tools, responding to authentic industry briefs, and producing professional reports from both the media buying and selling side. His main concern prior to implementation was how he was going to clarify and communicate the tasks to the students.

4.3.3 Implementation and further design

The unit began in late July, and Scott reported that there were 49 students in the class. Scott continued his design of the final two phases of the unit throughout most of the semester. What he was designing required the students to go through different aspects of the larger problem, first in the role of the seller and then back in their original buying role:

> [We'll see] whether or not I can make this role-play idea work and I can get the understanding [of] how to write the media to market brief, and then getting them to change roles and act as a seller of the media and add the brief, and then return back to their own role of doing an evaluation on it. (Scott, I-4)

Scott had not tried to do this before in any other versions of the unit, so working out the details was complex. Another challenging aspect of the final activity was the

culminating presentation. Scott said the final mark would be based on the document, but he wanted students to present their work in class if possible. Given the short timelines, he was not sure there would be enough class time to do this.

Early in the semester, Scott obtained a sample industry-training package from the professional body to check that what he was teaching aligned in the industry and to see another teaching approach. Scott also looked through the Learning Design site to see if he could find a design to support him with the role-play aspect of his design. He reported that he read a number of role-play Learning Designs and that this had made him realise that it would be useful to add an assessable milestone to keep students on track:

> I had a bit of a prowl around the role-play sections of the [Learning Design] website and in fact that was what brought my attention to this assessment point – because I was looking at some of the little video clips there...[they were saying] 'you've got to be very clear'....And a couple of the others sort of said well 'assessment is vital because if [students] don't think it's worth anything they won't do it'. Well, that's pretty logical but it just sort of triggered that point. (Scott, I-5)

However, as the assessments were already set, Scott could not add a new assessment to the unit at this point. Instead, he said he would have to remember this for future offerings.

After the students had gone through the first sub-problem in Week 7, Scott reported that this initial phase and the student presentations had gone well. He was particularly happy with the success of the presentations because he had previously identified this point as when he would be able to "actually see if they've been able to incorporate all the steps and stairs...[and] build [the difficult aspects] into the answer" (Scott, I-4). The only challenge in this first phase had been with some non-participating students, or, as Scott referred to them, "passengers in the boat" (Scott, I-5). Scott indicated that later discussions in the work-in-progress meetings and having teams revisit their team agreement had mostly addressed this issue. To further address it in the future, he said he was considering adding specific questions about teamwork into the unit evaluation and a peer-evaluation element to gain more insight into how teams had worked together.

The implementation of the final phases of the design did not go as smoothly as the earlier phase. Despite his efforts to clarify the activities, Scott reported that some students were confused as to the purpose behind the final-assessment simulation. Scott attributed some of the confusion to the fact that students did not really apply what they had learned in the previous units to these problems:

> [The students thought] 'that was 13 weeks ago...let's not go back in time and think about what we did before; let's just concentrate on what we're doing here'. (Scott, I-6)

With this in mind, Scott said in future offerings he would review the process for the students and make "them sort of grind through that to get that understanding" (Scott, I-6).

Overall, the unit ran as planned. The only change to the design that Scott reported was the addition of a template of the buying plan for students to use (the dark grey support circle on the right side of Figure 4.6). He said he added this to clarify the task for students who were confused.

Scott did not report making any major changes to the site during the semester. He said he used the site mainly to communicate with students "in broad brush", to distribute resources and for some administrative tasks like group sign-up. Students also posted their work for the first assessment, though Scott said he did not feel the students had looked at each other's work:

> The idea was for them to actually go back and have a look at each other's, but I don't know that too many of them did that. In fact, I had a couple of them say to me they rarely logged on for the simple reason that they didn't have internet access or they were out of credits – you know, half a dozen different reasons why they couldn't make it, which amazes me. (Scott, I-6)

Some teams had project sites, but Scott reported that, as in the past, they were not heavily used. Scott felt that many students used other communication technologies such as personal email accounts and face-to-face meetings to communicate.

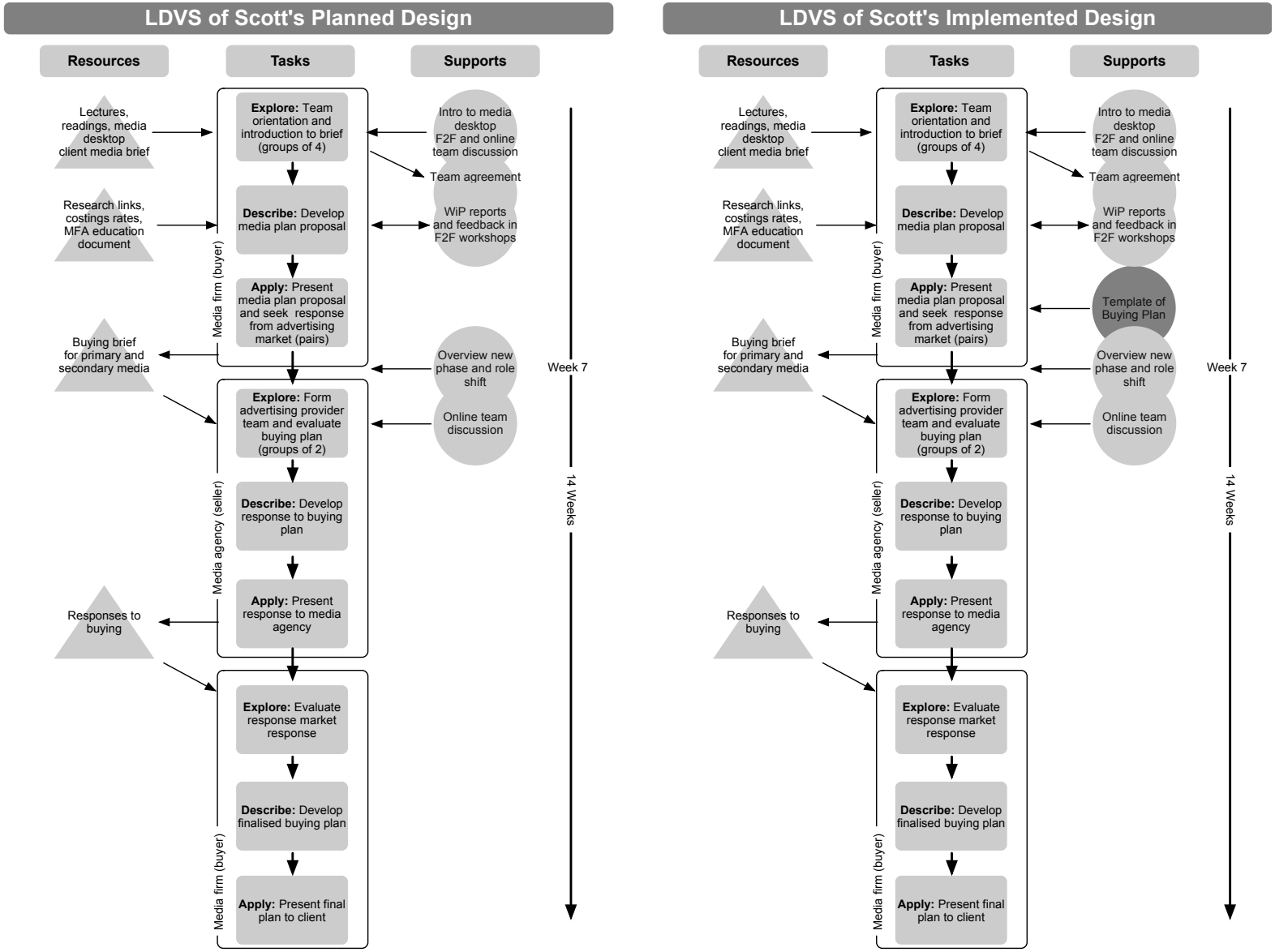


Figure 4.6: The LDVSes of Scott's planned and implemented designs

4.3.4 Reflection

4.3.4.1 The design and the Learning Design

After teaching had ended, Scott reviewed the entire design and implementation experience. Scott said that when designing, he had two things in his mind:

> First to make sure that I could deliver an interesting brief...which would bring out the stages and the steps under the requirement of the objectives for the [unit], and the second part of it also was to endeavour to marry the outcomes...to the learning objectives and deliver the content required in the sequence required by the accreditation process. (Scott, I-6)

Scott reported that he had taught the unit as designed with only minor additions to supports, and that his vision for the unit had been achieved. He had received feedback from only five students, but those students felt the assessments and tasks had aided their learning. The only negative remark had been that, for some, the final task had been confusing.

At the beginning of the study, Scott expressed a hope that the Learning Design would provide him with an expanded knowledge of how to apply problem-based learning. Scott's initial reading and selection of a Learning Design therefore focused on those that were problem-based. When asked about the strengths of the design he had created, Scott talked about the effectiveness of the scaffolds and problem-based learning approach for taking students through the steps of a real-world problem. He said the effectiveness of the design was evidenced by the work produced by the students, which had impressed those to whom Scott had shown it, including from the professional body and industry and his head of school. Scott felt that exposure to the Learning Designs had been informative, and that he would go back to the site again for ideas. He would also recommend using a Learning Design to a colleague looking for direction because "it can give you the steps and considerations that you would take into account" (Scott, I-6). When asked if he thought the Learning Design had affected the way he used the LMS site, Scott said, "It could have done. I had not really thought about it from that point of view" (Scott, I-6).

4.3.4.2 Plans for the design

Scott planned to add more scaffolds and assessable milestones to ensure that students moved through the steps week by week. He had first brought up the idea of adding milestones during the implementation, and said this idea had come from looking through the Learning Designs and resources on the site. While at times he said he felt the advice was often common sense, a statement about the importance of assessment in one of the Learning Designs had "just sort of triggered that point. I had it in the back of my mind but it came to the fore" (Scott, I-5).

For the next offering, Scott said that the final stage of the design was the area he wanted to focus on clarifying, as some students had struggled with the 'role shift'. Talking about this task and the unit as a whole, Scott said, "We got some good learning out of it and they got some good interest out of it, and I also got some areas to improve the [unit]" (Scott, I-6). He said that he was considering increasing the ratio of workshop time to lecture time for the final assignment and adding in a review of the process they needed to go through for the final problem. In the LMS site, Scott wanted to find ways to encourage students to use the site more. For example, he said he might add regular activities in the wiki that would keep students more involved.

4.3.5 Summary

Scott was an experienced university teacher and practitioner in the field of communications. His previous design work had been guided by considerations of the program's pedagogical approach (problem-based learning), industry requirements (e.g., content to be covered), students' workplace needs, and unit-specific learning goals. The unit that Scott designed was a new unit that had been requested by the industry. It covered areas Scott had taught previously as well as a new area. At the beginning of the study, Scott expressed a hope that the Learning Designs would provide him with an expanded knowledge of how to apply problem-based learning.

Initially, when selecting a design, Scott had concentrated on the pedagogical foci in the Learning Design site, with particular focus on problem-based learning, and key terms in the titles. When looking deeper, he focused on the tasks, outcomes, assessments, and pedagogy sections. Scott had difficulty choosing just one design and spoke of more

than one Learning Design during his work on the unit. However, the key Learning Designs he focused on were *Problem Based Learning in Medicine* and *Teaching and Learning in Multimedia*, which he said aligned with things he was trying to do with his students.

Scott's process was guided by industry requirements and a goal to make the students "work-ready." At each stage, he used questions to work through how he was going to achieve the objectives and create broad steps, and then to make more-detailed plans for each of the assessments. He mainly used the Learning Designs for inspiration and to think through the steps of how he would achieve his goal to get students to go through a problem-based learning process as both buyers and sellers of media.

Scott taught the subject as written with only minor additions to supports. The first problem-based learning sequence went well; however, the second and third sequences, which involved students switching roles, were confusing for some students. In the future, he planned to add more scaffolds and milestones, particularly to the final assignment. Scott indicated that the Learning Designs had been informative and that he would recommend using one to a colleague as they outlined the "steps and considerations" within the design.

4.4 Joanne

4.4.1 Background

At the time of the study, Joanne was a senior lecturer at a regional Australian university. She had seven years of university teaching experience and had recently returned to lecturing after an 18-month break. She identified herself as an experienced user of technology who had been involved in early institutional trials and implementations of new technologies. However, these trials, which often resulted in non-adoption of the new technology and significant time investments for Joanne, had made her wary of investing too much energy into new technologies:

> I guess I've been one of the early adopters especially as [the university's] rolled out different technologies.... They haven't implemented a lot of our e-learning technologies very well...and they've lost systems...and that's made me less inclined to use it. (Joanne, I-1)

She chose to apply a Learning Design to a new social informatics unit that was part of a recently redesigned major.

4.4.1.1 Previous design work and context

Previous design work on the unit had been done at the program level, during the restructuring of the new major. Prior to her 18-month break, Joanne had led a working group that had mapped out all the units in the major. She said the working group's process involved, "lots of scribbling on whiteboards…[and] quite a lot of give and take" (Joanne, I-1). The overarching goal of this process had been to create a set of units that worked together to build up students' skills and knowledge. For each unit, decisions about learning objectives, content topics, and assessment types were made. Additionally, topic-based resources were organised into a repository for reference during later design work on the units.

Decisions about content and assessments were guided by student needs, necessary workplace skills, professional body requirements and university rules. For example, professional-body requirements impacted on content and/or issues covered in the units:

> We're accredited by the Australian Computer Society and there is a requirement that we cover some of these issues...especially the ethics issues. That's always been a struggle for us – how do you work ethics into technology during courses where you're doing hard-core technology stuff? So this stream [of the major] has been to focus on that expectation. (Joanne, I-1)

Another example of a design consideration Joanne gave was of the impact of university assessment rules, which specified what proportion of group-based assessments could be set within a unit.

Joanne did not mention making any technology decisions during this initial planning of the unit, but spoke generally about her thinking when using technology. She emphasised that her previous experiences had taught her to be practical in this area. She said technology decisions involved a consideration of design workload, risk, student engagement, communication efficiency, affordances of tools, and infrastructure. Her usual practice was to upload unit content and set up class discussion boards for general questions and group discussion boards to facilitate group-work communication.

Joanne spoke of getting support from colleagues and university central services in her previous design work, and of her previous experience using an LDVS when designing. An educational designer had introduced her to the LDVS diagram as part of the process of redesigning a unit during a collaborative design project. In that project, they did not try to apply a previously documented Learning Design. Instead, the educational designer used the LDVS diagram conventions to map the work they were doing on the unit. Joanne described that process:

> [There] was a lot of diagramming, working out what we wanted and then as we designed each task it was always going back [to] 'well how does that fit in, what are...the [unit] objectives...and how did that task fit with that objective, which led to topics of supporting [tasks and], what assessments supported [an objective]?' So it was always double-checking, lots of arrows going everywhere, showing how it fits together. (Joanne, I-1)

The redesign project occurred over a year. During this process of working with the educational designer, Joanne said that they created some great online activities and materials; however, the time commitment and intensity of this design model made it unrealistic for her ongoing practice:

> It was so much work. It was twelve months of lead-up work to run the [unit] once. And it was fun but I don't think it's a sustainable way to develop work. (Joanne, I-1)

4.4.2 Pre-semester design work

4.4.2.1 Design plans

Joanne's early design goals and tasks for the unit focused on orienting herself with the design problem and content, then moving on to the design of elements. She planned to review the objectives and unit description as set out in the original planning documents:

> At the moment my [unit] outline is empty; it's just got the [unit] objectives and the [unit] description. Luckily, I found the bit of paper that actually has the [planned] lecture material, so my first step will be actually looking at those [and] seeing whether they're still relevant. (Joanne, I-1)

Another early design task was to review students' learning leading into her unit and ensure that necessary connections were made in the overall major. She said she had to

> [go] back to the [unit] that's just finished running to find out what actually happened in that one because...from what I saw [the lecturer of that unit has] taken it way off track.... So how do I bring [the focus] back...so the next subject that follows, actually follows [and] builds that block model. (Joanne, I-1)

Joanne said that the previously gathered repository of content needed to be filtered through and organised for her unit. She also needed to design lectures, tutorials and assessments and the LMS site. Her intended design focus for the tutorials was that she wanted them to be interactive and aimed towards the work that students would be doing. Her goal for the online component of the unit was to make the LMS site interactive rather than just a repository for content:

> If you're just going to use it for lecture notes, you may as well not use it because it's not doing anything...so I [am] looking at how I can still make it interactive.... Students aren't on campuses as much as they used to be, they're barely coming to lectures, so they need to be engaged somewhere, and online seems to be a useful way. (Joanne, I-1)

As mentioned previously, Joanne was cautious about using new technologies because of the time investment needed. However, she said that she was more willing to experiment with smaller student numbers such as the number she was expecting in this unit (about 20 to 40 students).

Joanne was familiar with the LDVS diagram, though she had not used a full Learning Design (i.e., the LDVS and supporting text) when designing a unit. Therefore, Joanne was still taken through the orientation to the Learning Design website and full Learning Design format during the background interview. After this orientation, Joanne said she hoped the Learning Design would help her to organise her thinking, as well as help her ensure that the objectives, assessments, and student needs were well aligned throughout the design process.

4.4.2.2 Learning Design selection and early design work

Before looking at the Learning Designs, Joanne oriented herself to her design problem. She began by first reviewing the original planning documents, which contained the learning objectives, unit description, and planned lecture topics. With this information in mind, she searched for a Learning Design to use. She said she looked for alignment

between her pedagogical approach, the resources that she had or could develop, and the Learning Design. Another major factor for Joanne was the time that she had available to design the unit. The Learning Design that Joanne chose was a balance of these considerations.

Joanne recounted that she first concentrated on the section of the site that included designs with a pedagogical focus that appealed to her. When looking at a specific Learning Design, Joanne said that she read the summaries and LDVSes as her first step. She said she got "a better snapshot of how [the design] interlinked throughout the course using the diagram rather than the text-based descriptions" (Joanne, I-2). She mentioned that she particularly focused on the resources, and to a lesser extent the supports, shown in the diagram. These acted as a checklist to determine how each Learning Design fit her design needs and constraints:

> [Using the resources and supports I could] almost tick off in my head...I will be providing case materials, I will be providing discussion summaries, they will be getting documentation that they need to analyse and the supports are also things that I have used before but not in such a structured way. (Joanne, I-2)

Using this checklist method, she said that she created a shortlist of Learning Designs to consider in more detail.

During this process, she spoke of having three or four Learning Designs open on her computer and flipping back and forth between them to see which one might work the best for her purposes:

> I actually had types of assessment that I needed to include. So because I had that constraint, when I started looking through the different Learning Designs...I was looking initially at problem based learning and role play but as I looked at those…[I thought] this [unit] – it's just not going to suit [that focus], in this first instance and certainly not under the time constraint I've got to get it done. So I started looking a little more sideways and thought collaborative was my next stop. Thinking...we want to encourage group work in this [unit] where they're building materials together. But none of those really suited when I looked at the [LDVS]. (Joanne, I-2)

This description of her thinking further highlights the factors that came into play when she tried to find a design and compare the pedagogical models.

After her initial focus on role-play, problem-based learning, and collaborative Learning Designs, Joanne looked at the case-study Learning Designs and chose *Real Life Cases in Multimedia* (Figure 4.7), a Learning Design originally from the education field. She

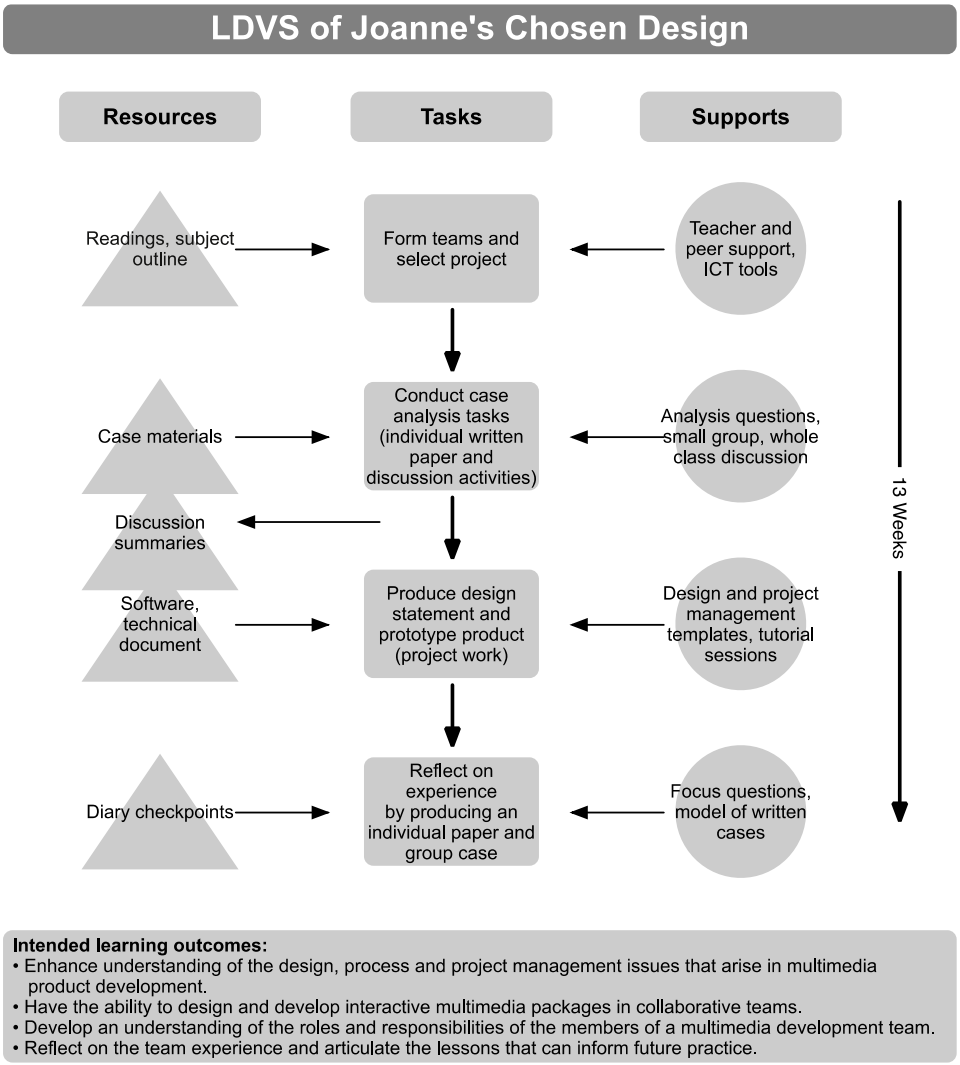


Figure 4.7: The LDVS of Joanne's chosen design: *Real Life Cases in Multimedia* (Bennett, 2002)

said she had been drawn to this Learning Design because it aligned with her thinking and resulted in the students having to produce a product:

> What I want them to do in this [unit] is get in touch with a lot of up-to-date sort of news-based things that are happening at present. So the resources for the [unit] will be newspapers, trade magazines, and journals....I started thinking, 'Well, that's more like a case-study approach'...and then I read the descriptor of project case-study focus, which said...the emphasis of this Learning Design is to create a product or artefact'. And the end result in [my unit] is that they actually write their own procedure for dealing with a certain aspect of IT in the workplace; that ...fit pretty well. (Joanne, I-2)

In a later interview, Joanne reflected that, while the process was not straightforward, she had no difficulty finding a Learning Design to apply to her unit, and that the selection of a Learning Design made her think through a variety of possibilities as starting points for the unit's design.

4.4.2.3 Design work

Early work

During her early design work, Joanne sought feedback from her unit assessor to confirm that her design vision was in line with her school's wishes. She indicated that the school wanted the unit and other units in the rewritten stream to start out simply saying, "our school is wanting it to be a very – not generic – but very vanilla-flavoured approach to some of these issues" (Joanne, I-2). Her choice of a Learning Design had aligned with much of what she had already planned – for example, the use of primary resources and development of a product – and therefore was in line with her goals of keeping the unit "fairly moderate".

The selection of a Learning Design was closely followed by the deadline for Joanne to submit the unit outline. For this Joanne needed to create the lecture schedule, which she focused around the module format she had planned to implement, and map out the assessments. To give herself more time to work with the Learning Design and further conceptualise the assessments, she intentionally provided only basic assessment information (e.g., assessment type, weighting, and due date) within the unit outline. Her plan was to provide students with the full description of the assessments, which was

required by university policy, in the first week of class and point students to the unit's LMS site as the source of updates and further information.

Describing herself as a "paper and pen planner", Joanne said her starting point was a blank piece of paper with weeks 1 to 13 written on it. Laying out the weeks and topics allowed her to look at the unit at a macro level, making notes on what had to be covered and determining linked resources. She described her process:

> So it's just been a lot of doodling and writing documents – not very scientific at all.... Rather than just looking at one topic, I'm looking at the three weeks of the topic, going, 'Oh, here's a resource. Which one does that fit into better?.... What would go [with a] lecture, what would go [with a] tutorial, what are the readings, what activities can [be attached] to those, how does that all relate to the assessment? (Joanne, I-3)

She said that most of the reading was to be sourced by students from trade journals, the news, and research journals. Her focus was therefore on compiling a list of examples and pointers to key resources to get the students on track.

As Joanne worked, she said she kept the Learning Design beside her and used it as a "touch point [for] when I started getting confused and lost in what I was doing" (Joanne, I-3). Looking at the diagram, in particular the resource triangles, helped her to refocus her thinking and decide what she might have to do next:

> It was good having the Learning Design sitting beside me because it reminded me of what I was planning on doing and just going back [and] being reminded about the case materials. That helped me as I was filtering through all the resources that I could use for the [unit]. (Joanne, I-3)

In this way, she used the Learning Design as a checklist to keep her focused and ensure she was providing the resources needed for specific aspects of the design. Joanne reported that the process of selecting and thinking about the application of a Learning Design also had her considering the long-term direction she wanted to take with the unit. Specifically, she was very interested in including a role-play or problem-based Learning Design.

Later work

After the submission of the unit outline, Joanne's design work focused on drafting the first six weeks of the unit. One challenge during this period was the discovery that a second cohort of students would be coming into the unit from the previous major. Joanne said that she had to spend some time thinking about how to connect the unit for those students as well. Joanne continued to use the Learning Design during this phase of her design work. She noted that she considered it reaffirming to find that a lot of what was described in the Learning Design were things that she did intuitively, but that she didn't think using a Learning Design would suit someone who was inexperienced in designing units:

> I guess if you're not confident in your ability to design [units] or look at flows of materials, then these could be seen as quite restrictive. Or people haven't got the nous to see that this particular process doesn't work exactly but [you] need to juggle things around. It's that diagram…it's nice to see the formalised version of it and how somebody with an education perspective actually manages to develop a [unit] and not chase themselves around in circles. (Joanne, I-3)

Joanne said she felt that she had "played it safe" with the design of this unit because this was its first implementation. She saw the unit design as a long-term process that would evolve over numerous iterations, and she hoped to incorporate a problem-based learning scenario in the future. One of the reasons for this staged approach was the lack of time to fully create what she wanted. She commented that she had found it reassuring that the unit described in the Learning Design "had been built up over several semesters" (Joanne, I-3). This aligned with her plans to work towards building in more interaction and activity types, and had her consciously thinking about building unit evaluation into the process:

> It's not going to happen first cycle round, and I'm actually looking forward to seeing this run one time round. That's what I did take out of this.... The comment from the project team that put the reminder in saying, 'Keep in mind that this has been developed over a long time and it is a complex one'. And the more I read that, the more I went, 'You're not going to do all this in one semester, so get the structures there, see how they look'. But the other good reminder out of this was…it has been evaluated each time it's run and I guess that's not something I've ever gone in thinking to do. It has happened out of random circumstances and it's

> worked well, but this time I would like to go in and go, 'Okay, let's review it'. (Joanne, I-3)

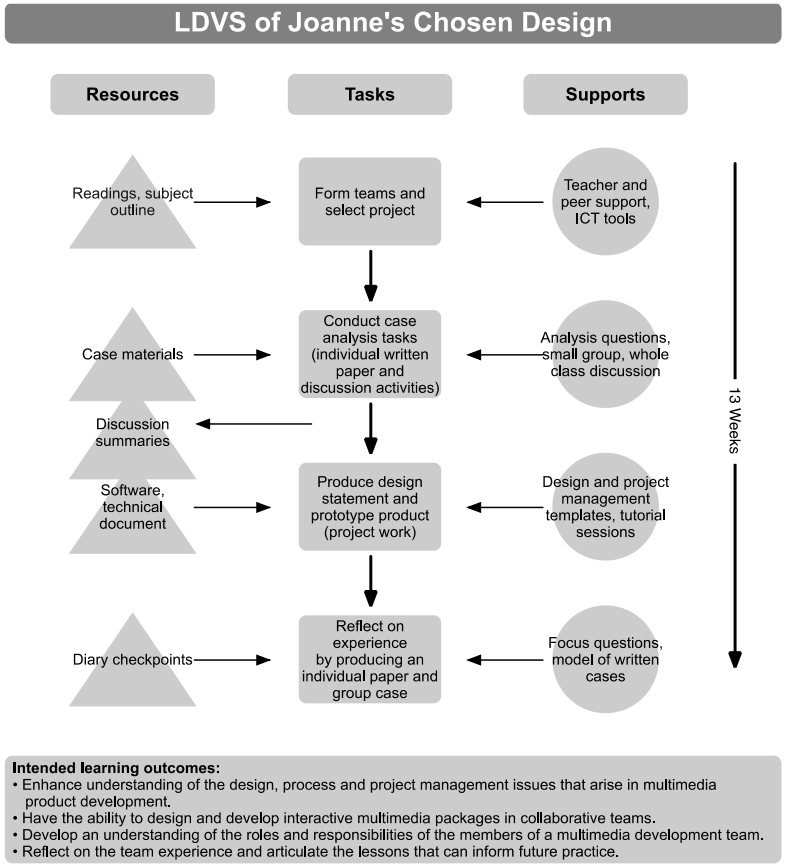
Joanne's work setting up the LMS site began shortly before teaching commenced. During this time, she had culled unnecessary items from the university-provided template, and set up the discussion space to support the reflective journal and the discussion space for the first three-week module. Joanne said she would most likely be putting up the assessments and criteria along with the lecture notes, tutorial information readings, and announcements as the semester went along rather than all at once. Despite her being an experienced user of technology, she said that for this offering she was focusing on setting up the framework for the LMS site and building on it in future offerings. Her reasons for this were multifaceted and included time pressures, the unknown aspects of a new unit, and a concern about using the LMS after her recent break from teaching.

4.4.3 Pre-semester planned design

The LDVS diagrams of Joanne's chosen Learning Design, *Real Life Cases in Multimedia,* and Joanne's planned design prior to teaching are shown in Figure 4.8. Comparing these two figures shows that Joanne incorporated much of the original Learning Design's macro structure, resource types, and supports. The LDVS of *Real Life Cases in Multimedia* Learning Design (shown on the right side of the figure) shows four main tasks conducted over a 13-week semester: form teams and select the project; conduct case-analysis tasks; produce design statements and prototype the product; and reflect on the experience.

When discussing how she had adapted the original design for her unit, Joanne noted that there were two main differences. First, she had delayed the formation of teams until after the students had individually conducted the initial case analysis and written a critical argument paper. She explained that during this early individually focused phase she would be

> learning more about [the students] and how they're working. They get a chance to show me what they're capable of and then we fall into the group work once they've established a bit more rapport with each other. (Joanne, I-3)



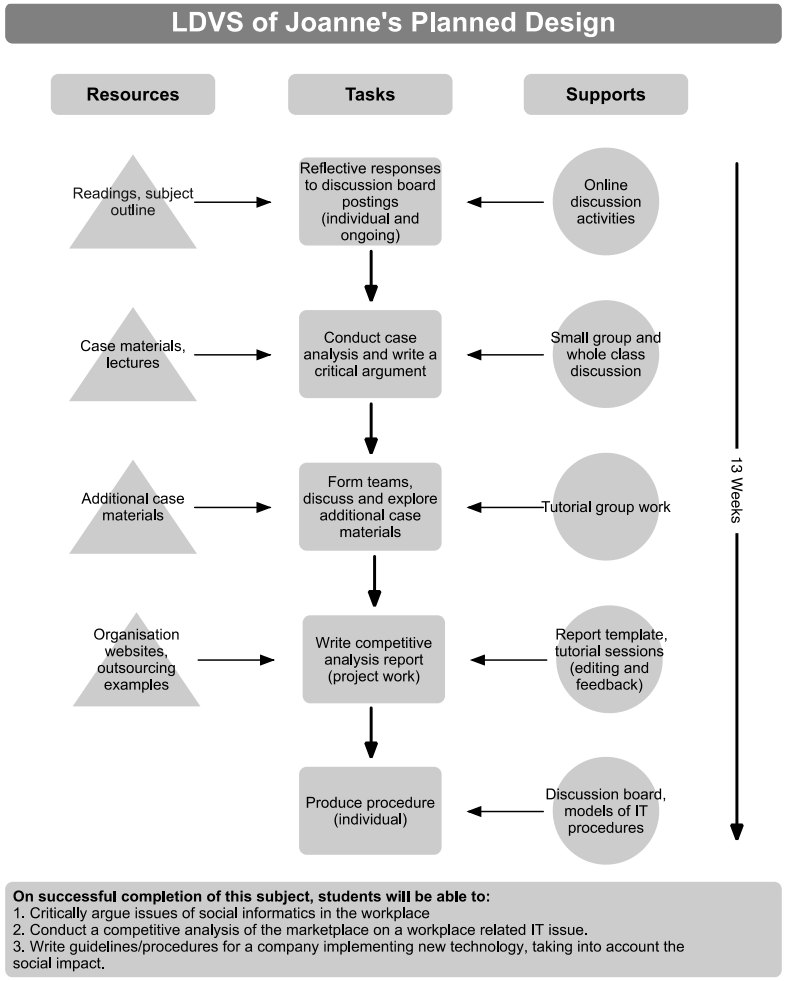


Figure 4.8: LDVS of Joanne's chosen design, *Real Life Cases in Multimedia* (Bennett, 2002), and planned design

Second, she had changed the final reflective task to an ongoing discussion-board activity with a reflective component. She said that each week she said she wanted the students to respond to the weekly topics on the discussion board and then reflect on what they had learned through that activity in a journal entry that they would submit for assessment. This reflective journal was similar to the journal entries in the Learning Design. She hoped the assessed reflective journal would get students to engage in the discussion and give her a better way of marking online discussions:

> I don't know how you're meant to mark an online discussion other than looking at the number of posts...which is why when I discovered that journal, I went 'Aha, maybe that's the better [way]'. Because I'd like [the students] not only to discuss the key topical issues that they came across over the course of the semester but the self-reflective part – how did they engage with the discussion? (Joanne, I-3)

Joanne reiterated that her design for this offering was a pared-back version of her long-term vision, and before implementation she reflected on some of the limitations of what she was going to be able to do this semester:

> I'm not going to be able to do as much back-up material for the cases as I would have liked and they're probably going to be put up in a quick and dirty fashion on the e-learning space. Ideally, I'd like to have that in a more structured format where students are actually working through it.... At the moment, I sort of fling it at them, see what happens, talk about it in [tutorials] and then put it back to the online discussion. (Joanne, I-3)

Joanne remarked that the Learning Design's impact on the unit's LMS site had been limited for this offering, but it had impacted on her long-term plans: "It's given me lots of ideas for how I'd like to do it next year" (Joanne, I-3). She said she had a number of ideas including more interactivity, richer case materials, and richer visuals to support the unit. Despite her suggestion of limited technological impact, she did provide her students with online resources, supports, and activities similar to those in the Learning Design. The biggest change was in the focus of how she used the discussion-board tool. In the original design this tool was used as a team project communication tool and a distribution and summary-sharing tool for the teams' project work; however, Joanne's use of the tool was primarily for individuals to further discuss weekly topics and related resources at a class-wide level.

4.4.4 Implementation and further design

Joanne had specifically approached the unit's design with what she termed moderate goals for this offering, belaying many of her more time-intensive goals for future offerings. However, achieving even these moderate design goals was a challenge during implementation. With the onset of teaching, she still had many design tasks left to complete, including the design of the remaining lectures and tutorials, details of the assessments, and further aspects of the LMS site. She described feeling constantly under pressure to get everything done: "It's a bit of a fly-by-the-seat of my pants kind of [unit] where I'm only writing the materials Sunday night, delivering it Monday morning" (Joanne, I-5). She said that she had underestimated the time it took to complete all of the preparation and administration for teaching, and as the unit was being taught she began to feel that she had not spent enough time preparing the case materials prior to implementation.

In addition to time pressures, Joanne's design of upcoming tasks, lectures, and tutorials during teaching was influenced by the student cohort and how the unit was being received. Two major impacts were the size of the student cohort and the language abilities of the international students. First, the student cohort had increased threefold: from about 40 students from a single major to 120 students from mixed majors. Second, the language abilities of many of the international students were much lower than expected and created communication difficulties that necessitated some adjustments both to planned activities and the approach to lectures and tutorials.

Joanne said the online reflective journal activity was impacted most by these challenges. She had designed this activity originally with 40 students in mind, and with the increase in student numbers she had not initially made any changes to how it was run online. While many students enjoyed the activity, others were overwhelmed by the high number of posts (over 1,300 by the end of the activity), and communication difficulties contributed to further misunderstandings of the scope of the task:

> My instructions aren't being received very clearly so there's a lot of confusion around [the discussion-board task] and what's expected of them. The international students particularly are having a hard time with it so I've explained

> it I don't know how many hundred times now, and I can't make it any clearer than I have. (Joanne, I-4).

She said the issues remained unresolved over the semester, and eventually she decided to end the activity two weeks early to reduce the stress it was creating for both her and the students.

With the exception of the change to the duration of the discussion-board activity, Joanne's design ran as planned (Figure 4.9). Throughout the semester, Joanne said she spoke to colleagues and her head of school about how the unit was going and the issues she was facing. She reported that she had also relied on the technical-support person in her faculty to assist her with the set-up and upkeep of the LMS site more than she had in the past. She indicated that this was largely due to time pressures during design and implementation.

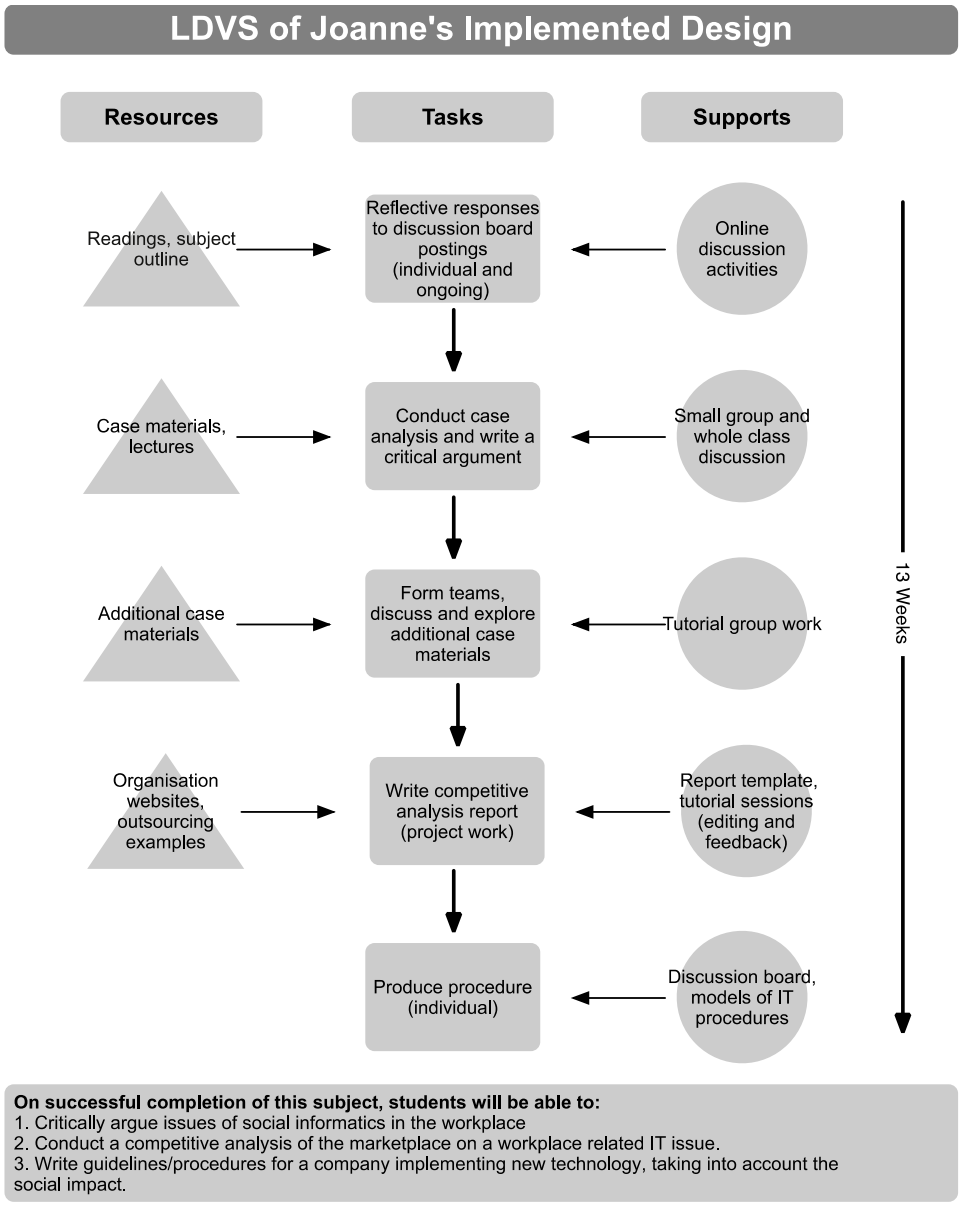


Figure 4.9 LDVS of Joanne's implemented design

4.4.5 Reflection

4.4.5.1 The design and the Learning Design

After completing her teaching, Joanne said she felt the final design had communicated the content of the unit and that students had really enjoyed the interactive lecture sessions and the competitive analysis task. She identified her 18-month break from teaching, the mixed cohort of students, the lack of independent learning skills amongst most of her students, and the time needed for teaching and administrative tasks as challenges to the implementation of the unit. She had not invested as much time as

usual in the LMS site. Near the end of the semester she reflected on her use of technology in the unit:

> The technology's been pretty basic…In our current format I still can't see how I could have done it any differently, without investing a semester's worth of effort preparing it...I think for a first time [unit]...it's been good having it simple. (Joanne, I-6)

Joanne said that access to the Learning Designs, the process of looking for a Learning Design that was suitable, and adapting one to the unit had a strong impact on her during the design phase. First, she reported that the selection of a Learning Design had made her think through a variety of possibilities for the unit's design:

> Part of it was looking at the design strategies that you gave me access to.... I remember looking back at those, and trying to work out how what I was doing would fit into one of those sorts of models, and I remember thinking none of them…was a 100% fit with what I did. It was more a juggle of – 'let's try it this way' – knowing it's a first time run [unit]...I knew at the start of the semester that there would probably be a significant amount of rework in this [unit]. (Joanne, Interview 7 (I-7))

Adapting a Learning Design had a strong impact on her design work, encouraging her to consider her design more carefully and helping her to enjoy the process:

> It has actually gotten me to think about things, rather than just being a bull at the gate...and it just reminded me that I do enjoy the learning-design part, and I don't think we put enough effort into that in our school in general.... It's always looking for the quick fix, and that certainly doesn't serve students. (Joanne, I-7)

She also commented that it was when she forgot about the Learning Design "and just tried to change things at random, it really hasn't worked". By this she may have been referring to problems she had with the discussion-board activity. Finally, she indicated that the Learning Design had helped to benchmark her own design knowledge, and had encouraged her because much of what was described in the Learning Design aligned with what she did intuitively. Based on her experience, Joanne said she would recommend the use of a Learning Design to a colleague, but also said she would advise them to remember to take an incremental approach rather than trying to do too much at once.

4.4.5.2 Plans for the design

In future offerings, Joanne planned to rework two of the four assessment tasks. In particular, she felt that the discussion-board activity needed to be designed so that the number of messages was manageable for students: "there were too many messages, there was too much to try and comprehend, the group was too large" (Joanne, I-7). For this activity, her plan was to break the class down into smaller discussion groups. For the unit, she wanted to make greater use of technology over time, building in more interaction, more online activities, richer case materials, and richer visuals to support the unit. She also said that she still wanted to try incorporating other Learning Designs such as problem-based learning and/or role-play activities. Joanne had discussed these ideas with students of this offering and their feedback had been positive about the future changes.

4.4.6 Summary

Joanne was an experienced university teacher and user of technology in her teaching. The subject she was designing was a new unit in a newly redesigned major; the work that had previously been done on the unit had been done during that process. Joanne's goals for the unit were broadly to ensure high levels of interaction both face-to-face and online. However, she was concerned with the short timelines she had for designing.

Her goal for the Learning Design was that it would help to organise her thinking and align elements such as content and assessments within her design. With her unit's learning objectives in mind she approached the Learning Designs looking for alignment between her pedagogical approach, resources, assessments, and the Learning Designs she read. Time available to achieve the design for the upcoming semester was also a factor. When searching through the designs, Joanne started with the summaries, then used the LDVSes to compare designs, in particular the resources needed for each.

The Learning Design was a key influence for Joanne both in her ideas and as a guide for her steps when designing the unit prior to teaching. The process she spoke of was not linear, but was anchored by her use of the Learning Design, which she said she used as a checklist for resources and to remind her of what she should be focusing on when she got off-task. Joanne started her design work with the macro design of her unit, first

focusing on the unit outline and then the detail of the weekly activities (with earlier weeks receiving more attention). Her planned design aligned quite closely to that of the Learning Design. The two main changes were the addition of an introductory phase and the discussion-board activity, which fed into the journal activity.

Joanne had many design tasks left to do throughout the semester, in particular the development of resources and completion of assessment tasks. Challenges included issues with the size of the cohort, which had increased threefold from the expected number and communication difficulties with international students. In response to student difficulties with the discussion-board task, she had reduced its duration and in future offerings planned to rework this activity.

The students had enjoyed the unit. She said her design had been necessarily minimal for this offering and she had spent less time than usual on technology; however, given that it was a new unit she was happy with what she had achieved. Her longer-term plan for the unit design included the incorporation of other Learning Design activities. When reflecting on the impact of the Learning Design, she had indicated that it had helped her consider options, focus her thinking, and benchmark her practice.

4.5 Daniel

4.5.1 Background

Daniel was a lecturer in biochemistry at a regional Australian university. He had tutored for one year and lectured for two-and-a-half years, and was fairly new to teaching with technology. Daniel said he had begun using the university's LMS in the second semester of the previous year. He said that his teaching approach was not based on "any founded theoretical basis" (I-1) but had been influenced by *How People Learn,* a book about practice-based learning (Pellegrino, Bransford, & Donovan, 1999). The unit to which Daniel planned to apply a Learning Design was a compulsory second-year undergraduate unit that Daniel had begun teaching the previous year. The unit focused on teaching nutrition and dietetics students the biochemistry of metabolism and disease. In the previous year, Daniel reported that there had been approximately 20 students; however, in the coming offering he expected a slightly larger cohort. This case describes Daniel's second design and implementation of the unit.

4.5.1.1 Previous design work and context

Daniel explained that when he had taken over the unit the previous year, the teaching area had been new to him. He said the main design requirement was to meet the objectives that had been set for the unit. While he had the freedom to teach to those objectives as he wished, he had to keep the program needs in mind as well: "The whole [program] fits together like a jigsaw; I just can't take something out of [my unit]...and say 'I don't do that anymore'" (Daniel, I-1). When designing, Daniel said he got support from the *How People Learn* book and had three faculty support people available to him: one who helped with pedagogical design, another with administrative responsibilities (e.g., correct format of the unit outline, unit registration), and a third with technology issues such as video lectures.

Daniel began his design work on the unit by reviewing what had been done by the previous lecturer: "I took the existing slides [and], tried to make sense of them myself, and where I thought they didn't make sense I added things" (Daniel, I-1). He said that he had chosen to leave the assessment the way it was but had added "lots of content that I thought [was] lacking – basically [to lead] the students from one concept to another one" (Daniel, I-1). He set up the LMS to distribute materials and information to students. Since attendance at lectures was not mandatory, throughout the semester he posted lecture podcasts and accompanying slides to give students the option to come in or download it. Despite these other uses of the LMS, he said he chose not to have any activities online because he was "a strong believer that face-to-face is best teaching practice" (Daniel, I-1). Therefore, distance students taking the unit had to travel and attend compulsory face-to-face practicals.

4.5.2 Pre-semester design work

4.5.2.1 Design plans

In the first interview, which was 16 weeks before the start of teaching, Daniel spoke of a number of design tasks and goals that he wanted to accomplish for this unit once Semester 1 had finished. Daniel said his first job would be to work on the unit outline, and then make changes to the practical labs and lectures. However, as with the previous

offering, he did not plan to design any online activities for students at this point. Daniel had not used a Learning Design before and said, "I'm just sort of more or less shooting from the hip" (Daniel, I-1). He indicated that he was interested in being provided with articles or other things that might be helpful for his teaching, and said that he wanted the Learning Designs "to positively influence what I'm about to do...[and] to help me make this subject delivery better" (Daniel, I-1).

For the practical labs, Daniel said he wanted to make adjustments and add in more labs if possible. To support his work, Daniel had contacted a practicing dietician with the plan to co-design some practice-based scenarios for the unit. Daniel wanted to do this because he had observed that students were not making all of the key connections between the lecture content and the activities they were doing in the practicals. One specific example he talked about was the role of the liver and blood-sugar regulation:

> The liver does all the sugar regulation for the whole body, and we'd had lectures on this, and then we had the prac where they measure their blood glucose.... Then I asked, 'Where did the sugar go?' and nobody really knew it; they hadn't really put together that the sugar in their blood was being regulated by the liver.... So it's easy [for students] to miss those fundamental things. I just want to give them some more exercise in that area just to hammer those key concepts home. (Daniel, I-1)

Daniel's goal for the lectures was to move away from the traditional lecturer-at-the-front model. His plan was to upload slides with commentary and have students review these before the lecture. He said he hoped this would then free up time to have "tutorial-type face-to-face discussions during the lecture periods" (Daniel, I-1). He also said he wanted to be able to improve the uploaded lecture materials by using specialised software to capture the lecture audio and align it with the slides.

4.5.2.2 Learning Design selection

The Learning Design Daniel selected was *problem-based learning in Medicine*. This Learning Design came from the Public Health and Medicine discipline grouping and had been targeted at graduate-level students. The aim of his chosen design (Figure 4.10) was to take students through a problem-based clinical reasoning process, in which

students had to identify, hypothesise, investigate, diagnose, and summarise a medical problem.

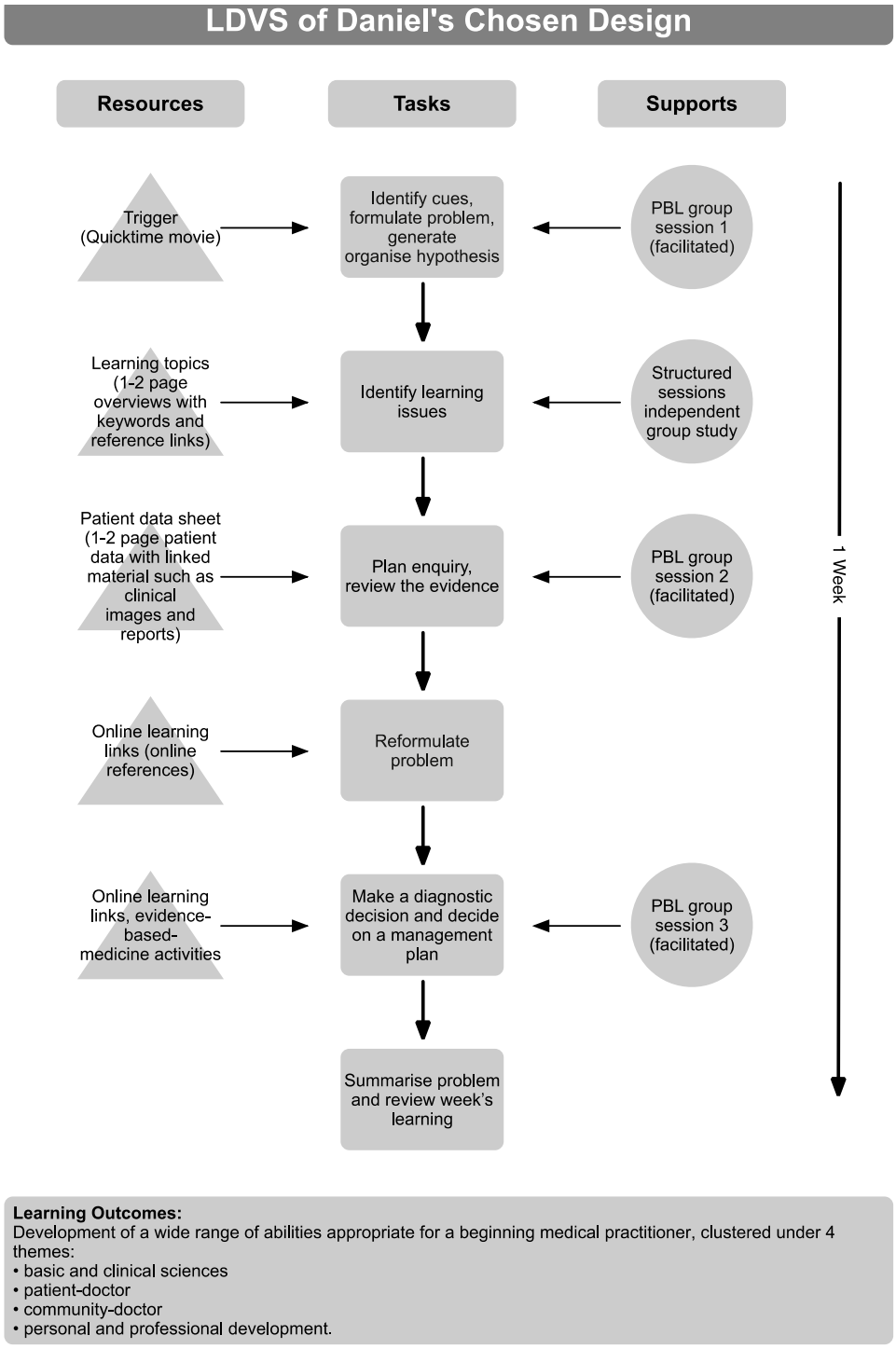


Figure 4.10: LDVS of Daniel's chosen design, *Problem Based Learning in Medicine* (Ryan, 2002)

When initially introduced to the Learning Designs in the first interview, Daniel had been interested in the *Problem Based Learning in Medicine* design because it was

applying problem-based learning in a related discipline. Responding to the LDVS, he said the design was "similar to what we wanted to do in the practicals" (Daniel, I-1); however, because his unit was not fully problem-based learning, applying it would require some adjustments to the time frame and structure. He said when he later returned to the Learning Design website and searched, he concentrated on the problem-based learning focus. He said he used the titles of the Learning Designs to make his decision, and had not delved further into the detail of individual designs. He explained his selection process simply:

> Well, my process is that I want to do problem-based learning – that's what I want to introduce into the [unit]. It's a [unit] for nutrition and dietetics students and so the closest is medicine and that's how I came to the *Problem Based Learning in Medicine* [design]. (Daniel, I-2)

Daniel reported that he had not read through the Learning Design prior to the Learning Design selection interview. As a result, during the Learning Design selection interview, Daniel skimmed through his chosen Learning Design. While doing this he shared his thoughts and concerns. First, he said his impression was that the Learning Design was not detailed enough and needed to link to further reading or have a literature review: "It seems very superficial. I can't really imagine that somebody would sit down and design a unit based on what's on this web page here. Maybe it works" (Daniel, I-2). He said he wanted to "delve deeper into the theory and the concepts behind it" (Daniel, I-2), and that he preferred the book he had been referring to, which he described as "more detailed in every way" (Daniel, I-2). Second, Daniel said the website's medium and format added to his reluctance to use the Learning Design, as he said he would "never attempt to read an entire webpage as such because you never know what's hidden behind all of these links" (Daniel, I-2). Daniel felt that it would be extra work and time for him to look through it all, saying "I've more or less got fixed ideas of what I want to do and trying to align it with something here is more or less extra work. My time's limited" (Daniel, I-2). Finally, he indicated that certain sections, for example the project comments, contained information that was not relevant to him.

Despite Daniel's concerns, he indicated that he would still try working with the Learning Design. He said he would do this only because the change he wanted to make was not major. He said that he planned to apply the problem-based Learning Design to the practicals:

> [The Learning Design] will be just applied to the development of a few practical modules because I want to do something else for the whole [unit] design and it doesn't really fit with anything that's here. (Daniel, I-2)

He planned to have each of the practical modules to run over two weeks; however, at this point he had not done any design work using the Learning Design.

4.5.2.3 Design Work

Daniel was teaching Semester 1 classes and planning multiple units during the time leading up to Semester 2. Thirteen weeks before the start of semester, Daniel said that he had been writing the unit outlines and doing administrative work for other units and now needed to "knuckle down and get [the design of this unit] done" (Daniel, I-2). Six weeks before the start of semester, Daniel reported on the work he had done redesigning the practicals. He said that he had worked collaboratively on the design with Amanda, the practicing dietician, because this unit was not in his area of expertise. Daniel explained that Amanda had used her knowledge as a practitioner to help select a problem that was "typical", provide authentic resources, and design content. Daniel said his role was to help set the learning objectives, structure the problem-based learning scenario, and talk through the options and considerations with Amanda.

A key influence on their design work had been an observation of a problem-based learning session conducted by the veterinary school at their university. Daniel reported that both he and Amanda had found this very helpful:

> Just really practical things but they gave us their whole...40-page [facilitator's guide] on this. There's much more information in there than on [the Learning Design website], and then they actually talked with us about the concepts and how it's done and what it's like being a facilitator. (Daniel, I-3)

After they had observed the session, they reflected on what they had seen and what the facilitator had done, and discussed how that translated to what they were trying to develop. During this process, they used the veterinarian facilitator's guide as a model for what they were designing:

> The first thing that happened in the [other case] was the lady telephoned a clinic, and so the first thing that would happen [in our scenario] would be the dietician would get a letter from the doctor.... That's the sort of approach that we took –

> imagining that the students are a dietician and they're confronted with this lady. (Daniel, I-3)

The general plan for the problem-based learning practicals was done at this point but Daniel said they would continue working on them until they were delivered later in the semester.

Daniel's earlier impressions of the limited nature of the Learning Design and concerns with the level of detail contained within them had not changed. The result was that Daniel and Amanda had not referred to the Learning Design during the design process:

> We didn't really use [the Learning Designs].... What we've done more or less is similar to [the Learning Design] – in structure. The [Learning Design] shows you how to do problem-based Learning Designs...but as I said before, there's this book, *How People Learn* and we went and watched a [problem-based learning] session at the vet school here, which was really [about] the idea of a facilitator and how they disclose information at certain times.... I don't know that we would have got that as strongly from [the Learning Design]. (Daniel, I-3)

Though Daniel did not use the Learning Design, his case was followed for comparison with other participants.

Daniel did not detail the design plan before teaching, and said that he would be continuing to work on the activity until it ran in Week 9. However, the basic plan for the activity was in place. The students would first receive a letter from a doctor about a patient providing details about the patient's particular medical problem. The students would then identify the learning objectives and plan what steps they should take before the facilitator revealed the learning objectives and released the next bit of data. For this problem, that would be the information from a consultation with the patient and clinical data. Daniel said he was not planning to use online technologies to support the problem-based learning activities:

> [Students will] get given these disclosures but we're not going to put them on [the LMS], which is common at [this university] because otherwise they'd all have to go on at once. We want to do it inside the practical period...so they'll get bits of paper. I suppose we could put them up later but it's not going to be an online phenomenon. (Daniel, I-3)

While he had not based his design on the Learning Design that he had chosen, Daniel said that there were similarities between them: "I looked at [the *Problem-Based Learning in Medicine* Learning Design] and our design is actually quite similar...in principle, it's the same but our set-up was a little different" (Daniel, I-3).

4.5.3 Implementation and further design

The unit was taught in Semester 2, with the problem-based learning practical being implemented in Week 9 of the semester. There were 17 students, five of whom were taking the unit in distance mode. Daniel reported that throughout the weeks leading up to the implementation of the activity, he had continued to work with Amanda on the design of the new practical. They were still "fine-tuning...collating the data and formatting it all for the students" (Daniel, I-5). While Daniel said the overall plan for the face-to-face students had basically remained unchanged, the five distance students were not all able to attend the practicals, and this necessitated a major change to the delivery of the practical for them.

Daniel said it was necessary to make provisions for these students to do the practical online rather than face-to-face. This resulted in the activity being offered in two modes. Daniel reported on both versions; the LDVSes for both designs appear in Figure 4.11. However, in Daniel's words, the problem-based learning practical was "designed for face-to-face delivery and was offered distance through desperation" (Daniel, I-6). As a result, he had not spent as much time working on the online version.

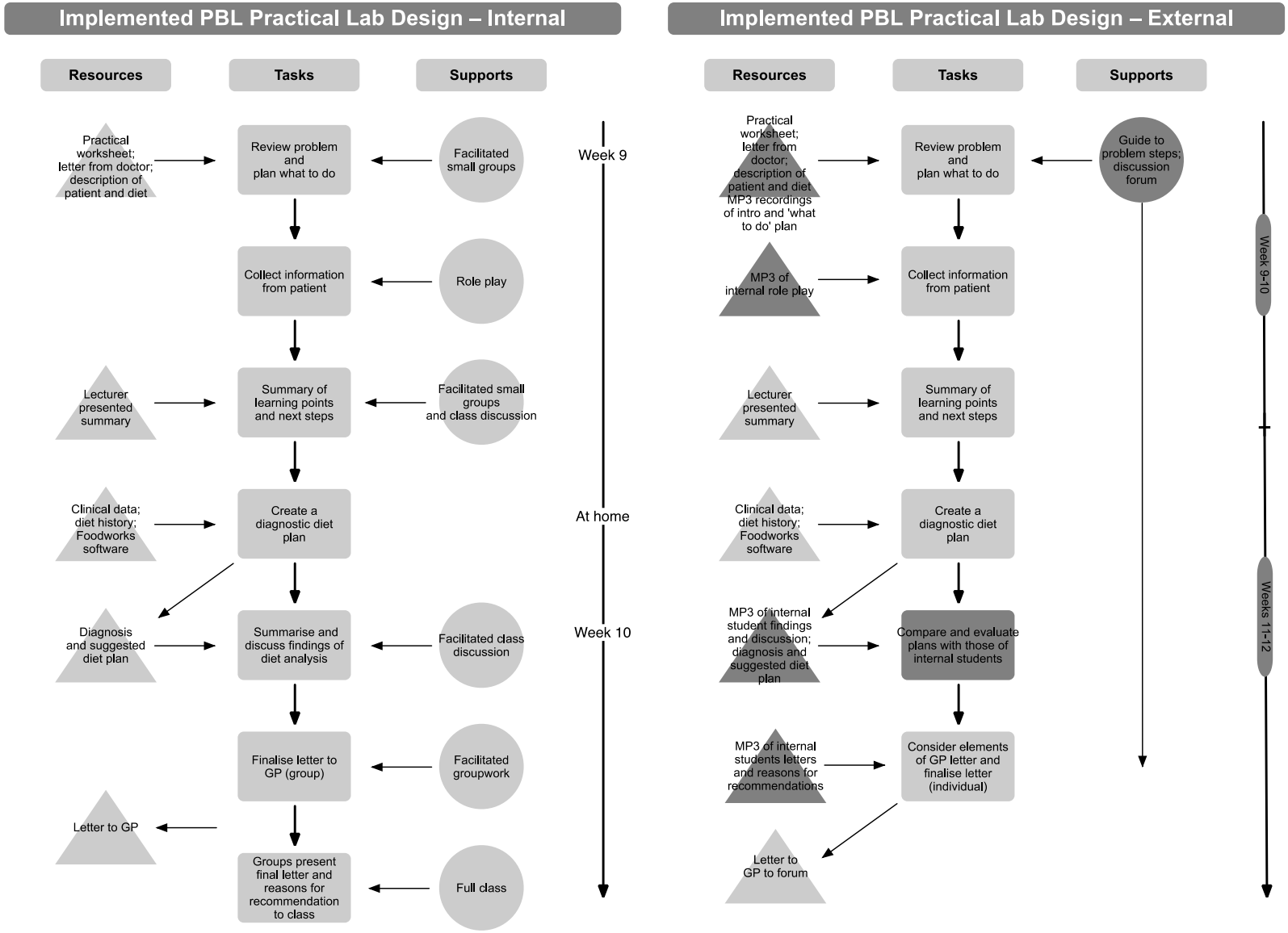


Figure 4.11: LDVSes of Daniel's implemented designs (internal and external)

The face-to-face internal implementation (left side of Figure 4.11) ran over Weeks 9 and 10 of the semester. In Week 9, Daniel said he was happy with how the first part of the activity had gone in the face-to-face session. Amanda had helped with the presentation of the practical. He said that Amanda had presented most of the problem scenario because she was a dietician and had more knowledge of the practice, while he "did all the physiology and the biochemistry behind it" (Daniel, I-6). The only concern Daniel reported was that solving the problem had been quite easy for the students. Daniel suspected that perhaps this was because students had recently learned about problems of this type in lectures:

> We're just doing cardiovascular this week and then we did this prac where there's this 'mystery disease' where the woman comes in – they all clicked straight away that it was cardiovascular.... So I don't know if that's good that they got it very quickly; it wasn't much of a challenge for them. (Daniel, I-5)

Despite the fact that students had figured out what was going on quickly, Daniel indicated that "it was a very beneficial process for them" (Daniel, I-5). Daniel also reported that he had been particularly impressed with how the role-play aspect had gone with Amanda playing the patient and one of the students playing the dietician.

The online implementation for the external students (see the right side of Figure 4.11) ran from Weeks 9 to 12. Daniel made a number of changes to make the practical available to the distance students. The adjustments are shaded darker grey in the diagram for easier comparison. First, he uploaded recordings of the introduction, resources, and a guide to the steps that the students should follow (the dark grey items in the first row of the diagram on the right). Second, activities such as the role-play and facilitated group summaries of learning points were replaced in the online version by recordings of the face-to-face students conducting these activities (the second resource triangle in the diagram on the right) and unfacilitated asynchronous discussion online. Initially, Daniel said he had thought the wiki might be a good space for the distance students to do the practical, so he had set up both the wiki and the forum and asked the students to choose one. He later reported that the students chose to use the discussion board because they were more familiar with it.

During the first week of the practical, some of the distance students requested more time to complete the activity so Daniel decided to allow this and delay the release of the

second part of the activity. This gave the external students a total of about four weeks to complete the whole activity rather than two weeks as the face-to-face students had had. These changes are shown on the timeline in the diagram on the right.

Daniel reported that there had initially been a lack of interaction and questioning among the external students in comparison to the face-to-face students. This had reinforced his preference for face-to-face teaching, as "it's much, much better when you're talking to them; you can ask them questions and things" (Daniel, I-5). However, after the slow start to the activity, Daniel later reported that the distance students increased their interaction levels and produced high-quality work:

> Actually [the distance students] were quite intensive on [the LMS]. They exchanged their ideas and worked backwards and forwards. There are only five of them so it was a good little group and yeah, at the end of the day, their output was better than the internal students – but then they had [more time]. (Daniel, I-6)

Overall, Daniel said that the distance students were satisfied with the solution for delivering the practicals. The main challenge for students had been that the recordings of the face-to-face interaction were sometimes difficult to hear. Reflecting on factors other than time that may have resulted in the distance students providing more in-depth discussions, Daniel said, "I must admit that my bias is that face-to-face teaching is always better than distance education, but maybe the discussion in the forum was a really useful medium for them" (Daniel, I-6).

4.5.4 Reflection

4.5.4.1 The design and the Learning Design

After the completion of the unit, Daniel reflected on what had gone well and what areas were of concern. He said he felt that the students had achieved the learning objectives. The students "really made the connection between studying energy metabolism [and] biochemistry, and then talking to a patient in a room who has diabetes" (Daniel, I-6). Daniel also reported on the student written feedback in which one student said, "Now I see why biochemistry is important for a dietician for the first time" (Daniel, I-6). As Daniel had mentioned in earlier interviews, he did not use the Learning Design to design this activity. He reported that he used readings, observation of a problem-based learning session, and documentation from a problem-based learning session. He

reiterated that he did not think the Learning Design would have given him enough detail to have designed and implemented the activity if he had tried to use it.

4.5.4.2 Plans for the design

Daniel said feedback from students had given him ideas for how to improve the activity in the future. First, the face-to-face students had requested access to nutrition-specific software during the practical so he planned to hold next year's session in a computer lab. Second, he was considering the idea of assessing the activity:

> It was a pleasant learning experience for them and it was deliberately not assessed, although a couple of people commented in [the written feedback] that it would have been better to be assessed because then they would have taken it more seriously. (Daniel, I-6)

Third, if Daniel were to offer it for distance students again, he said he would need to improve the recording mode and quality. However, despite the fact that he thought the whole unit was moving more towards distance delivery, he said in the future he still "wouldn't like to do it as distance" (Daniel, I-6) and would prefer to run the practicals back to back during a residential school instead. He indicated that this would work best, particularly if he were going to run an associated assessment with the new practical.

4.5.5 Summary

Daniel was a new lecturer with only one semester's experience using technology in his teaching. He indicated strongly that he felt face-to-face teaching was superior for learning; however, he did make use of the LMS site for the delivery of content. His previous design work on this unit had been focused on the unit's learning outcomes and had been adapted from the previous lecturers' slides and unit outline. For this offering, he was looking to generally improve the unit and add in one or two problem-based learning based practicals to emphasise connections between theory and practice.

Daniel's selection process was highly targeted. He focused specifically on problem-based Learning Designs and finding a design from a discipline closely related to his own. This left only one possible science-based choice, *problem-based learning in Medicine.* He chose this Learning Design before reading through the detail of the design to check for alignment of other aspects. Soon after selection, Daniel indicated

that he felt that the Learning Design might be lacking in the detail that he needed for his design work, but would still try to use it to design a practical to add to his unit.

Daniel worked on the design of this practical activity in collaboration with someone with practice-based expertise. The work continued from well before teaching until just before the delivery of the activity. During this time, the key influences on the design of the unit were the observation of a problem-based learning session and the receipt of a problem-based learning facilitator's guide to use as a model. Daniel reported that he had not tried to use the Learning Design and that he was not sure it would have helped him.

During the implementation of the unit, Daniel learned that in addition to offering the practical activity face-to-face for internal students, he would also have to create an online version for external students. To do this, he put up recordings of the face-to-face class and set up an online discussion board for the distance students. He did not feel that this was ideal but, given the circumstances, he considered it to be the only option. Both versions of the design ran well though Daniel preferred the face-to-face version. He planned to continue developing the activity and while he did not want to run it online again, said that if he did he would look to improve the recordings.

4.6 Nicole

4.6.1 Background

At the time of data collection, Nicole was a law lecturer at a regional Australian university. She had three-and-a-half years' university teaching experience, as well as some previous tutoring and workplace-training experience. Nicole had been using technology to support her teaching since she beginning work as a full-time lecturer. In her faculty, there was a minimum requirement to use the university's LMS to provide the unit information and lecture recordings. Nicole reported a high use of the LMS in her teaching, with a number of interactive activities and quizzes in addition to her unit's content and required information.

Nicole taught a number of taxation-law units. These units all contained similar content, which Nicole tailored for different student cohorts, degree levels, and delivery modes

(e.g., intensive versus semester-long offerings). She reported that since she had started working at the university she had taught the unit two to three times a year in one form or another. The unit Nicole chose to apply a Learning Design to was a taxation law unit targeted at undergraduate law students (Introduction to Taxation Law UG), offered in Semester 2.

4.6.1.1 Previous design work and context

Nicole did not articulate a specific set of steps that she went through when she designed the unit. However, she described a process that was iterative, heavily influenced by students' skill needs and by a broad context of considerations. The interrelated nature of her design work was the point she reiterated in the final reflective interview:

> For me, everything sort of happens at once. Like, it all has to evolve and fit in together as the whole course. It's not just [that] I'm thinking about this one project. It's 'how does it all fit...together?' (Nicole, I-6)

Nicole said that she used student feedback and the knowledge gained from teaching the unit to guide her review and redesign after each offering. She said that she also got new teaching ideas from textbooks, cases on the internet, and the media. She would then prioritise the focus for her energies; for example, adjusting an assessment or improving an online activity. University rules on assessment and professional body stipulations about content were the main restrictions to Nicole's design process. As she commented, the professional body set "the requirements of what the graduates have to come out with...[so] I don't have much flexibility in the content of the course" (Nicole, I-1).

Considering the design, selection, and organisation of content for the unit, Nicole said she drew on a range of textbooks for different presentation methods and points of view. When Nicole had inherited the unit three-and-a-half years previously, she said the textbook had been the main organisational framework for the unit and its content. After teaching the unit for a while, she changed the order of the topics to align concepts with students' familiarity with them and their prior knowledge:

> I've shifted [the order] so that we deal with Residence first because...I think it makes students feel more comfortable to start off with something they're familiar with and they don't have to work too hard to get. (Nicole, I-1)

Nicole said she felt it was important to connect the content to meaningful and relevant examples for the students, so she used both historical and current law cases as well as anecdotes. However, a first priority was to cover precedent cases; thus there was not always time to relay some of the more interesting cases.

Nicole spoke of mapping skills and skill-building as focal points for her design activities, and mentioned that assessment in general was an area she was very interested in. She spoke of "playing with the assessments" (Nicole, I-1), but said that she could be more creative with what she designed if she had more freedom. Nicole also explained that she had made changes to assessment over her time teaching the unit, reducing the weighting of the exam, removing the tutorial presentation marks, and adding case-study responses. When working on assessment items, Nicole said she looked at the skills that she wanted her students to gain both in her unit and in the course as a whole.

Using the LMS and recording all lectures was a Law Faculty requirement; however, it was apparent that Nicole went beyond the basic requirements. Nicole said she organised the unit's LMS site to be consistent with other Law units, which used a weekly organisation rather than a topic or modular organisation. To support student learning, Nicole reported that she uploaded resources and support materials, such as models and examples for students to base their work on. She had also designed online tutorials and simulations to build students' practical skills. Nicole said she felt that these online activities allowed students to work at their own pace through difficult topics or materials. A final area she used the site for was for the marking of assignments and unit administration, which she said were more efficient and streamlined using the LMS.

Nicole said that over her time at the university she had drawn upon a number of supports for her teaching, including conferences about teaching law, the university's introductory to tertiary teaching course, local teaching seminars, teaching discussions on the university mailing list, centralised teaching-support grants, and research papers on law teaching. Nicole said she liked sharing teaching ideas and resources with her colleagues and would often share reflections on strategies she had tried with her students.

4.6.2 Pre-semester design work

4.6.2.1 Design plans

When Nicole spoke about her plans for the taxation unit she listed a number of things she wanted to develop and change over the next two years. She wanted to add a peer-marking activity, further develop the online tutorials, and explore changing her use of the tools in the LMS. Her top priority for this next offering was adding a peer-marking step to the writing assignment, because improving students' writing skills was important to her. Finally, because capital-gains taxation was a key exam topic that students struggled with, Nicole's next priority was the design of an online tutorial for this topic. She said the benefit of having this tutorial online would be that students could go through the difficult material at their own pace. She reported that there was a newly available tool within the LMS and she hoped it would allow her to break down the problem-solving steps and provide feedback:

> I think having that tool will mean that I'll be able to give them more questions that are like what they'll actually face in the exam...and diagnose the different aspects. (Nicole, I-1)

Nicole also commented that having the main content of the tutorial online would allow more time in the face-to-face tutorial to focus on problem areas.

The kind of support Nicole said she needed most was law-specific information about teaching from colleagues or committees. She commented that there was too much information available and having a filtered set of materials would help "to focus the information that's coming in…so it's not just noise" (Nicole, I-1). Nicole was not familiar with the Learning Designs, but after being introduced to them, she said she would see if there was a design that fit her needs. One concern she had was the available time, which limited the scale of what she could design for this semester.

4.6.2.2 Learning Design selection

Five weeks before the start of Semester 2, Nicole had planned to select a Learning Design; however, by the scheduled meeting, she had not had time to look at the site. Therefore, during the meeting she began looking at the Learning Designs and was observed in her initial stages of selecting a design. It was observed that Nicole started

her selection process by focusing on the Learning Design guides, in particular the descriptive titles of the guides. When looking at a particular guide, Nicole focused on the text of the summary and task sections in the Learning Design rather than the diagrams. She later commented on this:

> I guess I didn't think the diagram added anything to my understanding of how it worked...it's sort of useful as a summary, but on its own there's not enough detail in there to mean anything, so definitely the text bit for me. (Nicole, I-2)

When looking through the Learning Design exemplars, her approach was systematic, starting with the first design presented in the default view (pedagogical focus) and working through each in order. For each design, she clicked on it and read the summary, highlighting words of interest. If anything resonated, she would write down the name of the design on a list for consideration and continue to the next one. In some cases, when she thought a design would be of interest to another colleague, she sent a short email to them with the link and her ideas about what they could use it for. Nicole did this three times during the observation period. From this process, she created a shortlist for consideration, but did not make her final decision that day.

Nicole's first goal had been to find something that would support her in designing the peer-marking writing activity. She looked for a Learning Design with a similar focus to find guidance about group size, group work responsibilities or possible problem areas. However, she was unable to find a Learning Design that described this kind of activity, and she said that being limited to the set of Learning Designs available on the site made her feel restricted. Since she was not able to find a Learning Design to help her with the peer-feedback writing activity, Nicole considered Learning Designs that might support her other priorities. She had ideas about how she could use a number of the Learning Designs, and found several she was interested in trying. For example, she looked at *Sarcamotion* and *Financial Investment* for building in other information sources; *Communicating with a Tired Patient*, which she thought could help further develop the interview-skills scenario she had run the semester before; and Learning Designs to help students with the difficult capital gains tax topic, which was "legislation heavy". She spoke of being limited by the short amount of design time between Semester 1 and Semester 2, and thought she could "probably do more if I was working on it this semester for next semester (or over summer)" (Nicole, email communication).

In a follow-up interview, Nicole explained how she had made her final selection, saying that she assessed the relevance of each Learning Design and looked at the practical skill-building it targeted. Her focus was on finding something to help her with the key areas she wanted to develop, and she said she was drawn to Learning Designs that aligned with ideas she had seen at conferences or considered previously. While selecting a design, she said that she thought about her vision for the unit, how its parts were interrelated, other projects she was working on (e.g., a course-mapping project) and how ideas in the Learning Designs connected to seminars that she had been to.

Nicole's final choice was to use *Chemistry Pre-Labs* to develop a pre-tutorial activity for the capital gains tax topic, but her disappointment in not finding a design for the peer-feedback activity was still on her mind:

> Part of the reason I chose [*Chemistry Pre-Lab* was] because they did not have the one I really wanted.... I probably will do the pre-lab thing but that's not going to be the focus for me, especially at the beginning, because I'm doing the [writing] assignment first…[and that is] what I really have to emphasise at the moment. (Nicole, I-2)

That aside, she commented that *Chemistry Pre-Labs,* which focused on the development of a self-paced pre-tutorial activity, appealed to her because she thought the activity would highlight key points and allow students to cover a lot of the dense material before the face-to-face tutorial. This would then free up some time in the face-to-face tutorial to go over problem areas. Finally, since the Capital Gains Tax topic was also assessed online, Nicole said she saw this tutorial as a way to also help develop students' use of the online tools before the assessment.

The LDVS of her chosen design, *Chemistry Pre-Labs,* had two versions; therefore, for ease of presentation the version shown in Figure 4.12 is the researcher's interpretation of these two versions combined. The design has students read the theory, purpose, and procedures for an experiment, watch examples, perform a simulated experiment, and analyse data prior to conducting the experiment in the laboratory.

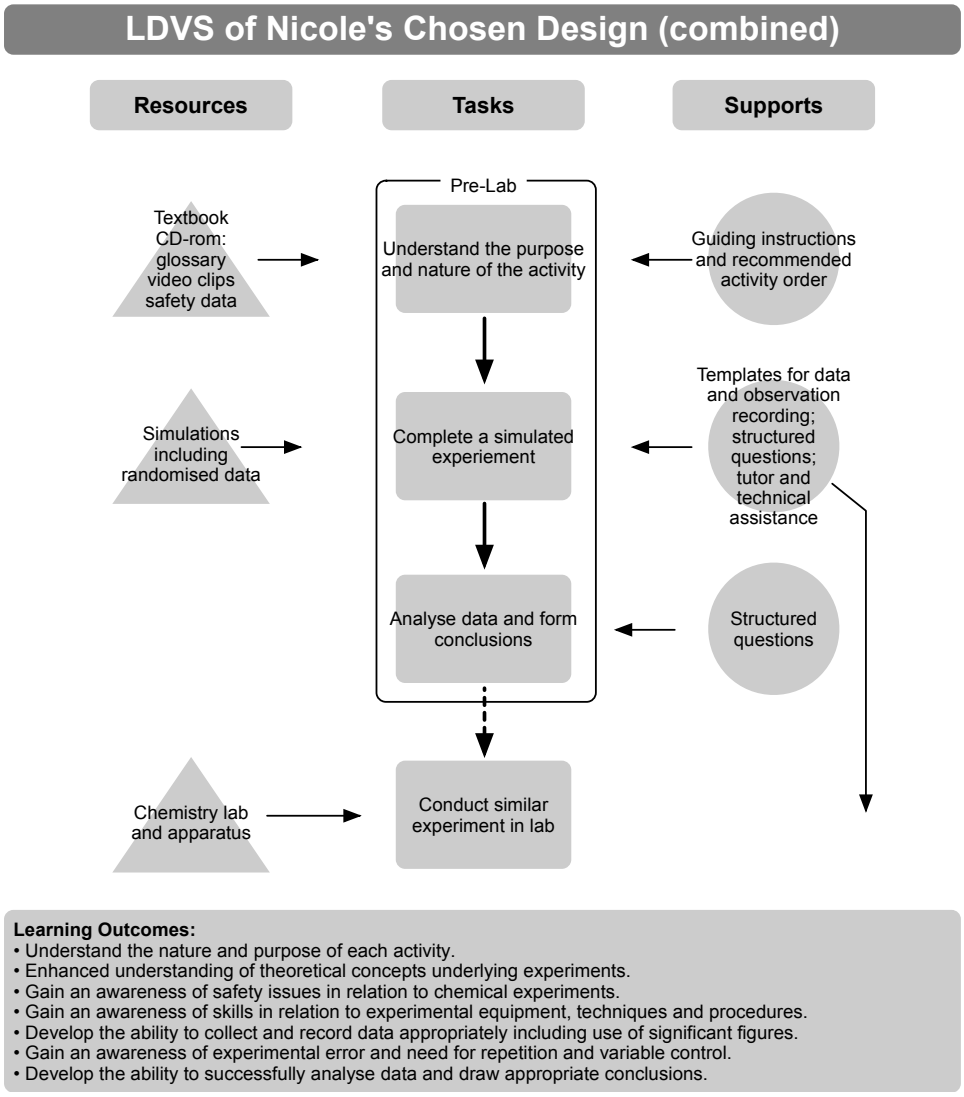


Figure 4.12: Researcher's combined LDVS of Nicole's chosen design, *Chemistry Pre-Labs* (Wilson, Atkins, Cavallari, & Harper, 2002)

4.6.2.3 Design work

As expected, Nicole did not do much more work on the unit until Semester 1 had finished and she had returned from a conference. After the conference, she focused on getting the unit ready for the start of teaching and reported that most of her pre-implementation design work had occurred during these three weeks leading up to the semester. She said that during this time she had worked on her unit outline to restructure her tutorials, assignments, and topics; looked at a new textbook to decide if she should change it; and thought more about how to build students' writing skills, a key skill for these first-year law students. She also spent some time on the capital gains tax pre-lab.

For the pre-lab, Nicole had reviewed her previous tutorial questions, identified key points that needed to be covered, and begun writing questions around the key points. Early in her design of the pre-lab she deliberated on how to best integrate the activity within her current unit design and how much adaptation of the Learning Design activity she should do. She said she had been thinking about "how the pre-labs are going to fit in with the tutorial and the practice quiz...[and] wondering 'should I change [the tutorial question] so that it's the same as I was going to use in the pre-lab. Or do it more like the pre-lab that was in the website, where the pre-lab covers really the basic issues and then the tute is still about the application' (Nicole, I-2b). She said the pre-lab style activity was something she would eventually like to incorporate into all of her tutorials and her plan for future pre-lab style tutorials was to use the Learning Design's steps of basic principles followed by application. However, Nicole indicated that she thought separating the key principles of capital gains tax from their application would be difficult. A final design consideration was how she would use the new tool to provide feedback. Nicole said she needed some training to see what was possible, but hoped each correct or incorrect answer could have specific feedback linked to further instruction if needed.

A major challenge to her design work came one week before the beginning of teaching when she was asked to switch from teaching Introduction to Taxation Law UG to teaching Taxation Law G. The unit to be taught now, Taxation Law G, was a graduate unit, which acted as a bridging unit for international students entering a masters level accounting program. Nicole explained that the content of Taxation Law G was very similar to Introduction to Taxation Law UG; however, the change required a rethink of her focus and goals for this different cohort and class size. Rather than the planned 150 first-year domestic law students she had been expecting to teach, she now expected approximately 30 international students. Teaching a class of this size was new for Nicole, who was more experienced and comfortable with large cohorts of students. However, she said smaller numbers would give her more flexibility to experiment with new ideas. Nicole was used to getting feedback on her unit from large cohorts so said she felt it would be difficult to get enough feedback on changes to fully determine their value.

When asked what steps she had gone through after the change of unit, Nicole described some of her design tasks, underlying influences, and reasons rather than specific steps. The change meant that Nicole had to make a number of administrative and design adjustments during a very short period. She booked rooms, set the timetable and assessment items for the unit outline, finished the first six weeks of the tutorial guide, and made a number of changes to how she was going to deliver the unit. Nicole's design decisions focused on tailoring the content and tasks to the new cohort's needs and characteristics. For example, she decided not to include the peer-review writing activity she had been working on:

> I don't think it's appropriate to have that group work for this [cohort] because they're international students.... I don't think they would feel comfortable or they wouldn't get a lot from that group work, particularly also because they're graduate students...[and] because language barrier is an issue for them. If I asked one of them to be a leader and read through the other papers, they might not be able to really value add in terms of language, and that's one of the things I see as the main role in this group work assignment. (Nicole, I-3)

With the decision not to include this activity, Nicole moved back to a more traditional written assignment.

Nicole decided to trial the use of a seminar format and a new textbook. Both decisions were influenced by discussions with another taxation-law lecturer whom Nicole had met at the conference she had just attended. That lecturer used a seminar format, rather than a lecture-tutorial format, to teach more than 7,000 students a year, and had written a textbook. Nicole reported that the new textbook had been a last-minute decision before she knew that her unit allocation had changed. She said the new, shorter text linked "with a lot more external resources" and explained that she thought this would enable students to compare multiple sources: "My vision with this shorter textbook is that they will use more outside resources...rather than just taking the textbook's word for it" (Nicole, I-3). Nicole said that teaching using seminars with this group would allow her to experiment with the seminar format in preparation for next year's unit, which would have over 200 students in it. Her plan was to have students do any online activities (e.g., the capital gains taxation tutorial) as preparation for the three-hour seminar.

For the online components of the unit, Nicole reused a site from another unit, Revenue Law UG, which she had just taught in Semester 1. This unit also had similar content, but was tailored to business students. After her initial work on the capital-gains taxation Pre-Lab, Nicole reported that she had not been focused on designing it, as this topic was not scheduled until Week 8, after the semester break. She expected that she would begin work on the online component a few weeks into the semester. The main change she had made to the site was the reorganisation from weekly activities and resources to a topic-based seminar structure. Nicole also reported that she had removed some resources that were no longer relevant and changed how students communicated electronically, asking them to use the forum to communicate with other students and email to communicate with her directly. Her plan was to post lectures each week and make the capital gains taxation pre-lab online tutorial available during the semester when she had finished designing it. When asked if the Learning Design she had chosen had had any effect on the design of the online learning space at this point, Nicole said that it had not had a big impact. However, she said that it had been "an incentive to move to the topic-based structure in the hopes that [students] would do the quiz before class and then bring to class any questions that they had and we could discuss [them]" (Nicole, I-3).

4.6.2.4 Pre-semester planned design

Before the start of teaching, Nicole had not completed her design work for the capital gains tax activity; however, Figure 4.13 provides a comparison of her planned design to her chosen design.

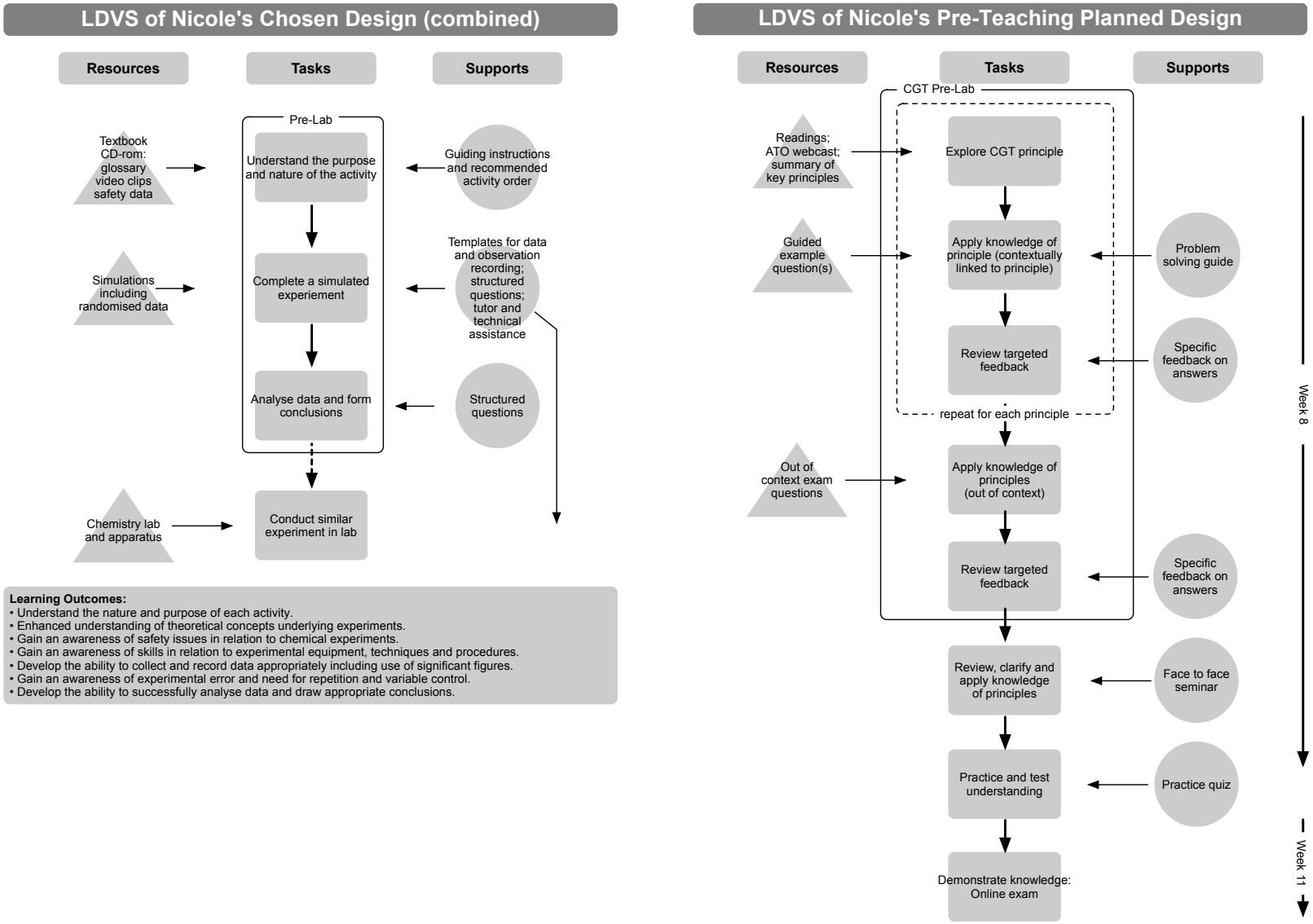


Figure 4.13: Nicole's chosen design, *Chemistry Pre-Labs* (Wilson, Atkins, Cavallari, & Harper, 2002), and her pre-teaching planned design

In *Chemistry Pre-Labs* (left side), students were first required to read through and watch introductory materials, then apply what they had learned in a simulated laboratory experiment, forming conclusions and understandings supported by structured questions. After this preparation, they would conduct a similar live experiment in the laboratory (the fourth task rectangle in the left diagram).

In Nicole's planned design, shown in the diagram on the right, students were first introduced to a key capital gains tax principle, after which they would apply their knowledge by working through a question supported by a problem- solving guide and receive targeted feedback on problems that may have led to any errors. This process is represented in the first three task rectangles within the dotted box in the diagram on the right, and was repeated for each principle students needed to know. The plan was also to allow students the freedom to redo any problem questions until they understood how to reach the answer. These three steps taken together provided students with an introduction to each principle while at the same time following the larger pattern of the Learning Design by first introducing a concept, then applying that knowledge, and finally understanding outcomes.

Once the students had been introduced to all of the principles, they would apply their understanding of the principles to exam-style questions that were not closely paired with the specific principle used to solve the problem (as was the case in the introduction phase). These questions would simulate aspects of their capital gains tax exam, providing practice as well as additional feedback on problems they were having. These two steps can be seen in the fourth and fifth task rectangles in the diagram on the right, and were the final online components before the face-to-face class. Next, as in the chosen design, students attended the face-to-face class. The purpose of this class was to work through another problem, review, and clarify any problems with Nicole (the sixth and seventh task rectangles). For additional support, Nicole also planned to use a previously developed practice test for students to use for review prior to the final step, the exam in Week 11 (the eighth and ninth task rectangles). The LDVS of Nicole's planned design shows two additional steps for this topic: the practice quiz and the online exam. She had developed the online practice quiz for a previous offering of the unit. The inclusion of these final two steps in the LDVS changes the time scale of the

chosen design and Nicole's planned design; however, they were included to show the broader unit connections for this activity.

4.6.3 Implementation and further design

The unit was taught in Semester 2, 2009 with only 15 students enrolled. Early in the semester, Nicole reported that the main challenges with the unit's implementation were the move to the seminar format and a lack of student preparation. With the move to the seminar format, Nicole had changed the sequence of the weekly activities from lecture, tutorial, online activities to online preparation activities (e.g., readings and quizzes) and seminar. This change mirrored the *Chemistry Pre-Lab* Learning Design's sequence, where students would do the preparation activities before coming to the class. However, Nicole reported that students were not doing the online activities or necessary readings before the seminar and therefore were unprepared to actively participate:

> It was supposed to run as a pre-lab. Perhaps I shouldn't have told them that I was willing to be flexible...[because] they've all been doing all the quizzes at the last minute which is actually after the class. (Nicole, I-3)

Additionally, Nicole speculated that the small class size and perhaps cultural differences were contributing to low participation in the seminar:

> Sometimes having a bigger group works well because then you've got a couple of keen students...and it sort of creates a bit of peer pressure, a bit of a critical mass...and that's enough to have a discussion.... Also the nature of international students is that they have a culture where you don't talk to your teacher because they're so respectful of you and they're sort of shy types when it comes to their teacher. So that might be a part of why a seminar is not working very well. (Nicole, I-3)

Despite the fact that students had not completed the first few online tutorials in advance, Nicole was hopeful that the students would shift their pattern for the new Week 7 capital gains tax pre-lab activity she was designing.

By Week 4, Nicole had finished designing the first part of the pre-lab within the LMS. This part paired questions with the principles the students needed to understand. She said she had begun by further developing the tutorial questions. Then, for each tutorial

question, she created a series of problem-solving questions to align with the new textbook's approach. These questions guided the students through the problem:

> It's not like a normal quiz where it just asks you questions. I've used lots of the description pages so it gives [the students] the information and then asks a question and it gives them lots of feedback...they just go through those steps. (Nicole, I-3)

She reported that her focus was now on the final set of out of context questions, "the more tricky…questions like [the ones] we use in the exam" (Nicole, I-3). The main challenge to this period of design was the limitations of the LMS tools. Nicole said she had begun her work using the new lesson tool, but as she worked, she discovered the tool could not give feedback specific to a student's answer. Rather, only one type of general feedback could be given for the question. For her purposes, she had wanted to pinpoint the error each student had made and give targeted feedback on the error. Nicole sought advice from the university's LMS support team, but they could not provide a solution. Given that there was no advantage to the lesson tool as she had hoped, Nicole decided to revert to using the more familiar quiz tool, which made it easier to import and export questions. She also decided to provide more feedback in class.

At the time of the Week 7 interview, broader factors and influences at the university were impacting on Nicole's motivation and design considerations for future offerings. As part of major changes in the university, there were calls for academic redundancies. Nicole's interpretation of the changes was that the university's "focus [was] clearly shifting away from teaching" (Nicole, I-4). In addition, the results of the university's Semester 1 unit satisfaction surveys had come back and Nicole said she was disappointed by the areas the survey missed and was re-thinking where she put her energies:

> One thing that I guess might affect my future teaching design is that [the survey] focus[es] on written generic skills. There's nothing to do with the oral-communications skills...so I guess it's a bit of a demotivator to invest time in those sorts of things. (Nicole, I-4)

Broader context aside, Nicole reported that she felt the unit was going well and that she had completed the capital gains tax design. Before the start of teaching, Nicole had used the Learning Design's text to draw out ideas, but since then she said she had not

referred to the Learning Design. Nicole also reported that she had not had any other support for her design process since the semester started. There was a suggestion that the time for extra support was before teaching started, when she said, “As we get into the semester it gets busier, and you’ve got to let your teaching run itself more I think” (Nicole, I-4).

Nicole described what she had designed, as well as the changes she had needed to make to her original plan. Figure 4.13 shows her original plan for the activity (left) next to the activity as she had planned it (right), just before the students going through it during Weeks 8 and 9. The main changes are shaded a darker colour to highlight them.

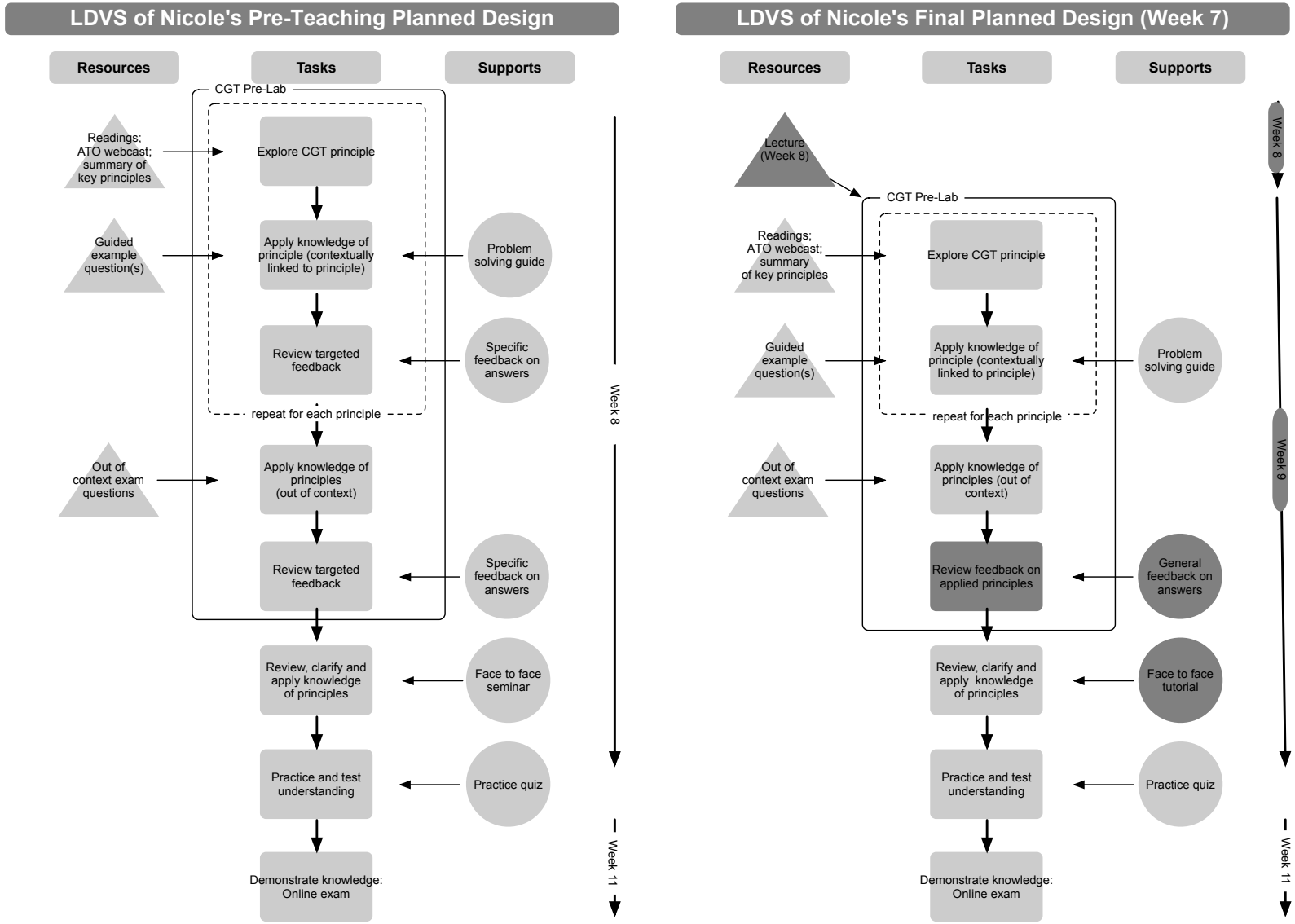


Figure 4.14: Comparison of Nicole's pre-teaching planned design and her Week 7 planned design

The first set of changes related to the order of weekly activities, which Nicole had already been trialling during earlier weeks. When she switched to the seminar format, Nicole also moved many of her pre-existing online activities to before the seminar, mirroring the format she was going to use for the capital gains tax pre-lab. This shifted the focus of these activities from review to preparation for the seminar. Despite this shift, students continued to wait until after class to complete these activities; moreover, while participation in the seminar had improved from the early weeks, students expressed concerns about their ability to participate with enough expertise. In response to these student concerns, Nicole made a change to the order of weekly activities, adding a lecture component back in. In the new sequence, she divided the seminar time. For example, the first half of the seminar was the final tutorial activity for Topic A. In the second part of the three-hour class she would switch to introducing Topic B, with a lecture. The following week students were expected to do the online tutorial for Topic B and then Topic B would be discussed in the first part of the class before moving on to Topic C.

These changes flowed on to the capital gains tax topic and are shown on the right side of Figure 4.14. Nicole's new plan had the lecture for capital gains tax topic starting in Week 8. This is shown as the first shaded triangle in the diagram on the right. After this, students were to complete the pre-lab, then review and discuss the issues arising from the online activity in the first part of the Week 9 class. This change is shown as the shaded circle feeding into the review, clarify, and apply knowledge of principles task in the right diagram. This support changed from a seminar format to a shorter tutorial format. The remaining changes were a result of the tool change that occurred early in the semester. When Nicole had discovered that the tool she had originally chosen could not provide the students with multiple sets of targeted feedback, she had opted to design the pre-lab in the quiz tool, which could only give feedback when the students had finished the activity. This resulted in the loss of the third task step, review targeted feedback, from the planned design (diagram on the left).

Before running the activity, Nicole was already starting to focus her design thinking on the next offering of the unit, which would be the intensive summer-session version. For this and the following offerings, she said she was thinking of adding more of the pre-lab type quizzes to cover the week's key principles. Additionally, Nicole was considering

adding more feedback to the capital gains tax pre-lab, but wanted to wait for student feedback about this offering first.

The second half of the semester began with the capital gains tax pre-lab, which ran in Week 10. The activity had originally been scheduled to take place in Week 7 before the semester break; however, Nicole had been unwell and the topic had to be shifted to Week 10. Later, another period of illness necessitated the postponement of the capital gains tax online assessment until Week 15.

Overall, Nicole said she was happy with the activity, identifying just one question that needed further work in future offerings. As had been the pattern with the earlier tutorials, Nicole reported that many of the students did not complete the activity until after the face-to-face tutorial. This made the pre-lab more of a revision activity, with all the face-to-face content and discussion coming before the online activity. However, over the remaining weeks of the semester, Nicole reported that this lecture, online tutorial, face-to-face tutorial sequence began to work more effectively. Nicole said she was happy with this improvement because this sequence allowed her to cover more material and answer specific student questions in class. Figure 4.15 shows the activity as it was planned prior to it running (left side) and as it was implemented (right side), with the changes due to illness and student reluctance to do the online activity before the face-to-face tutorial.

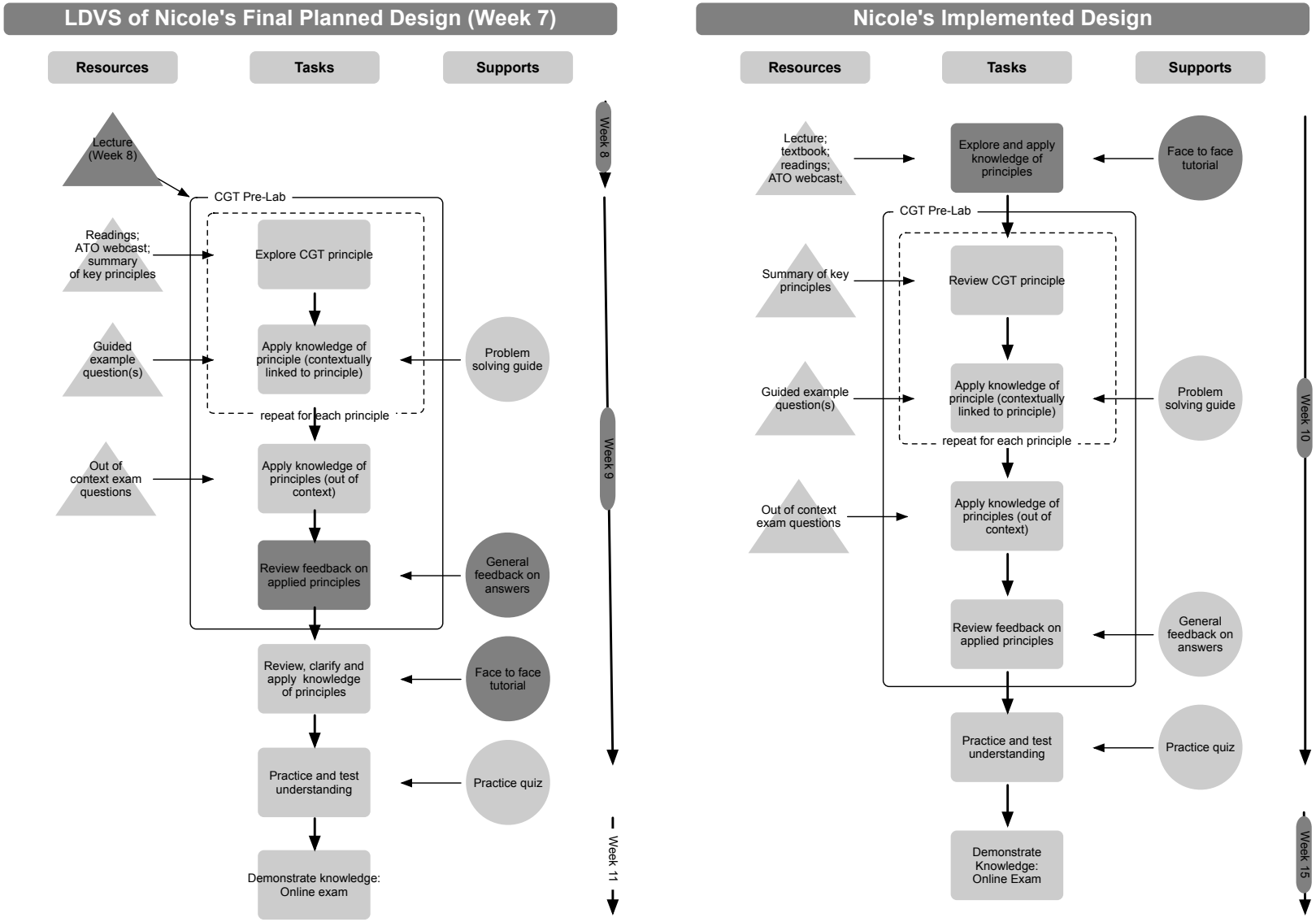


Figure 4.15: Nicole's Week 7 planned design (left) and her design as implemented (right)

4.6.4 Reflection

4.6.4.1 The design and the Learning Design

In her final interview, two weeks after the examination period for the unit, Nicole reflected on the overall experience of designing and delivering the unit and the adapted pre-lab activity. Her goal in selecting *Chemistry Pre-Labs* had been to give students an opportunity to work through the basic principles of the topic and identify areas in which they needed extra help before they came to the tutorial. This aligned with how she already worked with the students:

> In my face-to-face [tutorials], we always start by going through the principles and then we have the discussion and the application of those principles…. And so the pre-lab...[Learning Design was] about making sure they know those principles.... [In class,] sometimes it's just like dragging, or pulling teeth and so I thought the idea of the pre-lab [was] really good. (Nicole, I-6)

Nicole had not received the university's unit evaluation forms back at this time; however, she had collected feedback from students specifically about the online tutorials, through a feedback tool within the LMS. Nicole reported this feedback was positive and the students' comments suggested a deeper engagement with the topic. An example she gave was a student who said, "I did study that I would not have otherwise done" (Nicole, I-6).

Nicole recounted the factors that she thought had the most impact when she had been designing the activity:

> There was [the LMS], and what it can and can't do. There was my idea about how to set these online tutes up. I think – I guess the student cohort was a factor.... And I took into consideration…this pre-lab idea. (Nicole, I-6)

Generally, Nicole said she felt that she made better use of technology, and included more online materials and information for students. When asked what effect she thought the Learning Design had had on the LMS site, Nicole said:

> I think having that Learning Design of the principles...meant nutting it out 'what are the principles that I want them to have for each topic?' So then, I sort of included them in these little blurbs, to help [the students] focus their study. (Nicole, I-6)

The above quote illustrates how the Learning Design influenced not just the design of one activity, but also that of other topics within the unit.

Challenges to fully achieving her goals for the activity came both in the design and implementation stages. First, staged feedback had been a key goal for the design of the capital gains tax pre-lab activity, and therefore so was identifying a tool within the LMS, that could do this. However, neither tool Nicole tried could fully deliver the feedback in the way she wanted. In the end, Nicole designed the activity in the quiz tool. This allowed her to give specific feedback, but not until the students finished the quiz. Her concern about this solution was that students might have made the same error many times before getting the feedback they needed to correct it.

A second challenge was the students' lack of preparation, which was compounded by Nicole's flexibility with the timing of the pre-lab activity. She encouraged students to do the activity before the tutorial; however, the lack of a requirement to do so meant many students left it until after the class. This meant that the face-to-face tutorial focused more on ensuring students' basic understanding of the principles rather than on discussing more difficult issues. Despite these challenges to the design, Nicole said she felt that the activity had been a success and that the addition of the CGT online tutorial prepared the students better for the exam.

4.6.4.2 Plans for the design

At the time of the final interview, Nicole had already implemented some changes to the unit and capital gains tax pre-lab because she had already begun teaching an intensive version of the unit to a new cohort of students. For this new cohort, she reported that she had adjusted the capital gains tax pre-lab and dispensed with the pre-exam quiz, which she felt was redundant and had just been a historical artefact from previous offerings.

For the next offering in Semester 1, 2010, Nicole would be moving into a casual lecturing position. She said online communication would therefore be more important for answering student questions, and for this next offering she wanted to "focus on facilitating and encouraging online discussion, rather than technical stuff like setting up

the quizzes" (Nicole, I-6). That being said, she did want to improve the feedback cycles in the capital gains tax pre-lab; she thought one solution might be to separate the capital gains tax pre-lab's introductory principle-based questions and the exam-style questions, making two activities using the quiz tool. Doing this would allow students to get feedback on the introductory principle-based questions before they attempted the out-of-context, exam questions.

Finally, looking to the longer term, Nicole said she would like to design more online tutorials, both pre-lab style tutorials that prepared students for face-to-face work and fully online tutorials. She said the pre-lab style tutorials would be targeted to topics that were "more about thinking and analysis, and...[didn't] necessarily have a black and white answer" (Nicole, I-6).

4.6.5 Summary

Despite having only worked in her role for three-and-a-half years, Nicole was a very experienced teacher within her subject area and an avid user of technology. She taught the unit she was designing for this semester two to three times a year in various formats tailored to specific cohorts. Her previous design work had been skill-focused and iterative, and she looked to make continuous improvements. Each offering targeted something different to adjust or develop further, and this semester her plans were to work on a peer-marking writing activity and/or further develop the difficult capital gains tax topic. She preferred targeted, discipline-specific support, and hoped the Learning Design would help her find design ideas for the peer-marking activity.

When selecting a Learning Design, Nicole started with the guides because she liked the descriptive titles; however, she eventually went through the exemplars as well looking for a design that aligned with the issues she wanted to address and ideas she was familiar with. She focused on key terms within the text rather than the LDVS diagram, and when she could not find a design to suit her needs for the peer-marking activity, chose a design to help with the capital gains tax topic.

Prior to teaching, Nicole's early work had been focused on considering how she would integrate and connect the new elements of the capital gains tax activity into the unit and

exploring what tools might meet her needs. Much of Nicole's detailed design for the capital gains tax topic did not occur until after the start of teaching, as the activity was not scheduled to run until Week 8 and therefore was not as urgent.

She only spoke of referring to the Learning Design during the initial phases; however, she had a good understanding of the design and applied the ideas to the topic in a very similar way to the Learning Design. Finding the appropriate tool to meet her needs was a key challenge to the design of the activity.

During implementation, Nicole responded to student feedback and made adjustments to her unit's design that flowed on to the capital gains tax tutorial. One of the key challenges to the activity had been that many students did not do the activity prior to the face-to-face class, which meant they didn't get the full benefit of the preparation.

After teaching, Nicole indicated that the changes to the tutorial had prepared the students better for the exam, and that the Learning Design had impacted on the connections and organisation within the LMS site. Her plans were to adjust one of the questions within the tutorial and remove the related quiz, which was now redundant. Additionally, she planned to design more online tutorials in this format.

4.7 Alison and Lana

4.7.1 Background

In this case, two university teachers, Alison and Lana, were involved in the design work, and Lana implemented the design. The case starts with Alison, who was originally the only participant in this case; Lana was introduced as a co-designer after the selection of the Learning Design. This change was due to a decision to apply the Learning Design to a different unit to that originally planned.

Both Alison and Lana were lecturers in veterinary science at a regional Australian university. Alison had five years' full-time lecturing experience as well as 10 years' casual lecturing and casual high-school teaching. Lana's experience included six years in veterinary practice as well as nine years as a university lecturer. Alison said that she

and other lecturers in the veterinary program had been using the university's LMS to support their teaching since its adoption two years previously. The lecturers and students in the program had also been involved in the pilot phase of this LMS. Originally, Alison planned to apply a Learning Design to a second-year, problem-based learning unit that she was designing and teaching on her own. However, after selecting a Learning Design Alison changed her focus to a fourth-year, problem based learning unit, which she co-designed and taught with Lana.

4.7.1.1 Previous Design Work and Context

When speaking of her previous design work on the problem-based learning units within the program, Alison first recounted the redevelopment of the veterinary-science program and the original design work on all problem-based learning units six years before. The goal of this redevelopment had been to restructure the program to increase practical application of knowledge and student retention. To do this, the design team Alison was a part of aimed to include two years of problem-based learning units within the six-year veterinary-science program. She expanded further on the reasons and strategy behind this change:

> We felt it was an innovative way to teach and put the student into the role of the veterinarian early so they could try the clinical-thinking skills that are required…. [Also] the middle years are traditionally very hard and students drop out a lot because they just can't cope with the amount of information that is thrown at them…[so] we thought a break-up in the way of teaching across the six years would be a good way to [structure] it. (Alison, I-1)

According to Alison, at the time there was no university support available for the design and implementation of a problem-based learning program, so the team sought support from an external consultant and a lecturer experienced in problem-based learning. Additionally, they had used two other university's problem-based learning programs (from veterinary science and medicine) as models.

When designing the program and units, university rules for the number of units allowed per semester and professional body requirements were taken into account. Additionally, Alison and the design team were aware that this would shift how content was taught and that the professional body was concerned that the problem-based learning approach

might not adequately cover all of the necessary content. Therefore, the design team worked hard to ensure that everything was covered.

The planning work centred on a mission statement they developed and criteria that outlined "the sort of vets we wanted to produce" (Alison, I-1). Using the mission statement and criteria as a guide, the design team then looked at the previous traditional units, pulling out what was most important. They then divided the content into broad areas and units, on which specific teams focused. Each unit team then developed learning outcomes for the units and Problem Based Learning packages.

She recounted that the most challenging design aspect for the packages was "writing authentic [problem-based learning] packages that allow the students to develop and explore the learning outcomes." (Alison, I-1). The problem-based learning units were each designed to run intensively over three weeks. Each week, students would be taken through a new problem-based learning package.

All of the problem-based learning package materials (e.g., problem statements, disclosures, etc.) were delivered during facilitated face-to-face sessions with some of the resources also available on the LMS site. Each facilitated session was followed by student self-directed work. This cycle of disclosure release, facilitated discussion, and independent research culminated in the submission of the problem-based learning assessment item.

Alison said assessment decisions were based on what the team wanted the students to learn and skill-building goals. For example, oral examination skills were important in later years of the degree, so in earlier years lower-stakes oral examinations were included as preparation. Written examinations were based on clinical reasoning, using a format similar to the problem-based learning packages, as well as some more-traditional question types. Since the initial design, Alison said that the units had undergone regular yearly review and a major review once every three or four years. Changes to the problem-based learning packages were made based on student feedback and facilitator perceptions of student performance.

Speaking more specifically about the use of technology in her problem-based learning unit, Alison said she made decisions in the first instance based on what tools were available in the LMS. In her recent teaching, Alison used the resources tool within the LMS site for lecture slides, practical manuals, articles, lab manuals, images, video, and other resources. Alison indicated that having the problem-based learning package materials on the LMS site was convenient for students; for some resources, such as images, the digital format gave students access to higher quality. For communication purposes, she used announcements for formal messages and synchronous chat for specific questions and online office hours. She had used a discussion forum in the past but the online chat room had replaced it because it had the advantage of real-time communication. She also used a survey tool within the LMS to collect student feedback on each problem-based learning package.

4.7.2 Pre-semester design work

4.7.2.1 Design plans

For the next offering of the unit, Alison planned to do a routine review of the problem-based learning packages based on the facilitator's feedback, as well as a review of the practical classes and lectures to ensure they were "the right lectures...that will help [students] with this particular subject, and the particular package" (Alison, I-1). She indicated that she was happy with the order and timing of the student activities but wanted to look at the student workload and assessment tasks. Alison was particularly concerned about over-assessment. There were six assessments, five worth between 5% and 15% and an exam worth 50%. Alison said she felt the number and weighting of the assessments might be contributing to the high average marks students were getting.

4.7.2.2 Learning Design selection

Alison had not used a Learning Design before but had used the problem-based learning models the veterinary-science program had adapted for the program redesign. When introduced to the Learning Designs during the background interview, Alison said her interest in the Learning Designs came from a desire to "justify" what she was already doing as well as to explore other problem-based learning designs to get new ideas. In

particular, Alison said she was looking for technology support and to learn what more the program could be doing with the LMS.

Before the start of the semester, Alison looked at the designs on the site focused on problem-based learning, and printed out the Learning Designs that were of interest to her. She said she read the designs for ideas particularly in regards to running online problem-based learning sessions. When looking through the designs, Alison found the context sections of the Learning Design Framework to be useful because they explained "how you are going to interact with the students as far as the tasks and the resources and the support goes" (Alison, I-2).

At this point, Alison identified *Problem-Based Learning in Medicine* as the design that she was most interested in. The LDVS of her chosen design is on the left side of Figure 4.16. Alison said that *Problem-Based Learning in Medicine's* online design mirrored what she was already doing face-to-face. In *Problem-Based Learning in Medicine*, the students were taken through a problem-based clinical reasoning process. Broadly, the steps in the *Problem-Based Learning in Medicine* design could be summarised as identify, investigate, diagnose, and summarise. A clearer comparison of the two designs can be seen in Table 4.2, which focuses on the student tasks.

While the number and names of the tasks within Alison's design were different, the general pattern was very similar (i.e., identify, evaluate and investigate, evaluate and diagnose, and summarise). Alison's original design is shown on the right side of Figure 4.16.

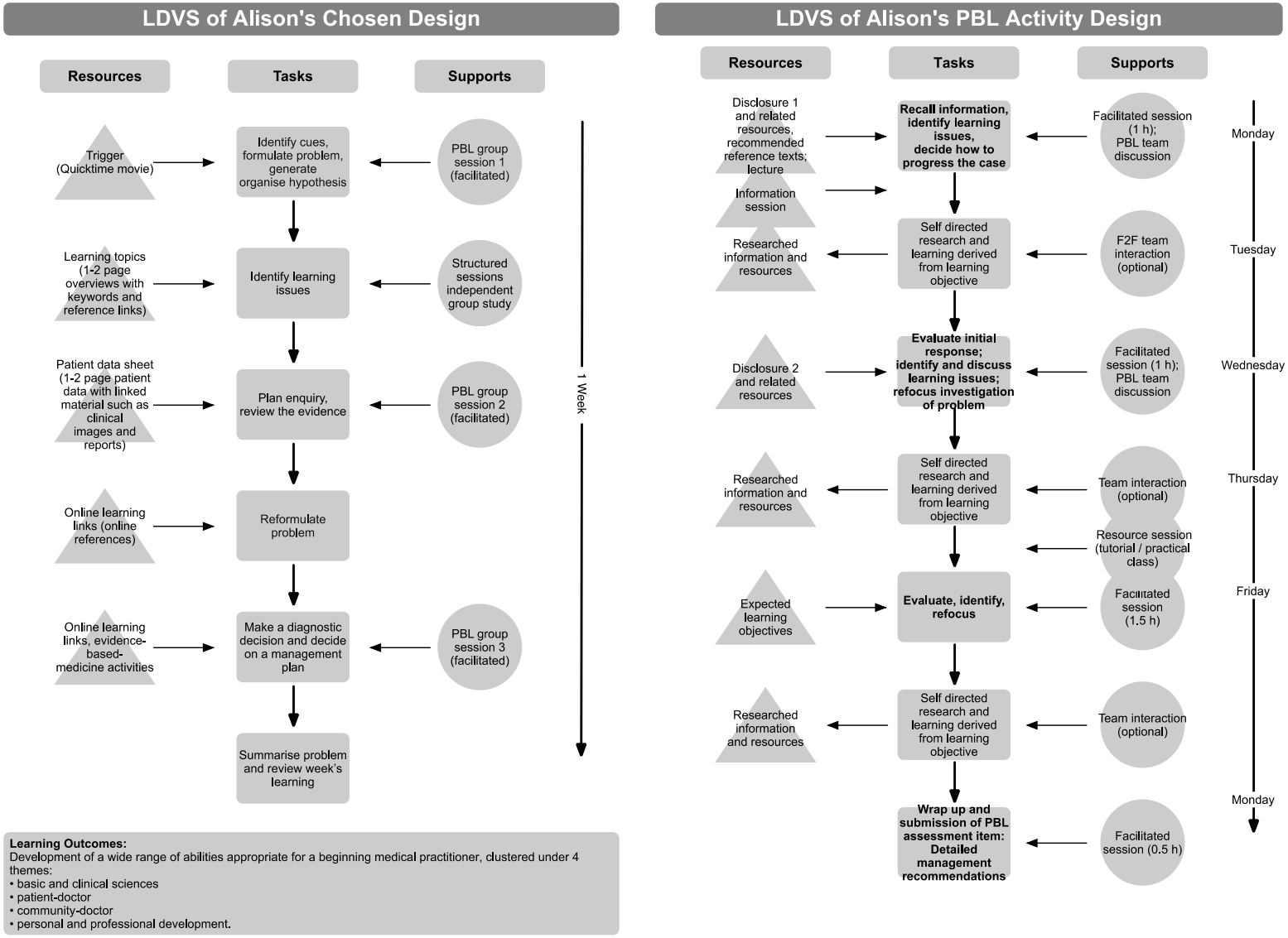


Figure 4.16: LDVSes of Alison's chosen design, *Problem-Based Learning in Medicine* (Ryan, 2002), and the original unit design

Table 4.2 Comparison of *Problem-Based Learning in Medicine* and Alison's Problem-Based Learning in Veterinary Medicine Designs

Chosen Design – PBL in Medicine	**Original PBL in Veterinary Medicine Design**
- Identify and Hypothesise the problem;	- Recall information, identify learning issues, decide how to progress the case - *Self-directed research and learning derived from learning objective*
- Identify learning issues;	- Evaluate initial response
- Plan enquiry and review evidence;	- Identify and discuss learning issues
- Reformulate the problem;	- Refocus investigation of problem - *Self-directed research and learning derived from learning objective*
- Make a diagnostic decision and create a management plan; and	- Evaluate, identify, refocus - *Self-directed research and learning derived from learning objective*
- Summarise problem and learning.	- Wrap up and submission of problem-based learning assessment item: detailed management recommendations

Commenting on the information in the Learning Design, Alison said that some of the information was too generic, and that she wanted examples that were more specific. In particular, she said she would like more details of assessment and the online disclosure of the problem. Her comments on this last item illustrate her point:

> Whilst they talk about problem-based learning, they don't actually say how it's delivered to the students. They simply say 'online presentation of the PBL case resources'.... They don't actually talk about the PBL material and they don't also discuss what…the students should be doing with the PBL [disclosures]…. I'm a bit unsure as to, one, how they are actually given to the students and, two, what they expect the students to do with the information that they've been given.... I haven't read through every word, [but] just now, I can't see anywhere where they actually describe how the information is given to the students for the problem. (Alison, I-2)

Given this, Alison said she did not feel that the support in the *Problem-Based Learning in Medicine* Learning Design would be enough to inform her of how to run online problem-based learning sessions, which she was now looking to trial; she said that she planned to look at other Learning Designs to see if they contained more support for the online implementation.

Overall, Alison still indicated that she thought the Learning Design would be a good introduction for those new to problem-based learning:

> If you were thinking about doing problem-based learning it would be a good start because it gets you to think about the tasks, the resources, the support, you know, getting the notes, the outcomes of the assessment, etc. All of those sorts of things, and then thinking about it with the reflections, I think that's really good. (Alison, I-2)

She suggested that perhaps the help given in the Learning Design was too introductory for her current needs. The veterinary-science program had been using problem-based learning for six years, and she indicated that as a program they had "moved on from this. We were back at that stage a few years ago and having looked at it in more detail I think we are more advanced than what this is" (Alison, I-2).

4.7.2.3 Design work

As mentioned above, Alison was now planning to trial running problem-based learning sessions online. She indicated that she wanted to see whether online delivery might be a model that the veterinary-science program could use. With this goal in mind, Alison decided to change the target unit. From a design perspective, Alison explained that all of the program's problem-based learning units were setup "exactly the same" (Alison, I-2), but the unit she had originally chosen was not the best candidate for doing this trial, because it was within the students' first year of problem-based learning. Instead, she said she felt that a fourth year unit might be more suitable because the fourth-year students would be more experienced problem-based learners and would be more likely to adjust to the change and benefit from the flexibility of online activities.

With this in mind, Alison approached Lana, a coordinator of a fourth-year problem-based learning unit, to see if she would be interested in trying this with Alison. The move to a new unit changed the design scenario. First, Alison was now collaboratively designing the unit with Lana. Second, Lana would be facilitating the sessions rather than Alison. Third, this unit would be delivered during the third intensive problem-based learning unit of the semester, which meant that they had until October to work on the pre-implementation design.

Alison and Lana began working together to build on Alison's idea of converting one of the problem-based learning packages to a more flexible delivery mode. Alison introduced Lana to the *Problem-Based Learning in Medicine* design and the Learning Designs on the site. They reported that they spent their early design reading both *Problem-Based Learning in Medicine* and other Learning Designs and discussing ideas for how they might convert one of the problem-based learning packages for online delivery. While they looked at a number of designs, *Problem-Based Learning in Medicine* was still considered the best fit for their purposes.

4.7.2.4 Planned design

At the start of the university semester in July, Alison and Lana had not finished their design work for the changes to the package. The unit was to be delivered over three weeks in October with one of the weeks being converted to more online delivery and interaction with the problem. They reported that they planned to change the compulsory face-to-face tutorial sessions to online sessions and said that students would be expected to meet virtually or physically somewhere (the shaded support circles in Figure 4.17).

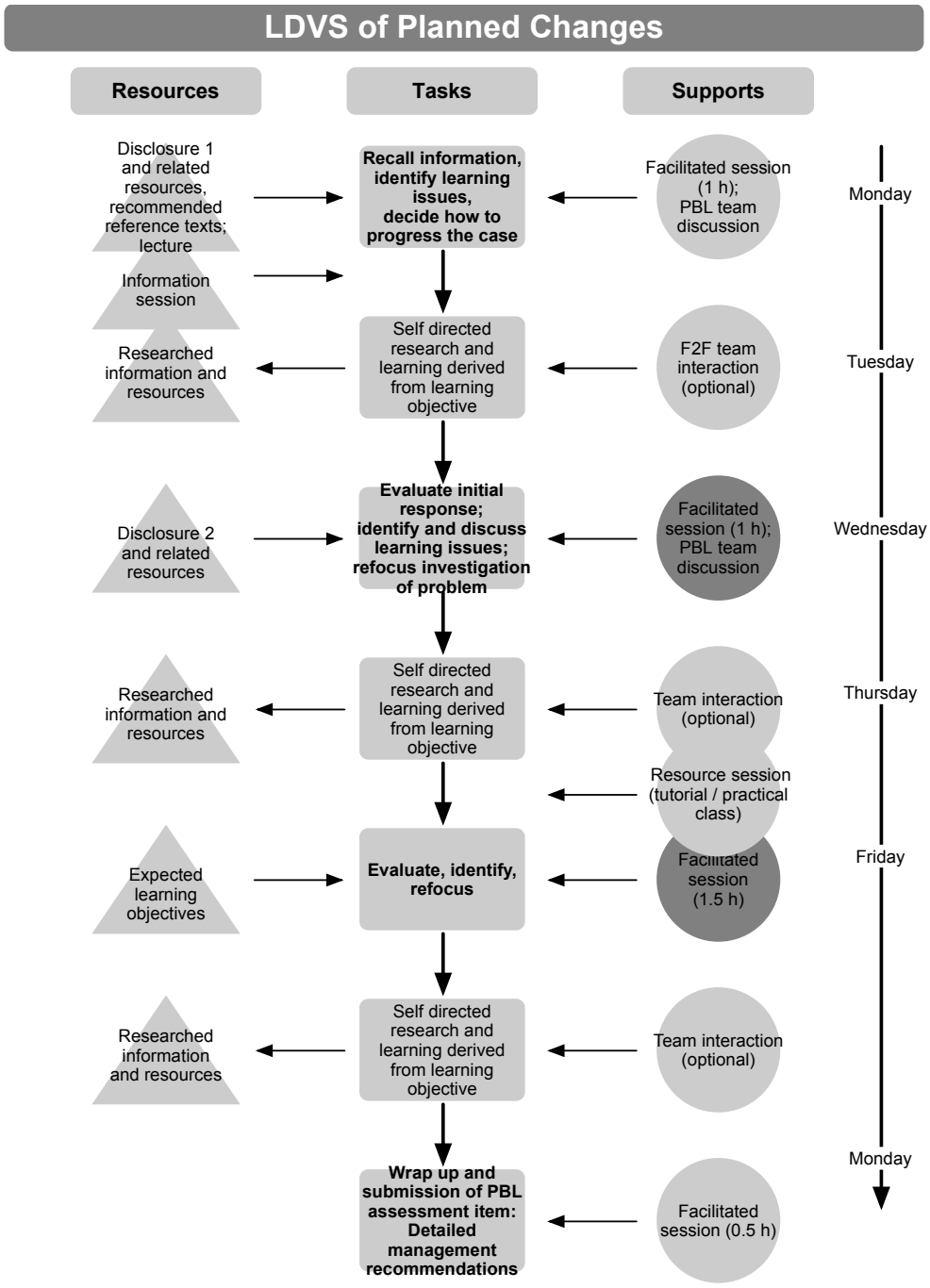


Figure 4.17: Alison and Lana's planned changes to supports

4.7.3 Implementation and further design

Design work continued through the start of the semester. Choosing the most appropriate problem-based learning package to move to flexible delivery was an early step. They reported that the target package was chosen for redesign because it was well-developed and students had not struggled with it in the previous offering. Being

comfortable with the pedagogy of problem-based learning already, Lana said the focus was on the considerations and impacts of shifting to a more technology-delivered implementation:

> I think from my perspective, because conceptually we're very comfortable with those Learning Designs, particularly how they relate to problem-based learning, for me it was more about ensuring that I didn't disadvantage the learning opportunities in this package for the students and that I actually hopefully enhanced their learning environment by encouraging further online discussion. (Lana, I-4)

Talking about their design work on the package, Lana said:

> It probably took over a period of time, half a day planning and then probably another half-day in terms of looking closely and carefully at the package and working out how we could format it without changing the [learning] path that the package was going to take. (Lana, I-4)

The LDVS of the designed problem-based learning activity is shown in Figure 4.18. The changes are shaded darker for easier reference.

Alison and Lana reported that the shift to a more online delivery of the problem-based learning package required a number of adjustments to the package. First, the Wednesday and Friday face-to-face facilitated tutorials were converted to online discussions on the LMS site (the third and sixth support circle in the diagram on the right). In order to ensure that the necessary work was done by students, they decided that this online interaction would have to be linked to assessment. During the normal Wednesday tutorial time, students were required to respond online within specific timeframes to the disclosures and resources (the fourth resource triangle in the right diagram) that were released at timed intervals. Second, without a face-to-face facilitator to support students' learning, Alison and Lana said they decided that some extra support was needed within the package. They identified specific research areas for each problem-based learning team and linked each of these to a specific learning outcome (the third support circle in the diagram on the right):

> The purpose was so that [the students] could focus their learning a little bit and focus their resourcing. It wasn't so much that we actually provided them with resources. I suppose they were given a little bit more direction. (Lana, I-4)

Alison said they also worked to ensure that the tasks remained a collaborative team process, and "that everybody was involved and everybody was pulling their weight" (Alison, I-2). Despite the fact that the online interaction was assessed, Lana expressed a hope that students would find the use of the tools an aid to learning rather than just a requirement for assessment.

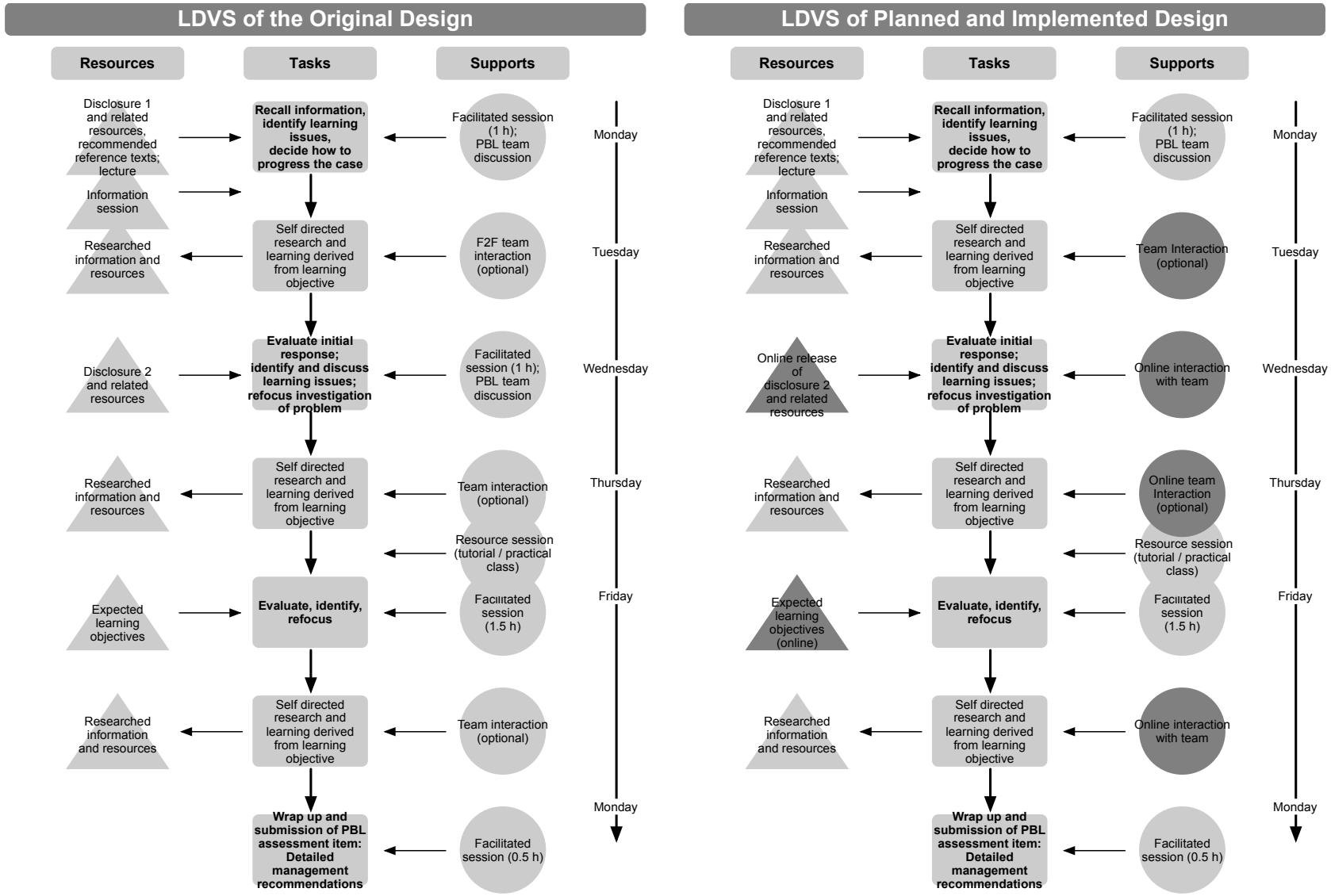


Figure 4.18: LDVSes of Alison and lana's original, and the planned and implemented designs

For the design of the activities within the LMS site, Lana and Alison said they spent time learning to use particular tools such as the wiki and blog, and spoke to colleagues about their experiences using these tools. Lana reported that she also spoke to the school's Learning Designer to clarify her understanding of what the tools could do and to ensure she "wasn't asking students to do something that wasn't possible" (Lana, I-4). With this knowledge they set up a unit site, as well as group sites, giving each student group access to tools including the chat room, wiki, and blog. Alison and Lana said that use of a particular tool was not made mandatory because they were mindful that some students might not be as comfortable with the use of all of the tools.

When asked about how the *Problem-Based Learning in Medicine* Learning Design affected their design process, Lana said that the Learning Design reinforced what they knew about problem-based learning:

> It reinforced conceptually what we were already looking to achieve through our PBL curriculum…and I suppose for me, thinking about this process…it refreshed those concepts and ideas. But I didn't think there was anything new in there that we hadn't already toyed with or looked at or thought about in the development and ongoing review of the curriculum. (Lana, I-4).

Similarly, when talking about support for designing in the online environment, she reiterated that the Learning Design provided "reinforcements and, if you like, moral support. It reminded us of the important concepts but didn't provide anything new" (Lana, I-4).

The implementation of the problem-based learning package took place in the final week of October 2009 after a delay due to illness. Alison and Lana reported that during implementation they had not made any changes to their plan. When asked about how the activity went Lana remarked:

> Certainly as far as the delivery online, I thought that went very well. I would put a lot of that down to careful choice of the case and the fact that the cohort of students that were involved are experienced problem-based learners. I think it would work much less well with inexperienced problem-based learners...[the fourth-year students] were better able to deal with the anxieties and frustrations that were associated with that level of independent learning. (Lana, I-4)

Alison and Lana reported that the initial student response to working online was slow but soon increased and, in some cases, exceeded the tools' limits:

> They reached the capacity of the forum really quite quickly. They filled it up and so that actually put an end to their discussions and they had to find another place. One team actually chose to meet face-to-face because they were a bit deflated by the fact that they couldn't talk online anymore. (Lana, I-4)

Even though the groups had not been required to meet face-to-face, Lana reported that most teams chose to meet face-to-face at least once; Alison said she thought this might have been because the students felt that meeting "online was just...too foreign to them at this stage" (Alison, I-4). Lana described some of the strategies used by the teams:

> One team...did all their interaction online. The quality of the use of the tools for that group was better than the others...some of them met on the Wednesday...as if they were sitting in a normal PBL tutorial. And then once the disclosures became available online they'd discuss them there and then, [then they] identified the learning issues and…went their separate ways, and then interacted online to address those learning issues. Then [another] team chose to independently view the disclosures on the Wednesday, they communicated electronically on the Wednesday afternoon and then they met face-to-face on the Thursday to identify where they wanted to go with the learning...and what they needed to find out before they came to the Friday tutorial. (Lana, I-4)

Student groups were allowed to make their assessable contributions using whichever tool they wished because Alison and Lana did not "want [fear or lack of skill with the tools] to be impacting on what [the students] could do in terms of what they achieved through their assessment" (Lana, I-4).

4.7.4 Reflection

After the completion of the unit, Alison and Lana were asked to reflect on the design of the problem-based learning package. Lana commented on whether she thought the vision for what they wanted to do was achieved:

> From my perspective I actually probably achieved more than I set out to... I think we identified, particularly with the electronic resources, how we can better integrate those...across not just the PBL curriculum but other aspects of the curriculum as well. (Lana, I-4)

Student feedback on the changes was sought through a face-to-face discussion as well as an anonymous online survey tool. Lana reported the students' feedback about the process, saying that students indicated that they liked having access to resources on the LMS site and the ability to research online while discussing the disclosures. Lana summed up the students' feedback as follows:

> They said they were happy with it...however, they proposed that a modified version would be possibly of greater value to the progression of the case and [their] learning. And they identified that this process...certainly supported their self-directed learning, but they'd consider it a useful addition to the delivery of packages rather than an alternative. [Also] that they would appreciate very much an opportunity to be able to come back as a group and have a longer and more in-depth [facilitated] discussion session. (Lana, I-4)

The face-to-face facilitator's role of guiding learning and acting as a checkpoint was something that students reported they missed in this online design.

Alison and Lana reported that the learning objectives had been addressed well by students, which they indicated had been shown in the students' written work and discussions. Lana said that the design allowed students flexibility and opportunities for deeper learning. Overall, Lana said, "the general consensus was that it drove their learning further...than [the students] thought the traditional process of receiving paper-based disclosures would have" (Lana, I-4). However, Lana reported that despite the high levels of interaction and reported learning benefits, the exam results were similar to those of a previous cohort.

Alison and Lana reported that the process of redesigning and implementing the problem-based learning package in this way had helped them learn how to better integrate online resources, with Lana saying, "I think we identified, particularly with the electronic resources, how we can better integrate those...across not just the [problem-based learning] curriculum but other aspects of the curriculum as well" (Lana, I-4). They also reported that the activity helped "identify a number of limitations with the wiki, the blog and the forum" (Lana, I-4) and revealed some misconceptions about students' abilities and adaptability to technology:

> One of the faults on my part was [that] I made the assumption that because of the generation difference that they would be more able to adapt to using those sorts of

> tools...but they were not keen, let's say, to experiment with them. I think if there had not been an assessment behind it, the uptake and use of those tools would have been a lot less. (Lana, I-4)

Alison pointed out that the program as a whole had just started using these tools, and in future years' students would most likely be more familiar with them by this stage in the program.

Reflecting on their experience with the Learning Design Framework they chose, Alison reiterated some of the comments she had made earlier in the study. She indicated that the basic problem-based learning information was in the Learning Design but that the veterinary-science program lecturers were already adept in the basics of problem-based learning, "so it probably wasn't as useful for us...it just confirmed...what we were trying to do" (Alison, I-4). While Alison and Lana said they felt the Learning Design was not at the right level for their needs, Alison commented that "for somebody new contemplating [problem-based learning] it would certainly be a very good base to start from" (Alison, I-4).

4.7.4.1 Plans for the design

When asked whether they thought they would deliver the problem-based learning package in this form again, Lana said:

> That hasn't been either discussed or decided at this point but the students were actually quite keen for this to be integrated, but more broadly, into the PBL units. But we would need to be very careful about how we introduce that and integrated it to make sure that we weren't disadvantaging them in any way. (Lana, I-4)

If they tried this online design again, Lana said that exploring how to best support students with the tools and reduce the number of technology problems would be key goals. Lana hoped to work on solutions with the Learning Designers at her university and planned to share the experience of this implementation with them.

4.7.5 Summary

Due to a change in the target unit, there were two participants involved in this case. Both Alison and Lana were experienced university lecturers and had experience using problem-based learning to teach their students. The problem-based learning package

that was redesigned as part of this study had been originally designed six years previously and had undergone regular modifications since that time. Alison was the participant who chose the Learning Design. She had not used a Learning Design before and her initial goals were broadly to explore other problem-based learning designs for ideas and to benchmark what the program was doing with their problem-based learning units. Alison chose the Problem-Based Learning in Medicine Learning Design because it most closely aligned with how the program's problem-based learning units were designed. Her plan was to convert one problem-based learning package to be delivered more flexibly. However, she felt that she would need more guidance in how to implement the online aspects of the design than that contained in the Learning Design.

After the selection of a Learning Design, Alison decided to change the target problem-based learning package for redesign to ensure that students were ready for this kind of change. From this point, Alison, who was the coordinator of the target unit, worked collaboratively on the design with Lana. Alison and Lana did not identify specific design steps. They chose a package they chose to redesign based on past student performance and package complexity. They spoke about reading through the Learning Designs and discussing ideas for how they might convert the packages for online delivery. They both indicated that the Learning Designs, while a good introduction to problem-based learning, did not contain any information that they didn't know already.

Alison and Lana did not make any changes to their planned activity during implementation and indicated that the design had allowed students both flexibility and opportunities for deeper learning. The main challenge to implementation was the discovery of unknown limitations of the tools within the LMS.

After teaching was completed, Alison and Lana said that the process had helped them to identify how to better integrate online tools into the curriculum. They also indicated that student feedback had indicated support for wider adoption of a flexible model; however, no decisions had been made about whether this would happen.

4.8 Mary

4.8.1 Background

Mary was a full-time education lecturer at a regional university. She had been teaching in universities for 10 years and had over 20 years' teaching experience in schools. She could not recall exactly when she began using technologies in her teaching but estimated that she had started using them about 13 years ago when she was a teacher in schools. Mary said she was always keen to try new tools and technologies and would be considered an early adopter by her colleagues. The unit to which Mary chose to apply a Learning Design was a professional-experience unit in education program. Mary said the unit had originally been created to provide opportunities for education students to extend and apply their understanding of Indigenous knowledge and perspectives in schools with a high Indigenous population. When Mary had begun working at her current university two years previously, she had been asked to redesign and teach this unit. This case describes the design and implementation of the third offering of the unit.

4.8.1.1 Previous design work and context

Mary's redesign of the unit two years previously highlights both her experience as an educator and her student-focused approach. The circumstances and timelines for the redesign of the unit had not been ideal. She had started work at the university only two days before the beginning of teaching and had been told that the unit was in need of a redesign. Therefore, she lacked contextual information about the unit and sufficient time for her design work. Despite this, Mary endeavoured to redesign the unit. The learning objectives were set, but other than that she said that she had freedom to adjust assessments and tasks with the approval of the Head of School.

She recounted that she began by reviewing the learning outcomes for her unit, gathering information on similar units, speaking to other lecturers, and brainstorming ways that the outcomes could be achieved. Then in the first week of class, she presented her ideas to her fourth-year students and involved them in the process by negotiating the choice of content, problems, activities, and assessments that would lead towards the learning outcomes. Mary said she

> used their local knowledge to identify what the problems might be...[and we] walked through all the possibilities. I then went away reworked it, brought it back the following week and we sort of changed a few minor things. And we ran from there. (Mary, I-1)

At the time, the university was also piloting a new LMS; Mary, not wanting to work in a system that was being replaced, volunteered to be part of the pilot group. She set up the LMS site in stages, providing resources and creating weekly learning modules. She said that she liked the access that the LMS site provided:

> I found it absolutely brilliant because everything's online and the students have access, and so do I, 24 hours a day, 7 days a week, all over the world.... So I just gradually built the modules and the resources. You know, week by week as I went. (Mary, I-1)

In addition to uploading resources, she spoke of using the site to communicate with students via announcements, a chat room, and blog posts.

After the first offering of the unit, Mary made adjustments based on knowledge gained from the experience of teaching the unit and the students' feedback. She reported that she had not made many major changes to content, but had adjusted the weightings of the assessments and moved to less face-to-face class time. In the LMS site she set up several student group sites so that the practicum groups could have a place to interact, develop ideas, and store group project resources. She also changed some of the tools she used; for example, she replaced the blogging tool with the more stable wiki tool and reduced the use of the chat room. She said that the biggest barrier for her in designing with technology was "the sense of being overwhelmed with the possibilities or not really understanding.... I've really got to sit down and really knuckle it out" (Mary, I-1).

4.8.2 Pre-semester design work

4.8.2.1 Design plans

Eleven weeks before teaching the third offering of the design, Mary related her plans for the upcoming offering of the unit, which were focused on ways to address the fact that she was going to be overseas during both the pre-semester design period and the first six weeks of class. As a professional-experience unit, Mary stated that students spent

extended periods away from campus for their placements. The LMS site had therefore been a key tool for continued contact and facilitation of student projects in previous offerings. However, the early weeks had previously been face-to-face, and had served as the foundation for the later, more flexible work. In the upcoming semester, Mary would be overseas during these early weeks, making it necessary to shift these initial weeks from face-to-face to online. Mary indicated that she was concerned that the information and connections that students normally got from the early interaction within lectures would be lost. She wanted to have some sense of this interaction within the LMS site but said, "I've got no idea how I'm going to do that. I'm hoping that, you know, I'll get some brain waves as I go through those Learning Designs" (Mary, I-1). Mary stated that her goals were to create a community experience for students. She wanted to add different forms of media and tools to support student communication and collaboration, and improve the organisation and consistency within the site.

Before being introduced to the Learning Designs, Mary indicated that she had not used a Learning Design before and did not have much knowledge of what Learning Designs were; however, she said that she hoped to find some inspiration for changes to activities. After being shown the Learning Designs, she also said that she would like to add a Learning Design Visual Sequence (which she referred to as a "flow chart") to her site to "scaffold [students'] week-by-week learning" (Mary, I-1).

4.8.2.2 Learning Design selection

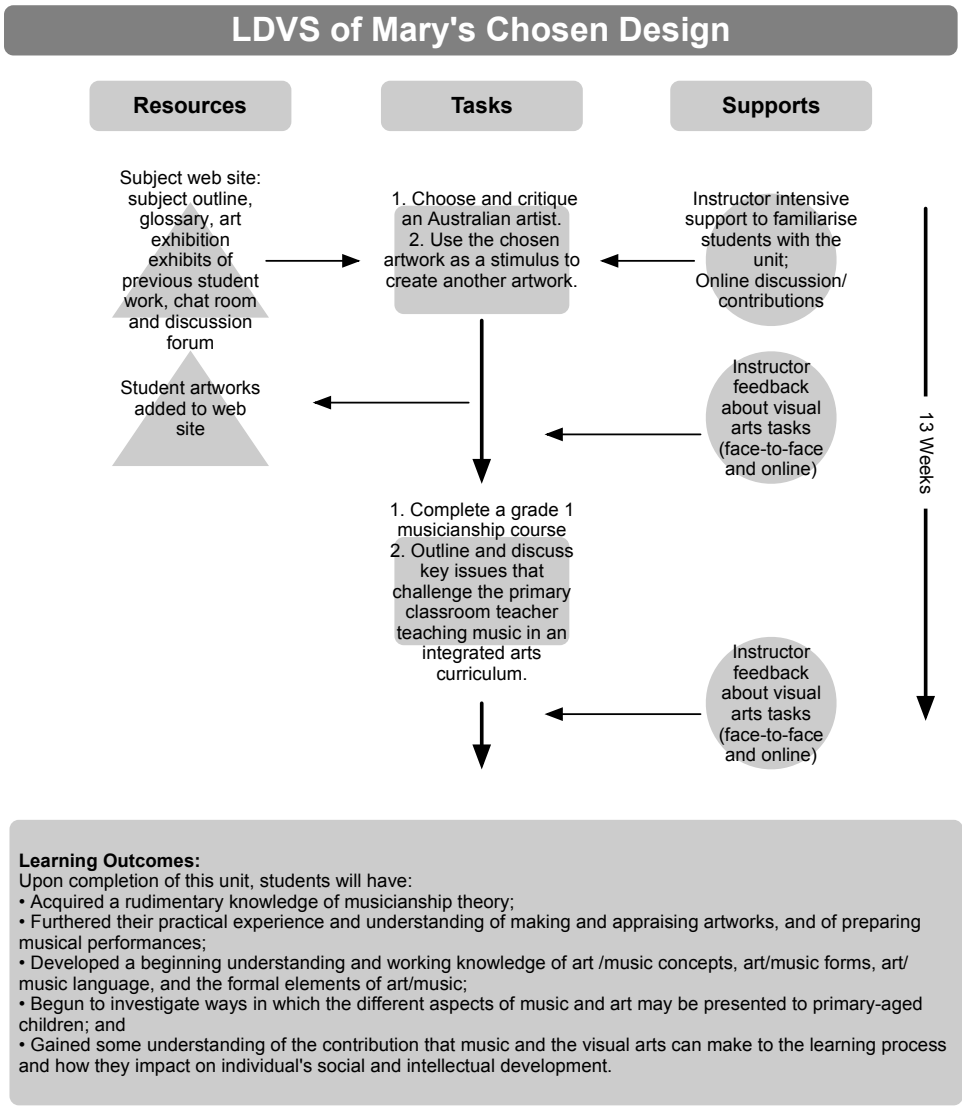
Five weeks before teaching, Mary spoke about her experience of choosing a Learning Design, including the process and reasons for her choice. When searching through the Learning Designs, Mary said she had looked at the pedagogical focus areas that organised the Learning Designs, but the main criterion for her first step had been key terms in the Learning Design titles. She reported that she looked for key discipline words like 'teachers', 'teacher training', or words that represented what she wanted to do such as 'interactivity'. If the title did not resonate with her, Mary said she did not look at it any further. She gave the following example:

> I don't seemed to have opened any of [the Learning Designs focused on role plays] because...[the titles] just don't engage with me... 'Middle East

Politics'...could be spot on, but I can't imagine that being much use to me in terms of what I'm doing. (Mary, I-2)

If the Learning Designs title was of interest, Mary said she would open it and evaluate it "by reading what each of the designers intended with their Learning Design and trying to match…outcomes and expectations from the [unit]" (Mary, I-2). Finally, although Mary said she was "more conceptual than visual" (Mary, I-2), she thought the LDVS was the deciding factor.

The Learning Design Mary chose to use was *Interaction Among Trainee Teachers* (Figure 4.19). This Learning Design came from the Education and Educational Technology discipline grouping and was part of the collaborative focus. The aim of the design was to encourage student communication within the LMS site.



*The wording of this diagram has been modified to ease reading and display.

Figure 4.19: The LDVS of Mary's chosen Learning Design, *Interaction Among Trainee Teachers* (Alter & Hays, 2002)

For Mary the design aligned with her past pedagogical approach as well as her goals for the unit:

> Even the…outcomes were similar. I wanted to develop communication group skills. I wanted [students] to engage with information/communication technology because I really believe they...need to be literate in terms of [information and communication technology] use themselves, as well as teaching children to use it. Those life-long learning skills of independent learning, engaging with academic concepts, all those things were very similar. (Mary, I-2)

Additionally, Mary said that when she read the implementation section that detailed the original implementation context she found the design aligned across other key aspects such as timing, student numbers, breakdown of assessments, and requirements for online participation.

After her selection of a Learning Design, Mary shared her reservations and difficulties with the process. Additionally, she cited the necessary time investment as well as the website's design and use of terminology as barriers. She said that she had spent more than 10 hours looking through and working with the Learning Designs. This was something Mary was not sure all lecturers with heavy teaching and research loads would be able to afford. One suggestion she had for aiding the selection process was the addition of more summary information on the page that listed all of the Learning Designs. Referring to the terminology used within the site's navigation she remarked, "I'm not a Learning Designer. I'm a teacher. I'm a lecturer. I'm an academic. [So] a lot of the terminology to me doesn't say what's behind it" (Mary, I-2). She also expressed her reservations about the idea of best-practice models in general:

> I'm still not totally convinced that [the currently popular idea] of best practice or showcasing design, etc., is the answer for me in terms of producing the best teaching and learning for my students.... I guess as we get older and more experienced we start to recognise much better the things that…engage us and...reading about what other people have done doesn't engage me particularly well unless I have a real reason for doing it.... I am learning a great deal but it's a little bit of a struggle. (Mary, I-2)

4.8.2.3 Design work

After selecting a design, Mary's tasks focused on finalising her unit outline, setting up the LMS site, redesigning activities, and creating an LDVS to represent her unit's design. Mary said that after her initial read-through of the Learning Design she had not gone back to her chosen Learning Design, saying, "for me there wasn't anything really new or different, you know – those are the steps I would expect an experienced teacher to go through" (Mary, I-3). However, she did mention a sense of reassurance in what was represented there:

> I read through [the Learning Design] and, you know, as someone who's been lecturing for 10 years and teaching for 35 I guess I felt happy that most of what was there was stuff that I appear to do from tacit knowledge or intuitively. (Mary, I-2)

With an already established pedagogical design, the main value that Mary got from the Learning Design was not the pedagogical model but the LDVS as a tool to represent her practice. In fact, Mary's creation of an LDVS for her unit was a key aspect of her process and affected her thinking.

The LDVS Mary created (Appendix L) was more detailed than the LDVS of the Learning Design she chose, and represented close to a week-by-week task focus to guide the students. She was enthusiastic about the potential of the LDVS to support her students' understanding of the unit's design:

> I sound like a child with a new toy. The concept of using a Learning Design sequence and actually putting everything into it and so representing the course...it has been for me a bit of a revelation...and I'm quite excited to see whether the students engage with it. (Mary, I-2)

While Mary said her purpose in creating her LDVS was to aid her students, the creation of the diagram had also made Mary think more about how things were connected in her design:

> What was most useful for me was just that whole concept of developing the [LDVS] flowchart and the ideas...of how the different sides of it would interact...that whole concept of resources, tasks, and supports and then that sort of

> timeline down the side...[as well as] tying in the student learning outcomes to the [LDVS]. (Mary, I-3)

The impact of creating the LDVS on Mary's design work could be seen in how she described her design of the modules, assessments, and unit site for this offering. Mary also said she added in a great deal more scaffolding for the modules and assessments, and she attributed this to the LDVS creation process:

> I've actually gone through and reiterated it, you know, step one, step two, step three, but I did that because I was very conscious of the Learning Design and the fact that there perhaps has been a greater need to scaffold the students' learning. (Mary, I-3)

The visual links and steps appeared to focus Mary's thinking on the connections within the design. She said that previously she would have done this kind of thing in a lecture, but because of the virtual nature of the first half of the unit, she felt it might be more important to explicitly support the students' process with the LDVS.

Her design process for the first assessment further illustrates how she made the LDVS connections visible as she worked:

> I went step-by-step, that was sort of new and influenced [by the Learning Design]...I actually had sticky notes and...went through the other modules and tried to put, okay – this links to this links to this...it was like a Learning Design on my desk with all these sticky notes. (Mary, I-3)

Using the LDVS diagram as a tool in this way made Mary feel more confident in the coherence of her design:

The whole idea of following the Learning Design was about clarity. Clarity that we can perhaps get when we've got students face-to-face, but when we don't have them face-to-face, when we're relying on a website, there's a definite need to make things more clear. (Mary, I-3)

One challenge Mary reported having early in her process was becoming distracted by technology, which took time away from her main design tasks. She said the problem occurred when she went "looking for some further ideas and support for problem solving" (Mary, I-4) and IT tools that she could not find in the Learning Design:

> I looked at the [Learning Design] sequence...and found that a fairly worthwhile exercise. What I didn't learn and what I then went searching for was more of

> those IT tools that I could use, and that's where I really hit problems because I don't have the IT support and I don't have the software that was necessary.... I'm a teacher. I'm not an IT design specialist and I can go so far and then I just get frustrated. (Mary, I-2)

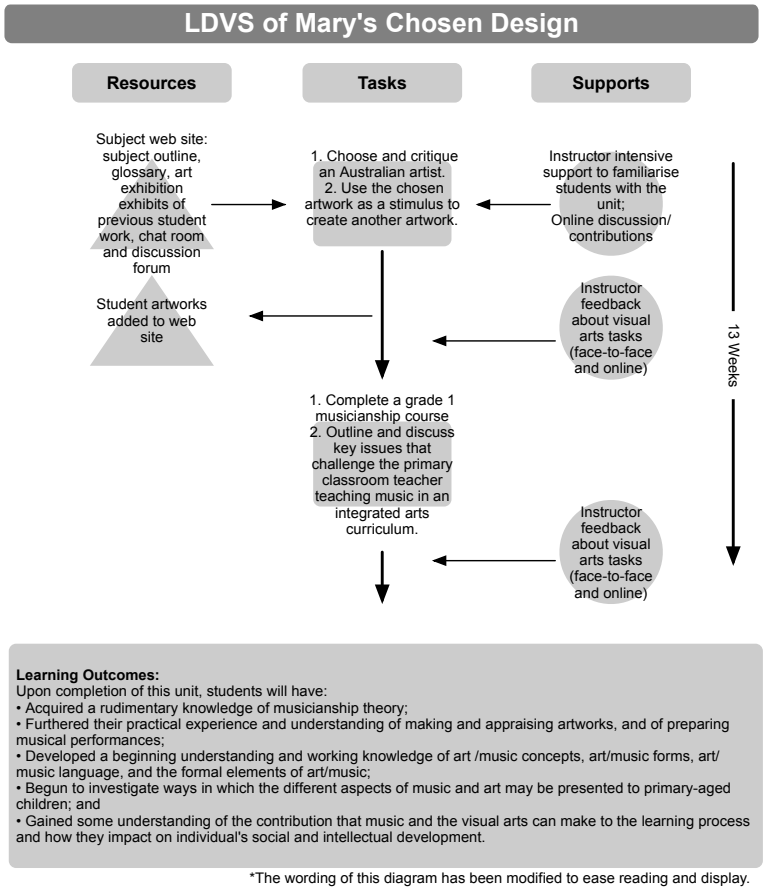
After spending time struggling to install and set up a tool, Mary became aware that this was taking time away from design development, polishing, and pedagogical links, so she shifted her focus back to these items. On reflection, she said that she should have trusted her educational experience and kept the changes simple from the beginning, rather than trying to add in impressive technology tools.

As a result, Mary reported that her choice of tools and structure of the unit's main site were very similar to what she had set up in past offerings. The main addition to the site was the LDVS she had created. She said she had worked hard to get the content of the unit up into the site before the start of teaching because "one of the real things that gets up the students' noses is when you change things" (Mary, I-7). She reported that she put up all the learning modules, organised resources, added announcements to communicate important updates and information, and added the wiki for group work and the chat room as a real-time meeting space. Despite having the majority of the site ready early, Mary emphasised she planned to have a dynamic and flexible site that she could change depending on how the students responded. This flexibility was something that she had not seen within the Learning Designs she looked at: "I think that was one of the things that frightened me.... I don't work having things completely ready. I do need to be able to make changes as I see...students and the individual groups...[and] I'm very conscious of not overwhelming them with technology" (Mary, I-3).

4.8.2.4 Planned design

Figure 4.20 shows the LDVS of Mary's chosen design, *Interaction Among Trainee Teachers*, and the LDVS of her planned design. As mentioned previously, Mary had selected a Learning Design that aligned with things she already did or planned to do with this subject. Therefore, when comparing the original design to her planned design Mary cited a number of similarities. For example, Mary said that the key pedagogical goals of collaboration and peer interaction, and the use of asynchronous and synchronous tools to support these goals, were in alignment with her design. These

were also the features that had initially drawn her to the design. However, after her initial read of the Learning Design, Mary had gone on to design her unit without specific reference to the Learning Design, and therefore was unsure as to how the described sequence had influenced her. She said, "It's like when you write a story, everything in your life influences what you write. I suspect that this did influence me. There [are] some similarities between my site and the sorts of things that they've written here" (Mary, I-3).



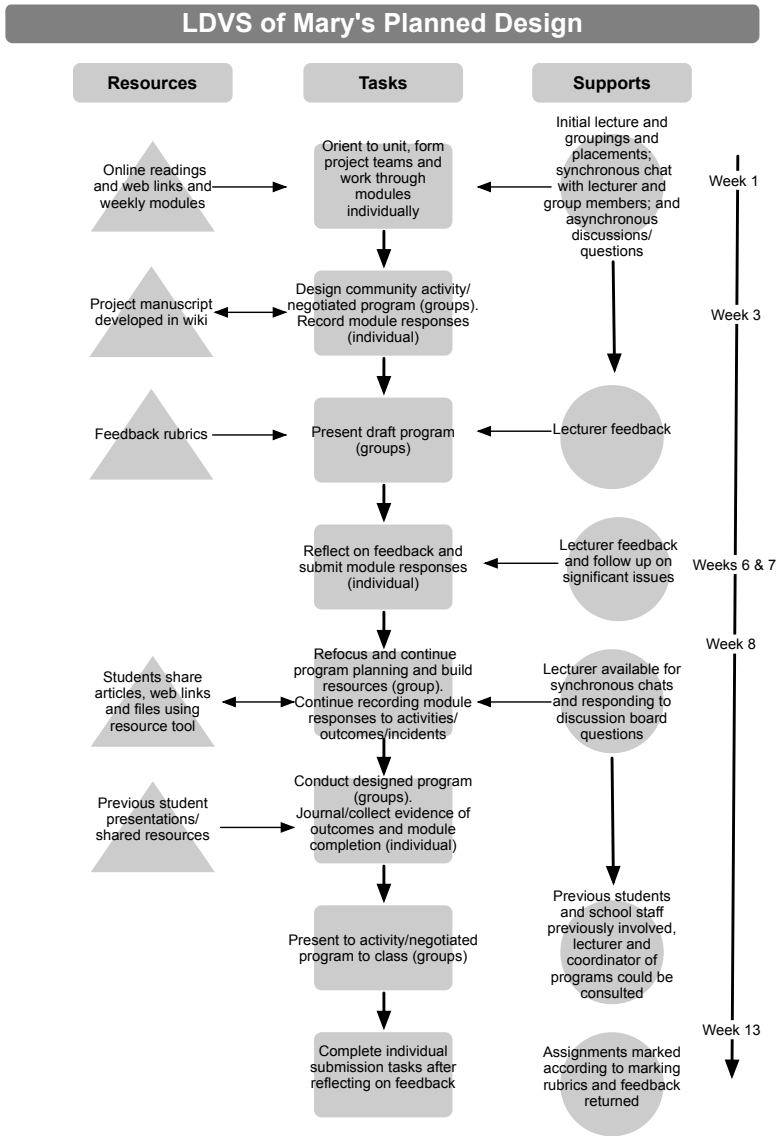


Figure 4.20: LDVS of Mary's chosen design and planned design

Throughout the semester, Mary planned to have students working both individually through the modules and in groups on the major group project. These two activity streams fed into each other. The major group task was for groups to design (task rectangles 1-4 in diagram on the right), conduct, and present outcomes on a community activity/negotiated program (task rectangle 7 in the diagram on the right). Mary divided the design of the community activity/negotiated program task into a series of milestones with feedback to guide students towards the culminating task of conducting the event (task rectangle 6 in the diagram on the right) and a final presentation to synthesise and communicate the outcomes to the "community" (in this case the class). Mary paired this with individual module tasks, which had students build knowledge through module readings, activities and reflection on both individual and group activities. Comparing her design and creation of the LDVS to the original design, Mary said she used:

> that concept of instructor feedback under support…excessively... I used the ideas and the outline but...I put a heck of a lot more detail into the flow chart or the Learning Design sequence. (Mary, I-2)

Mary saw relationship building with students as key and said she was still somewhat uncomfortable with the distance between her and the students in the online environment:

> I still believe that undergraduate courses in particular do need the face-to-face contact, do need the lecturer understanding their students, what their students' need, their students background experiences, their different skills, their different attributes, etc. (Mary, I-3)

As a way of easing her concerns, Mary had arranged for another lecturer to go and meet the students at the first class

4.8.3 Implementation and further design

The unit was implemented in Semester 1. Reporting on the first month of teaching, Mary said that she had set up student project sites and reported that the groups had been adding resources and using wikis for meeting notes. Mary said that the unit was going well, citing the fact that students had gotten started on their work without much assistance. While overall she took this lack of questions as a positive sign, it also concerned her:

> Maybe I always think the worst, but...in past years if I'd been sitting in my office I would have had lots of queries, whereas this year there have been very few. I've been going online every Monday night.... I tell them I'm going to be in the chat room for an hour and...a few come on but it hasn't been huge. And I've told them anything urgent, to email me and there's been a couple of emails but very few. (Mary, I-4)

Mary said she worried that the distance was the reason for the silence, and felt that she would get a better indication of how things were going when she returned to Australia in Week 6 and saw the group presentations.

After returning from overseas, Mary met all the student groups for their presentations in Week 6. Later, in Week 9, she was still happy with how the unit was going; however, she did report group dynamics as one challenge to the smooth running of the unit, saying "some of the groups are falling over despite their presentation to me [in Week 6] when they all got on so well" (Mary, I-5). Mary attributed the problems within the groups to students' lack of full engagement with the readings on group work that she had assigned:

> I can see why they're falling over because as I read their individual assignment…[I can see] they didn't really identify the important aspects of group work. They really mainly went by what they already knew and didn't do the reading.... One can't help but feel disappointed that despite your very time-consumingly conceived learning plan and process for their learning that they don't do it and then they suffer the consequences. (Mary, I-5)

Within the individual assignments, Mary said she sought feedback on the unit and asked students how they worked out what they were supposed to do. Given the time she had spent on the LDVS, she had hoped to receive a lot of feedback on their value. After the first assessment, she said she was:

> A little disappointed that of the, say, 40 individual assignments I marked...at the most, five actually mentioned the Learning Design [diagram] as being something they engaged with.... Those five actually said it was fantastic, said it really helped them understand what they were supposed to be doing. And I'd have to say they were probably on the whole my high-distinction and distinction students. So, what does it tell us? I don't know. (Mary, I-5)

In the second assignment, only one student commented on the LDVSes. Again, this feedback was positive, but Mary had hoped for more students to comment. She reported:

> [The student] actually said 'the Learning Designs are very clear and outline exactly what needs to be done each week – both individual tasks and group tasks. The format gives a very clear and holistic picture of this unit'. That's very good news, except for I would say she is the only one who commented. (Mary, I-7)

Mary wondered if perhaps the other students had just taken the LDVSes for granted. She said that she had not explicitly stated that students should read the Learning Design diagram she had created, and talked about adding that direct instruction for the next offering.

Mary did not make any major changes to the unit during the semester and overall taught it as originally planned (see Figure 4.20). As she pointed out, making changes to a unit was not an easy task so it was important to have your plan in place before teaching starts:

> I'm too scared to [make changes]. If we make any changes, it has to go through our Head of School and they have to be approved and I've learnt that that is not a good thing to do, which is why I bust my guts to get it all absolutely as perfect as I can before the subject outline gets published. (Mary, I-7)

She used the unit's LMS site and tool set as planned, adding only the group project sites after the semester started. According to Mary, each group used their project site quite extensively. Mary said the students were "blown away by the potential of their project sites" (Mary, I-7). Each of the group project sites was set up with a similar complement of tools to the main unit site, and Mary said that this was where most interaction took place. In general, Mary reported that groups used the sites and tools in much the same way as she did in the main unit site. The students used the wiki in a variety of ways (e.g., to keep minutes, develop the proposals, do module work, and respond to readings), and she said that she was impressed by the students' use of the chat room for group meetings.

During teaching, Mary also spoke of wanting to use an LDVS diagram again:

> I teach four subjects...[and] I wish I had ownership over the other subjects that I'm teaching because I think I would do a Learning Design again. (Mary, I-5)

When asked to clarify how she would use a Learning Design in her other subjects she said that she would use it to both design the subject and create another LDVS to aid students.

4.8.4 Reflection

4.8.4.1 The design and Learning Design

After the completion of the semester, Mary talked about the design and implementation as a whole. Reflecting on the selection of a Learning Design for her unit, Mary said that she had chosen a one that aligned with the way she already taught. She therefore found, unsurprisingly, that "it affirmed the things that I already did" (Mary, I-7). Mary reported that she thought the unit had run better than in previous years. She related anecdotal observations about how it was better but was not sure if they were because she had taught the unit before or because she had created the LDVS for students and made more connections herself in the unit. One improvement she reported was the increase in the proportion of students who handed in final assessments that were complete and had followed all of the necessary steps. Mary said that 55 out of 56 students had done this, and "for my students, that's pretty exceptional" (Mary, I-7). She also found there were fewer complaints and queries than usual from the students about what to do.

Mary's work with the Learning Design mainly focused on the creation and use of a visual representation of her unit. She said that as a trained teacher she was coming to the Learning Designs "backwards." By this, she meant that she already had a good understanding of pedagogy. She saw the visual representation not as a way to communicate the pedagogy to herself but to her students:

> Because of my many, many years of teaching, I seem to intuitively have a Learning Design, but to put it down in that diagrammatical format – fine-tuned it, yes, provided a visual representation of it, yes, but in many ways was just an extra tool to support my students. (Mary, I-7)

While this quote she downplayed the impact of creating the LDVS on her process and thinking, another of her reflections illustrates that using the LDVS to represent her design also raised her awareness of design links and steps:

> I'm much more conscious of the links – all those little arrows that I have on the Learning Design sequence where everything interacts.... So I keep bringing [the learning outcomes] back and linking [them] together with the resources, the tasks and the supports and the weekly progress timeline, and because that's so visual... I think I knew it intuitively before but I think I've just become much more aware of that and how the whole subject content, knowledge, skills, experience, understanding – how they build from week to week. (Mary, I-7)

Thus the impact of the Learning Design Visual Sequence extended beyond her goal of just a communication tool for students. She also said that the experience of working with the Learning Design and creating an LDVS had affected her thinking when teaching her other face-to-face units.

4.8.4.2 Plans for the design

Mary said that the design of this unit was good and that she would only make a few small changes to the LDVS for the next offering. In the future, she planned to continue to use the LDVS diagram as a design tool in this and other units. She was also keen to share her experience with colleagues and, for the upcoming semester, had begun work on another LDVS diagram of a unit to share with lectures of a unit she was convening. She saw the LDVS diagram as a learning tool, saying "We never stop learning, and this is something that I would like to see me sharing with my colleagues. Even though...we, as teachers, are coming into it backwards, it's actually, to me, something that's really worth sharing" (Mary, I-7). In addition, Mary said that she wanted to use the LDVS to "engage [students] in conversations around the Learning Design" (Mary, I-7).

4.8.4.3 Summary

Mary was an experienced educator with an established pedagogical plan in place for her unit. As Mary said at one point, she felt that she was coming to the Learning Designs backwards because she already had strong pedagogical knowledge and plans in place. Mary's original design work on this unit had involved reviewing the learning outcomes, brainstorming how the outcomes could be achieved, and then negotiating the curriculum with her students. Since then, she had used her experience and student feedback to guide adjustments. For this offering, she had not been looking to make large pedagogical changes to what she was doing.

Therefore, Mary approached the Learning Designs looking more for inspiration and ideas to improve her model than for a new model or guide to follow. When searching for a design she focused initially on key discipline words within the title and used the LDVS to help give her the picture of what was happening in the design. She selected a design that aligned with her pedagogical ideas, context, and discipline area.

The key influence of the Learning Design on her design process for this offering was not the pedagogical ideas of the design but rather the representational power of the LDVS. She used the representational ideas from the LDVS formalism to create a representation of her unit with the purpose to support students' understanding of her design. While her focus was almost solely on the power of this diagram to aid students, the creation of the diagram also impacted on Mary's design process and thinking by making visible the pedagogical links within her design. Mary's tool use did not change much for this offering, but she reported that she had been clearer with how she set out materials and made links within the site because of how the LDVS had raised her awareness of these connections.

The designed unit ran with few issues or changes. The main challenge had been students' teamwork in the group project; however, overall, Mary reported there were fewer problems and more completed assignments in this offering than in previous ones. She was not sure as to whether this was a result of the Learning Design, but she had found the process useful and planned not only to use a Learning Design and create an LDVS again but to also recommend them to others.

4.9 Marcus

4.9.1 Background

At the time of data collection, Marcus was a senior lecturer in a research-intensive Australian university and had been lecturing for over 12 years. Marcus spoke extensively about technology being a large part of his teaching and research, and was confident in his use of technology. He spoke of enjoying both exploring and 'pushing' technologies, and reported that he was always looking at new tools to see how he might use them. Recently, he said he had been making more use of technologies outside of

the university's LMS. The unit Marcus was designing for the upcoming semester was Social Marketing. This unit presented challenges because of its subject area and content, which often focused on controversial social issues and methods for changing people's thinking related to these issues (e.g., abortion, contraception, social welfare). Marcus said that in the past the content had offended some colleagues' and students' moral sensibilities, and that he had even faced opposition to getting the unit approved because of such reactions. Marcus had been teaching this unit on and off for over 10 years, and currently taught it every second year at his institution. This case describes the redesign and implementation of the unit for the first semester.

4.9.1.1 Previous design work and context

Marcus said he enjoyed experimenting with designs for the unit and had tried a number of previous designs for Social Marketing. Past changes in the design had been prompted by a number of factors such as developments in the field, exposure to new ideas (e.g., doing the Graduate Certificate in Teaching and Learning), review of activities that had not worked well and discovery of new technologies and technological possibilities. A last reason for changes was purely to have variety. Marcus explained, "The biggest part of this is if you do the same unit day in day out, time in time out...the familiarity breeds contempt" (Marcus, I-1).

Marcus identified three ongoing challenges to the design of this unit. The first was the issue of getting the unit approved. This had often been difficult because of the controversial content matter and other faculty members questioning whether the unit fit within the discipline. A second challenge was faculty policy, which required strict adherence to a standard bell curve for all unit results. Marcus said this affected the design of his assessments and had forced him to come up with systems for preventing too many students from getting high marks. This was a practice that he was uncomfortable with. A third challenge was the mixed cohort of students in the unit. One cohort of students was from the Marketing major and therefore already had done three or four units in the area, while the second cohort of students was from another major and usually did not have any previous experience in marketing.

Marcus reported that he generally started his design work by surveying the available resources and texts. He said that there were not any "classically designed" textbooks available in this subject area. Therefore, he usually chose the most recent specialist text, which he then supplemented with relevant resources. In addition, Marcus said he provided an extensive set of resources:

> I have a disturbingly large number of PDF files at my disposal…[and] somewhere in the vicinity of two to three hundred PDF files go up to the site on average.... It doesn't matter that they don't use them. It matters that they are aware that there's a bigger field to play in than just the textbooks. (Marcus, I-1)

The weekly structure of topics and timing of assessment items were then designed with careful attention to "the terrain of the semester", which Marcus said he "judged on criteria like semester breaks, good timing" (Marcus, I-1) and students' expected learning.

According to Marcus, his school did not readily provide information about how to obtain teaching support. He reported that, in general, communications were to direct energies away from teaching and towards more time on research:

> We are told to minimise the investment in our teaching...we're told to focus on our research...it comes explicitly through the chain of command.... We're not told about where the teaching resources are. (Marcus, I-1)

Despite these messages, Marcus sought out his own supports. He said that studying the Graduate Certificate in Teaching and Learning had given him support in educational design and theory. He also looked at teaching strategies, specifically from his own discipline area, and turned to his peer network (often online) for advice. General support for using technology in teaching was available in the form of centralised university training sessions; however, Marcus's knowledge of the LMS was already strong so he said the training sessions were usually pitched too low for his needs. If he needed help in this area, Marcus reported that he would search for answers on the internet, ask peers (usually online), or direct specific questions to help-desk staff. Because of his knowledge of the LMS, Marcus said other members of the faculty often approached him for assistance. Despite his confidence and ability with technology, when asked about design support that he would like to have, Marcus's focus was still on getting more technology support. He reiterated that, in the past, he would have liked help finding more-efficient solutions to technology-supported teaching.

The LMS site for the previous offering of the unit had contained a range of tools used for communication, resource distribution, and assessment. When setting up the site for students, he said he would first try to "trim down the site" by removing unnecessary items from the standard template and set up conditional release for different cohorts. He described his approach to tool use:

> I've got a base set of technology that I like to have available.... I've [also] got a second level... I'll go through the [LMS] and pick off a set of tools which I think the students might want and [then during teaching] I will usually ask [students]...'do you want the interactive whiteboard, the chat room?'... If they do I'll activate it...and then I will monitor use." (Marcus, I-1)

Marcus said if he had a specific idea of what he wanted to do, he would try to find the tool to do it or a workaround to do it within the constraints of the LMS. Other times, he said that he would play with the available technology, discover its capabilities, and then think "what can I do with that?" (Marcus, I-1).

4.9.2 Pre-semester design work

4.9.2.1 Design plans

Marcus had four main design goals for this offering. The biggest planned change was the integration of numerous resources and presentations from a recent conference he had attended. A second goal was to review and change the assessment items. When doing this, Marcus reported that he wanted to explore the possibility of an online essay exam. A third goal was to increase classroom interaction, which Marcus said he had worked on in the last offering of the unit and had found challenging:

> [The students] all voted for [more interaction] but they didn't participate. So I drilled down a bit and found what they really wanted was...to watch other students interacting...[so] I'm still trying to work out how best to do this. (Marcus, I-1)

Finally, Marcus said he was aware that the university might be trialling a new LMS for the upcoming semester and he wanted to explore the possibilities it offered. He talked of hopes for better tools and features in the new LMS and was particularly eager to have a blog on the main page of his site. He said this would give the unit's site a sense of history and allow students to comment on his posts.

4.9.2.2 Learning Design selection

Marcus did not have any previous experience with Learning Designs; however, after his introduction to the site in the first interview, Marcus said he hoped the Learning Designs would help him to formally document his teaching plan within publications and communicate his plans to other teaching staff:

> I am really aware that I personally can't continue improvising...the further I head up the tree the more likely I am to have staff, [and] the more I am going to have to have [more formal] structures [in place]. (Marcus, I-1)

After being introduced to the Learning Design site, Marcus reported that he began his search by looking at the Learning Design foci (e.g., collaborative, concept development, etc.) that were of interest to him. He wanted a design that would fit with how his unit was taught, with a focus on "critical thinking, reading, literature, which is very different to things like finance and accounting which are more numbers-focused" (Marcus, I-2). Early in his search, Marcus reported that the Learning Design's navigation had led him to miss the detailed information about the Learning Designs (e.g., the LDVS, description of the tasks, resources, supports, and implementation and reflection sections). Additionally, he said that there were a large number of science-focused designs that could not be applied to his unit, and this deepened his frustration. In this early phase, he said he spent a lot of time looking through the Learning Designs, and got to a point where he felt "kind of stuck...to be honest, if I wasn't in this project I probably would have hit close and walked away" (Marcus, I-2).

However, Marcus continued, and once he had located the links to the detailed sections of the Learning Designs, he reported that he created a shortlist by focusing on the designer's summary, context (i.e. LDVS, tasks, supports, and resources), and implementation sections. He described looking for alignment of content and his previous pedagogical approach:

> I basically started looking...most of this was done in my head, calculating, reading the design, going through it saying, 'Right how does this fit what I've done?' And so each of the Learning Designs was run through this sort of thing of 'does this fit the content?' That was the first question. If it fits, yes, okay, then it's down on a short list... Then it came down to 'what have I already done in [this unit] that could support this sort of behaviour?' (Marcus, I-2)

The process narrowed down the designs to *Real Life Cases in Multimedia*, a graduate level design from Education, and *E-Journal*, a design from Engineering and Design. Both of these designs were from the project/case study focus section of the Learning Design site, and each aligned with elements of teaching designs he had created previously for his units. Marcus's final choice was *E-Journal*, which focused on researching and creating a fortnightly electronic journal and case study (Figure 4.21).

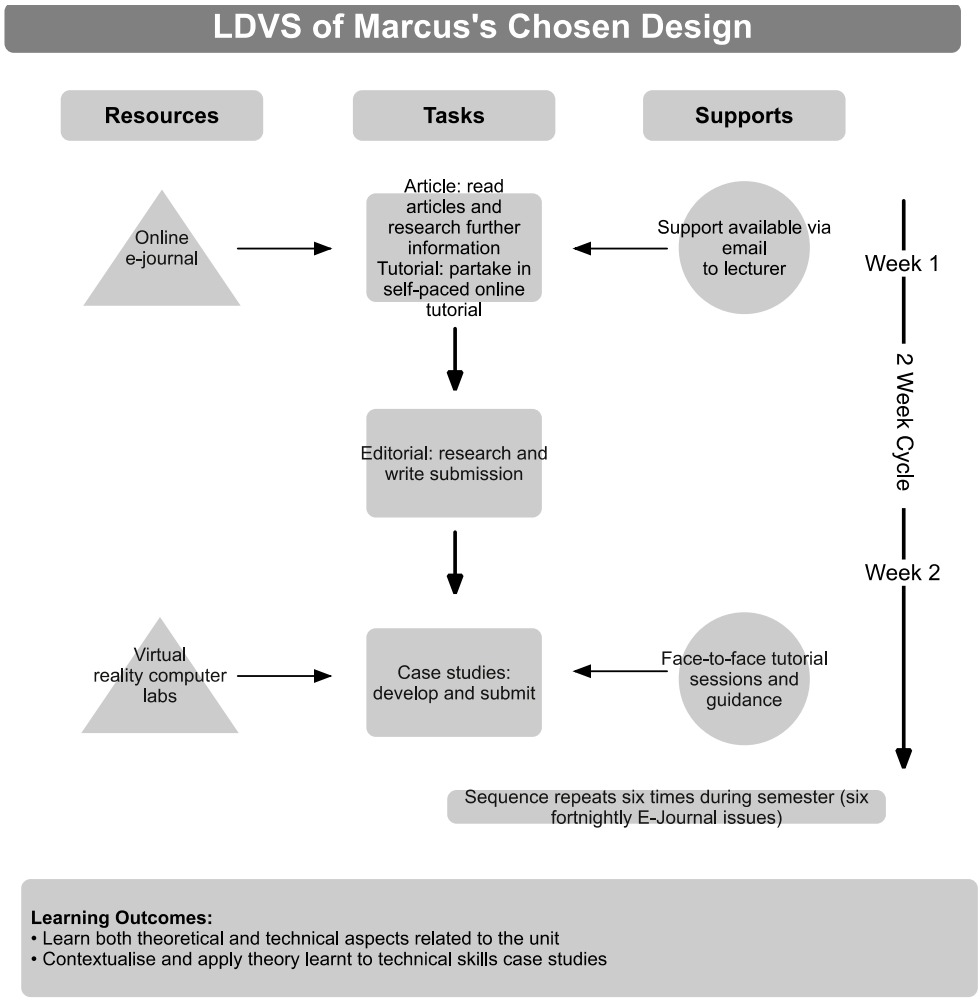


Figure 4.21: Marcus's chosen design, *E-Journal* (Bucolo, Goss, & Matt, 2002)

Marcus said the design of *E-Journal*s appealed because it required students to participate throughout the semester, not just near assessment deadlines. The Learning Design was also similar to a face-to-face activity that he had designed previously, which he referred to as tutorial kits. In his tutorial-kit activity, students had researched responses to tutorial questions and submitted compiled tutorial kits for assessment. Despite the similarities *E-Journal*s had to the activity Marcus had done previously, at

the time of selection he said he thought he was going to have to do a lot of adjustments to apply the Learning Design to his unit.

4.9.2.3 Design Work

Early Work

Marcus' early design work focused on integrating the *E-Journal* design into his current unit considering the weekly structure, weighting of marks, and current features of the LMS. Early in his design process Marcus printed out the Learning Design and "put it on the desk in front of me, physically...to view whilst I'm trying to spot parts together to see...my expectations" (Marcus, I-2). He reported that an initial barrier to understanding the Learning Designs had been the language used in them, and that he would prefer the Learning Designs to use "simple words...basic terms and common phrases" (Marcus, I-2). One of the most helpful parts of the Learning Design for Marcus was seeing how other people had implemented it. Marcus used this information as validation of his thinking and ideas. This gave him confidence that he could extrapolate his ideas to other technologies and activities. One thing he said he would have liked the Learning Design to include was a template so that he could fill it in and adjust it for his unit "like an intellectual Lego kit" (Marcus, I-2).

Early in his design work, Marcus reported focusing on integrating the *E-Journal*s into his unit while working on the unit outline. His plan was to design his unit as two modules, with the *E-Journal*s being the culminating item of each module. He saw the first *E-Journal* as a training and adjustment phase for everyone:

> This first *E-Journal* [will be to teach] them [and me] how to handle *E-Journal*s...[and see] how well my expectations met with what they were doing. Then fixing that up...over the semester break [for] the second [half]. (Marcus, I-2)

He also was working to have the *E-Journal*s build towards other assessment items in the unit:

> The materials covered by *E-Journal* one, should feed into what they know and what they can use for the assignment...then what they've learnt through the assignment...I can feed that into [the] exam and...[the] second *E-Journal* [is then] training for the exam. (Marcus, I-2)

Despite having his larger-scale plan in place, Marcus said he was still looking for support to help him build the design.

Marcus reported that to design the *E-Journal*s he had to do "a rethink about the assessment" (Marcus, I-2) during this process, and considered a number of assessment structures and timings. At this stage, he intended to change the midterm exam to a final exam and move the essay submission date to midterm. To do this, he had adjusted the weightings of the assessments. During his consideration of this he said that he had to remember that the university's assessment policy said assessments could not be due in week 13. He commented that "infrastructure-wise [an end of semester exam] is not too easy to implement" (Marcus, I-2), and his school had an assessment strategy and marks weighting that units in the school were expected to use. These considerations were counter to what he wanted to do, and the fact that he would have to get his assessment strategy approved by his school was of concern to him. He was also concerned about the improvements he was making:

> I think setting up a good *E-Journal* or Learning Design...putting the effort into pedagogy is going to come back to bite me. In the way that my students are going to do well...[and] then I've got to go and crush their spirits...[to] fit the bell curve. (Marcus, I-2)

He had previously mentioned that the norm-referenced system of allocating marks in his school was an ongoing point of contention for him.

Marcus's work on the structure of the unit's topics and content had him using a structure that did not match his chosen textbook. The text's topics were ordered based on the steps a practitioner would make, but he preferred not follow these steps, particularly when considering the mixed cohort of students in this unit:

> I've got two possible cohorts for students: I've got marketers who know their stuff on marketing and sustainability people who may not know marketing.... Going straight into the planning...is actually one of the more complex areas. When you are doing this practically, you start [there]...whereas at the teaching side I think you're better teaching people about how to make use of some of the fundamental platforms that they're familiar with. (Marcus, I-2)

Therefore his plan was to jump around the text's chapters, but he was aware that this "non-linear structure [might] annoy the students" (Marcus, I-2). Marcus also planned to

recycle some of his older content and adapt it for this offering. He said that his next step would be to get the resources designed and organised, and then return to the Learning Design, saying "I want to...have the PowerPoints, the content, the reading...built up so I can come back to the Learning Design again saying 'Hey resources are in place'" (Marcus, I-2)

Later work

The week before teaching began Marcus reported on his design process since the last interview. He said it had been a turbulent, highly iterative process, and that the *E-Journal*s were "the only thing that has survived thus far unscathed" (Marcus, I-3). Despite the complex nature of his design work, Marcus said that the process had still been "pretty positive". He reported that the design had been impacted by a number of factors, including time pressures, an increase in student numbers, concerns about tolerance for change, the school's committee approvals process, a visit to a colleague, and the university's new LMS. One surprise for Marcus was that the school's committee had approved, with the exception of his final exam format, his assessment types and weightings.

The structure and organisation of the topics had been an ongoing design challenge for Marcus. Just before teaching, he reported that the unit had "been through about four more reboots, down to tearing it down [and] starting again twice" (Marcus, I-3). As he had previously mentioned, he had wanted to organise the unit into two modules and teach the topics in a different order to the text. However, if he did this, he said the initial workload for himself and students would be high. It would also run counter to the expectations of students and his superiors. Marcus's frustration with the expected linear structure was apparent:

> The biggest...flaw with [this linear] approach is...this is a cyclical discipline – we go back, we go forward, we go sideways. But this is a linear university...if I was to run this as a non-13-week course...the students would riot. There would be complaints. The Dean will be coming in [saying]... 'Couldn't you just have done 13 weeks and saved us all some grief?' And I've [already] had [him] lean over me again and say...'very innovative but don't do it again'. (Marcus, I-3)

Added to this was the increase in student numbers from an expected 25 to 40 students, which Marcus described as akin to putting "large amounts of explosives underneath [a] volatile position" (Marcus, I-3). Considering all this, and after discussions with a colleague and the textbook's co-author, Marcus made the decision to use a 13-week structure and "trust" the order of the text.

Organising, selecting, and creating the resources for the unit had been a significant task. Marcus reported that he had gone through over 5,000 resources (PDF papers, presentations, etc.) for the unit. This included a number of newly acquired resources as well as 10 years of teaching materials. He reported that he had decided to follow the textbook's framework and had the course outline in front of him while going through all of the resources to see where things fit. When reviewing his old teaching materials, he looked for materials he might be able to reuse and renew. For example, he said he had been "reworking old questions... looking at this going, 'Do I give them a classic – a [1994] reading and a question from it and a 2009 reading', and say, 'well, what's changed?'" (Marcus, I-3). He organised everything into an offline file structure, which totalled 1.8 GB. Marcus said he wanted students to be able to easily access, and ideally, take these resources away after the unit. His solution was to purchase USB drives and load all of the organised resources onto them for students. This had proved to be a bit tricky with bookstore processes and copyright issues, which were still being navigated just prior to the semester start.

A late decision to take part in the beta trial of the university's new LMS meant Marcus was working with a new system that was not set up to fit his previous practices. He explained that previously he could do most of the preparation offline, as he had with the resources, then upload the zipped folders through WebDav and "plug in all the pieces" (Marcus, I-3). However, with the new LMS, WebDav was not available yet so he would have to upload the files in a more piecemeal manner. Additionally, his early work with the new LMS had him unsure of its stability. These factors, combined with the fact that students would be unfamiliar with the LMS, had Marcus concerned:

> I volunteered to go in because I'm a reckless, innovation-seeking nut case when it comes to this stuff...[but in this unit] we're hitting them with so much novelty at one time. I need a back up. (Marcus, I-3)

As a result, he had decided to develop the unit in both LMSes to ensure students were not disadvantaged.

One of the main reasons that Marcus had decided to trial the new LMS was because he had heard of a tool within it that might be able to support his plans for the *E-Journal* activity:

> The tutorial kit [activity], back when it was last run was a series of questions associated with readings; the students wrote up their responses and then submitted their responses at the end of semester.... I believe [the new LMS] is going to let me do this with the database tool on a more week-by-week thing. First, you submit your materials then you gain access to the tutorial forum to discuss. (Marcus, I-3)

However, because of his late decision to use the new LMS and his usual design work practices, on the Friday before classes started Marcus was still exploring whether the tools in the new LMS could support his plans.

This pressured design scenario seemed to be common practice for him, and he indicated that he thought it was important to test the new LMS system under these conditions:

> I really feel I need to do this under the gun, under pressure. I don't want to do this in a slow, relaxed six weeks, drip feed my stuff through there.... I volunteered for a beta test. I will put it through an unpleasant and extreme performance. It means I've got to go through it as well. It's not necessarily smart on my behalf. (Marcus, I-3)

His final deadline for the LMS to go live was Tuesday afternoon of Week 1. Marcus said his plan was to work intensively over the weekend before classes started, and if the tool did not work as hoped, he said he would have to adjust and have some aspects of the *E-Journal* taking place in the face-to-face tutorial.

When talking about the Learning Design documentation, Marcus said that he had not looked at it for a while "in terms of breaking it back out and going over the details of it again. It's sitting there as I want to make stuff" (Marcus, I-3). As timelines shortened, Marcus said he thought the language used in the Learning Design would frustrate him so it was best not to look at it during this final lead-up. When asked if he felt the Learning Design had an influence on the use of technology, he said, "I think there has,

insofar as because it's going to be an electronic delivery... the assignments are going to be electronic; the course work is electronic; the discussion forum is electronic; the tutorial work is electronic" (Marcus, I-3).

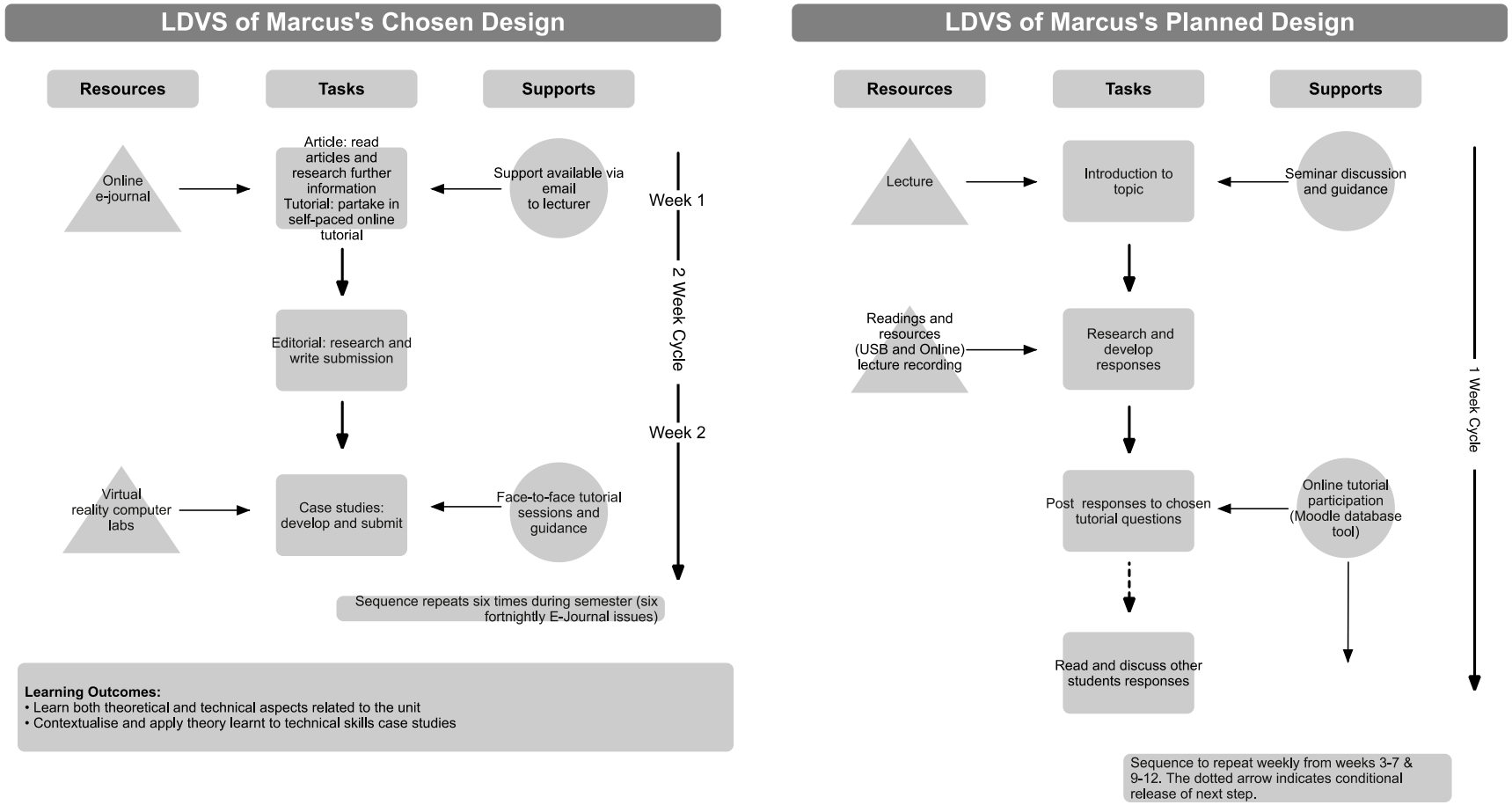


Figure 4.22: LDVS of Marcus's chosen and planned design

4.9.2.4 Pre-semester planned design

As mentioned above, the design of the unit was still in flux during the week leading up to teaching, and the details of the online delivery of Marcus's adaptation of the *E-Journal* design were intertwined with his exploration of the university's new LMS. Figure 4.22 shows the LDVS of his chosen design, *E-Journals* and his pre-implementation plan.

The chosen *E-Journal* Learning Design (the diagram on the left) had students reading and partaking in an online tutorial, which Marcus was also trying to achieve. His plan was to introduce students to the topic through the face-to-face lecture and follow-up seminar (the first row of the diagram on the right). Then, he wanted students to research and develop their responses to the readings and submit their responses online (second and third task rectangles in the diagram on the right). After each student's online post, Marcus wanted a tool within the LMS to then reveal other students answers along with a restricted discussion space where all students could discuss them. When reflecting on the supports to the tasks, Marcus said:

> As far as the supports, I have not even begun to consider how nightmarish this is going to be to implement. I'm trying not to think about that. I'm going to wait for it to happen. I'd rather improvise this time around. (Marcus, I-3)

When looking at the chosen design in comparison to his own plan, Marcus indicated that the *E-Journal* Learning Design's editorial step (the second task rectangle in the diagram on the right) was not something he had fully understood or tried to adopt, but that the final task of submitting the case studies was similar to the compiled assessable *E-Journal*.

4.9.3 Implementation and further design

Marcus taught the subject in Semester 1, and his plan continued to evolve during teaching. Throughout the semester, he spoke about a number of challenges to his design, including problems with the LMS, increased class size, student preferences, students' program workload, and the delayed arrival of the textbook, which was more than eight weeks late. Three key factors influenced the design of the *E-Journal*s: student feedback (questions, perceptions of task flow), technology challenges, and Marcus's own observations. Marcus responded to these factors by adjusting and

adapting the planned design throughout the semester. In response to these challenges, Marcus made changes to his design on more than one level and at more than one point during the implementation.

In the first week, Marcus set up the unit's sites, took students through an unassessed cycle of the *E-Journal*, and began making adjustments. His early week centred on setting up the old LMS and uploading all of the resources, which he mirrored onto the students' USBs. The new LMS proved to be more difficult, and he had problems with both its speed and access to its upload features. Added to this, he had limited time to explore the new LMS tools; therefore he decided to initially only upload the first week's content and set up the tool for the *E-Journal* activity.

In class, he had the students begin an *E-Journal* training activity, which took them through the activity but was not assessed. Marcus saw this as an invaluable stage because he got feedback from students. He learned that the tutorial questions needed to be refined and the students needed more guidance with the activity. This prompted Marcus to rework the tutorial questions and create a survival guide to help outline activities, saying, "The survival guide's purpose was to give focus.... What chapters we cover, what do I expect you to look at on the USB.... What's the discussion, tute questions, feedback from last semester? 'Heads up, assignment coming'" (Marcus, I-7). Another discovery was that the teaching spaces had not been fully set up to run the new LMS, which Marcus discovered while trying to demonstrate the new tool to the class.

Marcus continued to discuss the *E-Journal*s with the students weekly, and by Week 3 he had made two adjustments to the design (discussed in detail below). Figure 4.23 shows both Marcus's pre-semester plan for the *E-Journals* (left) and the design as implemented during the first half of the semester (right). The elements of the design remained similar, but, as discussed below, the mode and ordering of activities had shifted.

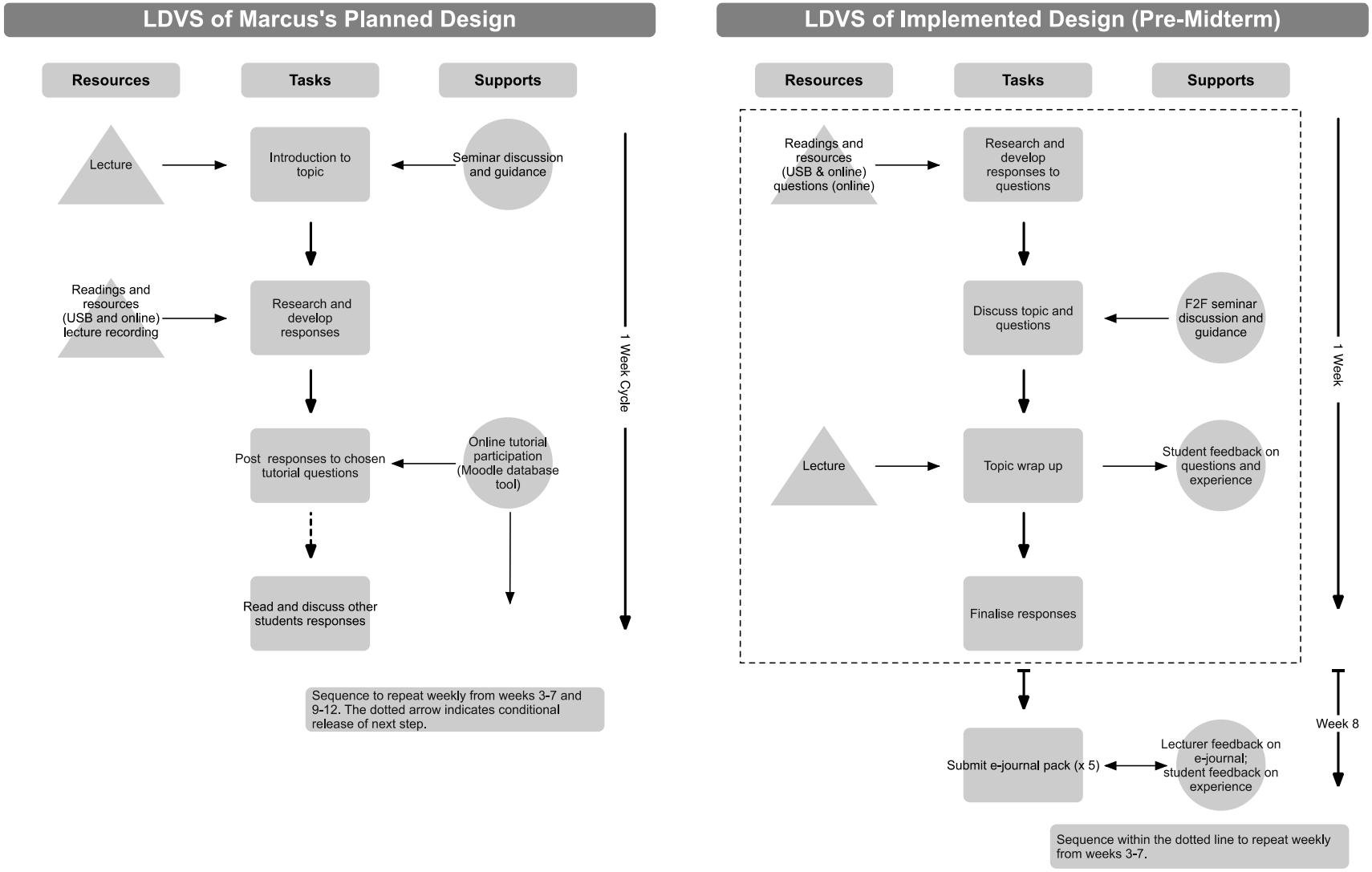


Figure 4.23: Marcus's planned and pre-mid-term implemented design

The first change Marcus made was a result of problems with the new LMS: "The *E-Journal*s should have been, on the surface, really straightforward, but as basically bits of the [technology] infrastructure crumbled...we lost absolute confidence in the [new LMS] site, which is what you need for using it for an assessable object" (Marcus, I-5). Without a tool to create the online experience that he was wanting to achieve, Marcus decided to change the *E-Journal* activity from interactive online activities to face-to-face activities, repeated each week. At the end of each week, students were to write up the face-to-face *E-Journal* discussions. This activity cycle is enclosed within the dotted line in the diagram on the right. In Week 8 the students compiled these discussions as an *E-Journal* (the final task rectangle in the diagram on the right). Despite reverting back to face-to-face delivery of these activities, Marcus said he still hoped he could explore options for electronic discussion for the *E-Journal* activity after the midterm break.

The second change Marcus made was in response to student feedback on the order of the lecture and seminar. He had designed the subject with the lecture as the introduction to the week's topic. The lecture was then to be followed by the *E-Journal* interaction and discussion of the materials throughout the week. The next topic would then start with the lecture the next week. The left side of Figure 4.23 shows these elements with the timeline. However, when speaking to students, Marcus discovered that they saw the "lecture as the end point..., which is a different way from how I'd put the site together and how I'd thought things through" (Marcus, I-4). Marcus responded to this by adjusting the order of the activities to align with his students' preferences so as to not "[push the students] through a counterintuitive model" (Marcus, I-7). In the new model, the students started the week by exploring and researching the posted questions and going to the seminar to discuss them further. The final activity was a summary and wrap-up lecture.

While marking the first compiled *E-Journal* pack, Marcus said he observed that there had been too much choice in the tutorial questions and that students were not always making the connections to resources and theories that he would have liked them to. Each week, students had been asked to answer two of four questions. The feedback from students on this was that they would have liked fewer choices and from Marcus's perspective less options would reduce the marking workload significantly. Secondly,

despite the guidance that Marcus had given students within the survival guide, he found that the students "weren't making a link to [the resources] naturally...and they were overwhelmed by the number [of resources]" (I-7). Thus, Marcus worked to point even more specifically at key resources for the activity in the second half of the semester.

Marcus indicated that the feedback he was giving students on their assignments was leading to increasingly higher-quality work and, as the semester progressed, Marcus's previously anticipated challenge with marking to a standard curve surfaced. The submission of an essay assignment had been the next major task for the students, and Marcus said that more students were producing high-level work. It was work that he said he could not find appropriate reasons to deny high marks for. Marcus was deeply conflicted and disheartened by this but was not able to find a solution to the problem.

After the changes to the *E-Journal* prior to the midterm break, Marcus had spoken of trying to set up the activity in the second half of the semester using the discussion board in the old LMS if he could; however, this did not eventuate. That being said, the activity did undergo changes in the second half of the semester. The changes to the implementation are discussed below and presented in comparison to the pre-midterm design (Figure 4.24).

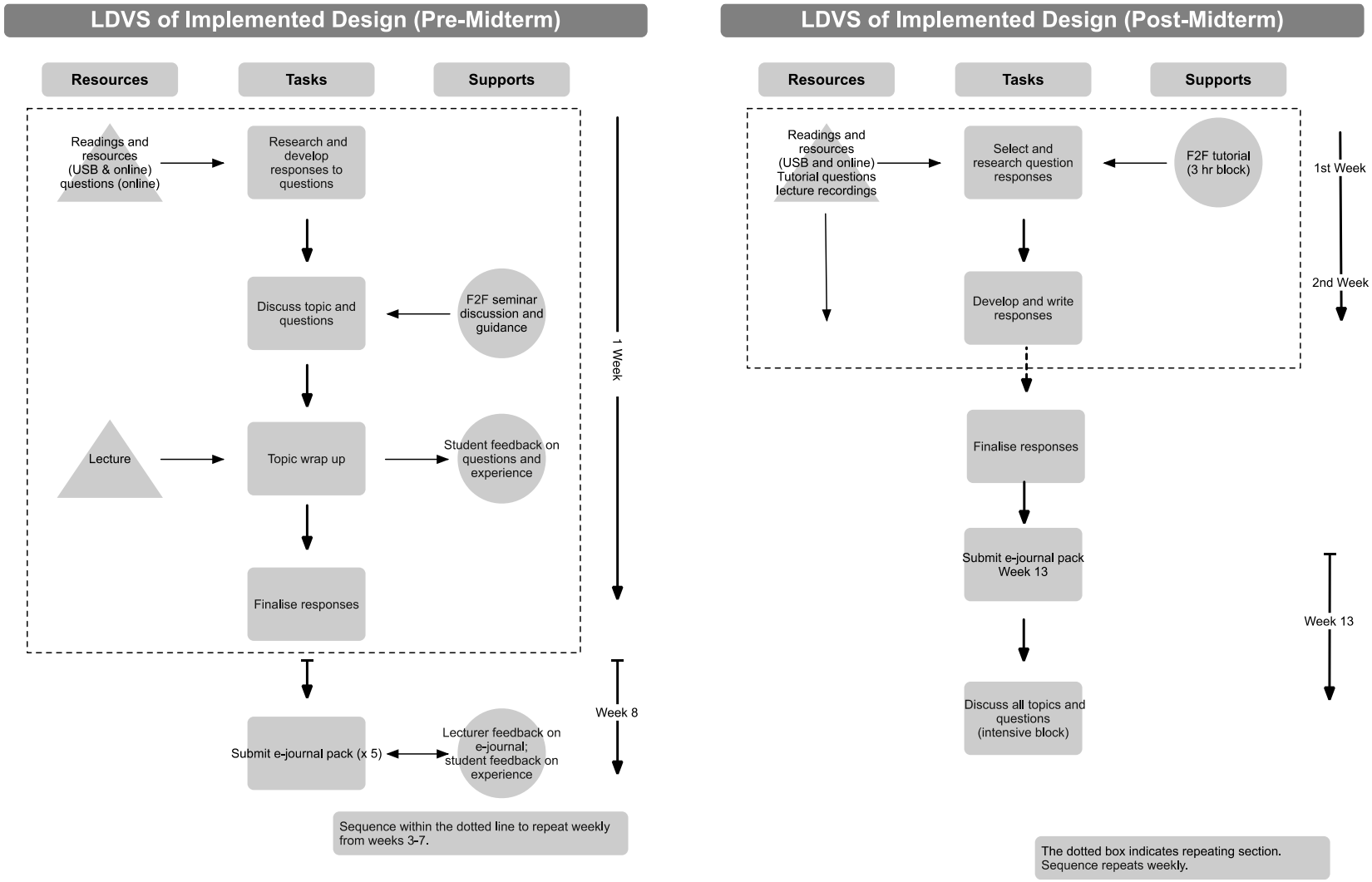


Figure 4.24: Marcus's pre-midterm implemented and post-midterm implemented designs

In Week 10, Marcus investigated the reasons behind students' dwindling attendance. He found that assessment pressures from other units were high at this time and students did not have enough time to commit to an ongoing face-to-face tutorial discussion for this unit. In response to this, Marcus decided to allow students to work on the weekly tutorial questions independently in preparation for the exam. This weekly activity is represented within the first two rows of the right side of Figure 4.24. Then, leading into the exam, students were to compile their *E-Journal* pack and prepare for a final intensive discussion of the questions in Week 13.

Marcus said that this adjusted design relieved the weekly pressure on students and changed the purpose of the *E-Journal* tutorial discussion:

> Our in-class discussion will now move to being held on one night as opposed to four separate nights. It will be held on Week 13 after everything's been submitted, and instead of being a discussion of the item in preparation for the submission of the tutorial questions, it's now a discussion of the tutorial questions that [they've] submitted in preparation for the exam. (Marcus, I-6)

Marcus said he felt the change to face-to-face interaction with an upload of responses in the first half of the semester had allowed him more flexibility at this point to adjust the activity again. He said he believed that if he had been doing the online *E-Journal*s at this time, it would have been problematic and difficult to make this adjustment. He further speculated that if he had not been able to make this adjustment, the online *E-Journal* participation would have been limited to the few really committed students, and that they would have become frustrated by the lack of participation by others.

4.9.4 Reflection

4.9.4.1 The design and the Learning Design

In the final reflective interview, Marcus reviewed the experience he had had designing and implementing a unit with the support of a Learning Design. Marcus chose *E-Journal*s because they aligned with key elements of an activity that he had done previously, saying "It looked like a 21st-century version of what I [already] did.... I saw [this] as a chance to extend on that... I was actually thinking that this could have taken out the face-to-face element of the tutorial" (Marcus, I-7). When he was working with

the Learning Design, he reported that he had gone through the whole design, written notes, and incorporated ideas.

When considering the implementation, Marcus explained what he thought had worked and what had not for this offering. He spoke of the difficulties of introducing a new technology while also trying a new teaching method, the assumptions he had made about the cohort, and the ordering of the face-to-face components. Marcus responded to technology challenges and student needs during the implementation by adjusting his planned design and returning to an offline model for the *E-Journal* activity. However, he clarified that the Learning Design had still impacted on his thinking and the new design was an evolution rather than a return to the previous design:

> So I used [the Learning Design] as a building/learning theatre in process. The stuff that I liked out of this framework and this structure would have been grabbed, shoved in, and [tweaked if necessary]. So whilst...on paper it looks like it reverted to a previous structure, it was a new structure again.... The elements out of [the Learning Design]...that research and write submission and discussion – I managed to get that happening. (Marcus, I-7)

He also said the sharing and discussion of other students' answers was another major difference to what he had done before.

Over the semester, Marcus had reported increasing student engagement, quality of work, and levels of interaction. By Week 13, Marcus had observed that students were "showing that high-level learning which frankly I always thought was slight mythology from the Grad Cert courses" (Marcus, I-6). Moreover, at the end of the semester, the students had exceeded the objectives that Marcus had set for them. Marcus admitted that the effectiveness of the design had come as a surprise to him: "To be honest, at the start of semester I thought this would be a really fun way of doing things, because I did not actually think it would work" (Marcus, I-7). However, it had worked, and Marcus attributed the success to the connections within the design saying, "One of the things I will say...again on [the Learning Designs]...is the feedback, the way everything feeds back together, the way everything links together, the way everything forms up – it's great pedagogy" (Marcus, I-7).

Marcus reflected on what had shifted in his teaching, and said he had changed how he used resource materials and feedback. His approach to resources changed greatly, and his comment after teaching illustrates his shift in thinking: "I want [them] to use the resources that are there...[but] I'd rather that they learnt how to use six resources well than [my] usual 'intimidate, and give them six hundred', and they use none of them" (Marcus, I-7). He said that assignments and more overt classroom explanations had been important tools for communicating what he expected and what he was doing pedagogically. Marcus also listened to student feedback on what was not working and made adjustments accordingly. In this way, the unit evolved and built momentum. Marcus said this process had given him a, "huge amount of validation of the techniques. This is [the] 12th year I've been in...higher-education teaching...and this time around this course worked and I'm happy...the designs work the frameworks held together...people learnt" (Marcus, I-7).

Marcus said that he could see the difference between this unit and the other unit he had taught during the semester. He commented, "There is a palpable difference between [this] unit where I used this stuff and I pushed and I used all this gear and I used all the techniques, and [one of my other units] where I just coasted" (Marcus, I-7). Additionally, informal feedback from students suggested the design had supported, challenged, and encouraged students' learning. Marcus reported that he had received emails from students thanking him, while also saying that the unit was the hardest thing they had ever done. He also had feedback saying that the unit had inspired them to explore this subject area as a career.

That being said, the success of the design created a conflict for Marcus. Marcus said the students' learning could not be properly rewarded because of the school's policy to grade using a standard distribution and he felt this set up false hopes:

> The frustration for me is I don't want these students who put heart into learning to come out of it feeling screwed because they won't put their heart into the learning again...because they sank time, effort, energy, emotion, everything you want to ask for... and the design helped and it facilitated [that]. (Marcus, I-7)

As a result, he said he was not sure he would use a Learning Design again. His reasoning was that the Learning Design's success had amplified the inequities of the school's grading system.

Finally, Marcus reported that despite the problems he had implementing the new LMS and its interactive tools, he had used technology in some new ways. He reported that the Learning Design had influenced the extent of the electronic delivery that he was trying to achieve and the integration between the "component parts" in the LMS site. One key example of this was the changes to how he delivered and linked to content. Additionally, as a support to his marking of the *E-Journal* packs, Marcus said he had developed an electronic marking system, which allowed him to more easily give students additional feedback and information about the marking, criteria, and class averages.

4.9.4.2 Plans for the design

For the next offering of the unit, Marcus was not sure how much he would change. It was his pattern to make changes and adapt to the cohort's needs during implementation:

> I've never taught the same subject the same way twice. The subject I taught [this time] was based on the cohort...even if I was to take what I built this time around, as soon as I apply it to the [cohort] it will be different. (Marcus, I-7)

Also, as already mentioned, he was still disheartened by the requirement to grade on a curve and stick to the school's assessment pattern. He revealed that he had considered compromising to make the unit less pedagogically effective to solve this problem, as it would then be harder to achieve high grades.

That being said, he conceded that he would most likely be substantially retaining the design. He said he would like to try setting up the interactive *E-Journal*s again, linking the materials, questions, and discussion all in one online area:

> What I [had] wanted to do inside [the new LMS] was that forum discussion area, have the questions at the top of the forum and all of the resources you needed just down underneath it and then the space where the discussion took place there. And that's how I'd see it done…[Next time they] would be linked. (Marcus, I-7)

He also wanted to incorporate the timed release of the tutorial questions and assessment items. To aid students with the technology, he said he would ensure that he scheduled training sessions and/or computer lab sessions so that students could learn how the technology worked in a supported environment. Whatever he did, he said that from the

outset he intended to tell the students that it was "going to be a ranked contest" (Marcus, I-7).

4.9.5 Summary

Marcus was an experienced university teacher and user of technology in his teaching. The unit to which he chose to apply a Learning Design was well established and he had taught it for over 10 years, though he spoke of having a pattern of constant change for this unit. His previous design work had tended to start with mapping of the overall structure in relation to the content to be covered. The content of the unit was a key aspect of Marcus's focus, and he provided large numbers of resources for students to draw on. For this offering, he spoke of changing the assessment items, working to increase students' interaction in tutorials, and integrating a large amount of new content into the unit. Marcus approached the Learning Design looking for help documenting and communicating his design for others. More generally, he was looking for help integrating technology into his teaching.

Marcus's search for a Learning Design started slowly, first from a pedagogical focus; but early in his search he was frustrated by what he perceived as a science focus to the Learning Designs and the issue he had locating information within the website. However, he continued his search looking for designs that aligned, foremost, with his content and, secondly, with teaching approaches he had previously used. The design he chose was an online version of an activity that he had previously conducted face-to-face. He liked the Learning Design because it encouraged ongoing participation throughout the semester rather than just around assessment deadlines.

Marcus started his work looking at how to integrate the design into his current unit's design, finding the implementation examples both helpful and validating. However, he still wanted more help building the design. During his early work he spoke of struggling with the language used in the Learning Design, suggesting that he would have found it easier to understand it if it had had less pedagogical jargon. In the final weeks leading up to the beginning of teaching Marcus decided to beta-test the new LMS, and planned to run the activity in one of the new LMS's tools. However, just prior to teaching he did not have a solid plan in place.

Marcus's pre-semester plan for the design changed throughout the semester based on student feedback and needs. A number of factors impacted on the design of the activities, in particular, the 'failure' of the LMS, increased class size, and student feedback. Early in the semester, Marcus gave up on the beta test of the new LMS because it was not reliable enough, and reverted the tutorial activity he had developed based on the Learning Design from online to face-to-face. He continued to adapt the design, and made a second major change to the activity during the second half of the semester. For this version of the activity, he created an intensive face-to-face block near the end of the semester to overcome the workload burdens that students were feeling from other units.

In his final reflection, Marcus had spoken of the high outcomes the students had achieved, and attributed those outcomes to his thinking based on the Learning Design. He commented that the design had reverted to a face-to-face version of the design, but that this version had evolved from previous designs. He said that if he taught the design again he would add in a timed release of tutorial questions and assessment and add a training session for the technology to ensure students were comfortable with the tools.

4.10 Chapter Summary

This chapter has presented eight case studies of university teachers' design work with a Learning Design. In each case, the story of the design work and implementation of a Learning Design has been presented to provide a rich picture of the use of Learning Designs in a naturalistic context. Additionally, at the end of each case a brief summary has been provided to highlight key points. The cases have shown a variety of Learning Designs uses from targeted redesigns of short single activities to completely new designs of entire units. They also show use of Learning Designs in a broad range of contexts and by university teachers from varied levels of experience. These findings are further explored in the next chapter, which presents three cross-case analyses: first focusing on themes, shifts, and patterns within each of the phases of participants' design work, then on possible relationships between findings and specific case attributes, and finally on the observed changes within the areas of technology, pedagogy and content across all of the cases.

5 Cross-Case Analysis

5.1 Introduction

This chapter presents a comparative analysis of all eight cases. To help understand the use of Learning Designs across the design process, the analysis explores the various phases that emerged from the data and highlights shifts over time by discussing design work and Learning Designs in each of these phases. The presentation of this analysis follows the structure of the phases as presented in the individual cases: background and design plans; Learning Design selection and early pre-semester design work; continuing pre-semester design work; implementation and ongoing design work; and post-semester review and future design plans. Within each phase, the design work, considerations, challenges and associated learning design activities and impacts are presented (Figure 5.1 lists each phase and the associated themes discussed). Within each theme, the number in brackets indicates the number of cases in which each sub-theme occurred. In some instances, specific cases that illustrate common practice or are unique across the cases are discussed to emphasise or clarify points of interest and, patterns.

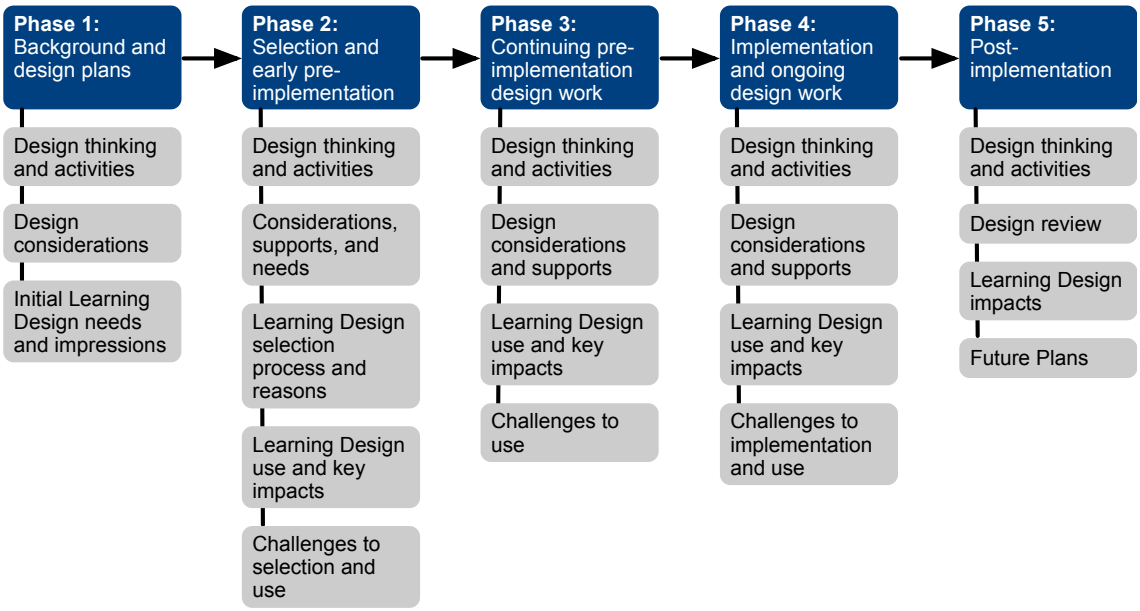


Figure 5.1: Design phases and related themes presented in the phase analysis

After presenting the phase based cross-case analysis, this chapter gives the results of a second analysis, which investigated relationships between the case attributes and participants' design thinking (including Learning Design selection, use, or impacts).

This is followed by a further analysis of technology, pedagogy, and content that categorises reported and observed impacts on participants' design work and links between these areas using TPCK as a framework. As the patterns from these analyses are drawn from a small number of cases, the observed relationships are presented as tentative. The chapter finishes with a summary of the key findings across these three analyses.

5.2 Phase-based cross-case analysis

5.2.1 Phase 1: Background and design plans

In the pre-design phase, the participants described their design plans and thinking, and provided background information about the unit. They had not begun creating any design artefacts. When comparing the cases during this phase, all participants explained their goals (8), and pedagogy (8), and most cases mentioned content (5) and technology (5). The participants described their personal design goals for the unit at this stage, though two participants also highlighted formal learning outcomes and program goals. The discussion of pedagogy focused on tasks (both assessable and non-assessable) at the broad level; the details of the tasks were not evident at this time. When talking about the content of their units, the participants tended to focus on the organisation and improvement of pedagogical links. When talking about technology, participants spoke of wanting to use new tools, create interactive spaces, improve online content, and design self-paced tasks.

The most common design considerations in the pre-design phase were students, the participants' previous experience, and design time. Students were clearly the leading consideration, and a breakdown of this theme shows that participants' main focus was on their cohort's attributes (e.g., size, prior knowledge, and skills) (5) and designs to keep students engaged and interacting within the unit (4). Previous teaching experiences were the next most common consideration in the pre-design phase, with four participants highlighting the influence of previous iterations or other related teaching experiences. Finally, three participants reported that design time – in particular the limited amount of time available – was a challenge to their design work and to the changes they could make.

At this stage, participants had not begun using the Learning Designs; however, they indicated initial impressions, goals, plans, and concerns regarding the Learning Designs both before and after being introduced to Learning Design site. The participants indicated that they were looking for help in a variety of forms; for example, design ideas, benchmarking, ways to document and communicate design work, technology help, organisation of design thinking, and alignment of design elements. After the Learning Design introduction, some participants indicated that the site had given them design ideas (2), helped to validate their previous pedagogical practice (1), and given them ideas for how they might document design practice (using the LDVS) (2). Additionally, two concerns were expressed: the possible need for a greater time investment if a Learning Design was used and a sense of being restricted by the idea of following a particular design.

In sum, this period of the design was characterised by planning without the creation of design artefacts. Participants set design goals with a focus on student tasks, unit content, and technology. At this early stage, only two participants referred to particular learning outcomes or program goals. While specific Learning Designs had not been selected for use at this stage, the introduction of the Learning Design repository and formalism had inspired ideas and acted to benchmark current practice for two participants. Previous experience, considerations of the expected student cohort, and ways to engage students guided participants' thinking.

5.2.2 Phase 2: Learning Design selection and early pre-semester design work

During this phase of design work, which for most participants included Learning Design selection, participants spoke most commonly about pedagogy (8), design goals (6), resources (6), and technology (6). In the area of pedagogy, the discussion of the pedagogical model was most often highlighted across the cases, with all eight participants discussing pedagogical models and Learning Design options at this time. This follows, as the participants had just selected a Learning Design or were in the process of selecting a design to apply, and had therefore been examining a number of pedagogical models for their unit. At this stage, participants were also discussing their design thinking about student tasks (7) and the 'big picture' or macro structure of their

units (6). Work on the creation of design artefacts had also begun, with some participants working on their unit-outline documentation (4) and design of tasks (5). While most participants were discussing resources (6) and technology design (5), only one participant, Mary, had begun to set up her LMS. When discussing goals at this stage, participants spoke of learning outcomes (4), design goals (4), future goals (3), and program connections (2).

Participants cited students' needs (7) as their main consideration during this design phase, with design time (3) and rules and requirements (3) also being important. Specific considerations were most frequently focused on the participants' anticipation of the attributes of their student cohort (5) and probable needs for extra support (5). A few participants highlighted student engagement and interaction (2). Finally, the policy and practice guidelines of the university were a focal consideration in two cases. Since almost all participants had selected a Learning Design at this stage, the Learning Design figured in almost all participants' design support (7). Other supports were colleagues (3), previous student feedback (2), and literature (1).

When choosing a Learning Design, all participants looked for design ideas, and three looked for a solution to a specific design problem. Alignment with their design goals (8) and known pedagogical models (8) were key considerations for participants. The next most common considerations were alignment between the Learning Design and their own unit's task types (4) or resource types (3). Only one participant cited the technology used in the Learning Design as a strong consideration.

When selecting a Learning Design, most participants (6) first focused on the pedagogical categories in the Learning Design exemplars. The other two participants were initially drawn towards the guides. Most participants then used the key terms in the title and/or summary to identify designs of interest and then read through the summary, visual representation and/or detailed description of the tasks, resources, and supports to make a full assessment. Only two participants referred to the original implementation detail as a key consideration during selection. To gain an understanding of the design, some participants used both the text and visual descriptions, while others focused mainly on the text. For those who referred to the LDVS, the diagram was reported to help participants understand the overall structure

and identify the key elements of a design. For those who reported a greater focus on the text, key terms within the title and summary were identified as important.

Alignment with design goals (6) and known pedagogical models (4) were given as the main two factors leading to final selection within the cases. Other reasons given for selection included alignment with context and cohort (2), practical skill-building focus for students (2), increasing students' independent learning (2), alignment with resources (2), alignment with assessment types (2), and increasing technology use (2). Only one participant said that their main reason for selecting their design was that it solved a specific design problem.

All but one participant selected and made use of the Learning Design at this stage. All seven reported they had used the Learning Designs for design ideas (7) and to guide design work (6), benchmark their current practice (3), and document their design (2). The ideas drawn from the Learning Design were usually for application to the current iteration of the unit but one participant, Joanne, also emphasised her plans for using the Learning Design ideas for other units. Participants used the Learning Designs as a guide for the task steps and flow as well as for the organisation, selection, and connection of the resources and supports within the design. Two participants made particular use of the LDVS at this stage: Joanne used the LDVS diagram as a design checklist and Mary created her own LDVS diagram to communicate her design plan to students. Similar to Mary's use of the LDVS, Emily created a text-based version of the steps from the Learning Design she chose. Only four participants reported impacts on their design practice at this point. A key reported impact at this time was on participants' design processes through the use of the Learning Design as a guide, as described above; however, this impact was explicitly highlighted by three participants at this stage. Other reported impacts were more specific to individual cases, such as design ideas, benchmarking of practice, improved design connections, an increase in online activities, and an increase in student support.

The cases displayed five types of challenges to the selection and early use of a Learning Design. The most commonly reported challenge during selection was the perceived extra effort or time (4) that would be needed to apply a Learning Design. The challenge of time investment was raised in two ways. First, some participants, generally those

who were applying a design to a previously taught unit, perceived the selection and application of the Learning Design as potentially just extra time and work, possibly without enough corresponding benefit. Second, some Learning Designs, for example role-play designs, while of interest, were perceived as being too labour intensive to apply in the available design time. This concern was particularly expressed by Joanne, who was designing a new unit in the short break between first and second semester. Given that her unit was new, Joanne also wanted to trial the unit with students before investing in a more complex Learning Design that might not suit their needs.

A second type of challenge described by participants was related to limitations or excess content within the Learning Designs. For example, a few of the participants wanted more detail (2), others more technical support (2), and one wanted less information about the original Learning Design project, which they felt was irrelevant to their needs.

A third area that caused problems for participants was the web-based format of the Learning Designs. The website's navigation was not intuitive for some participants (3), making it difficult for them to find all of the information contained within the Learning Design. The final two challenges were the limited number of designs available (2) and the initial feeling of being restricted to a set design (1). In most cases, these issues were only initial challenges that the participants overcame. However, for one participant, Daniel, these challenges led him to seek other forms of primary support to aid his design work.

In summary, Phase 2 was characterised by 'big picture' or macro-level design ideas and tasks. Most participants selected a Learning Design during this phase and many began work on design artefacts, in particular the unit outline. Design work focused on macro-level tasks, such as the pedagogical model and structure of the unit, as well as identification of the major components of the design. As in Phase 1, student-cohort characteristics and needs were the primary consideration. The next most frequent influences on design work were available design time and consideration of contextual design rules, such as assessment or content requirements. In comparison to Phase 1, there was more mention of formal learning outcomes.

The Learning Design was a key influence and support at this stage, with participants selecting a Learning Design to apply and beginning to work with the ideas. The selection of the Learning Design raised concerns for some participants about the time investment needed, as well as the content and organisation of the Learning Design site. However, at this stage these concerns did not prevent most participants from continuing their work with the Learning Designs. The two main uses of the Learning Designs at this stage were for design ideas and to guide design process. Additionally, some participants used the Learning Design to benchmark their practice and as a model for the documentation and communication of design plans. At this stage, the Learning Designs were the most commonly used design support, with some participants also receiving support from colleagues and literature.

5.2.3 Phase 3: Continuing pre-semester design work

In the period just prior to the start of teaching, design work and thinking across the cases focused on the more detailed design of tasks (8), the design of the online components (7) and resources for the unit (7). Participants continued to refer to goals connected to learning outcomes (4), program connections (3), and future iterations (2). In one case, that of Nicole, there had even been a need to re-establish design goals after she was assigned another unit that taught the same content to a very different cohort of students. The pedagogical model and macro-level design were still part of most participants' discussion of their design work (6). However, the nature of their discussion of these had generally shifted from establishing the macro-structure tasks to focusing on the connections within the macro structure.

When discussing their design work patterns, some participants reported that they worked in intensive blocks of time on their designs (4). Characteristically, these blocks were during the final week or two before the semester started. In some cases, such as Nicole's mentioned above, the intensity of the work during this phase was amplified by the need for design adjustments resulting from unexpected changes to the design context. The key changes that triggered adjustments to the design were changes in the expected unit or cohort (e.g., Nicole, Joanne, Marcus), and limitations of the available technology (e.g., Nicole, Marcus). Additionally, some participants decided to strategically defer some of their final design decisions at the task level until they had

met the student cohort. This was particularly true of tasks occurring later in the semester and decisions associated with technology usage (i.e., how much technology to use or which specific technology tools to include). The delay of some design decisions in this way illustrates the importance that participants placed on considering student needs, attributes, and opinions. It also illustrates the participants' desire to mitigate against the need to make design changes, if possible.

In Phase 3, students (6) and limited available design time (4) remained participants' key considerations. When discussing students, participants focused on the attributes and needs of the cohort, as well as support structures for students (4), with many participants describing the supports they had added to aid students' progress through the unit.

Participants reported a number of design supports to their design during this phase. Almost all participants were still using the ideas from the Learning Design they had chosen to support their design work, but the ways they used the Learning Design had shifted. Consultation with colleagues (4) remained the main additional support. In fact, in two of the cases, participants designed collaboratively with colleagues for most or part of the design work. Other supports were infrequent; for example, support from an educational designer (1), observation of other university teachers (1), and reference to educational literature (1).

At this stage, almost all participants had used the Learning Design during their work. Daniel was the only participant who had not engaged much with the Learning Design. He indicated that he was not focused on the design of this activity yet as it was scheduled for later in the semester. The other seven participants used the Learning Designs for design ideas (5) and to guide their design work (5), validate their previous pedagogical practice (2), and document the design for students (1). When discussing the types of ideas stimulated by the Learning Design, some participants reported not only new ideas for the current iteration of their unit (5), but also ideas they wished to use in future iterations (2). The most frequently reported impacts of their use of the Learning Design in this phase were the increase of technology integration and use (3) and influence on the design process (2).

Direct reference to the original Learning Design during this stage of the design was not common; instead, most participants relied on their memory of design ideas and steps, or design artefacts they had created during their early work with the Learning Design. For example, Emily created her own textual representation of the design adapted for her purposes, Mary created an LDVS of her unit, and Marcus wrote notes. When participants did refer back to the original Learning Design, they mainly did so to check implementation details. Only one participant, Joanne, spoke of specifically using the original LDVS in her design work. Her main use was to ensure she had all of the necessary resources and to focus her on what needed to be done at each step. As this was a new design there were many design tasks to be undertaken and Joanne suggested that the diagram had helped to keep her on track. The use of the LDVS in this way most likely came from her previous work with the LDVS diagram, as this was her second experience with them. Given how useful Joanne and others who created design artefacts based on the Learning Design perceived it to be, instruction or suggestion of such approaches could usefully guide users to richer experiences with the Learning Designs.

Specific challenges in this stage were highlighted in four cases. Mary and Emily indicated that using someone else's design initially felt restrictive; Marcus highlighted the challenges he had with the educational jargon used within his chosen Learning Design; and Daniel was of the opinion that the Learning Designs lacked the depth of information he needed. Daniel had only just selected a Learning Design at this point and had not fully read it, but his impression was that for his design work, he needed more practical examples of implementation and templates, and more detail. Even with these reservations Daniel still planned to apply the Learning Design.

In summary, the pre-implementation phase can be characterised by a continued shift towards the design of specific activities, with a peak in working with the associated resources and an initial 'big picture' design of the LMS site. Participants' design work often occurred in intensive periods, focusing first on the design of activities occurring early in the semester (i.e., the most time-sensitive activities). Almost all participants' LMS design left many aspects unfinished and open for ongoing development during implementation. Some participants sought external support in addition to their use of the Learning Design at this time; however, external support from colleagues and other

sources was at its lowest during this period. When external support was sought, the focus was on technical questions to university support staff about tools. This might suggest that participants did not need extra support at this time, or that they had less time to discuss their design with others during this period. Most participants continued working with the Learning Design ideas, making adjustments based on changes or challenges faced during implementation. While fewer participants referred directly to using the original Learning Design they had selected at this stage, its use and impact were still apparent, particularly in supporting design ideas and the design process.

5.2.4 Phase 4: Implementation and ongoing design work

During this stage, participants' design thinking and work was focused most on the ongoing design and implementation of tasks (8) and the technology-supported parts of their designs (6). There was also ongoing work focused on developing resources such as weekly lecture content or specific resources for an activity during the implementation, though this was not highlighted as frequently in the participants' descriptions of their work. Another area that many participants highlighted was the pedagogical model for the unit, in particular the links between elements of the design or to design goals (5). Finally, many participants were making plans for design adjustments and additions to future offerings (4).

During implementation, students (8), design rules and requirements (3), and design time (2) were reported as key design considerations. A number of student considerations were highlighted at this time: specifically, supports for student needs within the design, particularly in reference to increased engagement and comprehension (7); student feedback on the unit (6); and student workload (3). These interactions and considerations of students also acted as a support to participants' ongoing design work and, in a few cases, led to changes to the planned design. The most noteworthy illustration of this was Marcus's case, where the design shifted significantly in response to student feedback and needs. Other supports reported were discussion with a colleague (3) and consultation with design professionals (3).

Four participants, Nicole, Scott, Emily, and Marcus, described the Learning Design's ongoing influence on their ideas (4). One participant, Scott, returned to the Learning

Design website to search for a second design to support a different aspect of his design, and he was also the only participant who spoke of referring back to the original Learning Design documentations during this stage. Other participants relied on their recollections of, or design notes and diagrams they had made about, the Learning Design. Conversely, Daniel, who had earlier indicated that he would try to use the Learning Design, said he had not used it in the design of his activity. The most probable reason for this was that he had not found the Learning Designs approach helpful or easily understandable. Early in the process he had perceived the Learning Designs as extra effort, insufficient in the information he was wanting, and difficult to navigate. He expressed a preference for support from pedagogy books and more in-situ examples of resources and supports such as those provided by the problem-based learning session he observed. Perhaps these supports were more useful for him because he was a new university teacher with less experience to draw on, or perhaps it was just his personal preference.

There were a number of challenges to the designed units and activities during the implementation. Some challenges affected the unit more, and others were more specific to the Learning Design being adapted. The implementation challenges broadly fell into themes related to students (7), technology (4), tasks (specifically the optimal order of the weekly lecture and tutorial) (2), and resources (arrival of and quality) (2). The theme of students and technology is described further. First, problems related to students were the most commonly reported challenge, with all but Alison and Lana's case reporting challenges in this area. Specifically, student engagement and interaction problems emerged for many participants (5), and in some cases these engagement issues were related to the pedagogical changes the participant had implemented using the Learning Design. For example, the Learning Designs that some participants chose moved students to pedagogies with which they were less familiar, and that required a more active role from students that was outside of their usual experiences or patterns established within previous units. This was a challenge that was more prominent at the beginning of the semester, with most participants later reporting a positive shift towards more engagement. Other challenges related to students were the size of the cohort (either too large or too small) (3), cultural differences (2), and impacts of high student workload both within a unit and more generally in the program (2). Second, technology challenges were often more specifically related to Learning Designs use, as the

participants had tried implementing new things in their LMS to achieve the design. The challenges related to what tools could do (3), and in one case to the time to devote to the LMS site and related activity. Participants made adjustments to lessen technology challenges by choosing alternative tools, moving some online activities to face-to-face, or adjusting the requirements of an online activity.

In sum, during this phase, all participants continued to adjust their existing unit design and complete aspects of the design left unfinished before implementation. Though the 'big picture' design for the units usually remained unchanged, finalising the details of specific weekly activities and online components and resources were the main activities comprising this ongoing design work. During this phase, there was almost no direct reference to the original Learning Design, with most participants relying on their planned design to guide implementation. Scott was an exception to this pattern, as he returned to the Learning Design site during implementation to look for another Learning Design to help him implement a second embedded problem-based role-play activity he had planned in the second half of the semester. During this phase, one participant, Daniel, also chose not to use the Learning Design he had originally chosen.

Students continued to be a key support and consideration, with participants working to address student feedback and difficulties within the implementation if they could; in particular, by adjusting the design and teaching to encourage student engagement with the pedagogical approach.

5.2.5 Phase 5: Post-semester review and future design plans

When asked about their overall experience at this time, participants noted pedagogy (7), technology (6), learning outcomes (4), and resources (3) as key focal points. The discussion about pedagogy focused on tasks (5) and the overall pedagogical design (5). These comments emphasised deeper or clearer connections between elements such as resources, tasks, supports, and technology within the design and the participants' thinking. As in earlier phases, students remained a key consideration (7), with discussion of student supports needed or added to the design being a common focus. Student feedback and evaluation was the main support to design thinking at this stage

(6), and participants were relying on this feedback, as well as their own assessments of the effectiveness of the design, to shape plans for the next offering.

Seven of the eight participants reported perceived impacts from their use of the Learning Design at this stage, with more than half of these participants reporting six or more different impacts to their design work. The most common examples were improvements to participants' design processes (5), improvements to student supports and guidance (4), increased technology use (4), improved technology integration (5), increased confidence in the pedagogical approach (4), new long-term ideas (3), and improved connections between resources, tasks, and supports (3) within their design and/or in their design thinking. Participants also perceived improved and/or deep levels of learning (6). This last perception of improved learning outcomes was supported by participants' reports of student feedback, in which some students reported they had increased their level of engagement and/or learning in the unit in comparison to other units. The impacts related to design process, connection of design elements (e.g., tasks, resources, supports), and integration of technology are of key interest to this study. One point to highlight is that despite earlier questions about the impacts in the area of technology, many participants did not perceive some of these impacts until this post-teaching phase. The reason for this is not clear, but suggests that post-implementation reflection or time and space from the design work may play an important role in the conscious recognition of such changes.

In six of the nine cases, participants said that they would continue to use and refine the ideas they had acquired from their use of the Learning Design. Of the other two cases, Alison and Lana stated that students had indicated they would like more of the program to be delivered as it had been for this trial (i.e., with more online activities). However, at a program level the decision had not been made as to whether or how this would be done. In the other case, Daniel had discontinued his use of the Learning Design after selection, though he said he did intend to continue to develop the new activity he had added this semester.

The areas where participants foresaw a need to make changes in the future were technology (6), adjustment of the current design's sequence for learners (3), use of their chosen Learning Design for another unit (3), adjusting the pace (1), and using the

LDVS to communicate the design to others (1). One participant, Nicole, was already focused on the design of the next offering, which followed the completion of Semester 2 and was being taught as an intensive summer-session unit. For this offering she reported that she had made her planned adjustments to the online activity to clarify content and streamline steps.

In summary, the post-implementation design phase was characterised by reflection and forward planning for the participants' design. Design goals were future-looking and focused on student needs and refining the Learning Design ideas. In this phase, participants who used the Learning Designs made more connections to positive Learning Design impacts than they had previously. Perhaps this was because they had completed both the design and implementation and now had a clearer view of the experience of using the Learning Design. Among the key Learning Design impacts, participants cited design process, technology use and integration, improved student support, and improved pedagogical links.

5.2.6 Summary of Design Work Phases, Learning Design use and Selection

The preceding phase-based analysis across the cases highlighted participants' design processes, influences, and use of the Learning Design throughout the study. Table 5.1 provides a summary of the key findings from this analysis, identifying five phases to the participants' design processes, the key characteristics of each phase and the associated role of the Learning Design in each phase. While participants were from different disciplines and institutions, and worked on designs at different stages, general design-work patterns across the cases were observed.

Table 5.1 Design Phase, Key Characteristics, and Role of the Learning Design

Phase	Key characteristics	Role of learning design
Phase 1: Review and plan	- Orientation to the design problem - Identifying overarching goals and key considerations - Review previous offerings or experience	- Benchmarking practice - Stimulate ideas
Phase 2: Big picture design	- Map macro structure and pedagogical model - Identify and schedule the major tasks and resources for the design	- Discovery and use of ideas - Design steps and/or checklist - Benchmarking practice - Documentation model
Phase 3: Targeted activity design	- Shift towards activity level design (urgency focus) - Set up macro structure of LMS site - Design tasks and resources for the design - Adjustments based on changes or challenges (review, align and refine)	- Use of ideas - Design steps and/or checklist - Implementation examples - Reflection on design*
Phase 4: Ongoing design and adjustments	- Ongoing design of activities - Adjustments based on implementation and feedback (review, align and refine)	- Check implementation details - Discovery and use of ideas for ongoing design
Phase 5: Review and future planning	- Reflect on design - Plan future adjustments	- Ideas

*This was based on the LDVS of their design.

The early design phases (Phase 1 and 2) began with orientation to the design work, selection of the Learning Design and 'big picture' design activities. The selection and early design phase was the peak participants' of reports of direct reference to the Learning Design. Direct reference to the Learning Design then reduced over the pre-semester design period as participants incorporated the ideas into their own design work. Key roles of the Learning Design included acting to benchmark participants' practice as a source and inspiration for ideas, as a guide to steps for design work, and as a model for documenting and communicating practice.

Participants then moved on to targeted design activities (Phase 3), in which they assessed student needs, time available for design work, and urgency as the implementation of specific weekly activities approached. This period of targeted and iterative design work was responsive to changes in the design context and students' needs. For the participants designing new units, the role of the Learning Design was as a

source of further ideas, design sequence and process, and details of implementation. For almost all participants redesigning portions of their unit, the Learning Design ideas continued to be used during design work, but reference to the Learning Design was no longer necessary. This pattern of design work and Learning Design use continued into the implementation of the unit (Phase 4) during which participants continued to refine and create the activities they had planned prior to implementation. Few participants referred to the original Learning Design during this period; however, almost all participants continued work based on ideas from their chosen Learning Design. During all phases, students were a key consideration of participants' design work, and with the start of the semester, participants relied even more strongly on student feedback to shape and the direct final design work. In fact, the characteristics of the student cohort and their preferences were deemed to be so important that some participants used this as the reason for delaying particular design decisions. This was particularly true when finalising decisions about technology tools and activities.

Finally, during the review stage of the design and implementation (Phases 4 and 5), participants reflected on their design work and use of the Learning Design and made future plans for changes to the design. The Learning Design's role during this phase was to aid reflection and continue to inspire ideas for future plans.

5.3 Cross-Case attributes and impacts related to Learning Designs use

A second analysis that tabulated the attributes of each case and examined the data for possible relationships or patterns between these attributes and Learning Design selection, use, and impacts on design was conducted. This analysis focused on a number of attributes such as discipline, teaching experience, type of design task (e.g., new design versus a change to a previous design), and design scale (e.g., whole unit, specific activity). Across the small number of cases within this study, most attributes had no clear associations with other attributes or Learning Design use. For example, when the participants were divided into two groups based on years of experience teaching in universities (fewer than five years=new, five years or more = experienced), teaching experience had no apparent relationship to the extent, selection, or use of the Learning Design. The only observed relationship related to experience was that

experienced participants all spoke of using the Learning Designs to validate or benchmark their pedagogical practice, whereas participants with fewer than five years' experience did not report this as an impact of the Learning Designs for them.

However, when the number of times a design had been previously taught was examined in comparison across all cases, several possible relationships became evident. Specifically, differences in Learning Design selection, application of design, selected Learning Design, focus of design work, reference to the original Learning Design, challenges to implementation, and challenges to Learning Design use were seen between new designs and previously taught designs (i.e., redesigns). A summary of each of these points of difference is presented in Table 5.2, which compares these two groups; the results are elaborated on further below.

Table 5.2 Participants Creating a New Design vs. Participants Engaging in a Redesign

	New design (3)	**Redesign (5)**
Learning Design selection	Primary focus: alignment of learning outcomes, content types and task types (in particular assessment)	Primary focus: on pedagogical alignment
Application of design	Macro-scale design application (whole unit)	Smaller-scale Learning Design application
	Focused on designs they could apply to their whole unit	All targeted a specific aspect of their design
Selected Learning Design	Two chose cross-disciplinary designs; one chose a generic design guide	Three selected Learning Designs that were aligned to their discipline; the other two indicated discipline as a consideration in selection
Focus of design work	Focus on face-to-face pedagogy	In all but one case, the incorporation of more online components
Reference to original Learning Design	Referred to and engaged with the original Learning Design for a longer period than those redesigning.	Early reference, then tended to incorporate the Learning Design ideas without further reference
Challenges (implementation)	All experienced similar implementation challenges (e.g., student participation/ engagement, communicating the design)	Only one common implementation challenge: technology use
Challenges (Learning Design use)	Initial restriction was the only barrier mentioned	Early feelings of restriction initially
		Many felt the support within the Learning Design was too limited

When selecting a Learning Design, those designers of new units (i.e., Scott, Emily, and Joanne) approached and used the Learning Designs differently to those redesigning portions of a previously taught unit. This group's primary aim was on the alignment of learning outcomes, content types, and task types (in particular assessment) with a focus on designs that could be applied at the macro level. The participants of new designs selected Learning Designs that were either cross-discipline or discipline-neutral, and made no mention of looking for discipline alignment. Additionally, it was from this group that the only generic Learning Design guide was chosen. The new-design group applied the Learning Design to the entire unit or module that they were designing, and were most concerned with establishing the macro structure, and with face-to-face delivery of the unit. This suggests that macro and face-to-face pedagogy of the unit were the first priority, and may indicate that participants viewed the technological aspects of their units as 'add-ons' to the core of their unit. They referred to the Learning Design for a longer period of their design work and checked details during implementation. This may mean that the participants working on new designs needed the support of the Learning Design more; this may have been a due to the new design being less defined or clear in their own minds. All new designs shared similar implementation challenges, which focused on students' levels of engagement, participation, and understanding of design requirements. Finally, in the area of Learning Design challenges, the new-design group expressed only one common challenge: a sense of initial restriction associated with the idea of selecting and/or using a Learning Design. This challenge was also shared by the redesign group.

Those who were redesigning units had a different focus for the use of the Learning Designs and tended to focus on designs that were pedagogically aligned with what they had already designed. They searched for and chose Learning Designs that targeted a specific aspect of their design (e.g., activity, delivery mode, support strategy). In most cases, this resulted in the selection of a smaller-scale Learning Design to apply on a trial basis. For example, Nicole and Marcus chose to refine activities they had both taught before, and Alison and Lana looked for examples of how to transfer more of their unit's activities online, using one problem-based learning module online as a test case. Three of the participants redesigning selected a Learning Design that was from the same or a very similar discipline to their own; the other two highlighted discipline alignment during their selection process even though they selected a cross-discipline design. This

suggests a possible preference for disciplinary alignment with previously taught units. Perhaps, in contrast to the less-defined design problems in the new design group, the redesign group perceived less scope for change within their more defined design problem. In contrast to the new design group's primary focus on face-to-face pedagogy, all but one of the participants from this group included a focus on the increase of online components. This may suggest that the participants in this study viewed the technological development of the unit as a key focus only after the pedagogy was well established. Overall, the redesign group made reference to the original Learning Design for a shorter period of their design work than those creating a new design. Perhaps this shorter period of reference to the original Learning Design was due to the alignment of the selected Learning Design with what they had already created, or because of a better understanding of their own design problem. In any case, they seemed to incorporate the Learning Design ideas into their own design plans early in the process with little or no further reference to the original Learning Design documentation. As already mentioned, this group all indicated early in the selection and/or Learning Design use that they felt restricted by the idea of Learning Design use. In addition to this challenge, many in this group suggested that the Learning Design support did not completely meet their needs. Finally, everyone in this group shared the implementation challenge of technology use.

5.3.1 Summary of cross-case attributes analysis

No differences were observed in association with most case attributes; however, participants with five or more years of experience all indicated that they used the Learning Designs to validate their own pedagogical ideas and approaches, whereas the less-experienced participants did not refer to using the Learning Designs in this way. Several key differences were found between participants who chose to design a new unit and those who sought to redesign part of a previously taught unit; for example, in the areas of design scale (e.g., whole unit versus specific activity), Learning Design selection focus (pedagogical model versus possible disciplinary focus), and pattern of reference to the Learning Design (ongoing versus initial reference). These differences, which impact on participants focus and needs from the Learning Designs, suggest a possible need for changes to the Learning Designs organisation for selection and additional support strategies to encourage continued engagement with the Learning

Design over time for these specific groups. These differences also provide a better understanding of the types of Learning Design users and their possible needs as a guide for further research.

5.4 Cross-case analysis of technology, pedagogy and content

A third analysis was conducted to answer the second research sub-question: How does the use of a Learning Design impact university teachers' design thinking and knowledge? The aim of this question was to investigate reported and observed evidence of how the Learning Design impacted participants design work and thinking, with a particular focus on teacher knowledge.

This analysis task built on the Cross-Case Attributes matrix, the second analysis presented above. Within each of the cases, reported impacts on content, technology, and pedagogy, as well as the changes to the links and integrations between these areas were categorised and tallied. These tallies were mapped to the TPCK diagram of teacher knowledge areas (see Figure 5.2). The numbers beside each of the types of reported or observed changes show the number of cases where each change was reported.

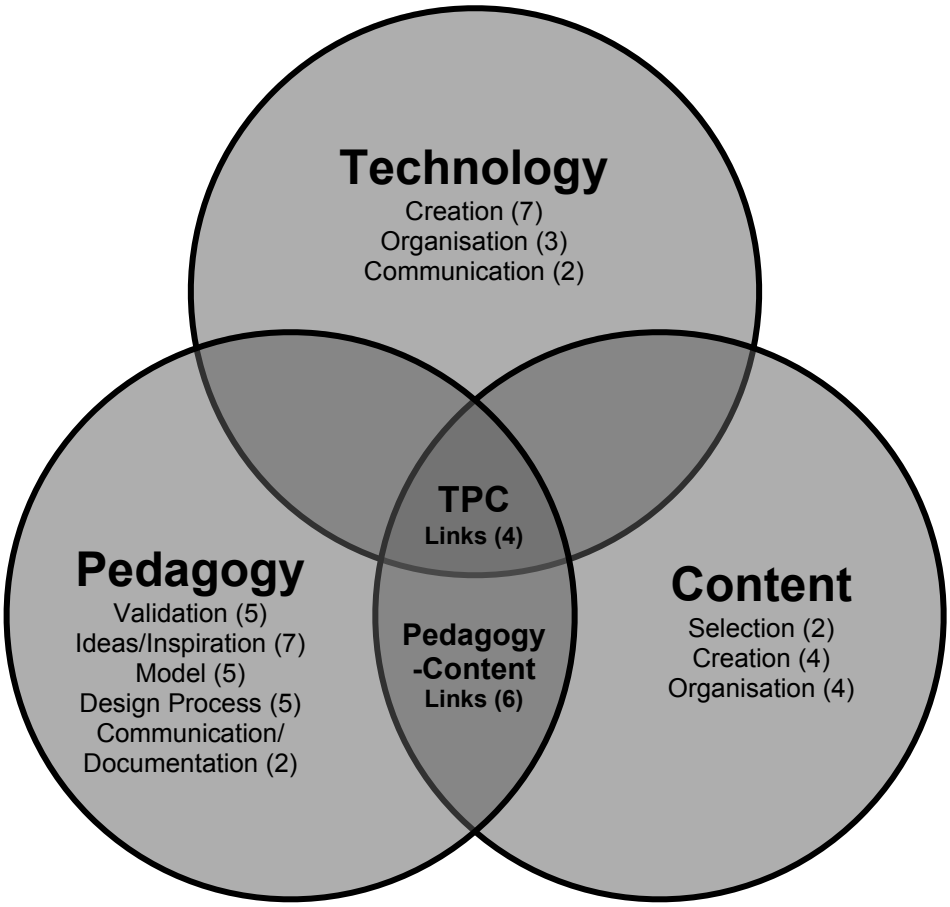


Figure 5.2: Reported impacts in the areas of technology, pedagogy, and content and links between them

While the figure suggests clear delineations, given the complex nature of design it is difficult to completely separate discussion of the areas of content, technology, and pedagogy. In particular, participants' discussion was rarely purely about technology as separate from thinking about a pedagogical task or need for content. Similarly, discussion of content was rarely only of disciplinary content knowledge as defined within the TPCK model, but rather of the content to be taught and how to approach it. As this analysis was based on a categorisation of participants' perceptions of change, the types of changes represented within the diagram show both the changes as reported and, upon closer inspection, a distinct difference in the level of change between the area of pedagogy (specific) and that of the areas of content and technology (broad).

In the area of pedagogy, shifts were seen in participants' ideas (7), pedagogical validation (5), supports for students (5), pedagogical models (5), design process (5), and

communication/documentation (2). Six participants reported using the Learning Designs as part of their design process, and indicated they felt that pedagogy was more integrated with other elements of the design (e.g., technology or content) than it had been previously. These will be discussed further in the following paragraphs. An additional impact related to changes in their pedagogy was how participants supported their teaching. Participants in this study worked hard to support students' learning and attributed some of their additional support to the use of a Learning Design. Work with the Learning Designs raised many participants' awareness of the need to build in both face-to-face and online supports for each task within the design. This resulted in the creation of additional resources, feedback loops, and connections between components of the design. Participants were not always clear about how they ensured that supports were in place or about indicating which supports resulted directly from their work with the Learning Design; however, there was a focus on how to support students around the time of the selection of the Learning Design. This raises the question as to whether this was just the participants' usual design practice when considering the overall design of their unit or activity, or whether the explicit nature of identifying the supports within the Learning Design resulted in this impact. In any case, in five of the cases participants explicitly reported that the Learning Designs had prompted them to think about additional ways of supporting students and improving the design.

In the area of content, the diagram shows that of the seven participants who used the Learning Designs, four highlighted better organisation of content, four indicated that the Learning Design impacted on their creation of content, and two indicated that it impacted on the selection of content. Additionally, six participants reported greater integration of content with the pedagogy of the unit (PCK) and four reported greater links between content, pedagogy, and technology (TPCK). When looking at these changes in relation to case attributes such as experience, discipline, and type of design, some possible relationships were observed. First, those participants who indicated that the Learning Design had an impact on the creation or selection of their content were either creating a new unit using the Learning Design or had a content focus to their redesign. Only one participant, Scott, who was creating a new design, did not report any impacts in this area; however, a professional body set the content requirements for his unit, so perhaps this restriction was the reason the Learning Design did not impact on content in this case. This pattern seems to suggest that Learning Designs have the

greatest impact on content creation and selection when the participants have a content focus to their design or are creating a new design with flexibility in their content choices. Conversely, for participants working on the redesign of previously taught units, the impacts tended to be focused on the organisation and integration of previous content within the unit.

In the area of technology, seven participants created new online activities for their units as a result of their Learning Design use, three reported better organisation, and two spoke of improved communication with technology. While all participants used digital resources or activities to implement their designs, changes to the LMS site designs as a result of Learning Design use were not strongly reported, particularly early during the pre-implementation phase. This may suggest that the Learning Designs did not support the changes participants were making in this area, or that participants were not aware of the types of changes in the early phases of there design work. Most impacts reported in the area of technology came after implementation, when participants had completed their ongoing work on the site.

To expand on the understanding of the types of technology impacts that may have occurred, for the participants who had redesigned their unit, the data from the previous unit sites was compared with the new unit sites data. This comparison showed a shift towards more interaction and tasks designed for the online space. For example, there was an increase in the number of participants using the LMS for independent learning activities, group learning activities, student communication, assignment administration, and feedback. It is difficult to ascertain whether these changes to the sites were due to the use of a Learning Design. However, of the four participants who redesigned an existing unit, each reported that the use of the Learning Design had led to better integration of the content and pedagogy within their sites. While these impacts were often not highlighted until after the unit had run, the four redesign cases were the only cases in which these TPCK links were reported, whereas participants with new units reported PCK links.

5.4.1 Summary of cross-case technology, pedagogy, and content analysis

In summary, the analysis of the impacts on pedagogy, technology, and content showed that the Learning Design stimulated a number of changes within the designs. Pedagogical changes were the most evident, with changes to ideas, model, process, pedagogical confidence, and documentation. For technology and content, the largest changes came from the increased pedagogical links rather than, for example, increased knowledge or skills solely in the areas of technology or content. These links provide evidence of PCK and TPCK development related to Learning Design use. Furthermore, a relationship between design type (i.e., new designs and redesigns) and development of TPCK or PCK was observed, with new units showing development of PCK links but only redesigned units showing development of TPCK. The differences in TPCK and PCK knowledge development suggest a possible progression of knowledge development when working on design problems.

5.5 Chapter summary

This chapter has presented findings from the cross-case analysis. The chapter began by presenting the key aspects of participants' design work in each phase of the study. A number of areas, including design thinking and activities, design considerations, and Learning Design use and impacts across each of the phases, were presented. The key findings from this section are:

- Participants' design work generally started with big-picture thinking and moved towards more detailed levels of activity design.
- Design work was iterative, continued after teaching began and was responsive to students' needs before, during, and after implementation.
- Key supports to design were Learning Designs, student feedback, and colleagues.
- Key considerations were student cohort, students' needs, and design time available.
- Direct reference to the Learning Design tended to occur near the time of Learning Design selection and unit-outline creation, even for participants who chose Learning Designs for smaller-scale activities rather than whole-unit designs.
- Prior to teaching, the Learning Designs served to benchmark practice, provide ideas, guide design work, and document and communicate the design.

- During teaching, they were used to check implementation details and find new design ideas using additional Learning Designs.

The chapter then discussed two further analyses of the data, beginning with an examination of relationships between attributes of the cases and Learning Design use, then categorising and discussing the impacts of Learning Design use on technology, pedagogy, and content. Key findings from these analyses point to a number of differences in Learning Design use and impacts related to whether the participant was creating a new design or redesigning a unit. Specifically, designers of new units and previously taught units used the Learning Designs differently. Differences between these two groups were observed in the scale of design selected and applied; openness to cross-disciplinary designs; duration of reference to the original Learning Design; purpose and focus of work; and challenges to Learning Design use and implementation. The analysis of the impacts on technology, content, and pedagogy investigation showed the most powerful impacts being in the areas of pedagogy and integrated areas of PCK and TPCK. The impacts to the integrated knowledge areas showed a possible relationship with design type, with the impacts associated with participants of new designs predominately being in the area of PCK, whereas those associated with participants working on previously taught units highlighting TPCK impacts. The final chapter further discusses and draws conclusions from the findings with specific reference to the research questions posed within this study, and outlines the implications of these findings, contributions, and possible avenues for future research.

6 Conclusion

This chapter discusses the key findings of this study in relation to previous research and outlines implications for research and practice. The chapter begins with a summary of the main findings for each research question. Next, a discussion of the limitations of the study is presented, followed by an exploration of possible areas of further research. The chapter finishes with a summary of this study's contributions to research, theory, and practice.

6.1 Summary of findings

The purpose of this study was to investigate university teachers' use of a Learning Design within the context of designing and teaching a university unit. It was guided by the following broad research question:

- How do university teachers use a Learning Design in the design and implementation of an undergraduate university unit?

From this arose two sub-questions:

1. How do university teachers select and use a Learning Design as part of their design practice?
2. How does the use of a Learning Design impact university teachers' design thinking and knowledge?

The focus of the remainder of this section is to summarise and discuss the findings in relation to each of these questions.

6.1.1 Research Question 1: How do university teachers select and use a Learning Design as part of their design practice?

This study followed university teachers' design work before, during, and after the implementation of a unit for which they were the designer and teacher. Over this period, participants selected a Learning Design, conducted their design work using the Learning Design, taught the unit or activity while making adjustments as they saw fit, and reflected on the entire experience after teaching. Data gathered and analysed throughout this study provided insights into the types of activities participants undertook, as well as their considerations and influences at each stage of their design practice.

6.1.1.1 Learning Design selection

The pedagogical focus of the Learning Designs and key terms within titles and summary text were important for participants in initially identifying Learning Designs of interest. Most participants first focused on designs grouped under pedagogical approaches that were of interest to them (e.g., problem-based learning). This initial emphasis on the pedagogical focus of the design could have been an artefact of the Learning Design site's default organisation (by pedagogical focus); however, alternate organisations of the Learning Designs (e.g., by discipline area, technology used, etc.) were available and participants had been shown how to access these, if that was their preference. During their selection process, participants scanned the titles and summary text for key terms indicating pedagogical focus, task focus, or the original discipline of the Learning Design. Highly contextualised or discipline focused terms encouraged further investigation only when they explicitly aligned to the participant's context. When disciplinary or context specific references in the titles did not align well, these terms acted, at least initially, as cross-disciplinary barriers for some participants (e.g., Mary and Stephen). Conversely, more pedagogical and task-focused descriptions within titles and summaries appeared to encourage exploration of the Learning Designs ideas and facilitate understanding.

The fact that more pedagogical and task-focused terms were preferred and that contextually bound words could act to discourage exploration of a Learning Design suggests a need for Learning Design tools and collections to review and adjust titles to facilitate selection and reuse. Further research to confirm the effect on selection would be needed; however, by ensuring that titles focused more on the pedagogy and tasks undertaken within the design rather than the particular context a design was drawn from, it seems teachers may be more open to considering a design. Such an adjustment in titles is similar to the shift that can be seen between an AUTC Learning Design exemplar and its generic form, as an example, take "Teaching and Learning in Multimedia" (Herrington & Oliver, 2002) and its generic form "Explore, Describe, Apply: A problem focused learning design" (Oliver & Herrington, 2002). Both of these designs have the same basic pedagogic form; however, the titles communicate very different information about the design. The generic Learning Design uses

pedagogically descriptive verbs to represent the task sequence within the title rather than describing the design's original application. Given the above findings the second title, with its pedagogically and task-focused descriptive verbs, might communicate the design more directly and perhaps encourage some cross-discipline teachers to explore it more readily.

The visual representation (i.e., the LDVS) was an important summary of the design information for some participants. Participants in this study used the visual representation to gain an overview of the design and design elements (i.e., resources, tasks, supports), and for comparison to other Learning Designs and participants' design needs. Joanne, who had used the LDVS diagram to document and discuss design plans in a previous redesign project, was the participant who most emphasised her use of the LDVS during selection. She used the LDVS diagram as a quick way to compare designs visually and determine required resources. Two other participants, Mary and Emily, also used the LDVS diagram to get an overview of the design during selection. For these participants, the visual representation was an important summary of the design information. This finding supports previous research indicating that visualisation of a design facilitates understanding (Botturi, 2005; Conole et al., 2008; Lucas et al., 2006) and specific research on the AUTC Learning Design diagram, which highlighted the role of the LDVS as a communication tool (Agostinho, 2011; Bennett et al., 2008). Given the effectiveness of visual representations as a design-overview tool for some participants, it may be more effective to locate the visual representation together with other higher-level summary information (i.e., title and summary) so that teachers have quick and easy access to their preferred format. Additionally, given that participants focused on key pedagogical terms in the summary text, it may be important to ensure that Learning Design visual representations include these.

The various levels of the Learning Design summary and representation (e.g., textual, visual) provided multiple ways for participants to understand the designs and facilitated selection. When initially selecting a Learning Design the participants relied on key summary elements such as the title, pedagogical type, summary, and visual representation. Then, when focusing on specific designs, most participants went through the entire Learning Design, using the detailed textual descriptions to gain understanding, answering their questions and assessing how the design would fit into

their design plans. Additionally, some participants used both the text and the visual representation of the design, while other participants focused more on one or the other. Within the literature, multiple representations have been suggested as supports for understanding Learning Designs (Falconer & Littlejohn, 2006). The findings of this study have shown that the inclusion of multiple representations and multiple levels of description within the AUTC Learning Designs support understanding of the design at different points and help to tailor to different participant needs. This was especially true during selection and suggests a need for Learning Design tools and collections to consider how they present Learning Designs to teachers during this stage. For example, within Collage, Learning Designer, and the AUTC Learning Designs, the Learning Designs are all presented as a simple list of titles (sometimes organised by pedagogy, discipline, etc.) for selection. While this presentation allows more Learning Designs per page, it also limits teachers' initial understandings to the information within the title or requires the teacher to click and search within each design for the most relevant summary information to make a more informed decision about possible fit. Given the findings of this study, it seems that the selection of a design could be facilitated by the initial co-location of multiple summary items. For example, instead of presenting just a list of Learning Design titles, perhaps an inclusion of a shorter summary and preview of the visual representation could help initial decision-making. Such inclusions could help in two ways. First, it would allow teachers quick access to all of the key summary information in one place. Second, it would allow teachers to focus on whichever format(s) of the Learning Designs they personally found most useful for distilling information without the need to search for them within the full design descriptions.

The contextualised Learning Design exemplars were more commonly chosen than the generic Learning Design guides. Almost all participants chose a contextualised exemplar Learning Design (i.e., a Learning Design that still contained disciplinary context information) with only one participant choosing a more discipline-generic Learning Design guide. The single case of generic Learning Design use within this study brings into question the speculation that generic designs may not contain enough information to be understood and applied (Bennett et al., 2004; Falconer & Littlejohn, 2006). Despite generic designs being understandable, the fact that the remaining seven participants chose and applied a contextualised design suggests that contextualised designs may be preferred. However, as only two participants chose Learning Designs

that had both a contextualised and generic form this is not clear. Perhaps contextualised designs are easier to understand (Bennett et al., 2004; Falconer & Littlejohn, 2006), or perhaps the contextualised designs chosen were just the designs that aligned best to participants' design needs.

The only participant who used a generic Learning Design had fewer than five years' teaching experience, and was working on her first completely new design. Contrary to the findings regarding contextualised designs discussed above, Emily indicated that she found the contextualised designs to be lacking in detail and the generic designs to be more practical. While this is a single case and would need further research, it suggests a possible relationship between experience level and preference for more generic (i.e., abstracted) designs. This builds on the finding above that less experienced participants preferred generic titles and summary information when choosing a Learning Design. These types of preferences could be related to design expertise, as experts have been found to form mental abstractions more easily than novices (Akin & Akin, 1996; Ho, 2001). This point of design expertise is further made by Cross (2004): "Experts are believed to be able to store and access information in larger cognitive 'chunks' than novices can, and to recognise underlying principles, rather than focussing on the surface features of problems" (p. 146). From this perspective, perhaps generic designs, with their pedagogically focused terms within the titles and less contextually bound descriptions, address the needs of novice designers by simplifying the presentation of the design solution. Conversely, perhaps contextualised designs provide the details that more experienced designers are able to more easily abstract from. This has implications for Learning Designs such as Pedagogical Patterns, which aim to provide generic solutions for teachers to adapt. It is possible that this high level of abstraction may be hindering reuse for some teachers. Further research with a focus on the strengths of different levels of abstractions and design expertise could help to expand and clarify these findings.

Participants most often gave alignment to design goals and pedagogy, rather than to discipline, as their reason for their Learning Design choice. This seems to build on Eley's (2006) finding that activity or topic type was a better predictor of design choices than the broader category of discipline. However, adding to the complexity of the findings related to discipline, a possible pattern between type of design work (e.g., new

design versus previously run design) and different levels of preference for discipline alignment emerged. For example, some participants redesigning part of a previously run unit initially spoke of preferring or wanting designs that aligned to their discipline. Additionally, in the final Learning Design selection, many of the participants redesigning selected discipline-aligned designs, while all participants of new designs chose designs that were cross-discipline or discipline-neutral. It is unclear why this was the case; however, perhaps those redesigning are less open to cross-disciplinary designs because they have more narrowly defined design problems, and those working on completely new designs are open to these designs because they begin with a broader scope. If so, it would suggest that new-design or complete-redesign scenarios represent the optimal time for Learning Design selection, as at this point perhaps teachers are more open to cross-disciplinary ideas and greater pedagogical variety.

Participants who chose designs outside of their discipline were able to effectively transfer the design to their own context. As stated above, there was a possible relationship between unit redesign and a preference for discipline-aligned designs, if available. However, despite this, only three participants chose a design from their discipline area, with most participants ultimately favouring pedagogical fit over discipline match. In all cases where cross-disciplinary designs were chosen, participants were able to understand and extrapolate the design ideas to their own context without additional support, even when the disciplines were seemingly very disparate. The clearest example of this was Nicole, who, despite original preferences for law specific designs, chose and successfully applied a Learning Design originating from chemistry to her law unit. The fact that cross-disciplinary contextualised designs are understandable and transferrable once selected suggests a need to find ways to overcome teachers' perceived need for discipline-specific designs rather than creating designs that are more generic. Perhaps, as suggested earlier, using discipline-neutral language and key pedagogical terms within the titles and summaries could help to initially broaden the set of contextualised designs that teachers considered by connecting with pedagogical task types rather than discipline. Alternatively, more abstract Learning Design formats such as Pedagogical Patterns could be used to provide high-level views of the design during selection and connect teachers to more contextualised Learning Designs. Further research with an aim to learn more about what can best facilitate teachers in both their selection and understanding at different

points of the design process would help to guide directions and development of Learning Design formats.

6.1.1.2 Learning Design use

The participants used the Learning Designs in four ways during the pre-semester design work: as benchmarks for design practice, stimuli for design ideas, guides for design activities, and frameworks for thinking about and communicating design ideas. These uses are discussed briefly here and expanded within the section on Research Question 2, which describes how these uses impacted design thinking and knowledge.

First, acting as a benchmark specifically during selection and early use, the Learning Designs worked to affirm the validity of pedagogical thinking, particularly for university teachers with more than five years' teaching experience. This use has not been previously identified within the literature, perhaps because this is secondary to Learning Designs' primary goal of communicating design ideas; however, it provides insights into possible alternate uses and benefits for more-experienced users.

Second, the findings in the areas of idea generation and use as a design guide and a communication tool provide confirmation of previous research findings suggesting roles for the AUTC Learning Designs (Agostinho, 2011; Bennett et al., 2004). However, as this is the first study of Learning Design use throughout a full cycle of university teachers' design work, the findings also provide expanded and varied insights into uses and impacts. One example is the role of the Learning Designs as a stimulus for ideas. Within this study, the process of selecting a Learning Design was identified as a particularly generative phase for design ideas for both the current offering and future offerings. While Learning Designs have been presented as having a design-inspiration role (Agostinho, Bennett, Lockyer, Jones, & Harper, 2013; Conole, 2013), the specific role of the Learning Design selection process emphasises this activity in a way not shown in the literature previously.

Third, when using the Learning Designs as a guide for their process, the participants:

- used the text and the visual representation (i.e., LDVS) as an outline of the pedagogical steps the students would follow (text and LDVS);

- focused their design process and activities (text and LDVS) for clarification of detail (text);
- used the text and visual representation as a checklist for design elements; for example resources, tasks, supports (text, LDVS);
- made connections between resources, tasks, and supports (LDVS); and
- documented their design thinking for communication with others (LDVS, key task terms from text).

Additionally, for those participants who chose a semester-long or multi-week Learning Design, reference to the Learning Design aided the process of creating unit outlines and the big-picture design of the unit through the identification of tasks and resources.

Finally, the Learning Designs were used as a framework to scaffold thinking and as communication tools for design plans. Within the literature the role of Learning Design has been conceptualised as representations of design as well as potential mediating artefacts within design processes (Conole, 2009). Participants within this study who used the Learning Design concepts or visual representation to document and communicate their designs showed these conceptualised roles. The documentation process acted as an additional scaffold to their thinking, which appeared to lead to more-connected forms of design thinking; these are discussed further when answering Research Question 2. These uses were embedded within participants' larger design process, which is outlined in relation to some of the key foci of Learning Designs use in the following sections.

Participants most actively referred to and used the Learning Design in the period before teaching began. During the early pre-semester implementation phases (Phases 1 and 2, described in Chapter 3), participants were introduced to the Learning Designs, selected a Learning Design to apply to their unit, and began planning their units. This stage is when most participants created their unit outlines and their consideration of the Learning Designs, with a focus on the macro-level design work. Overall, direct reference to the chosen Learning Design during participants' design work was most frequent during selection and early design work. This seems to emphasise that these early stages of design work and planning are key stages of Learning Designs influence.

During the pre-implementation period, participants worked to ensure they had the necessary tools and technology knowledge to implement the Learning Design. While the participants of this study did not largely draw on external support, technology advice and guidance was one area where they sought support in addition to the Learning Design information. The nature of the advice they sought tended to be focused on discovering specific information about the features of their university's LMS system or seeking targeted technical help with a tool they wished to use. This was perhaps due to the fact that, in many cases, the tool set used within the original implementation of the Learning Designs was somewhat different from the tools available to the participants for their design. Also, the original AUTC Learning Design site offers no aid for setting up the tools.

As the beginning of the semester approached, the general nature of design work shifted from macro design work to more specific development of the tasks and refinement of the design. During these design activities, reference to the original Learning Design documentation was infrequent and tended to be focused on clarification or troubleshooting. During this phase, differences were observed between designers of new units and designers of previously taught units. Specifically, participants designing new units continued to refer to and use the Learning Designs for design steps and clarification of details or implementation examples. In contrast, participants redesigning short one- or two-week activities for a previously taught unit reported little or no reference to the Learning Design during this period. Instead, they based their design work on their adapted design summaries and notes or their extrapolated design ideas.

None of the participants had completed all aspects of their design by the start of the teaching session. Further, those participants who chose shorter, activity-level Learning Designs did not complete the work on these activities until just before implementing them, and made little reference to the original Learning Design during implementation (Phase 4). In these cases, the participants used the Learning Design during their early macro-level structure design and when considering needs for the design of the activity prior to teaching; however, the major design work on these activities occurred after the implementation of the unit had begun. This delayed design of weekly activities aligned with the overall pattern of participants' design work on weekly unit activities, which,

prior to teaching, focused most heavily on the content and activities that occurred during the teaching period before the midterm break, leaving later weeks to be finalised during implementation.

Most participants did not refer to the original Learning Design during implementation. However, those participants who referred to the Learning Design reported that they used it to confirm implementation details or to communicate the design to students. Again, participants of previously taught units were less likely to refer to the original Learning Design during implementation. This may be explained by one or more factors such as familiarity with the design problem, urgency, or knowledge of the student cohort. For example, participants of previously taught units would most likely have a more established mental model of their design and would therefore be able to more readily incorporate the ideas of the Learning Design earlier in the process. Additionally, in all cases where short one- or two-week activities were being trialled there were several weeks before the activity would be implemented. Therefore, there was little urgency for designers of these short activities to complete the design of the target activity immediately after the macro-level thinking and connections had been determined. Finally, some participants may have been waiting until they had a better understanding of the student cohort. This tactic of delaying design work and decisions was shown in the cases, and allowed participants to better assess the students' needs and obtain feedback on new ideas and plans before investing time into their full design. This finding seems to align with a characteristic identified within Owen (2007), who suggests that design thinkers have an ability to delay or avoid decisions to search for alternatives and combine possibilities.

The above findings on participants' design practices and use of the Learning Designs have a number of implications for Learning Design tools and research directions. First, with teachers' primary Learning Design focus being within the initial stage of selection and use, researchers and tool developers may wish to investigate ways to aid the selection and provide better support in this early planning (usually at the macro level). Second, Learning Design tools will need to support the ongoing design work, which becomes more focused on activity level detail and the practical application and implementation of technology solutions. Addressing the need for technology support matched with the pedagogical approach and facilitating the implementation within the

teachers' LMS environments could be the key to truly engaging and supporting teachers' use of Learning Designs. The value added by efficiency and support could also facilitate the uptake of Learning Designs and enable the development of more effective technology integration within a design. Third, as teachers continue their design work throughout teaching, tools need to allow for changes and provide relevant support. The design needs to be editable after the start of teaching (particularly at the activity level) so that teachers can make adjustments contemporaneously. The provision of activity level examples, as well as support for common implementation issues could also help teachers adapt a design to their context. However, these implications and possible solutions need to be further investigated and developed within existing tools to assess the match with teachers' needs and determine the most worthwhile directions.

6.1.1.3 Summary of Research Question 1

The findings point to the importance of pedagogical fit and key summary items such as the title, summary text, and visual representation during selection. Additionally, they highlight the Learning Designs' use as a benchmark, generator of pedagogical ideas, design guide, and tool for communicating design ideas. The results also suggest that the provision of both textual and visual representations of the Learning Designs gave participants multiple ways to learn about the designs.

Selected designs were most often contextualised Learning Design exemplars, with alignment to pedagogical goals being the most common reason for selection. Overall, contextualised designs within participants' own discipline group were the ideal, but when a Learning Design is not available in their discipline group, the pedagogical approach embedded within a context may be more important for understanding the detail of a design. Further investigation would be necessary to determine whether these findings are more broadly consistent. However, these results imply that work to remove the contextual information from detailed Learning Design descriptions of any format may actually make Learning Designs more difficult to understand and reduce transferability to new contexts.

Design work with the Learning Designs, and more generally within the unit, began with big-picture thinking and moved towards more-targeted design activities. The peak of reference to the original Learning Design was during the selection and early design-work phase, with later reference generally being focused on specific details. The Learning Designs were mainly used during the early design-work stages to guide design activities and document ideas for communication with others. The following section looks more closely at the impacts these uses had on design processes.

6.1.2 Research Question 2: How does the use of a Learning Design impact university teachers' design thinking and knowledge?

This research question was concerned with how the use of a Learning Design impacted design thinking. The impact on participants' design thinking was examined by looking at the reported and observed impacts using the Technological Pedagogical Content Knowledge Framework (TCPK) (Mishra & Koehler, 2006) as a lens. The impacts were categorised and mapped within the areas of technology, pedagogy, and content as well as the associated integrated knowledge areas (see Section 3.4 for descriptions of these areas and Section 5.4 for the cross-case analysis).

In this section, the impacts on participants' design thinking resulting from the use of the Learning Design are first discussed separately in the areas of content, technology, and pedagogy. Then particular focus is given to the Pedagogical Content Knowledge (PCK) (Shulman, 1986) and Technological Pedagogical Content Knowledge (TPCK) (Mishra & Koehler, 2006) areas, as these integrated knowledge areas have been suggested as indicative of teachers' knowledge growth and therefore possibly of the development of more integrated forms of design thinking and knowledge.

6.1.2.1 Content

Several participants reported that the use of the Learning Design impacted on the organisation of content, creation of resources, and connections between these and the tasks and supports within the unit or activity. This was particularly evident for those creating new units or integrating many new resources. For example, when Emily designed her student tasks following the *Explore, Describe, Apply* Learning Design, she also specifically created and/or selected content to link to each task in the sequence.

Emily also indicated that the Learning Design had influenced how she looked at the broader literature in her field and thought about the content connections that could be made.

Content impacts were primarily focused on each Learning Design's overall organisation and integration with both pedagogy and technology. Marcus's case is particularly illustrative. He was probably the most content-focused participant within the study. He had a large volume of content resources, which he had historically provided to students; however, the most relevant resources, with the exception of the textbook chapters, had not been directly linked to the weekly tasks for students. Instead, he provided the students access to large numbers of resources, which he said would allow them to explore and gain an understanding of the depth of the field. For Marcus, the Learning Design led to his realisation that linking to selected key resources online would support his students' work on the tasks more effectively. This shift provided the students with the guidance to focus their initial study of the material that he had collected for them. As a result of this shift, Marcus felt that the students had achieved higher outcomes than they had in the past, and that both his online and face-to-face teaching had been improved.

The finding that working with the Learning Designs can influence both content creation and content connections within the design is new to the area of Learning Designs. However, findings from a study focused on the use of concept maps to represent teaching pointed to similar benefits in the organisation and linking of content for university teachers (Amundsen, Weston, & McAlpine, 2013). In that study, concept maps were found to help participants rethink course content, highlight content relationships, and provide an overarching view, and to help make thinking explicit. The alignment of these findings points to the value of conceptual tools, such as inspirational Learning Designs, and visual representations to develop designs and design knowledge.

6.1.2.2 Technology

Applying a Learning Design to a new unit or large portion of a unit often resulted in lessened or buffered technology use by participants (e.g., Emily, Joanne, Marcus). This was true even when initial intentions were to make greater use of technology. There are

several possible reasons for this. First, the participants may have been mitigating risk of failure or over extension by minimising the number of new elements or areas of the design that required extra investments of time. Second, perhaps the technology support within the Learning Design was not detailed or current enough to support what the participants were doing with the tool set that they had in their university. As stated earlier, the area for which participants sought the most additional support when using the Learning Designs had been technology. Third, participants not teaching fully online may have seen the face-to-face pedagogical aspects of the design as a higher priority, particularly during its first offering. Fourth, the capabilities of the tools within the university's LMS and its robustness may not have met the needs of the design. Statements from Marcus, Joanne, and Emily suggest that a combination of these reasons were involved in their more moderate technology use. These factors impacted on other participants use of technology as well; however, with a greater degree of overall familiarity with their pedagogical design, these participants, making smaller changes to previously run units, were able to work and experiment more on the technological aspects of their design.

The Learning Design helped participants, particularly those redesigning previously run units, think about how to connect and support aspects pedagogically within their LMS sites. In particular, this study's findings point to a deepening of connections between technology, content, and pedagogy, as described in Marcus's example in the content section above. However, the impact of the Learning Design on these connections was not always realised in the early design phases. In fact, many participants did not recognise it until after the implementation of the unit. This later recognition of the impact may have been due to an initial mismatch of expectations. Perhaps participants were initially looking for the designs to have a larger impact on their knowledge of technology tools or simplification of their work within the LMS, and therefore did not initially recognise these other changes in thinking. Alternatively, perhaps this lack of earlier reporting of such changes was because most of the technological design elements were largely incomplete prior to implementation. Since participants continued to work on sections of the site and released elements as they went through the semester, it was not until after implementation that the participants had a complete picture of what they had done and time to reflect on the impact of the Learning Design in this area. Certainly, after implementation, many of the participants, particularly those of

previously run units, reported that they had improved the organisation and connection of design elements (resources, tasks and supports) within the site as a result of the exposure to the Learning Designs.

6.1.2.3 Pedagogy

The Learning Designs' greatest impact was on the participants' pedagogy, particularly impacts on their process, a deepening of pedagogical connections within the technology environment and links to the content being taught. The participants used the Learning Designs in four main ways: for ideas and inspiration; as validation of and a benchmark for practice; as design guides; and to document and communicate practice. The impacts of these uses on participants design thinking are discussed below.

6.1.2.4 Design ideas and pedagogical inspiration

The participants used the Learning Designs to stimulate design ideas and adapt pedagogical approaches. As stated earlier, the selection process was particularly important for the purpose of exposing participants to a variety of design ideas and pedagogical approaches for consideration and inspiration. In this way, the Learning Designs impacted on participants' design thinking by expanding pedagogical possibilities available within participants' repertoires. Given that a larger set of possible solutions to a problem is one characteristic of design experts' knowledge (Cross, 2001; Owen, 2007), it is possible that exposure to the Learning Designs provided an externalised set of design expertise to focus design thinking and creation of a solution for participants in this study. Additionally, during the selection process participants evaluated a number of design ideas, which required them to consider alternate solutions for their design problem, thus perhaps creating a number of rapid cycles of ideas and design evaluation that could stimulate design thinking. In this way, the selection process seemed to act as a support to what is referred to within some applied Design Thinking processes as the ideation phase of design work (Brown, 2009; d.school, 2013) or what others may refer to as brainstorming or idea generation, to address the participants' design needs.

Participants adapted ideas from the Learning Designs, applying them to targeted activities or the whole of their unit. In many cases, these also included adaptations to

the scale or disciplinary context of the design to fit particular design needs. This reuse and transfer of Learning Design ideas to new contexts, and in most cases, to another discipline provides evidence of the feasibility of the concept of the AUTC Learning Designs as a format for the transfer of pedagogical ideas (Oliver et al., 2002). This result expands on previous findings that the Learning Design concept of distilling pedagogical ideas for reuse is applicable beyond design-workshop environments with the AUTC Learning Design (Bennett et al., 2005) or design- protocol exercises with Pedagogical Pattern-based Computer-Supported Collaborative Learning scripts (Alvino et al., 2009; Villasclaras-Fernández et al., 2013) and LAMS sequences (Verbert et al., 2012). It provides evidence of transfer of design ideas to university teachers' more naturalistic contexts and ill-defined design problems. Additionally, these results provide evidence of the transferred Learning Designs beyond the initial stages of design through to implementation with students in these new contexts.

Participants incorporated the Learning Design ideas into their pedagogical repertoire for reuse beyond the target design unit or activity, expanding their pedagogical approaches and thinking. For example, some participants reported using the ideas from their chosen Learning Design within other units they were teaching (e.g., Emily, Scott, Marcus). This evidence of being able to transfer and extend ideas to other areas of their design practice shows that Learning Design use contributed to changes to participants' design repertoire and suggests that they affected deeper changes to participants design knowledge and design thinking skills.

6.1.2.5 Validation and benchmarking of practice

The selection and use of the Learning Designs provided validation of participants' pedagogical practices, acting as a benchmark for past design thinking and knowledge. As mentioned earlier, this was of particular note for participants with more than five years' teaching experience. For many participants in this study, previous designs and teaching ideas had primarily been drawn from experience-based knowledge of what works, student feedback, and discussions with colleagues rather than formal pedagogical models. Additionally, some participants spoke of participation in professional-development activities and personal reading on teaching. Therefore, many of these influences on participants' design thinking was informal, of unknown quality or

unevaluated in its application. The Learning Designs, which are evaluated models of good practice, provided a formal benchmark against which some participants could judge their own design thinking and knowledge. For example, Marcus, Joanne, Scott, Mary, and Alison and Lana found alignment of ideas and methods within the Learning Designs that they said increased their confidence in their own design thinking and knowledge in practice.

This benchmarking role also worked as a starting point for participants to expand upon their current designs. While the Learning Designs the participants used to benchmark their own practice aligned with their current practice and/or ideas, the Learning Designs also contained variations and possible extensions, which participants used to improve and enhance their practice; for example, Alison and Lana's expansion of their primarily face-to-face problem-based learning design into a more online delivery and Scott's idea of adding in assessable milestones to help ensure and check student progress through the design. In these cases, the Learning Designs provided both an example of further possibilities and, for Scott, a connection to learning-theory principles through the contextualised examples within the Learning Designs.

6.1.2.6 Guided and scaffolded design thinking

The use of the Learning Designs impacted on participants' design thinking by providing an organisational framework that guided their design activities and scaffolded their pedagogical understanding of the design. The information contained within the Learning Designs is set out in a consistent pattern at multiple levels of detail (i.e., summary and extended detail) and in multiple formats (i.e., textual and visual). In this way, the Learning Design text and the visual representation presented a structure, set of concepts, and organisational framework for the participants' thinking and work. The ways participants used the Learning Designs' information varied in both extent and method; however, broadly speaking, participants used the Learning Designs to get an overview of the design, as a guide for the sequence of tasks, as a checklist for associated design elements (e.g., resources and supports), and to clarify details (particularly implementation information). In these ways, the Learning Designs guided participants' work and scaffolded design thinking. This aligns with suggestions that diagrams and structured vocabularies can act to increase pedagogical understanding of the Learning

Design's structure, provide a checklist for design work, and highlight design connections (Conole, 2009).

The use of the Learning Designs also highlighted the links between resources, tasks, and supports during design work and implementation. The participants' final reports of impacts suggested that the visualisation (e.g., LDVS), structure, and breakdown of key elements (e.g., resources, tasks, supports) of the Learning Designs may have provided new ways for participants to think about their design work. In particular, connections between the resources, tasks, and supports were clearer for many participants (e.g., Marcus, Joanne, Mary, Emily, Nicole). Most of these participants not only spoke of improved connections within their designs and design thinking but also indicated an increased awareness of the connections during teaching. This impact is shown in the example of Marcus, who spoke of more-connected thinking when teaching and more-targeted connection of content to tasks to support students' learning. Additionally, it was shown in Mary's use of the visual representation to map and identify needs in her current unit design as well as redesign activities to ensure that each task was connected to the necessary resources and supports. There are suggestions within these findings that there was greater power in using the Learning Designs than just the transfer of pedagogical ideas from the Learning Design to the participant. In each of these examples, the participants used elements from the Learning Design to focus and organise the relationships in their design and to support thinking.

6.1.2.7 Production of design representations scaffolded design thinking and resulted in deeper understandings

Work to document and represent design thinking during planning resulted in stronger design understanding and connections. This finding builds on the previous finding that the visual representation, structure, and breakdown of key elements (e.g., resources, tasks, supports) of the Learning Designs guided and scaffolded thinking. In this study, two of the participants, Emily and Mary, used the Learning Design concepts to document and represent their design plans for students. Emily created a text-based version of her design using Learning Design key terms and descriptions of the main learning sequence; Mary created a visual representation diagram as a way to represent her design plan. In both cases, the goal had been to communicate the design to students,

but the results within the cases suggest that the process of creating these design representations perhaps impacted most on these participants' design processes and thinking. Mary's case was particularly illustrative. She indicated that mapping her work using the visual representation emphasised the connections between the resources, tasks, and supports in a new way, giving her a structure that helped her to ensure that what she was designing for the students was connected and supported within the online environment. Her additional description of arranging Post-it notes representing the tasks, resources, and supports on her desk is a powerful example of how a simple framework could enrich even a very experienced teacher's practice. For Mary, the Learning Design, in particular the visual representation, appeared to clarify design thinking and understanding, test possible solutions, and highlight connections within the design. These findings align with the uses of diagrams and models within the field of design (Brown, 2009; Cross, 2011) in which such activities are thought to "facilitate the designer's reflection, dialogue, and self-critique and therefore serve the purpose of representing and testing the designer intent" (Razzouk & Shute, 2012).

6.1.2.8 Development of integrated forms of knowledge

This final section looks at the impacts on the links and integrations between the areas of technology, pedagogy, and content and points to possible ways Learning Designs supported the deepening of these forms of teacher knowledge. As already mentioned in the sections discussing technology and content, some of the greatest impacts were related to the changes to the relationships between these areas and the area of pedagogy. The main findings were that the Learning Designs impacted not just the individual elements of the design but also the strength of connections between the parts of the design that represented the development of the more-integrated knowledge forms of Pedagogical, Content, Knowledge (PCK) and Pedagogical, Content, Technological Knowledge (TPCK). All participants who used the Learning Designs showed evidence of the development of one or both these integrated knowledge forms in their design work.

Changes in TPCK were more strongly observed in cases where the participant was applying a Learning Design to a previously run unit. Participants of previously run designs reported better integration of the content and pedagogy within their online site.

The changes were seen in the reorganisation and refining of existing content (resources) in regards to the pedagogical tasks and clearer connections within the online environment. While some reorganisation is to be expected when redesigning, the reported links between the resources, tasks, and supports (both online and offline) seemed to be representative of a deeper shift in design thinking rather than a surface application of a Learning Design. For example, as already discussed, Marcus's more targeted links to key content to support his pedagogical tasks show how the structure of the Learning Designs elements facilitated change within his thinking and suggest a development of TPCK. A second example suggesting the deeper design-thinking changes can be found in Nicole's case. She spoke of a similar increase in the links between tasks, resources, and online supports throughout her unit and attributed these changes to her use of the Learning Design. These unit-wide changes to the connections occurred despite the fact that she chose a Learning Design to apply to a single activity within her unit. For both of these participants, these shifts in design thinking extended beyond the scope of the original design task; this suggests growth in more integrated TPCK.

Participants designing new units primarily showed changes in their PCK, with less focus on the online aspects of their designs. For these participants (Joanne, Scott, and Emily) the changes in their design thinking and knowledge integration were shown primarily in the areas of pedagogy and content, and in the connections between these (PCK). For example, Emily's creation of resources specifically designed for and linked to the tasks within the *Explore, Describe, Apply* sequence of her chosen Learning Design. In addition to the influence on links between pedagogy and content within her design, Emily also spoke of how use of the Learning Design changed how she viewed the literature in her field and its connection to what she was teaching. These stronger pedagogy-content connections point to possible PCK development. The example of Emily's resources also highlights the primary focus on establishing face-to-face aspects of new units first. These resources were tailored and well integrated into the pedagogy of Emily's design, and while these resources were available for download from the LMS site, the focus of work with them resources was in the face-to-face environment. Emily had plans to extend upon the tasks within the online environment in future offerings. This pattern was evident in all of the cases of participants designing new units. While they each used their online site to support their teaching, their use of

technology and development of online activities appeared to be secondary to establishing the pedagogy and content for the first implementation of these units, resulting in less evidence of TPCK development. This could be due to a usual progression towards TPCK integration, a remnant of previous design practices that see technology as an add-on, or a result of time constraints limiting the scope of the design solution.

In summary, the findings suggest that while the Learning Designs supported participants in each of the cases differently, there is evidence that they supported the development of participants' design thinking. The key differentiator between participants who showed changes in TPCK versus PCK appeared to be whether participants were applying the Learning Design to a new unit or to a previously taught unit. Findings point to a deepening of connections between technology, content, and pedagogy, TPCK development, (particularly for participants of established units), and PCK development (for participants designing new units). Finally, the Learning Designs supported idea generation, provided models to scaffold participants' design processes, and provided a framework for representing design work. This led to the development of design thinking that activated relevant teacher knowledge and built integrated teacher knowledge (i.e., PCK and TPCK).

6.2 Limitations of the study

This section discusses the limitations of the study by outlining known limitations of the study's methodology and scope of the findings. The three main limitations of the data set and data-collection methodology arise from the number and characteristics of the case participants, the influence of the data-collection points, and the primary reliance on the interview data within the study. An additional limitation comes from the questions being investigated, which were limited to university teachers' use of a Learning Design, and therefore did not investigate the quality of the designed unit. The nature of these limitations is described more fully below.

6.2.1 Participants

The number and characteristics of the participants recruited and followed in this study acted as both strengths and limitations. First, the study was restricted to a small number of contextually varied cases from Australian universities in New South Wales and the Australian Capital Territory. The strength of the small number of cases that were within a relatively close geographical proximity to the researcher was the ability to investigate each case in depth and over an extended period of time. Additionally, the variety of participants provided opportunities to discover a wide range of Learning Design uses and possible factors influencing use. The resulting limitations are that the findings do not allow for statistical comparison, controlling of any variables or drawing of broad generalisations to the wider population. It is important to keep these limitations in mind when considering the findings of this study. However, it is also important to consider that the aim of the study was not to make broad generalisations but to provide opportunities for the reader of the study to make naturalistic generalisations and to discover possible themes, ideas, and patterns that could be further investigated.

Second, the participants in this study were all volunteers, and thus perhaps more open to change and development in their practice than other university teachers. These participants were either already members of a teaching and learning professional development association or were forwarded a message from a colleague who thought they would be interested in being involved in this study. As members of a professional-development association, the participants in this study may have had a higher-than-average interest in teaching and learning. This should be kept in mind when considering the results of the study, as the participants may have been more open to Learning Design ideas and pedagogical change due to their interest in professional development activities focused on teaching.

6.2.2 Data collection points

Multiple data-collection points were chosen to follow the participants' natural design-work processes over an extended period; however, there were limitations to this approach. First, despite the attempt to ensure key design information was captured, data collection activities would inevitably have missed some information. This limitation is recognised as a reality that necessarily results from an attempt to balance a number of

factors, including the often tacit nature of design work, researcher impact, timeframes for the research, and the prolonged period of design work. This research has attempted to provide the fullest picture while balancing these factors, but it is recognised that the findings are necessarily based on an incomplete view of these participants' design processes and Learning Design use. Second, the timing and nature of these data-collection points may have unduly influenced the observed design process or participants' design thinking to a greater degree than the influence of the Learning Design alone. Ultimately, the act of explaining and reflecting on design thinking may have created impacts attributed to the Learning Designs that were a result of the methodology or intensified by it. This limitation could possibly be addressed or clarified by further research using alternate methodologies, perhaps with fewer data-collection points. However, such methodological changes would introduce limitations to the depth and frequency of activities.

6.2.3 Interviews

Due to the tacit and often internal nature of much design work, the findings of this study relied heavily on interviews and the reported actions and thinking of the participants in each of the cases. Therefore, findings may have been most affected by some common weaknesses inherent in the use of interviews. For example, the interviews by nature relied on the participants' interpretations, memory, and ability to articulate design thinking, activities, and impacts. The scheduling of regular design interviews in line with the participants' schedules was used to help to increase chances of clearer recall of design work. Multiple interviews also provided multiple opportunities for the researcher to understand the participants' design thinking and for the participants to articulate it. This point leads to another area for caution when using interviews: that is the impact of the researcher on the participants' interview responses. While the researcher took care not to influence the participants' responses, the researcher is also aware that her relative inexperience as an interviewer may have led to missed opportunities within the collection of interview data and at times unintentional influence on the direction of participant responses. Participants may have also been influenced by what they believed the researcher wanted to hear, depending on their own assumptions about the researcher's biases or background.

6.2.4 Quality of the design and the learning experience

While the participants adapted Learning Designs, which had previously been evaluated and considered to be of high quality, the aim of this study was not to judge the quality of the participants' designs or assess the students' outcomes. Rather the focus was on uncovering participants' design processes, support needs, and impacts while using a Learning Design. Some participants did perceive improved outcomes, but none undertook formal evaluations. Therefore, the reported impacts and outcomes cannot be considered indicative of the quality of the design.

6.3 Further research

This study sought to discover how participants might select and use a Learning Design to support their design process. The study also sought to better understand the nature of the influences, impacts, and knowledge development surrounding design and the use of a Learning Design. Little was known about these areas, and therefore the study was necessarily exploratory in nature. The findings of the study contribute to knowledge of how learners use Learning Designs, how they go about their design work, and what possible impacts Learning Designs might have on participants' thinking, design process, and product. The findings also prompt further investigation in a number of areas, described in the following sections.

6.3.1 Learning Design use and design processes

As is mentioned in Section 6.2 of this chapter, it is difficult to know how much of the observed Learning Design impacts came from the use of the Learning Designs and how much came from the methodology of the study. Therefore, separate studies using tailored methodologies that look more specifically at the key aspects of Learning Design use and design processes would both clarify findings and further inform key research directions. For example, a study that followed two groups of participants as they designed either with a Learning Design or without one would help to highlight the extent of the impact attributable to the Learning Designs. An additional benefit of such a study would be the comparison of the design processes and any workload changes between university teachers designing as they normally would and those designing using a Learning Design. Determining the comparative ways and extent of any

workload changes would help to inform both those working on and with Learning Designs as to the specific value proposition they provide for teachers. As for learning more about the patterns of design work, perhaps a larger-scale study using an experience sampling method (c.f., Forgasz & Leder, 2006) might help to identify more generalisable design-work patterns for comparison with those observed in this study.

Additionally, the longer-term impact of the Learning Designs on participants' design practice could be of interest, as many of the participants in this study predicted that the work they did with the Learning Designs would impact on future design work. In fact, in some cases ideas, strategies and pedagogical knowledge had already been applied to other units prior to the completion of the study. A follow-up study that investigated the impacts over time could help to inform teachers and professional developers of the long-term benefits of Learning Design use.

Within this study, the TPCK framework was used as a lens to view teachers' design knowledge and integration of that knowledge. The Learning Design Visual Sequence (LDVS) was used to represent and compare the Learning Design and unit design at various points. This approach aligned well to the study's aims and research questions. Further questions could be explored within the data by applying different analytical lenses. While the LDVS provided a tool to view the macro level structure and changes in the design, a more detailed picture of the changes to the design at the activity level could be developed. For example, Laurillard (2012), explored how the concepts described within the Conversational Framework could be used to map the interactions and learning cycles within designed learning activities and compare them to a redesigned learning activity. For the participants who redesigned their units in this thesis' research, the original design and redesigned activities could be mapped to the components of the Conversational Framework, highlighting how the various roles (teacher, learner and peers) interacted and identifying differences in how the versions of the activity generated and influenced learning. A second application of the Conversational Framework could compare participants' chosen Learning Designs and their modified designs. These two analyses could provide a number of insights. First, they could reveal specific detail about which particular aspects of the Learning Designs had and had not been transferred to the new learning context. Second, the findings could highlight adaptation choices made by individuals that could be used as examples

of possible variations of the design. Third, these analyses could identify the types of activity level changes made through the application of a particular Learning Design. Given the ongoing nature of the activity level design identified within the findings, the above insights could provide important clues to areas of the Learning Designs which may need further support for adaptation and what aspects of the designed activity might need ongoing support.

6.3.2 Selection processes

The selection of a Learning Design proved to be a useful stage during which participants could be exposed to and inspired by different pedagogical ideas from multiple disciplines. Previous research has provided findings on potential participant needs during selection, and the current study has provided information regarding the overall process and needs for AUTC Learning Designs. However, research focused on the role of Learning Design selection in idea generation, or on ways to encourage further exploration across disciplines, could provide evidence of the role Learning Designs could play in developing design-thinking expertise through expansion of participants' pedagogical perspectives and repertoires.

6.3.3 Learning design use, user needs and influencing factors

In the case of Learning Design use, fewer data-collection points and less interaction with the researcher may be the next step to scaling up investigations and clarifying individuals' use patterns. In this study participants' selection and initial design work were the critical phases of direct Learning Design use and focused work. The next-richest period of information on the use of the Learning Designs came from the post-implementation interviews, when participants could assess the full impact of their work with the Learning Designs and speculate about future use. A study that focused on these phases of the design work would be less labour-intensive for both participants and researchers and would allow for a larger scale investigation of Learning Design use. This larger-scale investigation would, in turn, also allow for expansion into broader contexts (e.g., outside of the Australian university context) and provide opportunities to observe patterns around other possibly influential factors.

Understanding more about the challenges leading to lower levels of engagement with or non-use of the Learning Designs, particularly in the early stages, could increase use by focusing the development of support tools and information. Within this study, participants expressed a number of challenges early in their use of the design. These included time investment, differing expectations of information contained within the designs, website design, and feelings of restriction. In some cases, participants were unsure whether they would have continued on with the Learning Designs if they had not been involved in the study; for a few others, these challenges were barriers to full engagement with the use of the Learning Designs. Once past these initial challenges, participants who used the Learning Designs found them to be of value, and even worthy of recommendation to others. The problem, then, of how to best address these concerns and needs during the early stages seems to be of key importance to Learning Design use. Therefore, research that investigates how to encourage and support use beyond these early challenges could aid the development of support tools and information.

Broader factors such as learning approach, discipline, teaching experience, university regulations, or content of specific Learning Designs are also possible avenues for research. Research investigating possible differences in design practices and support needs, particularly, for example, between the sciences and the humanities, could be of value in determining factors of non-use. Within this study there was a suggestion that perhaps disciplinary preferences for information were factors that led to non-use or lower engagement with the Learning Designs. Scott and Alison and Lana were teaching applied-science subjects and wanted to use problem-based learning. The challenges they spoke of were similar to other participants in the study, yet they engaged the least with the Learning Designs. It is not clear whether this was due to disciplinary preferences or attributable to their chosen Learning Design. Research investigating what role, if any, discipline plays in design work and support needs could help to answer this question. Alternatively, a study comparing the use of specific problem-based learning designs (e.g., *Problem-Based Learning in Medicine*, *Explore, Describe Apply*, etc.) could provide direct comparisons of use, aid in the identification of key information needed for problem-based learning, and identify specific challenges for university teachers using particular designs.

Finally, the type of design work, particularly the difference between new designs and designs of previously run units, seems to be another factor that impacts Learning Design selection and use. The type of design work appeared to be related to the scale of design looked for, scale of application, disciplinary focus of the design sought, the extent of Learning Design reference, types of changes focused on (e.g., pedagogical model versus technological integration), and types of challenges. Further research could provide insights into how the Learning Designs, particularly Learning Designs of varying scale, might be best presented and supported for different types of design work.

6.3.4 Personal design representations

In the two cases where participants created personal design representations based on ideas from the Learning Design, there were suggestions of deep individual understanding of the design and interconnections. In particular, Mary's use of the LDVS to map her design plans for students illustrates the scaffolding and awareness-raising impact that such a use of the LDVS can have even for a highly experienced educator. In Mary's case, the act of documenting her plans and design ideas resulted in reportedly stronger links between tasks, resources, and supports as well as changes to her design process. A study of the creation of such design representations, particularly the LDVS, which connects the resource, task and supports would help to assess the value of such uses on participants' design thinking and processes.

6.3.5 Learning Designs, student support, and student learning

There were indications from some participants in this study that the use of the Learning Design led to additional student supports and deeper student approaches to learning. In some cases, the use of the Learning Design raised participants' awareness of the need to build in both face-to-face and online supports for each step of the design. This resulted in the creation of additional resources, feedback loops, and connections between components of the design. Within this study, results are unclear as to the extent of the supports created; however, there was an increase in discussion of how to support students around the time of the selection of the design and, in a few of the cases, direct reports that the Learning Design had made participants think about additional ways of supporting students.

Several participants in this study also reported that the designs challenged learners to engage in deeper approaches to learning and that they perceived high-level outcomes from students. Emily's design is highly illustrative of this. Her application of the *Explore, Describe, Apply* Problem Based Learning Design in a Spanish-language unit moved students from a model that relied heavily on fill-in-the-blank grammar exercises and rote learning of grammatical rules to a model in which students needed to think more deeply about the grammatical structures, language connections, and ways to solve language problems. A study looking at the impact of the use of Learning Designs on the student experience, student support, and comparative student outcomes could begin to comment on the possible impact of the Learning Designs, not only on the quality of the designed learning but also on the possible metacognitive benefits and outcomes for students.

6.4 Contributions to research, theory, and practice

This study investigated Learning Design use connected to participants' phases of design work before, during, and after the design of a unit. It has provided accounts of Learning Design use that move well beyond the scope of studies within the Learning Design literature regarding potential use or simulated design scenario use, and has provided findings over a whole cycle of design, implementation, and reflection on a unit. Such an investigation has not been previously done. At the broadest level, findings indicate that university teachers can apply both contextualised and generic Learning Designs in new contexts. This provides confirmation of the projected transferability of Learning Designs to different design contexts and confirms research findings of potential for use, which has driven previous work in the area.

Findings revealed that participants in this study engaged in design processes that were iterative, complex, and continuous throughout implementation. Big-picture design work occurred prior to teaching, and changes to this macro-level design were rare during the semester; however, activity-level design continued throughout the implementation. Ongoing design work and adjustments to the design plan were made based on cycles of feedback from students and teachers' assessments of students' needs. Shifting design parameters such as changing student numbers or changes to the expected student cohort both before and during teaching necessitated reassessment of

their design priorities. This resulted in a design process that was not entirely linear or stepwise in nature. Such 'messiness' is to be expected when undertaking a complex task such as unit design; however, it is not well represented within hypothetical design-scenario studies of Learning Design use.

Within this study, participants even made conscious, well-reasoned decisions to deliberately delay some design activities until they had met the students and begun implementation. In fact, at the weekly activity level design changes occurred throughout the semester. The findings remind developers that allowances and opportunities for non-linear, ongoing (during implementation), naturalistic design processes need to be considered in the development of Learning Design tools and languages. This would facilitate university teachers' continued development of the design in response to student feedback and build on early teaching experiences. Additionally, tools that could build in ways to better support in-semester design work could help overcome design and implementation challenges. This area needs further research; however, Learning Designs that contained links to common issues and solutions might aid during these periods of design. This finding has further important implications in relation to policy. Many universities require fully detailed unit outlines including all assessment to be finalised before the semester begins. Unit outlines are regarded as legal contracts with the students, and while changes are possible after the semester has begun, those changes must be approved by all students in the unit. This requirement tends to reduce the unit's design flexibility, making it difficult for teachers to change and adapt their unit as the semester progresses. This study found that allowing for design flexibility was an important factor in facilitating the improvement of student experiences.

Previous work on Learning Designs provided insights into potential Learning Design selection needs, some common focal elements during selection, and general reasons for Learning Design choice. Findings from this study have extended on what was known about Learning Design selection, providing detailed accounts of individuals' selection processes as well as key focal elements and ongoing design reasoning connected to a particular Learning Design selection. Within this study, findings on Learning Design selection suggest that key information used for design selection and comparison, such as the title and summary of the design information, should be pedagogically descriptive

but without overly contextualised references. The findings also suggest that the visual representation was an important alternative way of summarising design data, and that the provision of both textual and visual representations of the Learning Design gave participants multiple ways to learn about the designs. Therefore, within repositories it may be important to ensure all summary elements such as the title, summary, and visual representation are grouped for selection purposes and carefully curated for subsequent reuse. This is an area that requires more research; however, there is a need to discover the appropriate balance to attract potential teachers to pedagogically appropriate designs.

Participants' ongoing work with the design highlighted that the early design stages were a key period of work with the Learning Designs, particularly in their impact on participants' ideas and macro planning. As with the selection phase, the findings from this period of Learning Design use also provide evidence of previously unreported relationships. For example, the early selection of a Learning Design allowed teachers to integrate both the whole unit and weekly activities into their thinking before ideas and additional aspects of the design became fixed. This suggests that even when the chosen design targets activity-level designs, early selection is important and allows for integration into the macro design.

Of greater significance was that the selection, use, and associated impacts of the Learning Designs during the design process revealed potentially powerful roles in the development of design-thinking expertise. This study has highlighted the importance of the selection phase of Learning Design use in ways not mentioned in the empirical literature; in particular, the role of Learning Designs as personal benchmarks for pedagogical practice and the impact of searching through and considering multiple Learning Designs as a stimulus supporting for idea generation and long-term directions. Evidence of these roles and their impact on design thinking highlights the value that can be obtained from Learning Design use. For institutions, individuals, and support units, having a Learning Design repository to use in this way may not only get university teachers to move towards or improve on best practice, but may also encourage university teachers, like the participants in this study, to expand on previous practice or investigate new pedagogies. In some cases the changes might be initially perceived as only incremental in nature; however, incremental change is manageable and can

sometimes result in larger shifts in teaching and learning outcomes, as was seen in the case of Marcus (e.g., linking of content) and Emily (e.g., movement of students from a passive to a more engaged learning model).

The roles of the Learning Designs as design guides and representational tools also contributed to the development of design-thinking expertise. The Learning Design and the visualisation created a framework for thinking about participants' design work, and provided the outline of the process and focal points for needs and design work (resources, tasks, supports). Further, in the cases of those who used it to document their design, it served as a framework for visualising plans and created a new way to think about their design work, deepening even the study's most experienced educator's design process, connections, and understanding. The suggestion within the findings is that the use of the Learning Designs in this way impacted on the strength of connections among design components (tasks, resources, supports, learning outcomes, technology). This led to greater integration of TCP design connections and associated design knowledge, which implies a need to find ways to encourage and support this use. In fact, the Learning Designs' greatest impact was on the participants' pedagogical knowledge and the connection of that knowledge within the design to the content being taught and technology being used. In other words, while university teachers did not explicitly learn more about technology tools or their content, they did more clearly connect this knowledge with the pedagogical sequence and tasks they were designing for their students. This more-connected knowledge seems to indicate an increase in the development of TPCK and PCK. The implications of these findings for support units and Learning Design tool developers are that the use of such design tools to mediate and visualise thinking may deepen design understandings and knowledge integration.

The findings from this study significantly expand knowledge beyond the selection and early design stages of Learning Design use into the ongoing design work, implementation and post-implementation review of work done with a Learning Design. This study provides a rich account of university teachers' Learning Design use as well as the reported impacts of that use on their design thinking and design work. Participants were found to use Learning Designs to benchmark practice, expand their pedagogical repertoires, inspire ideas, and guide and represent their design thinking. Continued use of the Learning Designs into the later design work, particularly through

the use of the visual representation or creation of design artefacts impacted on participants' design. The findings in this area point to the added benefits that university teachers might experience if they were to extend and expand their engagement with the Learning Designs and suggest possible avenues of investigation and support for university teachers' design thinking and knowledge development.

6.5 Chapter summary

In sum, this chapter has provided a synthesis and discussion in answer to the research questions of this study. Broadly, the findings confirm that Learning Designs are reusable and can be adapted by participants to solve design problems in their own contexts. During selection, pedagogical groupings of Learning Designs, multiple levels of description and multiple modes of representation (e.g., text and visual), and key pedagogical terms and task terms within higher-level summary items aided the communication of the design and participants' selection. Findings pointed to four key uses for Learning Designs: benchmarking pedagogical practice; stimulating pedagogical ideas; guiding design steps; and serving as a framework for documenting and communicating design plans. These uses impacted on participants' design most greatly in the area of pedagogy and integrations of pedagogy with the areas of content and technology. In particular, use of the Learning Designs' visual and textual elements, both to guide and represent design work, provided a scaffold for design thinking which resulted in stronger connections to and within the design. This suggests that work needs to continue to extend past collection and potential uses of Learning Designs and towards ways to engage university teachers to use them as it is through this process of searching for, assessing, adjusting, and reflecting on Learning Designs that changes to design practice can occur.

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APPENDIX A ETHICS APPROVAL

COPY

University of Wollongong

INITIAL APPLICATION APPROVAL
In reply please quote: HE08/174
Further Enquiries Phone: 4221 4457

26 June 2008

Ms J Jones
[redacted]

Dear Ms Jones

Thank you for your response dated 18 June 2008 to the HREC review of the application detailed below. I am pleased to advise that the application has been approved.

Ethics Number:	HE08/174
Project Title:	Learning designs as supports for University teachers' design of eLearning experiences
Researchers:	Ms Jennifer Jones, Dr Susan Bennett, A/Professor Lori Lockyer
Approval Date:	19 June 2008
Expiry Date:	18 June 2009

The University of Wollongong/SESIAHS Humanities, Social Science and Behavioural HREC is constituted and functions in accordance with the NHMRC *National Statement on Ethical Conduct in Human Research.* The HREC has reviewed the research proposal for compliance with the *National Statement* and approval of this project is conditional upon your continuing compliance with this document. As evidence of continuing compliance, the Human Research Ethics Committee requires that researchers immediately report:

- proposed changes to the protocol including changes to investigators involved
- serious or unexpected adverse effects on participants
- unforseen events that might affect continued ethical acceptability of the project.

You are also required to complete monitoring reports annually and at the end of your project. These reports are sent out approximately 6 weeks prior to the date your ethics approval expires. The reports must be completed, signed by the appropriate Head of School, and returned to the Research Services Office prior to the expiry date.

Yours sincerely

P.A. Potter

Dr Nadia Crittenden
PP **Acting Chairperson**
Human Research Ethics Committee

cc A/Professor L Lockyer, Faculty of Education

APPENDIX B PROJECT INFORMATION SHEET

University of Wollongong

Project Information Sheet for University Teachers

Learning Designs as Supports for University Teachers' Design of eLearning Experiences

Jennifer Jones (Primary Investigator)
Sue Bennett and Lori Lockyer (Supervisors)
Faculty of Education, University of Wollongong

Thank you for expressing an interest in the *Learning Designs as Supports for University Teachers' Design of eLearning Experiences* PhD study being conducted by Ms Jennifer Jones from the Faculty of Education at the University of Wollongong.

This study is funded by a Australian Postgraduate Award (Industry) as part of a larger ARC Linkage grant, *Improving university teaching: Creating strategies and tools to support the design process*. The purpose of this study is to investigate how learning designs could best support university teachers to not only integrate technology into their courses and learning activities but also develop their technological, pedagogical and content knowledge.

During the study, you will be asked to select a learning design to use during the design of your course and to participate in the following data collection activities:

- Four 45 minute semi-structured interviews in which you be will asked questions about how you design, what contextual influences affect your course design and how you used the learning designs during the design of your course.
- Three 30 minute stimulated recall discussions about the design of your course website. During these discussions you will guide the researcher through your course website, and discuss how you have set up the site, what content and activities have been included and your reasons for including them.
- Three 20 minute design process tracking checkpoint interviews/questionnaires (in person, via telephone or as a blog response) throughout the teaching semester. These checkpoints will follow further developments in the design through responses to a set of questions which will ask you to reflect on the implementation of the design, alterations to the design made during teaching, and your reasons for making changes to the course.
- Provision of course documents and artefacts (e.g. unit outline template, course handbook, unit description, previous unit outlines, contextual policies, course website information, etc.) at three points within the project. The researcher will use these documents to map changes in the course and gain information about the design context.

All audio transcriptions of the data collected will be made available to you on a secure website for member checking and comment. The data collected from you will be used within a PhD thesis as well as conference, and journal publications. The following measures will be adopted to protect the your identity:

- data collected will be stored securely in a locked filing cabinet in the Faculty of Education, and will only be accessed by the researcher
- only quantitative findings and de-identified quotes will be used in publications arising from this study.

Participation in this research is voluntary, you are free to refuse to participate and may withdraw from the research at any time by advising Ms Jones. Refusal to participate or withdrawal of consent will in no way affect your relationship with the Faculty of Education or University of Wollongong.

In recognition of the time commitment involved in participating in this study a $200 honorarium will be given to you in the form of a gift voucher from your choice of Myer, David Jones or Bunning's. Payment of the honorarium will be made on completion of the data collection phase of the study.

If you have any further enquiries about the research, you can contact Ms Jennifer Jones (02 4221 3465or jlj366@uow.edu.au), Dr Lori Lockyer (02 4221 5500 or llockyer@uow.edu.au) or Dr Sue Bennett (02 4221 5738 or sbennett@uow.edu.au) If you have any concerns or complaints regarding the way the research is or has been conducted, you can contact the Ethics Manager, Human Research Ethics Committee, Office of Research, University of Wollongong by phone 02 4221 4457, fax 02 4221 4338 or eves@uow.edu.au.

APPENDIX C CONSENT FORM

University of Wollongong

Consent form

Learning Designs as Supports for University Teachers' Design of eLearning Experiences

Jennifer Jones (Primary Investigator)
Sue Bennett and Lori Lockyer (Supervisors)
Faculty of Education, University of Wollongong

I have been given the Project Information Sheet about the Learning Designs as Supports for University Teachers' Design of eLearning Experiences project. I have also had an opportunity to discuss the research project with Ms Jones who is conducting this research as part of a PhD supervised by Sue Bennett and Lori Lockyer in the department of Education at the University of Wollongong.

By signing below I am indicating my consent to:

- Four 45 minute semi-structured interviews in which I be will asked questions about how I design, what contextual influences affect my course design and how I have used the learning designs during the design of my course.
- Three 30 minute stimulated recall discussions about the design of my course website. During these discussions I will guide the researcher through my course website, and discuss how I have set up the site, what content and activities have been included and my reasons for including them.
- Three 20 minute design process tracking checkpoint interviews/questionnaires (in person, via telephone or as a blog response) throughout the teaching semester. These checkpoints will follow further developments in the design through responses to a set of questions which will ask me to reflect on the implementation of the design, alterations to the design made during teaching, and my reasons for making changes to the course.
- Provision of course documents and artefacts (e.g. unit outline template, course handbook, unit description, previous unit outlines, contextual policies, course website information, etc.) at three points within the project.

I understand that an audio recording of the design tracking interviews (if conducted in person or by phone), the semi-structured interviews, and the stimulated recall discussions will kept for later transcription.

I have been advised of the risk or burdens associated with this research, which include a large time commitment and have had an opportunity to ask Ms Jones any questions I may have about the research and my participation. I understand that my participation in this research is voluntary, I am free to refuse to participate and I am free to withdraw from the research at any time. My refusal to participate or withdrawal of

consent will not affect my relationship with the Department of Education or my relationship with the University of Wollongong.

I understand that the data collected from my participation will be used for PhD thesis as well as conference, and journal publications, and I consent for it to be used in that manner. I understand that the following measures will be adopted to protect the identities of participants in the study:

- data collected will be stored securely in a locked filing cabinet in the Faculty of Education, and will only be accessed by the researcher
- only quantitative findings and anonymous quotes will be used in publications arising from this study.

I have been informed that in recognition of the time commitment involved in participating in this study a $200 honorarium will be given to me in the form of a gift voucher from my choice of Myer, David Jones or Bunning's. I understand that payment of the honorarium will be made on completion of the data collection phase of the study.

If I have any enquiries about the research, I can contact Ms Jennifer Jones (02 4221 3465or jlj366@uow.edu.au), Dr Sue Bennett (02 4221 5738 or sbennett@uow.edu.au) or Dr Lori Lockyer (02 4221 5500 or llockyer@uow.edu.au). If I have any concerns or complaints regarding the way the research is or has been conducted, I can contact the Ethics Manager, Human Research Ethics Committee, Office of Research, University of Wollongong by phone 02 4221 4457, fax 02 4221 4338 or eves@uow.edu.au.

Signed **Date**

..../...../.....

Name (please print)

.....

APPENDIX D RECRUITMENT LETTERS

August 2008 – Example Recruitment Email

Subject: Participation in Professional Learning and Knowledge Development around Course Design Study

Dear members,

Are you...

- teaching at a NSW/ACT university?
- (re)designing a partially online course/subject for Semester 1, 2009?
- interested in exploring how Learning Designs might be able to support you this process?

If so, you are invited to participate in a study investigating this process. Participation in the study will offer opportunities for professional learning and knowledge development around course design.

University lecturers from a range of disciplines and experience levels are welcome.
If you are interested in participating please contact:

Ms Jennifer Jones
jlj366@uow.edu.au
(w) 02 4221 3465

Many thanks,

Sue Bennett, Lori Lockyer & Jennifer Jones

December 2008 – Example Recruitment Email

Subject: Planning a unit of study for 2009?

Hello everyone,

Are you a university teacher involved in planning/designing your own course/unit of study for 2009?

Would you like to try incorporating technology enhanced:

- Problem Based Learning
- Role-plays
- Project/Case Studies
- Collaborative Learning OR
- Concept/Procedure development into your teaching?

If so, Learning Designs, which can provide examples and help support planning, might be of interest to you and a study investigating their use would be interested in your participation.

Participants from a range of disciplines, who are teaching and designing a course/unit a NSW/ACT university for Semester 1, 2009 are required for the study. No previous experience working online or with Learning Designs is necessary.

Participation in the study will offer opportunities for professional learning and knowledge development around course design.

If you are interested in participating please contact:

Ms Jennifer Jones
jlj366@uow.edu.au
(w) 02 4221 3465

Many thanks,
Sue Bennett, Lori Lockyer

APPENDIX E INTERVIEW PROTOCOL 1

1. Interview details

Interview information: Interview 1

Participant name:

Institution:

Name of unit:

Date of interview:

Time of interview:

Total time taken:

2. Notes for interviewer

The focus for this meeting is on:

the background and contextual factors influencing the unit's design and implementation
the current design of the unit
teacher thinking about the unit
the plans for the redesign unit

3. Introduction

Hello [insert name of participant], thank you for agreeing to participate in this study.

As you know from our previous discussion and the information I've already sent you, in this project I'm interested in using Learning Designs to support university teachers' design of effective online learning experiences. So that I can concentrate on our conversation rather than take notes, I would like to record our discussion. Is that okay with you?

[Start Recording]

Today's meeting will be the first in a series that will follow your design process for the unit you have chosen to (re)design. There will be three parts to our meeting today:

an interview focusing on the context, design and plans for this unit
Webtour – led by you this will be a tour and discussion of your unit website
Initial Discussion of Learning Designs – I will introduce the Learning Designs being used in this project

I expect each part to take about 30 minutes. We can take a break at anytime, just let me know.

Before we start the interview, do you have any questions for me?

4. General Information

1. What subjects/units do you teach?

2. What level(s) do you teach? (Undergraduate, Postgraduate, Both)
3. How many years have you been teaching at university level (include all forms of teaching such as lecturing, tutoring, demonstrating etc.)
4. Do you have any prior/other teaching experience?
5. How long have you been teaching at your university?
6. How long have you been using online technologies to support your teaching?

5. The unit

1. What course are you going to be designing/redesigning?
2. How long have you been teaching this unit/subject?
3. Could you tell me a bit about this course and its history?
    a. Prompt for information about:
        - reason for course being set up
        - length of time it has been running
        - level (UG/G)
        - relationship to broader program/degree structure

6. Original design

1. When originally designing this course, were there any institutional restrictions or requirements that you had to fulfil? Have these requirements changed?
2. What process did you go through when you originally designed this course? What were some of the key decisions and steps?
3. How did you decide on the overall structure of the subject? (that is, what students do each week and how you spaced that over the semester)
    a How did you choose content?
    b How do you work out what resources you need?
    c How do you decide on the assessment?
    d How do you decide what online technologies you are going to use?
4. What was most challenging about the design of this course?
5. What areas would you have liked help with?
6. What supports are available to help you with the design and online implementation of this course at [university name]?
7. What kind of help would have helped you during the design of the online components?
8. What modifications have you made since the course was originally designed? What prompted these modifications?

7. Online components

1. Does the course currently have an online component?

a If yes:

- What parts of your course are online?
    - Readings & Resources
    - Interaction
        - Activities
        - Discussions
    - Administrative
        - Submission of assignments
        - Grades
- What were the reasons for having (some of) your course online?
- What tools do you currently use?
- How do you decide what tools you would use?
- How do you decide how to what to put online?
- How did you adjust the activities/content for online? Did this effect your teaching?

b If no: what were the reasons for not having any online components previously? Why have you decided to incorporate an online component into the redesign of the course?

8. Changes to the unit

1. Could you reflect on the current design of the course? What aspects work well? What aspects don't work well?
2. What do you envision/ hope to change in the next iteration of this course? What are you hoping to incorporate into the redesign?
3. Why do you want to make these changes?

9. Learning Designs

1. Have you used a Learning Design before?
2. What do you know about Learning Designs?
3. Why are you interested in trying to use a Learning Design?
4. What do you want the Learning Design to help you with?

10. Web Tour 1

The participant will also be asked to guide the researcher through the unit website, while articulating his/her design decisions and reasoning. The following questions will be used in conjunction with conversational prompts to probe for information when required:

1. Can you show me around your course website?
2. How did you decide what content/activities you would put online? Are there any items or activities that you specifically chose not to put online? If so, how did you make those decisions?
3. How have you organised your site?
4. What tools have you used? How did you decide what tools you would use?
5. Could you tell me how you and the students use the various tools on the site?
6. Do you have any ideas about changes you would like to make to the online learning space? What aspects would you like to add/remove/redesign?

APPENDIX F INTERVIEW PROTOCOL 2

1. Interview details

Interview Information: Interview 2

Participant Name:

Institution:

Name of unit:

Date of interview:

Time of interview:

Total time taken:

2. Introduction

Hello [insert name of participant], thanks for meeting with me today. In this interview I would like to focus on learning more about how you chose the Learning Design you are going to use, and how you have used the Learning Design to date. I the interview to take about 30 mins.

So that I can concentrate on our conversation rather than take notes, I would like to record our discussion. Is that okay with you?

[Start Recording]

Before we start the interview, do you have any questions for me?

3. Selection of the Learning Design:

1. How did you chose a Learning Design (or designs) to use for your course?
2. What features/elements of the Learning Design framework did you find helpful in choosing your design(s)?
3. Was it easy to find a suitable Learning Design for your context? How did you match it to your particular purpose?

4. Initial design process using the Learning Design

1. Since our last meeting, how much design work have you done on the course?
2. Have you changed any of your ideas regarding the redesign? If so, what has changed and what is the reason for the change?
3. Could you describe the process of working with the Learning Designs? Where did you start?
4. How did you make those decisions?
5. Once you made those decisions, what did/will you do next?
6. Have you sought assistance from any other sources (e.g. teaching support units, books, etc.) during the design process so far? If so, what sources and what kind of help have they provided?

5. **Reflection on the Learning Design framework**

    1. What elements of the Learning Design have been most helpful in your design process?
    2. What would make the Learning Design framework easier to work with?
    3. How could the Learning Design framework be improved to aid other people in their use of it?

6. **Collection of Documents & Wrap up question**

    1. Do you have any notes, diagrams or documents that you have developed so far in the design process?
    2. Is there anything else you would like to tell me about?

APPENDIX G INTERVIEW PROTOCOL 3

1. Interview details

Interview information: Interview 3

Participant name:

Institution:

Name of unit:

Date of interview:

Time of interview:

Total time taken:

2. Introduction

Hello [insert name of participant], thanks for meeting with me today. So that I can concentrate on our conversation rather than take notes, I would like to record our discussion. Is that okay with you? [Start Recording]

In this interview, I would like to focus on learning more about how you have redesigned your course and how you have used the Learning Design in that process. I expect the interview to take about 45 mins.

Once the interview is finished I would like you to show me through your online course space. Depending on how you are feeling, we can conduct this "web tour" today or at another time. I expect the web tour to take about 30 min.

Before we start the interview, do you have any questions for me?

3. The design process using the Learning Design

1. Since I last talked to you, how much time do you think you have spent on redesigning your course?
2. Do you think your vision for the redesign has changed over this period? If so, why?
3. When designing your course, what steps have you gone through? How have you used the Learning Designs in this process ?
4. How did you decide on the overall structure of the subject? (that is, what students do each week and how you spaced that over the semester)
    a. How did you choose content?
    b. How do you work out what resources you need?
    c. How do you decide on the assessment?
    d. How do you decide what online technologies you are going to use?
    e. How did you make those decisions? Once you made those decisions, what did you do next?
5. Did you seek any assistance from any other sources (e.g. teaching support units, books, etc.) during the design process so far? If so, what sources and what kind of help have they provided?

4. **Reflection on the Learning Design**

    1. What elements of the Learning Design have been most helpful in your design process?
    2. What would make the Learning Design framework easier to work with?
    3. How could the Learning Design framework be improved to aid other people in their use of it?

5. **Plans for the implementation of the design**

    1. Can you outline how you expect to run the course?
    2. Are their any aspects of the design that concern you? If so, what are they and why do they concern you?

6. **Web tour**

    The participant will be asked to guide the researcher through the course website, while articulating his/her design decisions and reasoning. The following questions will be used in conjunction with conversational prompts to probe for information when required:

    1. Can you show me around your course website?
    2. How have you organised your site?
    3. What tools have you used?
        a. How did you decide what tools you would use?
    4. Could you tell me how you and the students will use the various tools on the site?
    5. How have you decided what content/activities you would put online?
    6. Are there any items or activities that you specifically chose not to put online?
        a. If so, how did you make those decisions?
    7. How has the Learning Design you chose affected the design of your online learning space?
    8. Can you reflect on the changes you have made to the online learning space?
    9. Are there still aspects you would like to change or expect to change during the semester?
        a. If so, what kinds of changes do you expect to make and why do you think you will need to make these changes?

7. **Collection of documents and wrap up question**

    1. Do you have any new notes, diagrams or documents that you have developed so in the design process?
    2. Is there anything else you would like to tell me about?

APPENDIX H TRACKING-INTERVIEW PROTOCOL

1. Interview details

Interview information: Tracking Interview

Participant name:

Institution:

Name of unit:

Date of interview:

Time of interview:

Total time taken:

2. Introduction

Hello [insert name of participant], thanks for talking with me today. So that I can concentrate on our conversation rather than take notes, I would like to record our discussion. Is that okay with you? [Start Recording]

Today I would just like to get an idea of how things are going with the design of your unit. I expect the discussion to take about 15-20 mins.

3. Design tracking questions

1. How's everything going?
2. What week of teaching are you currently in?
3. How's the unit going?
    a. What aspects are working well?
    b. What aspects concern you?
4. Since our last discussion, have you changed any thing about your plan for the unit?
    a. If so, what have you changed? (technology, content, teaching design, etc.)
    b. Why did you decide to make that change?
5. Since our last discussion, have you sought any help in regards to this unit?
    a. If so, who or what did you consult?
    b. What kind of help did you receive?
    c. Why did you seek this help?

APPENDIX I FINAL REFLECTIVE INTERVIEW

1. Interview details

Interview information: Interview 4

Participant name:

Institution:

Name of unit:

Date of interview:

Time of interview:

Total time taken:

2. Introduction

Hello [insert name of participant]. As is the norm for our meetings, I am recording this conversation for transcription is that fine with you? [Start recording or stop recording based on answer]

There are two parts to today's meeting: a reflective interview and a web tour.

The purpose of this interview will be to reflect on the strengths and weaknesses of the design, alterations made to the design throughout the semester, considerations for future alterations and on how the Learning Design formalism supported this process. I expect the interview to take about 60 mins.

Once the interview is finished I would like you to show me through your online subject space. Depending on how you are feeling, we can conduct this " web tour" today or at another time. I expect the web tour to take about 30 min.

Before we start the interview, do you have any questions for me?

3. Reflecting on the LDVS (4)

Here is a Learning Design Visual Sequence that I created. This one shows the overall structure of the subject during the last iteration.

1. Have I captured all of the major elements?
2. Is there anything you would like to add or remove from this?

This is the Learning Design that you chose (show design).

3. What did you like about this design?
4. What aspects did you try to include in your design? Why?
5. What aspects did you not include? Why?

This one shows the overall structure of the subject just before you began te aching.

6. Have I captured all of the major elements?

7. Is there anything you would like to add or remove from this?
8. How has the subject changed over the semester?

4. Reflection on the Learning Design framework (4)

1. Did you refer to the Learning Design throughout the semester?
2. What elements of the Learning Design have been most helpful in your design process?
3. What would make the Learning Design framework easier to work with? What other support did you need from it?
4. How could the Learning Design framework be improved to aid other people in their use of it?
5. Would you try to use a Learning Design again?
6. What would you tell a colleague about your experience of using a one of these Learning Designs?

5. Reflecting on the design post enactment (4)

1. What learning objectives did you have for students at the beginning of the semester?
2. Do you think students achieved these objectives?
3. What do you think the strengths of this design were? What went well?
4. What do you think the weakness of this design were? What needs to be improved?
5. What changes, if any, did you make to the subject during the semester? Why were the changes necessary?
6. Do you think your vision for the subject was achieved this semester? Why or Why not?
7. Do you think the design was effective in communicating the content of the subject to your students?
8. Have you had any feedback about the subject and/or the Learning Design from students that you would like to share with me?
9. What factors do you think impacted most on your des ign process?
10. What factors do you think impacted most on the teaching of the subject?
11. What have you learned from this process?

6. Plans for the future design (4)

1. What would you do differently next time?
2. What do you envision/ hope to change in the next iteration of this subject? What are you hoping to incorporate into the next design?
3. Why do you want to make these changes?

7. Web tour

In this final discussion of the subject website, will focus on changes to the website and the reasons for those changes during the semester. The following questions will be used in conjunction with conversational prompts to probe for information when required:

1. Can you show me around the subject website?

2. Have you made any major changes (e.g. adding/removing content, activities, assessments) to the subject website since the beginning of the semester? What were the reasons for those changes?
    Organisation
    Tools
    Content
    Activities, etc.
3. What prompted these changes?
4. How has the Learning Design you chose affected the design of your online learning space?
5. How have you altered the Learning Design to suit your needs?
6. How have you and the students used the various elements of the site?
7. One aspect of this research was to look at your integration of technology into your subject, do you think you have made better use of technology to teach your subject this semester?
8. What areas do you feel need to be changed or improved for the next iteration of the subject?

8. Wrap up

1. Do you have any notes, diagrams or documents you could give me in reference to the subject and your design process?
2. Is there anything else you would like to tell me about?

Thank you so much for your participation (Give card with gif t card)

3. Do you mind if I contact you if I need to follow up on something for the study?

APPENDIX J CASE-COMPARISON MATRIX

	Nicole	Scott	Mary	Emily	Joanne	Alison and Lana	Daniel	Marcus
design #	Established	New	Early	New	New	Established	Early	Established
University	1	2	2	3	4	2	2	3
Discipline	Law	Communications	Education	Language	IT	Vet Science	Science	Business
Uni Exp	Early	Established	Established	Early	Established	Established	Early	Established
Tech Exp	Early	Established	Established	Early	Established	Early	Early	Established
Tech Use (previous)	Teacher communication Student communication Resource distribution Assignment admin Independent activities Group activities Feedback	Teacher communication Student communication Resource distribution Resource sharing Group activities	Resource distribution Resource sharing Teacher communication Student communication	(Previous similar unit) Resource distribution Teacher communication	(Previous similar unit) Resource distribution Student communication Teacher communication Group activities	Resource distribution Feedback Teacher communication Student communication Resource sharing	Resource distribution Teacher communication	Resource distribution Teacher communication Student communication Assignment admin Feedback
Tech Use (new design)	Teacher communication Student communication Resource distribution Assignment admin Independent activities Group activities Feedback	Teacher communication Student communication Resource distribution Resource sharing Group activities	Resource distribution Resource sharing Teacher communication Student communication Assignment Admin	Resource distribution Teacher communication Independent Learning Student Communication	Resource distribution Student communication Teacher communication Group activities	Resource distribution Feedback Teacher communication Student communication Resource sharing Independent activities Group Learning	Resource distribution Teacher communication Student communication Independent activities Group activities	Resource distribution Teacher communication Student communication Assignment admin independent learning Feedback
LD goal (pre)	Design ideas and inspiration: general, pedagogical	Design confirmation Design ideas and inspiration: general, pedagogical	Design ideas and inspiration: general, technological Design process: integration of design elements Design communication and reflection: share with students Design Implementation: guide student learning	Design ideas and inspiration: general Design Communication and Reflection: share design with colleagues	Design ideas and inspiration: general Design process: steps/guides for thinking, integration of design elements	Design confirmation Design ideas and inspiration: general, pedagogical	Design ideas: general, pedagogical	Design communication and reflection: colleagues
Selection: Focus	Keyword focused	Pedagogical approach	Keyword	LD guides: keywords	Pedagogical approach	Pedagogical approach	Pedagogical approach	Pedagogical approach
Selection: Steps	Titles, summary, context, short list, select.	Approach, keyword summary, context/tasks; short list.	Keyword, summary, context and LDVS	Title keywords; LDVS for overview; context and implementation for detail (for constraints), shortlist, design thinking, select	Approach, keyword, summary, context/tasks; short list, design thinking, select	Approach, summary, context, short list, print for review, select	Ped focus; title keyword; searched for alignment ped and discipline, selection	Ped approach, summary, then context and implementation, selection
Selection: Main Ref	Text	Text	Mixed	Mixed	LDVS	Text	Text	Mixed
LD Type	Exemplar: Concept/ Procedure Development	Exemplar: PBL	Exemplar: Collaborative	Guide: PBL	Exemplar: Project/Case Study	Exemplar: PBL	Exemplar/None: PBL	Exemplar: Project/Case Study
Discipline Alignment	Cross discipline	Cross discipline	Same or similar discipline	Generic discipline	Cross discipline	Same or similar discipline	Same or similar discipline	cross discipline

	Nicole	Scott	Mary	Emily	Joanne	Alison and Lana	Daniel	Marcus
Alignment	Expansion of pedagogy	Alignment of pedagogy, content and tasks	Alignment of pedagogy, tasks, context, assessments, and outcomes	New pedagogy, alignment of broad context	New pedagogy. alignment of task types, assessment and goals	Expansion of pedagogy: online	Alignment of pedagogy	Expansion of pedagogy
Design Scale	Activity	Unit	Unit	Module (or set of activities)	Unit	Module (or set of activities)	Module (or set of activities)	Module (or set of activities)
Design Considerations and Impacts	Technology Previous experience and Feedback Student feedback and Evaluation University context Cohort (change)	Pedagogical design Learning goals Practical application	Mode Technology Cohort	Other supports Technology Cohort	Time pressures Learning goals Student aptitudes	Learning goals Student aptitudes Content characteristics Technology	Other supports Learning goals	Technology Time pressures Cohort Policies and rules Admin Content characteristics
Overall Process	Iterative cycles starting with big picture moving to detail	Big picture to detail using student needs as guide for what to do next	Big picture to detail	Big picture down to detail, iterative cycles	Big picture to detail of content and assessment	Iterative, big picture to detail	Iterative cycle, outcomes to detail of content, tasks and supports	Iterative, big picture, design of detail, big picture connections,
LD Barriers	Initially restrictive Limited # of solutions	Initially Restrictive/formulaic	Initially restrictive Terminology	Initially restrictive	Initially restrictive	Too simplistic/broad Limited support	Too simplistic/broad Limited support	Initially restrictive Terminology Limited tech support
LD Reference Points	Early reference	Pre-implementation reference (cyclic)	Early reference	Ongoing reference	Early reference, revisited	Early reference	Non-use	Early reference, revisited
LD use: Selection and Early Design	Design ideas and inspiration Design process: steps/guide for thinking	Design ideas and inspiration Design process: steps/guide for thinking	Design benchmarking Design process: steps/guide for thinking (LDVS)	Design Process: steps/guide for thinking	Design ideas and inspiration Design process: steps/guide for thinking	Design Ideas and inspiration Design benchmarking	Design benchmarking	Design ideas and inspiration Design process: steps/guide for thinking Design benchmarking
LD Use: Late	Adaptation without further ref to original	Focus and refine thinking design guide - ped steps	LDVS formalism to organise/focus thinking; adaptation without further ref to original	Design guide organise/focus thinking Communication	adaptation without further ref to original	Adaptation without further ref	Non-use	Adaptation without further ref to original
LD use: Implementation	Implementation without further ref to original	Design ideas and inspiration: general and pedagogical (final design problem) Design process for new problem	Implementation without further ref to original Communication and reflection (adapted LDVS)	Communication and reflection (adapted sequence) Design reconfirmation	Design reconfirmation	Implementation without further ref to original	Non-use Implementation without further ref to original	Design reconfirmation Implementation without further ref to original Design ideas and inspiration: Ideas for book
Pedagogy Change	Expanded	Expanded/Refined	Expanded (Refined)	New	New	Expanded	New*	Expanded
Impact on Pedagogy	Ideas and inspiration Process Integration	Ideas and inspiration Process Integration	Confirmation Process (*) Integration Communication	Process Communication Integration	Validation Ideas and inspiration Process	Validation Ideas and inspiration	Validation	Validation Confirmation Ideas and inspiration Process
Content Change	Expanded	(New)	Refined	New	New	(Expanded)	(Expanded)	Expanded
Content Shifts	Organisation Integration	None reported	Integration Organisation	Integration Support Creation	Organisation Creation/selection	None reported	N/A	Organisation Integration Creation/selection

	Nicole	Scott	Mary	Emily	Joanne	Alison and Lana	Daniel	Marcus
Tech Change	Redesign: Expanded	New: Refined	Redesign: Refined	New: Expanded	New: Expanded	Redesign: Expanded	Redesign: Expanded	Redesign: Expanded
Tech Shifts	Integration Organisation Creation	Creation	Integration Organisation Creation Communication/Support	Creation	Creation	*Integration *Creation *Communication/Support	Creation	Integration Organisation Creation
LD outcome	Ideas Process Pedagogy Technology	Process Confirmation Ideas Pedagogy	Integration Confirmation Process* Ideas Communication Reflection Technology	Ideas Process Integration Communication Reflection Pedagogy Content	Confirmation Process Ideas Integration Reflection Technology Content	Ideas Confirmation Technology	Confirmation	Ideas Integration Content change Pedagogical change Process Confirmation Technology Design effectiveness*
Support	Networks University services and activities Professional activities and reading Models	Networks University services and activities External design services Networks Professional activities and reading Models	Networks University services and activities Students Professional activities and reading*	Networks Students Professional activities and reading	Networks University services and activities Models	Networks University services and activities External design support Models	Networks Models Professional activities and reading	Networks University services and activities Professional activities and reading Models
Implementation Challenges and Impacts (LD design only)	Technology Student participation	Student participation Communicating design Requirements		Student participation Communicating design Requirements	Student participation Cohort change Communicating design Requirements Cultural barriers Time pressures	Technology	Cohort change Mode change	Technology Time pressures
Implementation Challenges and Impacts (whole unit or broader)	Cultural barriers University context changes	Technology Complexity of activity	student participation		Time pressures			University policies Admin: resource availability Design: complexity or sequencing Policy and rules
Pedagogy, Content, Technology - Detailed Breakdown								
Pedagogy - Validation			√		√	√	√	√
Pedagogy - Inspiration/ Ideas	√	√	√	√	√	√		√
Pedagogy - Model	√	√		√	√			√
Pedagogy - Design Process (strong)	√	√	√		√			√

	Nicole	Scott	Mary	Emily	Joanne	Alison and Lana	Daniel	Marcus
Pedagogy - Communication /Documentation			√	√				
PC - Pedagogy - Content Links	√		√	√	√		√	√
Content - Selection					√			√
Content - Creation	√			√	√			√
Content - Organisation	√		√		√			√
Technology - Creation (new activities)	√	√	√	√	√	√		√
Technology Organisation	√		√					√
Technology - New Tool Use								
Technology - Communication			√			√		
Technology - Support for Students						√		
TPCK	√		√			√		√

APPENDIX K PHASE-BASED CROSS-CASE ANALYSIS MATRIX

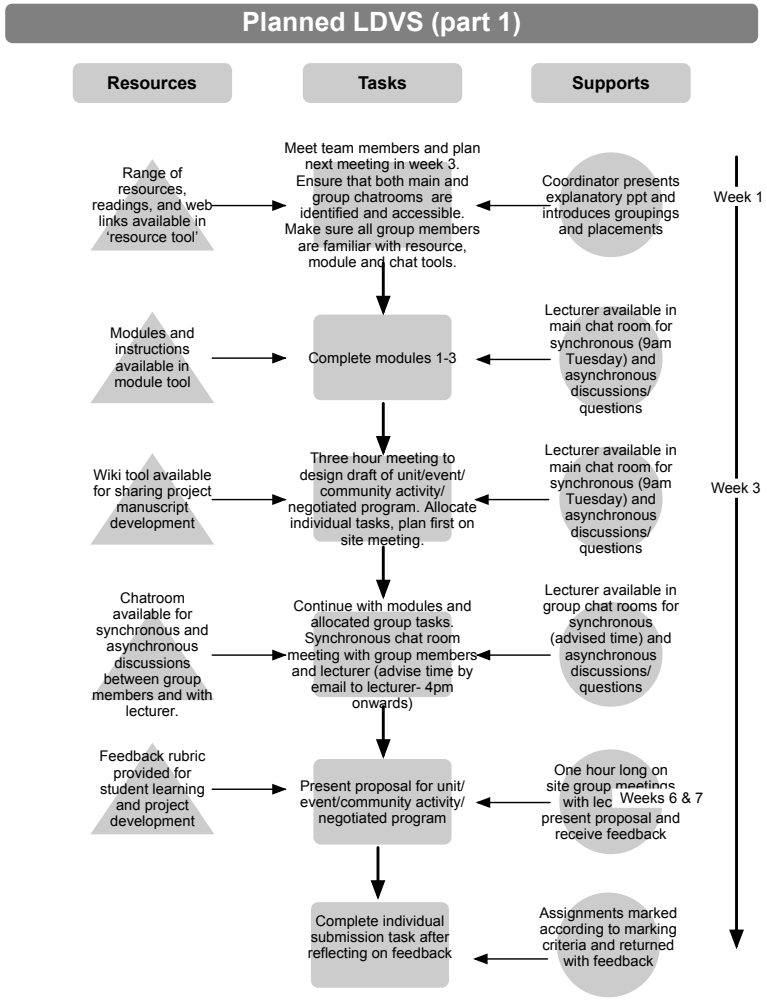
Phase-based considerations, activities, challenges, etc.	Pre-Design (1)	Early Design (& Selection) (2)	(Pre-Imp) Later Design (3)	Implementation (4)	Post-Implementation (5)	All
	Total	Total	Total	Total	Total	Total
Design thinking/work						
Goals - elements spoken about (all)	8	6	6	7	8	8
Goals - external	2	5	5	2	4	6
Learning outcomes/objectives	2	4	4	1	4	6
Program connections/goals	2	2	3	1	1	4
Goals (plans) - internal	8	4	3	6	8	8
Future iteration design goals/direction	0	3	2	4	8	8
Design goals (establishing/re-establishing/connecting to)	8	4	1	4	1	8
Pedagogy (all)	8	8	8	8	8	8
Pedagogy (elements spoken about)	3	8	6	5	5	8
Scheduling/outline/big picture structure and connections	1	5	5	0	1	6
Pedagogical model including links (new or changes)	3	8	4	5	5	8
Tasks (elements spoken about)	7	7	8	7	8	8
Activities (including assessments) "tasks"	6	7	7	7	6	8
Activity steps/design(ed) steps "task steps"	0	3	5	4	5	7
Assessment weightings/requirements/connections/grading	2	5	5	5	3	7
Pedagogy (physically working)	0	6	2	0	0	6
Thinking about big picture/steps	0	6	1	0	0	6
Unit outline design	0	4	2	0	0	5
Tasks (physically creating)	0	5	8	6	1	8
Activity design/adjustments	0	4	7	6	1	8
Assessment design/connections	0	4	6	2	0	6
Lectures/tutorials	0	1	1	1	0	1
Content (combined)	5	6	7	4	3	8
Content (elements spoken about)	5	6	7	4	3	8
Content/topics/resources	5	6	7	4	3	8
Content (physically working)	0	2	6	4	0	7
Working with or sourcing content/resources/topic	0	2	6	4	0	7
Technology (combined)	5	6	8	6	6	8
Technology (elements spoken about)	5	6	6	5	6	8
Change in mode (more online)	1	3	2	1	0	5
Technology design/affordances/use	5	5	6	5	6	8
Technology (physically working)	0	1	7	5	1	8
Technology design/set up	0	1	7	5	1	8
Considerations & impacts (during design work/changes)						
Design time/time limitations	3	3	4	2	1	6
Context/rules	1	3	2	3	2	4
University/school expectations/rules	1	2	1	2	1	3
Industry application/requirements	1	1	1	1	1	1
Previous experience	5	2	1	0	1	6

Phase-based considerations, activities, challenges, etc.	Pre-Design (1)	Early Design (& Selection) (2)	(Pre-Imp) Later Design (3)	Implementation (4)	Post-Implementation (5)	All
	Total	Total	Total	Total	Total	Total
Previous experience/implementation	5	2	1	0	1	6
Students	8	7	6	7	7	8
Student workload	1	0	0	3	0	4
Student cohort/attributes/skills/numbers	5	6	4	3	3	7
Student engagement & interaction incl group work engagement	4	2	0	5	1	8
Needed or added student supports/(supported skill development)	1	6	4	4	6	8
External supports	0	6	4	7	7	8
LDVS	0	2	0	1	1	2
Colleague or superior	0	3	4	3	0	5
Student feedback/evaluation (current/previous)	0	2	0	6	6	8
Observation/help from group/person running similar pedagogical model	0	0	1	0	0	1
Educational designer/Ed tech help	0	0	1	2	0	3
Professional body	0	0	1	1	0	1
Other (literature)	0	2	1	0	1	2
Other things of interest	0	2	7	4	0	8
Change (design/goals): due to new information/problem or change in unit/cohort	0	1	3	4	0	5
Intensive blocks of design time	0	0	4	0	0	4
Delaying some design activities until more was known about the students or students have been consulted	0	1	4	0	0	4
Learning design use activity	3	8	7	4	1	8
Reported use tally						
Totals for use/activity section (not including row 60 or 72)	3	8	7	4	2	8
Looked for LD to adapt (selection from website)	0	8	1	1	0	8
Creating an LDVS and/or written learning design/use of LDVS structure	0	2	1	0	1	2
Ideas	2	7	5	4	1	7
Ideas (current)	2	7	5	4	0	7
Ideas (future)	0	1	2	2	1	4
Benchmarking/affirmation	1	3	2	1	0	4
Benchmarking/pedagogical model reinforcement	1	3	2	1	0	4
Design work and model	0	8	5	1	0	8
Process guide/steps/organise design thinking	0	6	4	0	0	6
Selection, alignment or organisation of design elements (resources, tools, connections between)	0	3	2	0	0	3
Reference (checked details, looked for examples, implementation)	0	8	3	1	0	8
Communication & sharing (document)	2	2	1	0	0	3
Student support/communication	1	1	1	0	0	1
Communication of ideas/designs to colleagues	1	1	0	0	0	2
What used	1	6	4	0	0	7
To what: print out	1	4	1	0	0	5
To what: online version	0	3	3	0	0	5
LD impact (directly reported)	0	0	0	0	0	0
Totals for impact section	0	4	5	0	7	7
Design work and model	0	3	2	0	6	6
Design process/steps (positive change)	0	3	2	0	5	5
Strengthened connections between resource, task, support	0	1	1	0	3	3

Phase-based considerations, activities, challenges, etc.	Pre-Design (1)	Early Design (& Selection) (2)	(Pre-Imp) Later Design (3)	Implementation (4)	Post-Implementation (5)	All
	Total	Total	Total	Total	Total	Total
Ideas		1	1	0	3	3
Exposure to multiple pedagogical ideas/possibilities	0	1	0	0	0	1
Long term ideas (pedagogy, content, technology use)	0	1	1	0	3	3
Technology use and integration	0	1	3	0	5	6
Amount of online stuff for this activity/unit	0	1	1	0	4	4
Online organisation/structure/integration	0	0	1	0	4	4
Change in tool use	0	0	1	0	1	2
Student support/communication		1	2			
Improved student support/guidance in design	0	1	2	0	4	5
Clarified the design's steps (for students) in teacher's opinion (communication of the design)	0	0	1	0	0	1
Benchmarking	0	0	0	0	0	0
Affirmed previous practice/knowledge	0	1	0	0	4	4
Help wanted	0	0	0	0	0	0
Ideas	2	1	0	0	0	2
Articles	1	1	0	0	0	1
Improved subject delivery	1	0	0	0	0	1
Discipline specific/targeted help	1	0	0	0	0	1
Benchmarking	1	0	0	0	0	1
Student support/communication	1	0	0	0	0	1
Communicating and documenting design	1	0	0	0	0	1
Aid how it comes together (connection)	1	0	0	0	0	1
Technology use help/models	1	1	0	0	0	2
Organise thinking	1	0	0	0	0	1
Align design elements	1	0	0	0	0	1
Template/model	0	1	1	0	0	2
Practical examples of implementation	0	0	1	0	0	1
Depth of information	0	1	1	0	0	1
LD selection (focal points within site/design)	0	0	0	0	0	0
Pedagogical focus	0	6	0	0	0	6
Title/summary keywords	0	5	0	0	0	5
Summary detail	0	5	0	0	0	5
Task, resources, supports description	0	5	0	0	0	5
LDVS	0	5	0	0	0	5
Implementation section	0	2	0	0	0	2
Looked for/considerations (selection only)	0	0	0	0	0	0
General considerations	0	0	0	0	0	0
Ideas for self	0	8	0	0	0	8
Ideas for colleagues	0	1	0	0	0	1
Specific guidance for design problem	0	3	0	0	0	3
Goals and connections	0	8	0	0	0	8
Aligned with design goals/needs	0	8	0	0	0	8
Program goals	0	1	0	0	0	1
Pedagogical elements	0	8	0	0	0	8

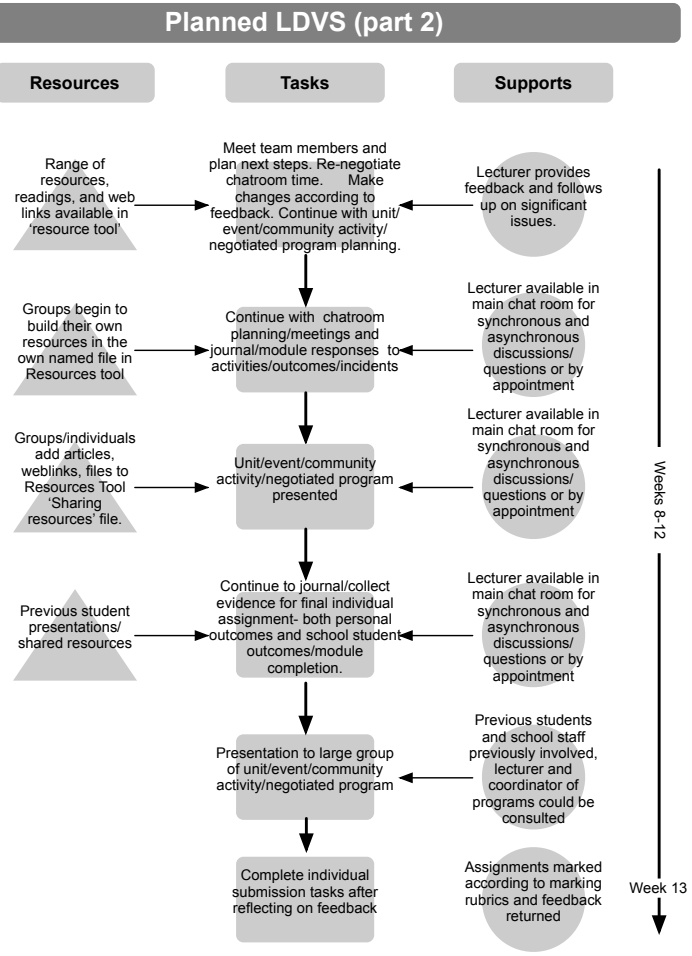
Phase-based considerations, activities, challenges, etc.	Pre-Design (1)	Early Design (& Selection) (2)	(Pre-Imp) Later Design (3)	Implementation (4)	Post-Implementation (5)	All
	Total	Total	Total	Total	Total	Total
Aligned with previous or known pedagogical models/pedagogical preference (might split this)	0	8	0	0	0	8
Task types/task keywords (including assessments)	0	4	0	0	0	4
Content	0	3	0	0	0	3
Content/resources	0	3	0	0	0	3
Technology	0	1	0	0	0	1
Technology ideas	0	1	0	0	0	1
Other considerations	0	5	0	0	0	5
A pragmatic design/clarity of design	0	1	0	0	0	1
Timeframe/scale of design (granularity of design)	0	2	0	0	0	2
Time available to achieve design	0	1	0	0	0	1
Discipline alignment	0	1	0	0	0	1
Practical skill building	0	2	0	0	0	2
Key reasons for final LD choice	0	0	0	0	0	0
Aligned with own design goals/needs	0	6	0	0	0	6
Aligned with previous or known pedagogical models	0	4	0	0	0	4
Practical skill building	0	2	0	0	0	2
Aligned with context and cohort	0	2	0	0	0	2
Independent learning	0	2	0	0	0	2
Aligned with content	0	2	0	0	0	2
Aligned with assessment types	0	2	0	0	0	2
More technology use/similar pedagogy with more tech	0	2	0	0	0	2
Specific guidance/ solution for design problem	0	1	0	0	0	1
LD barriers	0	0	0	0	2	0
Totals	2	6	4	0	2	8
Time/effort needed - too labour intensive (didn't choose some or any because time investment too heavy or using an LD seemed like extra work)	1	4	0	0	0	4
LDs felt restrictive/prescriptive/inflexible	1	1	2	0	0	3
Too few designs in discipline or addressing design goals	0	2	0	0	0	2
Technology design/affordances/use	0	0	2	0	1	3
LD site	0	3	0	0	0	3
Web site design/medium/navigation	0	3	0	0	0	3
Content of LD	0	4	2	0	1	4
Limited technical support/limited it tools	0	2	0	0	0	2
Not enough detail/or needed info to design/information too introductory/basic	0	2	1	0	1	2
Contained irrelevant information (e.g. Project info)	0	1	0	0	0	1
Language used within the LD was unclear (educational jargon)	0	1	1	0	0	1
All implementation challenges	0	0	0	8	0	8
Challenges during implementation (general)	0	0	0	8	0	8
Students	0	0	0	7	0	7
Student workload	0	0	0	1	0	1
Student cohort size	0	0	0	3	0	3
Cultural differences				2		
Student engagement & interaction including group work issues	0	0	0	5	0	5

APPENDIX L MARY'S LDVS FOR STUDENTS



Learning Outcomes:

- understand the features and outcomes of Stages 2 and 3 in the K-6 syllabus documents and relate these stages to the Quality Teaching Framework;
- demonstrate an understanding of the importance of contextual factors such as Aboriginality and rurality when planning an integrated unit of work;
- demonstrate an ability to translate theoretical learning to the practicum setting.



Learning Outcomes (continued):

- demonstrate a sound understanding of the nature and implications of inclusive curriculum as it applies to the middle and upper years of Primary School;
- plan an integrated unit/event/community activity/negotiated program of work for children in Years 3-6 of Primary School focussing on PDHPE, indigenous knowledges and rural perspectives;
- demonstrate ability to work collaboratively in planning, implementing and evaluating teaching and learning within a learning environment, culminating in taking responsibility for the learning experiences related to the designed unit/event/community activity/negotiated program;

APPENDIX M WORK IN PROGRESS PAPERS AND POSTERS

Jones, J. (2008). *Supporting the Design of Online Learning through Use of Learning Designs*. Poster presented at the Hello! Where are you in the landscape of educational technology? Proceedings ASCILITE Melbourne 2008, Melbourne. https://www.ascilite.org.au/conferences/melbourne08/procs/jones-j-poster.pdf

Jones, J., Bennett, S., & Lockyer, L. (2009). *Investigating Lecturers' Use of Learning Designs to Support Technology Enhanced Course Design*. Paper presented at the Proceedings of World Conference on E-Learning in Corporate, Government, Healthcare, and Higher Education 2009, Vancouver, Canada. http://www.editlib.org/p/32870

Jones, J., Bennett, S., & Lockyer, L. (2011). *Applying a Learning Design to the Design of a University Unit: A Single Case Study*. Paper presented at the Proceedings of World Conference on Educational Multimedia, Hypermedia and Telecommunications 2011, Lisbon, Portugal. http://www.editlib.org/p/38334