Academics’ Use of Technology with Face-to-Face Teaching:
Factors Predicting the Use of Blended Strategies

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ABSTRACT

Positioned in the literature related to academic professional development, this study makes a contribution to the understanding of academics’ blended practices by exploring how various factors influence academics’ use of technology with face-to-face teaching. The primary research question addressed by the study is ‘Why do some academics tend to use technology together with their face-to-face teaching to achieve blended teaching strategies to support learning, while others do not?’

The study arises from a context in which a growing number of universities are investing considerable resources in blended learning, as an institutional strategy to respond to the pressures of uncertain economies, increasing globalisation, and the changing expectations of cohorts of digitally savvy students. However, the success of blended learning as an institutional strategy is firmly grounded in the widespread adoption of effective blended teaching practices, which has generally failed to happen. Currently, the adoption of effective blended teaching practices is limited to a minority of academics. The premise underlying this study is that understanding the factors shaping academics’ blended learning practices is fundamental to the provision of the professional support needed to facilitate the uptake of effective blended practices on a larger scale. Unfortunately, existing blended

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learning literature provides meagre insight into academics’ blended practices. This study stems from the urgent need to better understand academics’ blended teaching practices.

Underpinning the study is a conceptual framework consisting of core ideas found in technology acceptance models and diffusion of innovation theory, and in the field of teachers’ use of technology for teaching. The conceptual framework along with a review of relevant literature enabled the formulation of a theoretical model of academics’ blended practices. The model was then further developed using a mixed methods, two phase methodology. In the first phase, a survey instrument was designed and distributed to academic staff within Griffith University. Using the data collected from the survey, regression modelling was used to refine the theoretical model. Other statistical methods were also used to gain further insights into academics’ perceptions of blended learning and the nature of their practices. In the second phase of the study, survey respondents were purposefully selected, on the basis of quantitative results, to participate in interviews. The qualitative data yielded from the interviews was used to support and enrich understanding of the quantitative findings.

A very interesting, and major finding, of the study is that the factors predicting academics’ blended strategy use differ between male and female academics. Factors found to be significant predictors of current blended learning practice are perceived usefulness,
teaching experience in higher education and, for female academics, self-efficacy. Significant predictors of the intention to use blended strategies in the future were found to be perceived usefulness, use of blended strategies in current practice and, for female academics, perceived feasibility.

The theoretical contribution of this study is the model, which predicts academics’ current use of blended learning strategies, and the intention of future use of blended strategies. The predictive model, together with other findings, enhances understanding of the nature of academics’ blended teaching practices. Findings from this study have implications for the design of professional development and support for the adoption of effective blended teaching practices, and are presented as guiding principles at the conclusion of the study.

**Keywords**

Blended learning, academic development, educational technology, higher education
STATEMENT OF ORIGINALITY

This work has not been previously submitted for a degree of diploma in any university.

To the best of my knowledge and belief, the dissertation contains no material previously published or written by another person except where due reference is made in the thesis itself.

__________________________________
Rosaria Girarda (Geraldine) Torrisi
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And finally, but by no means least, my heartfelt gratitude to my Mother Angela, and my Father Vito (1920-2001), who always encouraged me to do my best, instilled in me the value of a good education and worked so very hard to provide the opportunities for me to acquire it. I am also grateful to my sister Fina, who sparked a love of learning from my early years and set a solid foundation for further studies.

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DEDICATION

Dedico questa tesi alla mia carissima Mamma.

Chi dà sempre tanto, con molto amore -

Questo lavoro è tanto il vostro come è mio.

I dedicate this thesis to my dearest Mum.

Who always gives so much, with so much love -

This work is as much yours as it is mine.
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<thead>
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<th>Definition</th>
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</thead>
<tbody>
<tr>
<td>CD-ROM</td>
<td>Compact Disc – Read Only Memory</td>
</tr>
<tr>
<td>DOI</td>
<td>Diffusion of Innovations</td>
</tr>
<tr>
<td>ICT</td>
<td>Information and Communications Technologies</td>
</tr>
<tr>
<td>LMS</td>
<td>Learning Management System</td>
</tr>
<tr>
<td>PLATO</td>
<td>Programmed Logic for Automated Teaching Operations</td>
</tr>
<tr>
<td>TAM</td>
<td>Technology Acceptance Framework</td>
</tr>
<tr>
<td>TPACK</td>
<td>Technological Pedagogical and Content Knowledge</td>
</tr>
<tr>
<td>UTAUT</td>
<td>Unified Theory of Acceptance and Use of technology</td>
</tr>
<tr>
<td>WWW</td>
<td>World Wide Web</td>
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Chapter One: INTRODUCTION TO THE STUDY

Universities today face what may be their greatest challenge as they face globalization, expansion, and economic uncertainty, overlaid by emerging technologies that enable the technologically savvy student body to interact in new ways with content and with each other. This confluence of factors requires the academy to rethink and restructure, both what and how they teach and research, and how they intersect with society (Siemens & Matheos, 2010, para 4).

1.1 Introduction

The purpose of this study is to investigate why some academics, after having adopted the use of technology, use technology together with their face-to-face teaching to provide learning experiences through the creation of blended strategies, while others do not. On a personal level, this thesis presents the opportunity to pursue a question drawn to the author’s attention from experiences gained as an instructional designer, working with academics to develop educational software for use by tertiary students. In the role of instructional designer, it became obvious that various academics’ responses to using technology were strikingly different: some academics leaped at the opportunity to use technology, whilst others showed much less enthusiasm; whilst some academics simply used a web server as a repository for class PowerPoint slides, others expended a great deal of effort designing highly interactive modules intended to achieve important learning
objectives. These observations initially lead the author to question why various academics’ responded as they did to the use of technology in their teaching, and subsequently fuelled the author’s interest in researching the factors shaping academics’ use of technology with their face-to-face teaching. Now, as an academic, the author has become aware of the increasing presence of, and institutional emphasis on, technology in university teaching contexts. It has come to the author’s attention that the importance of addressing the question of ‘why some academics’ use technology in their teaching to provide learning experiences through the creation of blended strategies, while others do not’, extends beyond satisfying personal curiosity, to making significant a contribution to the literature surrounding teaching and learning in higher education.

The primary aim of the present chapter is to explain why the research documented in this thesis is important and, towards this end, a background to the study is given and the motivation for the study is established. The research objectives and questions are then presented. By way of introduction to the thesis, the chapter also includes a brief overview of the conceptual framework and methodology, and an outline of the organization of the thesis.
1.2 Background to the research

“Get a Degree by Blended Learning...Blended learning is booming as higher education becomes more demands focused” (Tobin, para. 15) announced an article on April 19, 2011 in *The Guardian*, a newspaper based in the United Kingdom. The article goes on to describe how a graduating business student had initially opted to leave university after gaining employment during summer break from a traditional degree but later realised the necessity of a degree for a ‘good’ career. The student subsequently enrolled in a blended degree. To explain why the blended, rather than traditional, degree enabled the student to complete her studies she is quoted as saying: “blended learning meant I could squeeze the degree into my spare time, and study whenever I wanted, but still receive personalised advice and help from tutors and other students” (Tobin, 2011, para. 2). As the story unfolds, it becomes clear that blended learning is attractive to students, especially for those juggling study and other commitments. The article then describes how various universities in the United Kingdom are implementing blended learning on an increasingly larger scale because it reduces isolation in their distantly located students, attracts international students, and caters well to students who prefer self-paced learning or who cannot attend campus full time.

The term ‘blended learning’ is defined in the article as “courses that mix classroom-based education with distance learning, often via online features that allow students to receive tailored help from tutors, such as online forums, video conferencing and internet telephony
technology such as Skype” (Tobin, 2011, para. 4). It should be noted at this point, that there is a lack of consensus on a precise definition of blended learning and as Driscoll (2002, p. 1) observes, the term ‘blended learning’ “means different things to different people”. Later, in chapter three of this thesis, the issues related to defining blended learning are discussed and the definition of blended learning used in the remainder of the thesis is formulated.

As the above-described article indicates, blended learning has piqued the interest of higher education and universities are investing considerable time and effort into its implementation (Bonk & Graham, 2006; Bonk, Kim, & Zeng, 2006; Graham & Robison, 2007). A search of universities’ institutional teaching and learning documents provide solid evidence of the growing popularity of blended learning. The quotations in (1), (2), and (3) below are representative of what is found and clearly show that universities are making a considerable investment in the implementation of blended learning as an institutional strategy.

(1)

Recommendation 1: That blended learning (which encompasses online) approaches be used by all staff to encourage student engagement to enhance learning outcomes and create an interactive and dynamic teaching and learning environment for all students (University of Canberra Teaching and Learning Centre, 2009, p. 3).

(2)

The University of Maryland has launched a new initiative to develop innovative learning opportunities for students. It
involves the complete redesign and implementation of ten challenging undergraduate courses from across the campus into blended learning formats [...] With funding from the office of the Senior Vice President and Provost, this initiative ushers in a new paradigm of undergraduate education of the highest quality, at the same time providing a model for enhanced student-faculty interaction and more efficient use of institutional resources (University of Maryland, 2011, para 1).

(3)

The University has adopted a blended learning approach to its learning and teaching which is outlined in the original Blended Learning Strategy. There is also a recent Update to the Blended Learning Strategy for the academic years 2010-12. The University also has aspirations about the way in which this approach is to be achieved and has set blended learning targets [...] A Blended Learning approach is one, which in most cases, will enhance and extend the learning opportunities for our 21st Century learners (University of Wolverhampton, 2012, para 3).

The reason for the burgeoning interest in blended learning arises from the argument that if universities are to capture a larger student base, remain competitive, and therefore maintain viability in the face of uncertain economies and globalisation, then traditional teaching approaches need to change (Siemens & Matheos, 2010). University administrators consider blended learning to be a promising strategy with which to incite the required change. In terms of attracting students and a larger share of the student market, blended learning is perceived by universities as having the potential ability to reach more students because of
Chapter One: Introduction to the study

the capacity to offer more choice and flexibility than traditional campus-based approaches. The perception that blended approaches are able to attract more students appears well-founded. Empirical evidence generally points to a positive student response to blended learning (Beutelspacher & Stock, 2011; Salamonson & Lantz, 2005; Uğur, Akkoyunlu, & Kurbanoğlu, 2011) for two main reasons. Firstly, the degree of choice and flexibility of access offered by blended approaches is advantageous to the many students who face increasing pressure to work and study (Graham, 2006). Secondly, students expect that the technology with which they freely interact in their everyday lives will also be present in their classes and blended approaches meet this expectation (Ross & Gage, 2006). In addition to offering the potential of attracting a larger number of students, blended learning offers the obvious advantages of efficiency for teaching to larger numbers of students.

Although, efficiency and numbers are important considerations for institutions to remain viable in the face of globalization and uncertain economies, the potential of blended learning to deliver a competitive advantage to an institution cannot be based on efficiency alone; it must also be based on the delivery of highly effective teaching practices. Supporting a similar argument, Graham and Robison (2007, p. 107) warn that, whilst efficiency is a “noteworthy goal” it should not be the primary goal and, ultimately, it is the adoption of widespread effective teaching practices that will determine if blended learning becomes a successful, widely used, institutional strategy.
The capacity of blended approaches to support effective teaching practices that deliver quality learning experiences is well described in the literature (Cooner, 2010; Garrison & Kanuka, 2004; Garrison & Vaughan, 2008; Kerres & Witt, 2003; Singh & Reed, 2001). Some examples of how blended learning can be used to deliver quality learning experiences include: (1) The development of competencies that would not be possible or practical in the real world. For example, a virtual laboratory that allows students to practise laboratory skills that would be difficult to practise in the real world (Sancho, Corral, Rivas, Gonzalez, & Chordi, 2006); (2) Technology provides a range of options for the delivery of content, and is thus conceivably of value in better catering to students with different learning styles (Ross & Gage, 2006); (3) Wireless connectivity provides opportunities for in-the-field data collection and analysis and, combined with collaboration tools, enhances the active engagement and support of students undertaking field studies. Geology students in the field, for example, can collect, record, and synthesise geological data and then remotely share their information with campus based students. At the same time, the campus based students could also participate in discussion and synthesis and provide data from other sources such as textbooks (Adams, Davies, Collins, & Rogers, 2010).

Despite general agreement that blended learning can be used for effective teaching practices, the widespread adoption of effective blended teaching practices poses a challenge. Literature indicates that the vast majority of implementations do little, or nothing, to change teaching practice for the better. At best, most implementations are
merely “stretching the mould” (Collis & Van Der Wende, 2002, p. 7) by using technology for purposes like administrative efficiency or convenient access to lecture slides. Given the view expressed earlier, that the ultimate success or failure of blended learning as an institutional strategy rests on the widespread adoption of effective blended learning practices (Graham & Robison, 2007), and given effective blended teaching practices are not being widely adopted, the potential of blended strategies to help universities meet economic and competitive challenges remains largely unrealised (Driscoll, 2002; Hoffman, 2006)

1.3 Study motivation
One likely reason why effective blended teaching practices are not being widely adopted is that using technology together with face-to-face teaching is a complex task and often demands academics acquire new knowledge and skills. Many academic staff will possess the skills necessary to teach effectively in more traditional settings, but they possibly do not have the skills to fully exploit the attributes of technologies. For example many academics are well versed in skills to promote discussion and reflection in face-to-face situations, but they not be so well equipped to guide and moderate an online forum. In order to effectively implement a blended teaching strategy, academics are usually faced with a steep learning curve. They need to build their knowledge of what tools are available; then they need to determine the pedagogic advantages and disadvantages of those tools. Having done this, the academics then need to identify what infrastructure is required to support use of the technology and assess whether it is available. Finally, the academics must decide how to
best integrate those tools within their curriculum. The Sloan Consortium (http://sloanconsortium.org) acknowledges these challenges and also emphasises that to successfully use the attributes of technology to improve learning requires significant course redesign, usually involving the creation of new learning activities and reconsideration of assessment methods – a view shared by others such as Garrison and Kanuka (2004, p. 96-97) who state: “Blended learning is inherently about rethinking and redesigning the teaching and learning relationship.” In essence, the implementation of a blended teaching strategy increasingly brings the role of instructional designer to the skill set of academics.

Given the considerable magnitude of the task faced by many academics attempting to implement blended strategies, the question must be asked: how can academics be best supported so that ultimately the university is able to achieve widespread adoption of effective learning practices, and subsequently become more competitive and successful? Whilst the present study does not attempt to answer this question, the motivation for this study stems from the identification of this challenge. What this study does intend to do is to contribute to a body of knowledge, which in turn, assists the planning and implementation of the required professional support. The fundamental premise underlying this thesis is that to address the question of how to best support academics, one must begin by gaining an understanding of the current practice of academics – a reasonable approach given that an individual’s response to new tasks is shaped by prior practices and experiences (Thornton, 2008).
It appears that little is known about academics’ current blended teaching practices (Graham & Dziuban, 2008; Kaleta, Skibba, & Joosten, 2007; Shih, Feng, & Tsai, 2008; Thornton, 2008). A survey of the body of literature related to blended learning in higher education reveals that the literature is dominated by research into the student perspective, such as that by Adam and Nel (2009), Lust, Vandewaetere, Ceulemans, Elen, and Clarebout (2011), Mitchell and Forere (2010), and Salamonson and Lantz (2005). Only a small portion of the literature presents research into the academic perspective. Of the literature related to academic practice that does exist, it is often found to be research exploring the factors facilitating or hindering academics’ adoption of technology. Adoption studies, such as those by Dzubian, Hartman, & Moskal (2004) and Ocak (2010), merely inform researchers about what factors encourage the uptake of technology, but do not assist understanding of the factors shaping blended practices after initial technology adoption. There is thus little understanding to be gained from existing literature about factors shaping academics’ blended practices, after the decision has been made to use technology. The question of ‘why some academics use technology with face-to-face teaching to achieve blended strategies to support learning, while others do not?’ remains largely unexplored, and subsequently, becomes the primary research question explored in this study.
1.4 Research objectives and questions

To gain insight into the primary research question, this study aims to identify factors which predispose academics to use technology with face-to-face teaching to implement blended strategies. With this aim in mind, the following objectives were deemed appropriate:

- To identify a model that predicts the likelihood of academics using blended strategies in their current practice;
- To identify a model that predicts academics’ intended use of blended strategies in the future practice;
- To determine if there exists a general trend among academics towards increased, or decreased, use of technology with face-to-face interaction for the creation of blended strategies;
- To identify which feasibility conditions are perceived by academics as being most important to the realisation of their intended future implementations of blended teaching strategy;
- To establish which teaching tools (tools include face-to-face teaching and technology) are being used by most academics;
- To identify the most commonly used tools for a particular purpose

Achieving the above listed objectives requires that the study seeks answers to the following questions:
• What factors predispose an academic to using technology with face-to-face teaching to implement blended strategies in their current practice?

• What factors predispose an academic to the intent of using technology with face-to-face teaching to implement blended strategies in their future practice?

• Do academics wish to change the extent of their use of blended strategies in the future?

• Which feasibility condition(s) do academics perceive to be most important to the realisation of their future plans to implement blended teaching strategies?

• Which tools are being used by most academics?

• For each purpose, which tools are most academics using?

1.5 Overview of conceptual framework and methodology

Designing a study that will adequately address the research questions demanded the formulation of an appropriate conceptual framework and methodology, both of which are briefly described below.

The conceptual framework embodies ideas from constructivist philosophy (Jonassen, 1994), technology acceptance (Davis, 1986), diffusion of innovations (Rogers, 1995), evolution of teaching practice (Sandholtz, Ringstaff & Dwyer 1997), self-efficacy
Chapter One: Introduction to the study

(Bandura, 1986), teaching style (Grasha, 1996), and teacher competencies (Mishra & Koehler, 2006). The conceptual framework will be further elaborated in chapter four.

The methodology used in this study firstly involved the proposal of an initial research model. A mixed method, two phase methodology, was then used to further develop the proposed research model and to answer the research questions. In the first phase, a survey instrument was used to collect data which was analysed using a variety of statistical methods. In the second phase, interviews were undertaken with participants purposefully selected on the basis of quantitative outcomes. The qualitative data confirmed quantitative results, and enabled the elaboration of the quantitative results.

1.6 Thesis organisation

The remainder of this thesis consists of eight chapters.

Chapter two extends the ideas presented in chapter one by describing, in more detail, the context for the study and giving further insight into the study motivation and rationale.

Chapter three is a response to a variety of definitions of blended learning found in literature. In this chapter, a critical review of existing definitions of blended learning in
both literature and in twenty Australian universities is undertaken, after which, the
definition of blended learning specifically used in this study is formulated.

In chapter four, an examination of concepts embedded in the motivation for the study, the
research question and the definition of blended learning, yields the elements of the
conceptual framework. The conceptual framework is presented and each element is
discussed.

The research model presented in chapter five is developed on the basis of the conceptual
framework. Each of the constructs of the research model are defined and explained in this chapter.

The first phase of the methodology used in this study, the quantitative component, is the
subject of chapter six. This chapter describes the development and structure of the survey
instrument used for the first phase of the study.

Chapter seven presents the quantitative results obtained by using a number of statistical
methods on the survey data. Statistical methods include: descriptive statistics, Tukey’s
HSD test, paired t-test, and regression modelling. On the basis of quantitative results, a
small subset of participants was purposefully selected from the pool of survey respondents,
and thirty-minute semi-structured interviews were conducted with each of the selected respondents.

Chapter eight presents the second phase of the research in which the interview data is analysed to support the quantitative findings and to gain an enriched understanding of the quantitative results.

In the final chapter, chapter nine, the study findings are summarised and the findings for each of the research questions are made explicit. The findings are discussed in terms of connection to existing literature and the conceptual framework. Recommendations are then made in the form of principles to guide professional support which helps to facilitate the widespread adoption of effective blended teaching practices.

1.7 Summary

Chapter one has provided a background for the study documented in this thesis, by first giving the background context from which the study has emerged, and then, explaining the motivation for the study, stating the research objectives and questions, outlining the conceptual framework and methodology, and finally describing the organisation of this thesis. Many of the ideas presented in brief in this chapter are revisited and expanded upon in the next chapter - the literature review of blended learning in higher education.
Chapter Two: BLENDED LEARNING IN HIGHER EDUCATION

Publications derived from this chapter:


2.1 Introduction

This chapter elaborates on the study context, motivation, and rationale that were briefly presented in chapter one. As will be discussed in this chapter, blended learning inherits characteristics from preceding approaches to the use of technology for teaching such as interactive multimedia, e-learning and flexible learning which are considered, by universities, as promising for responding to the economic and ‘need for change’ pressures they currently face. It is argued in this chapter that realising the promise of blended learning for higher education rests on the widespread adoption of effective teaching practices. It is then established that there is a deficiency in the knowledge base required to devise the professional support needed for achieving widespread adoption of effective teaching.
practices. The purpose of this chapter is thus to set a context for the study, provide a motivation and rationale for the study, and to establish the research question.

2.2 A brief historical context for blended learning

Blended learning, as the use of technology together with face-to-face teaching, is embedded in the history of the use of technology in educational settings. The term ‘technology’ as used in the context of blended learning usually refers to digital technologies, and so the history of blended learning is considered to begin with the technology based training approaches made possible by mainframe computers in the 1960’s and 70’s.

Systems like PLATO (Programmed Logic for Automated Teaching Operations) represent the beginning of the evolution of the use of digital technologies for teaching and learning(Bersin, 2004). PLATO, a mainframe system developed by the University of Illinois, was the first large scale computer instruction system. The development of PLATO was motivated by a need to provide education to an increasing number of students. By 1976, PLATO had 950 terminals located in a range of educational settings from schools to universities to business organisations with users having access to more than 3500 hours of training materials across more than 100 subject areas(Smith & Sherwood, 1976). PLATO employed a drill based approach in which students were presented with lesson materials
using text, drawings graphs, and colour photographs, displayed on a 22cm square screen (Figure 2.1).

![Figure 2.1 Example of a PLATO-IV screen](http://www.science.uva.nl/museum/PLATO.php)

The character-based main frame interface and keypad that were used for input enabled the user to experience some limited interactivity and control (Smith & Sherwood, 1976). The PLATO system evolved and remained in operation for over forty years (Smith & Sherwood, 1976). The legacy of PLATO continues with the PLATO Learning company (http://www.plato.com) that now provides online learning curriculum materials.
In the 1980’s to the mid-1990’s the emergence of the personal computer put access to computer based educational content within easier reach of the general population. Alongside the personal computer, technical developments in the 1990 made it possible to produce highly interactive and media rich computer based educational content. The use of the term ‘interactive multimedia’ became popular in educational settings. 'Interactive multimedia’ referred to the entirely digital delivery of content presented by using an integrated combination of audio, video, images (two-dimensional, three-dimensional) and text along with the capacity to support user interaction. The need for a method of distribution for new media rich computer based applications soon lead to the development of CD-ROM technology. CD-ROM became the preferred method for distribution of educational interactive multimedia. The educational content developed in the ‘CD-ROM era’ was typically media rich, with high quality video and sound, complex animations, sophisticated interaction, and visually appealing interfaces (Bersin, 2004). Figure 2.2 shows a multimedia interface typical of the CD-ROM era taken from an interactive work entitled ‘Investigating Lake Iluka’, produced by the University of Wollongong in 1993.
With support for multiple media modalities and with the capacity for sophisticated interaction, the advent of multimedia stirred considerable excitement among some educators, not because of large-scale education but because of the possibilities it might offer for improving learning, or to perhaps even replace instructor-led experiences (Bersin, 2004). The pedagogical power of interactive multimedia was seen in terms of supporting individual learning styles through multiple modalities, and in terms of the construction of individual learning pathways through the capacity for high level interactions with content (Butcher-Powell, 2005). Consequently, the case for using interactive multimedia for learning was argued on the grounds that it supported the constructivist principles of active engagement and the individual construction of knowledge. Morgenstern for example, discusses the impact of interactive multimedia on language learning and states that:

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All of the elements will soon be in place to benefit language learners and teachers: communicatively oriented, learner-centred materials, authoring systems allowing for adaptation to individual circumstances, and truly interactive distance learning[...]. Interactive multimedia can empower the learner to an unprecedented degree (1998, p. 86).

Morgenstern’s (1998) view of the impact of interactive multimedia is typical of the views commonly expressed in literature at the time. Furthermore, because the attributes of multimedia were seen to so strongly support the constructivist principles, some authors took the view that interactive multimedia could be a catalyst for a paradigm shift from traditional, teacher-centred, face-to-face instruction towards constructivist, student-centred approaches (Lefoe, 1998; Relan & Gillani, 1997; Richards & Nason, 1999).

Despite the potential for sophisticated, media rich, highly interactive learning experiences, CD-ROM based multimedia faced limitations. The first limitation of CD-ROM based educational courseware was the prohibitive cost of development, maintenance, and distribution. Secondly, the management of all the distributed copies of the course materials was difficult and there was no way of tracking who was using the materials, how well they were doing, and what was being completed (Bersin, 2004). The growing popularity of networks provided the solution to these tracking problems through the implementation of the first learning management system (LMS) software. Early LMS software simply functioned to store and track users’ CD-ROM data.
The public emergence of the World Wide Web (WWW) in the late 1990’s – 2001 further addressed some of the distribution and maintenance issues of CD-ROMs. Although the initial capacity of the Web to support media rich content was limited by both technologies and bandwidth, the ease of access and new capacities for searching and linking (Bersin, 2004) enabled it to become very popular, very quickly, in educational contexts. Terms such as ‘e-learning’- the “online access to learning resources, anywhere and anytime” (Holmes & Gardner, 2006, p. 14), and ‘online learning’ (sometimes used interchangeably with e-learning) became extremely popular. Like multimedia before it, web-based learning was often viewed as an alternative to face-to-face teaching (Alonso, López, Manrique, & Viñes, 2005).

The belief in the power of the Web to deliver educational courseware grew with the expanding ubiquity of networks and access to higher capacity bandwidth. These developments enabled increasingly media rich content to be used on the Web and, most importantly, made way for the development of a range of communications tools for both online synchronous (same time, same place or same time, different place) and asynchronous (different time, different place) communication. Founded on the socio-constructivist belief that deep learning is achieved when learners share and question their understandings (Laurillard, 1993), web-based communications technologies became popular as a means of providing more opportunities for students to collaborate and engage in discussion with each other and with teachers outside of on-campus contact time. Terms
such as ‘e-learning communities’, ‘e-communities’, ‘web-mediated learning communities’, or ‘communities of practice’ became commonly used to refer to the idea that groups of individuals come together online to collaborate, discuss their learning and share learning activities for the purpose of achieving deeper learning, (Alonso, López, Manrique, & Viñes, 2005; Holmes & Gardner, 2006). The idea that online collaboration is a powerful pedagogical feature of web environments remains popular today.

As access to the Internet and related communications technologies infused wider society, the idea of being able to access educational courseware from anyplace, anytime, gained momentum and popularised the idea of flexible learning. Taylor, Lopez and Quadrelli (1996, p. xi) define flexible learning as “practices which utilize the capacities for learner-learner and teacher-learner interaction made possible through developments in communication and information technology to provide increased ‘openness’ in both on and off-campus delivery of educational programmes”. As the word ‘flexible’ indicates, the principle advantage of flexible learning lay primarily in enabling students with work and personal commitments, which impacted on their ability to attend campus regularly, to continue to study off-campus. The use of communications technologies meant that off-campus students were not isolated from personal contact with peers and lecturers. Discussion and collaboration with peers and lecturers could take place remotely. The idea of flexible learning remains active today, with some universities implementing blended strategies as part of their focus on flexible learning. For example, La Trobe University’s
institutional teaching and learning document explains that the concept of ‘flexible learning’ encompasses e-learning, online learning, and blended learning (2011).

Founded on a heritage of digital technology for learning, blended learning embodies the ideas encountered in its history: technology for enhancing learning, delivering large-scale education, and flexibility of access. However, unlike earlier ideas of multimedia, online learning, and e-learning, the concept of blended learning alludes to a harmonious, rather than competitive, relationship between face-to-face strategies and educational technologies. In blended strategies the value of both technology and face-to-face teaching is recognised, and so the question surrounding blended strategy implementation is not ‘should technology be used rather than face-to-face strategies?’ or ‘can technology replace face-to-face strategies?’ but rather, ‘how can technology best be used together with face-to-face strategies for the best learning outcomes’. Hence, the concept of blended learning lies at the nexus of face-to-face strategies and new technologies.

2.3 Pressures for change in higher education

Much like multimedia and e-learning before it, blended learning is attracting considerable interest in higher education contexts. However, the investment of Universities into the implementation of blended learning as an institutional strategy is much greater than their investments in digital technologies in earlier times. To understand why blended learning
has become such a strong focus in universities, it is useful to first consider the situation in which universities are currently finding themselves. Siemans and Matheos’ (2010) hold the view that today’s universities are compelled to change as they face what is possibly the most significant challenge in their history. The source of the challenge, according to Siemans and Matheos (2010), is that at the same time as universities grapple with emerging technologies and the challenges of delivering education in a form palatable to a technologically savvy student body, the forces of globalization, expansion, and economic uncertainty are bearing down on institutions.

In the Australian context, Siemans and Matheos’ (2010) view certainly rings true. The $23 billion annual higher education expenditure in Australia represents 2% of Australia’s Gross Domestic Product (Norton, 2012, p. 2). The Australian Government recognises that this represents a large sector of the Australian economy and thus an internationally competitive higher education system is seen as important for maintaining the nation’s high standard of living. The Australian Government’s 2008 Review of Australian Higher Education (Final report) clearly expresses this view: “Australia faces a critical moment in the history of higher education [...]. If we are to maintain our high standard of living, underpinned by a robust democracy and a civil and just society, we need an outstanding, internationally competitive higher education system” (Bradley, Noonan, Nugent, & Scales, 2008, p. ix).
To achieve an internationally competitive higher education system, the Review of Australian Education Final report (2008) recommended changes to the Australian higher education system. The recommended changes were implemented in January 2012. The changes, relating to increasing the number of university students and to funding allocation, place significant pressures on universities to reconsider their modes of operation across both research and teaching. The Australian Government wishes to increase the number of students entering university, with the target being to have 40% of 25-34 year olds obtain at least a Bachelor degree by 2020 (Bradley, Noonan, Nugent, & Scales, 2008, p. 6) - a significant increase given that the current rate is around 29%.

The Government’s push for increasing the number of Bachelor degree graduates has two implications for higher education. Firstly, the number of students that must be catered to is obviously larger and secondly, to achieve the target, retention rates must be increased. The larger student numbers will invariably bring the challenge of catering to a greater diversity of students with a wide cross-section of interests, abilities, and circumstances. In fact, the report makes specific reference to targeting those groups of students who would otherwise not enter universities. With regards to retention, a follow up report entitled “Transforming Australia’s Higher Education System” argued that although students’ experience of Australian universities is generally positive, the dropout rate is high and so the report calls for “better levels of student engagement” (Australian Department of Education,
Employment and Workplace Relations, 2009, p. 14) and more emphasis on the quality of the learning experience:

The establishment of the Tertiary Education Quality and Standards Agency (TEQSA) will place a renewed emphasis on learning and teaching quality as the bedrock of the Australian higher education system (Australian Department of Education, Employment and Workplace Relations, 2009, p. 15)

To add to the challenge of providing quality learning experiences to larger numbers of students with diverse needs, the new model for funding forces universities to become more competitive. Unlike previous systems, funding is attached to students rather than institutions. Funding follows the students to whatever institution they choose to attend, and institutions are free to offer as many or as few places as they wish (Bradley, Noonan, Nugent, & Scales, 2008). There is thus increasing pressure on individual universities to attract students. The changes move higher education towards a truly demand based system. The changes also place financial pressure on universities as for some universities and disciplines, the costs will possibly exceed income per student place (Norton, 2012).

The current scene in Australian higher education is reflected across universities worldwide. For example, a report commissioned in 2008 by New York’s governor, recognised that universities contribute substantially to the economy, especially in terms of producing a workforce able to function productively in the future jobs that will require more technical
skills. Again, similar to the Australian situation, the recommendations focused on increasing the number of students entering universities and to facilitate this, removing barriers to disadvantaged groups (New York State Commission on Higher Education, 2007). Similarly, Agarwal (2007, p. 197) makes a case for change in universities in India on the basis that universities play a critical role in providing the ‘large pool of manpower’ needed to sustain the economy. In the United Kingdom, the government has called for universities to be central to the economy and places emphasis on the production of graduates with the skills needed to succeed in an increasingly skilled workforce (Wilson, 2012).

2.4 The promise of blended learning for higher education

In essence, governments recognise universities as vital to national economies and universities are thus being placed under pressure to attract larger student numbers, and retain those students for the lifetime of their degree. The potential of blended learning to help universities cope with current pressures is widely acknowledged in the literature (Bonk, Kim, & Zeng, Future directions of blended learning in higher education and workplace learning settings, 2006; Garrison & Kanuka, 2004; Graham, 2006). Indeed, many universities are investing considerable effort and money into the implementation of blended learning strategies, as the avenue for implementing the efficient, flexible, and quality teaching strategies needed to respond to the challenges they are facing (Bonk, Kim,
& Zeng, Future directions of blended learning in higher education and workplace learning settings, 2006; Graham & Robison, 2007; Garrison & Kanuka, 2004; Graham, 2006; Vasileiou, 2009).

The technology component of blended approaches offers obvious advantages of efficiency and flexibility of access which clearly helps universities to cope with increased student numbers and a need for greater access to materials. The use of electronic quizzes to reduce marking time and the ability to deliver the same content across multiple campuses or off campus to larger student numbers from geographically disperse locations, without the need for physical presence, are two examples of how blended approaches increase teaching efficiency.

From the perspective of attracting students, empirical evidence points to a generally positive student response to blended learning (Uğur, Akkoyunlu, & Kurbanoğlu, 2011). Students tend to respond favourably to the flexibility of access to content and to the ability to collaborate remotely, especially since many more students attending university are now juggling study, work, and family life. In addition, many students coming to university are immersed in new technologies and live in a highly connected social network and there is an expectation that the technologies with which they interact on a daily basis will also be present in their learning environment. Courses meeting these expectations will be more attractive to students (Ross & Gage, 2006).
Alongside implementing efficient practices and providing students with flexible models of course delivery, universities must also deliver high quality learning experiences. The Australian Government’s 2008 Review of Australian Higher Education identified the quality of the learning experience as being of utmost importance if universities are to remain competitive in global markets and if the economic benefits of universities are to be realised. As Graham and Robison (2007) point out, the promise of blended learning to help universities change in response to pressures will only be realised by the widespread adoption of effective blended teaching practices.

Proponents of using technology for teaching, argue that blended learning not only create effective learning experiences, but that blended approaches offer some pedagogical advantage over more traditional methods. For example, Garrison and Kanuka (2004) present the argument that the pedagogical advantage of blended learning is in its capacity to establish communities of inquiry, so that learners are able to engage in collaborative ‘knowledge building’ not just on-campus but anywhere, anytime. Garrison and Kanuka (2004) maintain that the variety of options available for communication makes it possible to choose the best option for the learning situation. For example, depending on the learning situation, the choice for student discussion might be internet discussions or face-to-face interactions. If the learning situation demands providing more thoughtful responses supported by evidential sources and a permanent record of the discussion is useful for further learning then internet discussions would be used. Face-to-face interactions, on the
other hand, are the best choice if spontaneity and the ability to think and contribute ‘on the fly’ are most appropriate to the learning situation (Garrison & Kanuka, 2004).

Others suggest that the pedagogical value of blended approaches is its capacity to provide experiences that might not otherwise be possible. For example, the virtual microbiology laboratory designed by Sancho et al. (2006) enabled students to develop non-manual competencies such as data reading, interpretation, reporting of results and protocol deployment, through activities that would otherwise be difficult or not feasible due to reasons such as: time required to culture micro-organisms, the complexity of culturing requiring highly developed laboratory skills, the use of costly resources, and the lack of immediate feedback in real laboratory situations.

Other proponents of blended approaches, for example De George-Walker and Keeffe (2010), argue that effective use of technology for learning necessitates focus on the learning and so promotes the design of learner-centred experiences. Furthermore, effectively designed technology orientated learning environments encourage learner engagement and the development of skills in self-directed learning. However, at the crux of views of pedagogical potential of blended learning is the academic’s ability to create effective blended learning experience through the appropriate use of technology together with face-to-face strategies. It is not the technology, per se, that has the power to transform learning for the better. Rather, this power rests with the academics.
2.5 Realising the promise of blended learning – the challenge

For many academics, harnessing the power of using technology with face-to-face teaching to transform learning for the better is a complex undertaking. Academics are often faced with a considerable task. They need to build a body of knowledge of what technologies are available and to identify the capabilities of each technology; not easy tasks especially when new technologies are emerging at a rapid rate. In addition, academics need knowledge about what technologies their university’s infrastructure supports and how they can be technically implemented. Academics then need to be able to map the attributes of both face-to-face teaching and the available technology to the requirements of the task and learning objectives so that they will be able to design the appropriate learning activity. This usually involves significant redesign of courses. To implement the learning activity in practice often requires academics to learn new technical skills in order to use the technology confidently and perhaps provide some technical guidance and support to their students.

Considering the enormity of the undertaking facing academics intending to implement blended approaches, it is not surprising that the achievement of widespread adoption of effective blended teaching practices is proving difficult, with the vast majority of implementations having little or no impact on practice, at best, merely “stretching the mould” (Collis & Van Der Wende, 2002, p. 7), using technology for reasons of administrative efficiency and provision of supplementary access. As was established earlier
in this chapter (section 2.4) the widespread adoption of effective blended learning practices to provide quality learning experiences is critical if blended learning strategies are to be a successful institutional response to the economic and competitive pressures currently faced. Herein, then, is a key challenge to the realisation of the promise of blended learning for higher education - how can academics be supported to facilitate the widespread adoption of effective blended learning practices? This study does not directly seek to answer this question, but rather, the question and its surrounding context motivates the study. What this study does intend to do is to contribute to a body of knowledge, which in turn, could be used to help plan and devise needed professional support approaches. The study motivation is given here

The study motivation: The adoption of widespread effective blended learning practices is necessary for realising the promise of blended learning as an institutional response to current competitive and tough economic conditions. However, achieving widespread adoption of effective blended learning practices is proving a challenge. Only a minority of academics are using blended strategies most likely because effectively using technology together with face-to-face teaching for effective learning is a complex task. The provision of well-informed professional support is critical to the uptake of effective blended learning practices on a larger scale.

This study is guided by the insights gained from the literature about what is potentially important for supporting the adoption of blended learning. Existing studies on technology
adoption and published experiences relating to professional development suggest that some important considerations for supporting widespread adoption of effective blended practices include: (1) Academics’ needing to perceive technology with face-to-face teaching as useful (Gibson, Harris, & Colaric, 2008; Kripanont & Tatnall, 2009; Macharia & Nyakwende, 2010; Tarcan, Varol, & Toker, 2010); (2) The interweaving of academics’ learning about technology with pedagogy (Keengwe, Georgina, & Wachira, 2010; Salter, 2006); and (3) Feasibility conditions such as time, funding, professional and technical support (Bagher, Marek, & Sibbald, 2007; Davis & Fill, 2007; Kistow, 2009; Ocak, 2010; Stewart, Bachman, & Johnson, 2010).

Having established the motivation for this study, it is necessary to turn attention to the formulation of the research question. The identification of the research question necessitates a review of existing literature in order to ascertain the state of research on blended learning in higher education.

2.6 The state of research on blended learning in higher education

It is apparent, on searching the literature, that there are many research papers describing implementations of blended learning or explorations of students’ perceptions of blended learning. There is very little research into academic practice and blended learning.
Thomson Reuters’ Web of Knowledge allows access to multiple databases and “covers over 12,000 of the highest impact journals worldwide, including Open Access journals and over 150,000 conference proceedings” (Thomson Reuters, n.d, para. 1). It thus provides access to a large volume of literature from varied sources; this is ideal for gaining an insight into a substantial cross-section of literature and identifying which issues related to blended learning in higher education have been reasonably well investigated by existing research and which issues require considerably more research attention. A search was conducted using the key words ((blended learning OR hybrid learning) AND (university OR higher education OR faculty)). This search identified 827 relevant articles. Each of the 827 articles was then examined to identify the aim or dominant theme of the reported research. It was found that the 827 relevant results could be sorted into broadly into three topic areas identified in the initial literature search: the student focus, case studies, and academic practice. Of the total 827 relevant results, 212 papers were student focused looking at the student experience, and effectiveness outcomes; 574 papers were found to be case studies of either implementations of blended assessment, of specific strategies used in courses, or of implementations at broader program/faculty or institutional levels; and 41 papers addressed academic practice topics such as professional development, technology adoption and factors influencing the manner in which academics use technology with face-to-face teaching.
Chapter Two: Blended learning in higher education

The deficiency in literature relating to academic practice is clearly evident when the count and percentage of papers in each of the three broad areas of (i) student focus, (ii) case studies, and (iii) academic practice are shown as a pie chart, as in Figure 2.3

![Pie chart showing the count and percentage of blended learning papers in each category](image)

**Figure 2.3**  The count and percentage of blended learning papers in each category

If the papers in each of the three broad categories are further classified into subcategories, it becomes clear that there exists a serious deficiency in literature seeking to explain the reasons behind how academics use technology together with face-to-face teaching (Figure 2.4).
Figure 2.4  The count of papers in each of the subcategories of research interest

The literature in each of the three broad areas of student focus, case studies, and academic practice focus is now considered in some detail.

*Student focused research:*

Student focussed research formed a substantial 25.63% of articles surveyed, with the majority of articles in this category concerned with the student experience (17.65% of
surveyed literature). This literature was concerned primarily with student attitudes to technology, perceptions of technology, preferences (technology or face-to-face interaction), and to some extent the effect of using technology on student outcomes. Student focussed studies such as that by Salmonson and Lantz (2005) often compared levels of student satisfaction with blended courses as opposed to traditional face-to-face courses. Studies such as those by Holley and Oliver (2010), Lust, Vanderwaetere, Ceulemans, Elen and Clarebout (2011), Mitchell and Forere (2010), and Richardson and Turner (2000) considered how individual differences among students contributed to levels of student satisfaction. Other student focussed studies considered effectiveness of blended approaches by comparing learning performance, the reactions of ‘experimental’ group of students exposed to blended learning techniques to a ‘control’ group exposed traditional face-to-face teaching only. Learning performance was generally assessed by pre- and post test scores (EL-Deghaidy & Nouby, 2008).

The research found within the student focussed literature neglected the experiences of the academic in designing and implementing the strategies. More importantly, the majority of research failed to adequately link the student experience with the design of the learning strategy and provided no insight into the factors driving the decisions behind the academic practice leading to the blended design being evaluated. To illustrate this shortcoming: an article by Hsu and Hsieh (2011) reports on a quasi-experimental study to compare learning performance and experience of nursing students using a blended module to study ethics.
with the performance of nursing students using traditional face-to-face methods. Hsu and Hsieh (2011) reported no differences in learning outcomes were found between the blended study group and the traditional group. The sweeping statement is made that “as demonstrated in this study, nursing students are generally more comfortable with traditional-style teaching” (p. 2442). Although some of the characteristics of students are acknowledged as contributing to the outcome, an explanation of the design of the blended experience is neglected. Furthermore, the outcomes of the study are compared to other studies attempting to determine the effectiveness of blended learning, but again, there is no consideration of the design (nor the academic context) of the blended strategies to which Hsu and Hsei’s (2011) study is being compared.

Failing to consider elements of design when discussing effectiveness is a significant deficiency because effectiveness is not inherent to blended strategies, simply using blended strategy does not necessarily result in good learning outcomes and positive student experiences. Rather, the extent to which a blended strategy is effective is more likely to be the result of the interplay between blended strategy design and contextual elements such as learning objectives, discipline requirements, and student characteristics. As Singh and Reed (2001, p. 2) note, “blended learning focuses on optimizing achievement of learning objectives by applying the ‘right’ learning technologies to match the ‘right’ personal learning style to transfer the ‘right’ skills to the ‘right’ person at the ‘right’ time”. Levels of optimization may differ.

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Case studies:

The case study research dominated the results of the literature search with 574 of the total 827 (69.41%) relevant results being case studies. Case studies typically gave detailed examples of the implementation of particular technologies or online assessment within a specific course or they described an attempt at implementation of an approach at faculty or sometimes institutional level. Of the 574 case studies, most were either broad context case studies (280) or course specific (265). Assessment specific literature was less common with only 29 of the 574 case studies attending to blended assessment models.

Case studies reported at the specific course level tended to direct attention to the student experience and paid little heed to the experience of implementation from the perspective of the academic. Course specific case studies frequently articulated a problem then described how technology was used in the specific context and evaluated the effectiveness of the approach (for example, see De George-Walker & Keeffe (2010), Sancho et al (2006), Shen, Wang, Gao, Novak and Tang (2009)). The specific course case studies tended to highlight advantages of blended approaches such as flexibility, ability to provide experiences not otherwise possible, and solving problems of teaching large classes. Evaluation of effectiveness of the described case was usually framed in terms of student perceptions, student achievement, and benefits to students.
Case studies at the faculty level also considered effectiveness in terms of advantages of the approach for students and evaluated effectiveness in terms of student satisfaction. Although student satisfaction was considered as a measure of effectiveness at institutional level, faculty case studies, unlike course specific cases, tended to place more emphasis on academic practice in terms of highlighting the conditions under which academic staff were more likely to accept the described blended approach (Chew & Jones, The E-Vangelist’s plan of action-exemplars of the UK universities strategies for blended learning, 2009; Engert & von Danwitz, 2004; Jones, Chew, & Blackey, 2011; Le, 2008). Institutional level case studies were reported from a ‘lessons learnt perspective’ and conceptualised the introduction of blended approaches at institutional level as an ongoing challenging process. The most common reported elements of successful blended strategies at institutional level included: development of a single, university wide, blended strategy (Engert & von Danwitz, 2004), emphasis on education over technology, appropriate professional development to develop ‘e-competencies’ (Engert & von Danwitz, 2004), provision of a central, multidisciplinary support unit, personalised support for staff in different disciplines, use of peer recommendations and good practice to act as good examples, the recognition of excellence in blended practice from management; availability of funding, and readily available technical support.
Academic practice:

It was very apparent that there was a deficiency in academically focused blended learning literature. Only 41 of 827 relevant papers dealt with academic practice. Most of these studies focussed on issues of professional development. Such papers usually described a specific implementation of a professional development program or support model and the challenge of achieving widespread adoption of blended practices (Brooks, 2010; Thompson, Jeffries, & Topping, 2010; Salter, 2006). The core characteristic of effective professional development found in this body of literature related to interweaving the development of technical skills with pedagogical approaches. Successful intervention strategies such as the ‘e-Scholars Programme’ at Hong Kong Polytechnic University described by Salter (2006), and the faculty training approach described by Keengwe, Georgina and Wachira (2010) reported that the most successful professional development approaches were those that emphasised the link between technology and pedagogy, rather than those that provided training in purely technical skills.

To emphasize the connection between technology and pedagogy, successful professional approaches (Keengwe, Georgina, & Wachira, 2010; Salter, 2006) encouraged the immediate goal of implementing the new skill in the academics’ teaching context. Other features of successful professional development were identified as being: (1) providing opportunity for feedback, (2) offering technical support to individual staff between training sessions and, in particular, support at the time it is needed, (3) implementing departmental
forums and other workshops (Keengwe, Georgina, & Wachira, 2010), (4) small participant numbers in workshops, establishing communities of practice (Brooks, 2010; Thompson, Jeffries, & Topping, 2010); (5) mentors and the use of mentors to provide “just-in-time “ support (Thompson, Jeffries, & Topping, 2010, p. 311).

Of the 827 relevant papers found in the search, five could be categorised as adoption studies. These studies sought to identify factors motivating or inhibiting the uptake of technology by academics. Studies, such as those by Bagher, Marek, and Sibbald (2007), Davis and Fill (2007), Kistow (2009), Ocak (2010) and Wang (2009) concern themselves with identifying the motivators and inhibitors of technology adoption among academics. There was consistency across findings, with identified factors impacting on the adoption of blended learning being: perceptions of usefulness, professional support, point of need technical support, funding, time, institutional infrastructure, dependable information technology structure, involvement of senior staff, and self-efficacy, that is the belief in personal capabilities to use technology.

Although adoption studies are useful for informing strategies to encourage uptake of technology, they provide no insight into the reasons why, after adoption, some academics use technology simply for course management and efficiency, while some use it to offer enriched, often innovative, learning experiences to their students. Out of the 827 papers surveyed only one (Woods, Baker, and Hopper (2004)) sought to explain current practice.
Since the Web of Knowledge search yielded only one paper related to explaining academic current blended practice and since this study is directly concerned with explaining academics’ current blended practices, an attempt to find more studies by searching outside of the Web of Knowledge. Google and Griffith University Library searches produced some additional studies related to explaining academics’ current blended practice. Table 2-1 summarises all the research found relating to explaining academics’ pedagogical use of technology with face-to-face teaching.

Table 2-1

*Literature investigating factors influencing academics’ technology use.*

<table>
<thead>
<tr>
<th>Author/s</th>
<th>Description</th>
<th>Findings</th>
</tr>
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<tbody>
<tr>
<td>Woods, Baker and Hopper (2004) Published in <em>Internet and Higher education</em></td>
<td>Woods, Baker, and Hopper (2004) examined responses from faculty members across 38 institutions using the Blackboard learning management system. The authors explored the factors predicting the type of usage of Blackboard whether as a supplement or for various instructional purposes such as community building, collaboration, or interactivity.</td>
<td>Results indicated administrative rather than integrated instructional use was more prevalent. Factors impacting the ways in which technology was used included age, gender, nature of subject matter, faculty perceptions about how students would learn best, and their personal preferences. Academics’ experience with Blackboard was found to be the most significant factor of usage. Academics with greater Blackboard experience tended to have more positive attitudes towards both the pedagogical potential of...</td>
</tr>
<tr>
<td>Author/s</td>
<td>Description</td>
<td>Findings</td>
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<tr>
<td>Celik (2011)</td>
<td>Used a modified version of the Level of Technology Implementation (LoTi)</td>
<td>The study revealed most academics were not using technology effectively for instructional purposes. There was no dependency between academic qualifications and level of technology use in their teaching. Participants’ level of technology integration declined with more sophisticated technologies. Among the most influential barriers to integration of technology were found to be time and lack of professional development.</td>
</tr>
<tr>
<td>Georgina and Olson (2008)</td>
<td>The study explored the impact of technology literacy and technology training on blended pedagogy use by academics. Specifically, the study addressed the impact on pedagogy of academics’ self-perception of technology literacy and of training in</td>
<td>The study suggested that there is a strong link between technology literacy and pedagogy. It was found that small group training was more effective than large training sessions. However, the study is rather narrow in its scope. Frameworks such as the Technological, Pedagogical and Content knowledge model (Mishra &amp;</td>
</tr>
<tr>
<td>Author/s</td>
<td>Description</td>
<td>Findings</td>
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<tr>
<td>Mehra and Mithel (2007) published in International Journal of Education and Development using Information and Communication Technology</td>
<td>Seeking to address the question of why some faculty members find the idea of using technology for teaching appealing while others do not, the study investigated the perceptions of the management faculty about the benefits of using technology and also considered how factors such as age, experience, time, and academic background affected the extent of use of technology for teaching.</td>
<td>The results of the survey of 150 respondents allowed them to be categorised into one of three groups according to technology use and perceptions. The least technology use was made by the group who perceived technology as too complex to use and who felt intimidated by its use in the classroom (Cynics). The second group included those who, with the assistance of support and training, were willing to incorporate technology (Moderates). The third group continually innovated and incorporated technology fully into their teaching (Adaptors). The study found there was no significant relationship between pedagogy used and the perceived usefulness of technology (the reasons why this might be were not explored), age and extent of technology use, academic background and extent of technology use.</td>
</tr>
</tbody>
</table>

<p>| Renzi (2008) Unpublished PhD | Used Azjen’s theory of planned behaviour to | Results indicated that while academics have a positive attitude |</p>
<table>
<thead>
<tr>
<th>Author/s</th>
<th>Description</th>
<th>Findings</th>
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<tr>
<td>thesis.</td>
<td>explain why some academics use a learning management system in a supplemental role whilst others integrate its capabilities into their teaching model. Variables under consideration included attitude towards the learning management system, subjective norms, perceived behavioural controls, and actual behavioural control.</td>
<td>to the learning management system, the more significant factors in determining whether the system was used as an integrated component of teaching strategy or in a supplemental role, were pedagogical skill along with the confidence to use technology. The outcome of this study is indicative of the value of the Technological, Pedagogical and Content knowledge model(Mishra &amp; Koehler, 2006)</td>
</tr>
<tr>
<td>Sturgeon (2011) Unpublished PhD thesis</td>
<td>The study attempted to establish factors contributing to the integration of technology with face-to-face teaching. A cross-institutional study was undertaken with 36 universities in the Appalachian Region.</td>
<td>Personal use and knowledge of technology were found to be important factors in determining adoption of technology. Age was found not to be a factor although gender appeared statistically significant, with females reporting the use of technology for teaching more frequently than males. The study suggested that the most important factor determining use of technology was “the knowledge that doing so would enhance student learning”(p.v)</td>
</tr>
<tr>
<td>Thornton (2008) Published in Proceedings of ASCILITE conference 2008</td>
<td>Used the idea of ‘cognitive frames’ and ‘sense making’ to explore ‘how [university] teachers deal with their</td>
<td>Technological expertise was much less important than “a strong sense of epistemic purpose” (Thornton, 2008, p. 1040). In producing effective learning</td>
</tr>
</tbody>
</table>
2.7 Findings on the state of the literature on blended learning in higher education

The literature search carried out using the Web of Knowledge revealed that little research attention has been given to understanding academic practice. Of the existing literature examining academic practice, the greater part is concerned with documenting professional development approaches and, to some extent, identifying factors inhibiting or motivating academics’ adoption of technology. There is a serious deficiency of literature exploring
Chapter Two: Blended learning in higher education

how various factors influence the way academics use technology with face-to-face teaching. Existing literature does little to explain why some academics use technology with face-to-face teaching to create blended strategies to provide learning experiences to students while other academics simply use the technology for administration or efficiency purposes. Kaleta, Skibba, and Joosten (2007 cited in Graham & Dziuban, 2008, p. 273) agree with this observation, noting that relatively little is known “about why [academics] adopt and implement a specific instructional [blended] model”. Given the results of the literature search, the primary research question becomes apparent:

The primary research question: Why do some academics tend to use technology together with their face-to-face teaching to achieve blended teaching strategies to support learning, while others do not?

It is instructive to now consider the link between the deficiency in the literature aimed at understanding current academic practices and the study motivation. Earlier (section 1.2 in chapter one) it was established that universities are investing considerable money and effort into the implementation of blended approaches with the aim of enabling institutions to remain viable in the current technological and competitive climate. The widespread adoption of effective blended practices was identified as a necessary condition for the realisation of this aim. However, the literature indicates that the widespread adoption of effective practices is, by and large, not being achieved and the lack of appropriate
professional development and support is one of the major factors inhibiting the widespread adoption of blended practices.

A lack of understanding of academics’ current practices impedes the ability to plan and design effective professional development approaches needed to facilitate the widespread adoption of blended practices. To explain why an understanding of academics’ current blended practices is considered necessary for developing effective professional development approaches, it is useful to take the view that professional development and support is: “adult education, learner-centred, transformative learning” (King & Lawler, 2003, p. 12). As adult learners, academics will have developed a mental model, that is, “assumptions derived from past beliefs and experience and expectations about future behaviour and events crafted by these assumptions” (Thornton, 2008, p.1040). When dealing with a new task, the mental model is invoked and will have impact on how the new task is accomplished. To change practice academics need to redefine their mental models about teaching and learning and the role of technology (Brancato, 2003, p. 63). In order to redefine their mental models, academics first need to make the connection between new knowledge and their existing practice (Cranton & King, 2003). The transformative learning needed to change practice is then achieved through a process of critical reflection, in the light of new knowledge, on existing values, assumptions, and beliefs. The role of professional support and development must be to effect connection to existing practice, facilitate reflection and, subsequently nurture transformation in practice. Having
established the connection between professional support and current practice, the study rationale becomes evident.

**Study rationale:** Professional support needs to effect a connection to existing practice to facilitate the critical analysis of existing beliefs and assumptions that academics need to undertake if they are to transform their practice. The required connection is best effected by understanding the factors shaping current practice.

### 2.8 Summary

It has been established in this chapter that blended learning places value on both face-to-face teaching and technology, and because it emerges from a history of multimedia, online learning, and flexible learning, blended learning embodies ideas of flexibility, collaborative learning, and multiple modalities along with the potential to support student-centred learning experiences. As a result, many universities are looking towards blended learning as a promising institutional strategy for meeting the economic pressures and the competitive challenges of an expanding and increasingly global market faced by higher education in the twenty-first century. The widespread adoption of effective blended teaching practices is imperative if blended learning is to be a successful institutional strategy which helps institutions remain viable in the face of economic pressures and globalisation is grounded in widespread adoption of effective blended practices. However the widespread adoption of effective blended practices is proving to be a significant challenge due to the steep learning
curve academics face in designing and implementing their blended strategies. There is thus a clear need for professional support in blended learning for academics. Ideally, a knowledge base of factors influencing academics’ current practice should inform professional support approaches to make the connection with existing assumptions about teaching and learning, and ultimately, facilitate the reflection that fuels changes in practice. Interestingly, not a great deal is known about academics’ current blended practices.

In the absence of a significant body of research seeking to understand current practice, the research question for this thesis has materialised: ‘Why do some academics tend to use technology together with their face-to-face teaching to achieve blended teaching strategies to support learning, while others do not?’. The emergence of this study, as described in this chapter, is visually presented in Figure 2.5.
Chapter Two: Blended learning in higher education

**PRESSURES FOR CHANGE:** Universities are compelled to change due to pressures from uncertain economic conditions, expansion, competition, globalization, new technologies, and a technologically savvy student population.

**PROMISE OF BLENDED LEARNING:** Universities view an institutional blended learning strategy as having the potential to implement the required change, and so are making considerable investments to encourage widespread adoption of blended teaching practices.

**THE CHALLENGE:** Success of blended learning as an institutional strategy hinges on widespread faculty adoption of effective blended practices that deliver quality learning experiences.

**BUT**

Only a minority of faculty are using effective blended practices

**NEED:** Appropriate Professional Development & support.

Most literature in blended learning in universities addresses:
- Models of implementation
- Student experience
- Satisfaction by faculty and students
- Effectiveness

Meager literature on academic blended practices, mostly about professional development and barriers to adoption of technology.

**BUT**

Significant deficiency in literature explaining current practice.

**PRIMARY RESEARCH QUESTION:** Why do some academics tend to use technology with their face-to-face teaching to achieve blended strategies to support learning, while others do not?

**CONTRIBUTES** to body of knowledge important to providing appropriate professional development and support.

**Figure 2.5** The emergence of the primary research question

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The examination of literature in this chapter has enabled identification of a rationale for the study and the study question. However, before proceeding further and presenting the theoretical model and study methodology, it is now necessary to critically re-consider the simple definition of blended learning as ‘the combination of face-to-face teaching with technology’, which up to this point, has been adequate. The adequacy of using this simple definition of blended learning for implementing the study is the subject of the next chapter.
Chapter Three: **RE-DEFINING BLENDED LEARNING**

Publications derived from this chapter:


### 3.1 Introduction

The term ‘blended learning’ has already been used numerous times in this thesis on the understanding that it refers the use of technology together with face-to-face teaching; a simple, broad idea, which has sufficed for the purposes of the preceding chapters. However, to clearly distinguish between uses of technology with face-to-face teaching that are considered blended learning and those which are not, an investigation of academics’ current blended practices demands a more precise definition of the term . Unfortunately, there is a lack of consensus about the meaning of the term ‘blended learning’ and, as Driscoll (2002, p. 1) observes, the term ‘blended learning’ “means different things to different people”.

This chapter critically reviews existing definitions of blended learning in literature and in the institutional documents of twenty Australian Universities. The critical review of definitions of blended learning leads to the formulation of a definition of blended learning used in the present study.
3.2 In search of a definition of blended learning

A search of literature for a definition of the term blended learning revealed a great variety of definitions. Although the term ‘blended learning’ was widely used, there seemed to be no agreement on its definition. As a result, in addition to the literature search, a catalogue of how the term blended learning is used across Australian universities was developed to determine if the use of the term ‘blended learning’ also varied across the different institutions. This exercise revealed a large array of definitions of blended learning and, notably, a number of weaknesses. These findings led the author to formulate the definition of blended learning used for the present study. The findings and the subsequent re-definition of the term ‘blended learning’ are discussed in more detail in the following sections.

3.2.1 Definitions of blended learning found in the literature

One of the main problems found with the existing definitions of blended learning in the literature was that they were too broad. Some suggest blended learning is simply the usage of a variety of instructional modalities with or without technology (Singh & Reed, 2001; Verkroost, Meijerink, Linsten, & Veen, 2008). Ross and Cage (2006, p. 156) maintain blended learning is a “spectrum of learning modes that range from the traditional face-to-face classrooms to fully online degree programs”. Others uphold the view that blended learning is a blend of tools and/or a blend of philosophies/theories (Carmen, 2002; Rossett, Dougles, & Frazee, 2003; Zemke, 2002). The difficulty with broad definitions is that almost
any teaching endeavour can be classified as blended learning. Furthermore, defining blended learning as a mix of modalities does not acknowledge the complexities of effectively using technology together with face-to-face teaching, and does not direct attention to the need for new approaches and curriculum designs.

The majority of existing definitions of blended learning suggest that the distinguishing feature of blended learning is the combination of face-to-face teaching and technologies. Graham (2006, p. 5), for example, defines blended learning as the combination of “face-to-face instruction with computer-mediated instruction”. In an attempt to give clearer understanding of the term and provide some insight into ‘how to blend’, Graham (2006, p. 13) then categorises blended learning systems according to impact on pedagogy, identifying the following categories: “enabling blends” which simply aim to provide flexibility of access but make no impact on pedagogy; “enhancing blends” that take the form of additional resources and supplementary materials and result in minor pedagogical change; and “transforming blends”, which engage students in active construction of knowledge and make significant changes to pedagogy.

Some definitions replace ‘technology’ with the idea of e-learning or online learning, and so refer to blended learning as the combination of face-to-face teaching with e-learning (Koohang, 2009; Akkoyunlu & Soylu, 2008) or as the combination of face-to-face teaching with online learning (Falconer & Littlejohn, 2007). Conceptualisations of blended learning
as the combination of face-to-face strategies with technology or groups of technologies offer a techno-centric perspective and provide little pedagogical information about the resulting learning experience.

In some instances, blended learning is defined according to the proportion of learning activities occurring online rather than in the classroom, (Garnham & Kaleta, 2002). Allen and Seaman (2007) identify blended courses and programs as having between 30%-79% of content delivered online, courses with > 79% online content as online, while those with <30% online content are categorised as web-facilitated. These definitions place emphasis merely on the presence of both face-to-face interaction and technology rather than on the pedagogical impact. Conceptualisations of blended learning as having fixed proportions of face-to-face interaction and technology do little to suggest that blended learning is more than both face-to-face interaction and technologies co-existing. No teaching and learning aims are inherent in these definitions.

Moving towards some focus on pedagogical considerations, other definitions include concepts of technology-mediated interaction between students and content, students and other students, and between teacher and students (Bliuc, 2007; Tick, 2006). Collis and Moonen (2001) argue that blended learning is a hybrid of traditional face-to-face teaching and online learning such that instruction occurs both in the classroom and online, with the online component becoming a natural extension of traditional classroom learning. Thorne

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(2003, p. 16) conceptualises blended learning as “a way of meeting the challenges of tailoring learning and development to the needs of individuals by integrating the innovative and technological advances offered by online learning with the interaction and participation offered in the best of traditional learning”. Similarly, Garrison and Kanuka (2004, pp. 96-97) view blended learning as “the thoughtful integration of classroom face-to-face learning experiences with online learning such that we are not just adding on to the existing dominant approach or method”. Garrison and Vaughan (2008, p. 148) observe that “the word blended is used to suggest that it is more than a bolting together of disparate technologies with no clear vision of the result”. Rather, as Dzubian, Hartman and Moskal (2004, p. 3) also suggest, blended learning is a coherent pedagogical approach and should be viewed in terms of a “fundamental redesign of the instructional model”.

3.2.2 Definitions used in Australian universities

The blended learning definitions given by Australian universities were obtained either from university websites or by email contact with appropriate staff in teaching and learning support areas. Responses were obtained for twenty of the thirty-nine Australian universities. The principal themes in definitions are shown in Figure 3.1.
Figure 3.1  Themes found in definitions of blended learning across twenty Australian Universities. Number in ( ) is number of universities
3.3 The problem of defining blended learning

The investigation of the definition of blended learning in both the literature and across the surveyed universities showed great variation. The definitions of blended learning can be broadly categorised as falling under one of the definition styles shown in Figure 3.2.

- A mix of pedagogical methods or philosophies with or without technology
- The combination of various learning styles, modes of delivery, and teaching methods
- The combination of face-to-face teaching with ‘technology’, ‘ICT’, or ‘online’, ‘e-learning’, or ‘computer-mediated’
- The combination of specific proportions of face-to-face teaching with online strategies
- The use of technology, e-learning or online materials to supplement face-to-face interactions.
- Optional face-to-face interactions combined with compulsory scheduled online activities or scheduled compulsory face-to-face interactions combined with optional online activities.
- Thoughtful, systematic, integration that uses the best features of face-to-face interaction with the best features of technology

Figure 3.2 The mains styles of definition of blended learning found across both literature and twenty Australian universities

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There are two main problems with the existing definitions of blended learning. Some definitions, such as those conceptualising blended learning as a combination of various learning styles and delivery modes, or those definitions conceptualising blended learning as a mix of methods or philosophies, with or without technology, are too broad in scope. Under the umbrella of such broad definitions almost any teaching practice could be considered blended learning. Other definitions, such as those conceptualising blended learning as a combination of technology with face-to-face strategies, are techno-centric and give little pedagogical guidance. Such techno-centric definitions draw attention to the technology rather than the learning experience as the important aspect of blended learning. As Oliver and Trigwell (2005) suggest, definitions of blended learning need to focus on the learning experience rather than the technology to clarify that the aim of blended learning is to provide a quality learning experience and does not use technology for its own sake.

3.3.1 Proposed definition of blended learning
Finding the existing definitions unsatisfactory, a new definition of blended learning was developed for use in the present study.

**Definition of blended learning used in the study:** Blended learning refers to learning achieved through enriched, student-centered, experiences made possible by the harmonious integration of various strategies combining face-to-face interaction with information and communication technology.
The proposed definition, seeks to be more specific than existing definitions and attempts to overcome the techno-centric issues by identifying the characteristics of the learning experience. The proposed definition requires that for strategies to be classified as blended, they must not only make use of face-to-face interaction with technology but must also intend make a positive contribution to the learning experience. This means that making use of technology only for purpose of efficiency or to simply replicate content for the purpose of access are excluded from being classified as blended strategies. However, according to the proposed definition, using technology together with face-to-face teaching for the purpose implementing strategies that will help students understand concepts would be classified as a blended strategy. This is in contrast to some perceptions of blended learning found in literature. The proposed definition is intentionally narrow in scope, encompassing only Graham’s (2006) idea of ‘transforming blends’ that is, blends that actively engage learners in knowledge construction and make a significant impact on pedagogy, but does not include the ‘enabling blends’ and ‘enhancing blends’ that have no or minimal impact on pedagogy, and which Graham (2006) also considers to be blended learning. To categorise the predominantly superficial use of technology as a blended strategy places emphasis on technology rather than learning needs, obscures the notion of impact on pedagogy, and is counterproductive to the goal of attaining widespread adoption of effective blended practices.
3.4 Summary

A search for a definition of blended learning that could be used for the purpose of this study revealed two issues: firstly, despite common use of the term in higher education, agreement on its exact meaning remains elusive; secondly, the existing definitions and conceptualisations suffer from limitations including being too broad, such that virtually any teaching practice could be considered blended, having a techno-centric focus directing attention to technology rather than the task of teaching and learning, and generally offering little pedagogical direction. As a result of these observations, a definition of blended learning has been proposed that intends to better capture the quality of the provided learning experience rather than technology as the central concern of blended learning approaches. From here on, when the term ‘blended learning’ is used in this thesis, it refers to the definition of blended learning proposed in this chapter.

Having established the definition of blended learning to be used in this study, it is now possible to turn attention to the present study, beginning with the research model as described in the following chapter.
Chapter Four: CONCEPTUAL FRAMEWORK

4.1 Introduction

Three cornerstones of the study have now been defined: the motivation for the study, the research question, and the definition of blended learning. In this chapter, a consideration of the ideas embedded in each of the established cornerstones leads to an identification of the components of a conceptual framework appropriate to this study as shown in Figure 4.1.

![Diagram showing the conceptual framework and study components]

**Figure 4.1** The conceptual framework and the study components from which concepts emerged

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4.2 Concepts embedded in the definition of blended learning

Adopting a definition of blended learning as ‘learning achieved through enriched, student-centered, experiences made possible by the harmonious integration of various strategies combining face-to-face interaction with information and communication technology.’ suggests two of the components relevant to the study’s conceptual framework. Firstly, ‘enriched, student-centered learning experiences’ is suggestive of using the constructivist philosophy (Piaget, 1952; Vygotsky, 1978) as a component of the conceptual framework for this study. Secondly, ‘combining face-to-face interaction with technology’ implies Davis’ (1986) acceptance of technology is also relevant conceptual framework component. Constructivist philosophy and technology acceptance are each described in more detail below.

4.2.1 Constructivist philosophy

Central to constructivism is the belief in the active role learners take in constructing their own individual knowledge. Since knowledge construction is viewed as a highly individual process, constructivist approaches strongly emphasise the individual characteristics of learners, and thus are often referred to as student-centred approaches. There are two strands of constructivism: cognitive constructivism, emerging from the work of Piaget (1952), and social constructivism, which emerged from the work of Vygotsky (1978). From the point of view of cognitive constructivism, the instructor is responsible for structuring the learning environment and providing guidance such that individual learners are able to actively...
explore knowledge, form their own understanding, and construct their own knowledge by engaging in meaningful, authentic, experiences. Vygotsky’s (1978) theory of social constructivism adheres to similar ideals as cognitive construction but places greater emphasis on the social nature of learning and the power of collaborative learning. According to Vygotsky, learning is strongly facilitated through interaction with peers and teachers. The role of the instructor is conceptualised in terms of the ‘zone of proximal development’ (Vygotsky, 1978) which is the difference between what the learner is able to do independently of others and what the learner has the potential to do by engaging in interaction with the instructor or more capable peers. Thus, the role of the instructor is to provide experiences within the zone of proximal development and, along with appropriate scaffolding through the structure of activities, to help advance the individual’s learning (Vygotsky, 1978).

The constructivist perspective has gained favour as the guiding philosophy for the design of technology-based teaching strategies (Rodda, 2004; Schoen, 2008; Jonassen, 1994; Kramer & Schmidt, 2001). The capabilities of multimedia to deliver multimodal content, and to provide for sophisticated interaction, are seen to support the active, student-centred, learning that encourages active knowledge building (Jonassen, 1994; Kramer & Schmidt, 2001; Strommen, 1999) that is the essence of constructivism. Table 4-1 shows how the core principles of constructivism are supported by the capacities of digital information and communications technology.
Table 4-1

*The capacities of technology to support constructivist principles*

<table>
<thead>
<tr>
<th>Constructivist principle</th>
<th>Capacity of technology</th>
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<tr>
<td>Learners have different learning styles</td>
<td>Supports multimodal presentations which cater to different learning styles</td>
</tr>
<tr>
<td>Individual construction of knowledge</td>
<td>Flexible navigation is designed to enable learners to proceed at their own pace and to choose their own pathways through content</td>
</tr>
<tr>
<td>Learning through problem solving</td>
<td>Sophisticated interaction with content can be designed which provides opportunities for experimentation with constructive feedback. Interaction is able to be tailored to learner needs to either provide flexibility so that learners choose their own pathways through content or provide either more rigid sequences or more guidance as needed.</td>
</tr>
<tr>
<td>Authentic learning contexts; context dependent learning that mirror the natural complexity of the real world.</td>
<td>It is possible to construct activities that offer near authentic situations that might otherwise be impractical in reality, for example, virtual laboratories and simulations. Mobile technologies enable learning activities to take place in the field so students can undertake authentic tasks that incorporate the natural complexity of the real world.</td>
</tr>
</tbody>
</table>
4.2.2 Technology Acceptance

The basic concept underlying technology acceptance models (Davis, 1986; Venkatesh & Bala, 2008; Venkatesh & Davis, 2000; Venkatesh, Morris, Davis, & Davis, 2003) is that individuals’ reaction to using information technology and their actual use of technology influence each other. Furthermore, individuals’ reactions to using technology influence future intentions, which in turn influence the actual use of technology. Venkatesh et al. (2003, p. 427) illustrate this notion in a simple diagram shown Figure 4.2.
The basic concepts underlying user acceptance models shown in Figure 4.5 form the bedrock for the research model (described in chapter five) used in this study. If Figure 4.2 is re-written so that is congruent with the concerns of the present study, Figure 4.3 arises.

Although Figure 4.3 captures the essence of the concept of technology acceptance for this study, to better understand technology acceptance models and the roles they play in this
study, it is useful to consider technology acceptance models in detail, beginning with the original model (TAM) developed by Davis (1986) and progressively describing the variations which followed.

Using Fishbein and Ajzen’s (1975) theory of reasoned action as a basis, Davis (1986) developed the original technology acceptance model (TAM) in an attempt to predict an individual’s acceptance of technology. Davis (1986) proposed that determinants of the behavioural intention to use technology are attitude, perceived usefulness, and perceived ease of use (Figure 4.4).
‘Perceived usefulness’ as defined by Davis (1989, p. 320) is "the degree to which a person believes that using a particular system would enhance his or her job performance”, and perceived ease of use is "the degree to which a person believes that using a particular system would be free of effort “.

Venkatesh & Davis (2000) later extended the original TAM model to include several other constructs including:
Subjective norm - a “person’s perception that most people who are important to him think he should or should not perform the behaviour in question” (Fishbein & Ajzen, 1975, p. 302)

Voluntariness – “the extent to which an individual believes the adoption of technology is not mandatory” (Fishbein & Ajzen, 1975, p. 302);

“Cognitive instrumental processes” - job relevance, output quality, result demonstrability and perceived ease of use” (Fishbein & Ajzen, 1975, p. 186).

Venkatesh and Davis’ model (TAM 2) is presented in Figure 4.5.

![Figure 4.5 TAM 2 (Venkatesh & Davis, 2000, p. 188)]
In an attempt to provide a more complete description of technology acceptance, Venkatesh and Bala (2008) proposed TAM 3 (Figure 4.6). In TAM 3 the determinants of perceived ease of use do not influence perceived usefulness. However, an important moderating influence on perceived ease of use is experience.
Figure 4.6 TAM 3 (Venkatesh & Bala, 2008, p. 280)
Although TAM and its later revisions provided quite a solid foundation for the prediction of technology usage, Venkatesh, Morris, Davis and Davis (2003) went on to propose the unified theory of acceptance and use of technology (UTAUT), hoping to provide a more comprehensive model.

In UTAUT (Figure 4.7), Venkatesh, et al. (2003) brought together constructs of models used in earlier research to explain technology usage behaviour, namely: (1) the theory of reasoned action (Fishbein & Ajzen, 1975), (2) the technology acceptance model (Davis, 1989), motivational model theory, (3) the theory of planned behaviour (Ajzen, 1991), (4) a combined theory of planned behaviour/technology acceptance model (Taylor & Todd, 1995), (5) a model of personal computer (PC) utilization (Thompson, Higgens & Howell, 1991), (6) innovation diffusion theory (Rogers, 1995), and (7) social cognitive theory (Bandura, 1986).
The technology acceptance models, TAM, TAM 2, TAM 3 and UTAUT, were initially developed for information systems contexts but have since been successfully applied to, and validated in, many contexts including the acceptance and use of technology in teaching and learning contexts. Table 4-2 summarises some of the studies using technology acceptance models to investigate academics’ acceptance of technology in their teaching contexts.
### Table 4-2

**Summary of some studies using technology acceptance models to investigate adoption of technology by academics**

<table>
<thead>
<tr>
<th>Bibliographic detail</th>
<th>Aim and constructs</th>
<th>Summary of findings</th>
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<tbody>
<tr>
<td>Ahmad, Madarsha, Zainuddin, Ismail, &amp; Nordin (2010)</td>
<td>Validation of extended TAM and to investigate the influence of gender and age. <em>Constructs: Perceived usefulness; perceived ease of use; intrinsic motivation; computer self-efficacy; gender; age.</em></td>
<td>Study supported TAM as a predictor of technology acceptance. Study supports the extended TAM used in the study as a useful predictor of technology acceptance. Age factor limits ‘generalisability’ of the extended TAM model. Age had a statistically significant effect on the relationships among constructs. Gender has no statistically significant effect.</td>
</tr>
<tr>
<td>Ball, Levy, and Lauderdale (2008)</td>
<td>“The purpose of this study was to empirically investigate factors influencing instructors’ intention to use Tegrity®, an emerging educational technology in traditional IS classes and other non-IS classes.” (p. 431) <em>Constructs: computer self-efficacy; computer anxiety; experience with the use of technology.</em></td>
<td>Computer self-efficacy was found to be the most significant influence on intention to use.</td>
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<tr>
<td>Bibliographic detail</td>
<td>Aim and constructs</td>
<td>Summary of findings</td>
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<tr>
<td>Chang, Lieu, Liang, Liu, and Wong (2011)</td>
<td>To investigate factors influencing technology acceptance of university teachers. The technology was a digital projector used in classes. <em>Constructs:</em> Perceived usefulness; perceived ease of use; computer self-efficacy; compatibility of technology; job relevance; subjective norm.</td>
<td>Job relevance was found to significantly affect perceived usefulness which in turn affected intention to use. Subjective norm and perceived ease of use were non-significant. Perceived usefulness was moderately influenced by compatibility with technology. Computer self-efficacy was most important factor on intention to use the technology.</td>
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</table>
| Gibson, Harris and Colaric (2008)          | Validation of TAM for online education acceptance.  
 *Constructs:* Perceived ease of use; perceived usefulness.                                                                                                         | Perceived usefulness provided strongest power of prediction. Perceived ease of use not significant.                                                                                                                     |
| Halawi and McCarthy (2000)                 | To study faculty perceptions of the Blackboard learning management system using TAM as a theoretical basis.  
 *Constructs:* Perceived ease of use, perceived usefulness; attitude toward using.                                                                                                           | Empirical justification for TAM. Faculty will use the learning management system (Blackboard) if they find it useful and easy to use.                                                                       |
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<th>Bibliographic detail</th>
<th>Aim and constructs</th>
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<tr>
<td>Kripanont and Tatnall (2009)</td>
<td>The aim of the study was to determine the ability of TAM to predict usage in contexts outside the United states, in this case Thailand. <em>Constructs:</em> Perceived usefulness, perceived ease of use; facilitating conditions; social influence; self-efficacy and moderating conditions of gender; age; experience and culture.</td>
<td>Actual usage behaviour significantly influenced by perceived usefulness, perceived ease of use, and self-efficacy.</td>
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<tr>
<td>Macharia and Nyakwende (2010)</td>
<td>To validate an extended TAM in terms of intention to use a learning management system. <em>Constructs:</em> Perceived ease of use; perceived usefulness; Vice chancellor/Chief executive officer Characteristics; Organizational Readiness; Subjective Norm (SN); Availability of information and communication technologies; Organizational information and communication technologies Support; Top Management Support.</td>
<td>All constructs except for perceived ease of use had a significant impact on usage of the learning management system.</td>
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### Bibliographic detail

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<tr>
<th>Oye, Noorminshah, and NorZairah (2011)</th>
<th><strong>Aim and constructs</strong></th>
<th><strong>Summary of findings</strong></th>
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<tr>
<td>To examine the effect of TAM on technology usage of academics in Nigerian Universities. <em>Constructs:</em> Performance expectancy; effort expectancy; social influence; facilitating conditions.</td>
<td>“The study shows that performance expectancy, effort expectancy and facilitating condition have a significant positive influence and impact on the behavioural intention to accept and use information and communications technology, by the university academic staff. However the findings show that effort expectancy is the most influential UTAUT construct.” (p533)</td>
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<tr>
<th>Park, Lee, and Cheong (2007)</th>
<th><strong>Aim and constructs</strong></th>
<th><strong>Summary of findings</strong></th>
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<tr>
<td>This study examines the factors that influence instructors’ adoption and use of an Internet-based course management system and tests the applicability of TAM. <em>Constructs:</em> Perceived usefulness; perceived ease of use; motivation; compliance with school policy; instructional technology clusters (functionally similar technologies); evaluation of functions (active evaluation of whether the technology improved learning); current system of use</td>
<td>Perceived ease of use impacted significantly on perceived usefulness which in turn directly affected behavioural intention. Perceived usefulness exerted an indirect effect on actual system use. Motivation was a significant influence on perceived usefulness, evaluation of functions, current use of the system and the intent to continue using the system.</td>
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<td>Bibliographic detail</td>
<td>Aim and constructs</td>
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| Stewart, Bachman, & Johnson (2010) | To validate an extended TAM to investigate faculty members’ perceptions of online teaching.  
**Constructs:** Perceived usefulness, perceived ease of use, facilitating conditions; faculty motivation to teach online. | “The extended TAM model used in the study was predictive of intent to teach online and interest in offering online degree completion programs, but it was not predictive of faculty members’ perceptions of the value and legitimacy of online education... although technology acceptance is related to behavioural intentions to teach online, it is not related to perceptions about online education” (p. 597). |
| Tarcan, Varol, and Toker (2010) | To investigate factors influencing Turkish academics’ intention to use information technologies.  
**Constructs:** Perceived usefulness; perceived ease of use; facilitating conditions (training, education, technical support); subjective norm. | Perceived usefulness had a direct influence on intention to use. Perceived ease of use directly and positively affected perceived usefulness. Perceived usefulness had a mediating effect on intention to use through perceived usefulness. Subjective norm had a direct influence on perceived usefulness and perceived ease of use and a mediating effect on intention to use through these two constructs. Facilitating conditions directly affected perceived ease of use but not perceived usefulness or |
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<th>Bibliographic detail</th>
<th>Aim and constructs</th>
<th>Summary of findings</th>
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| Toto, Kyu Yon, Nguyen, Zappe, and Litzinger (2008) | “This research project examines the similarities and differences between the faculty members who we consider to be innovators and early adopters” (p. 8) specifically the study considers differences in demographics, described use, teaching and computer efficacy  
**Constructs:** Perceived usefulness; perceived ease of use; teaching efficacy, computer efficacy. | Differences in perceived usefulness, ease of use and efficacy related to their perception of tablet usage and adoption. |
| Yuen & Ma (2008) | “To predict and understand teachers’ technology use” using an extended TAM model (p. 229)  
**Constructs:** Perceived usefulness, perceived ease of use, subjective norm; computer self-efficacy | “Perceived ease of use became the sole determinant to the prediction of intention to use, while perceived usefulness was non-significant to the prediction of intention to use […] subjective norm, computer self-efficacy and perceived ease of use were able to explain 68% of the variance observed in users’ intention to use the e-learning system” (p. 229). |
The studies shown in Table 4-2 typify how the technology acceptance models are used in research related to academics’ acceptance of technology. Some studies seek to validate extended technology acceptance models while others seek to investigate the factors influencing academics’ use of various technologies. From Table 4-2, it is clear that the studies share a common focus on the core TAM constructs of perceived usefulness, perceived ease of use and intention to use. However, there is a much variation in the other constructs used. The findings are varied, and in some instances contrasting. For example, Macharia and Nyakwende (2010) found perceived ease of use did not have significant impact on the usage of a learning management system. In contrast, Yuen and Ma (2008) found perceived ease of use to be the sole determinant of intention of teachers’ use of technology. However, Park, Lee, and Cheong (2007) found a significant influence of perceived ease of use, on behavioural intention to use an internet based course management system. Despite the large variation in methods and results, studies such as those summarised in Table 4-2 provide good evidence of the usefulness of the technology acceptance models for investigating influences on academics’ adoption of technology.

4.3 Concepts embedded in the study motivation

Concepts embedded in the definition of blended learning have led to the identification of constructivism and technology acceptance as two components of the conceptual
framework. A consideration of the motivation for the study leads to the identification of two more components of the conceptual framework.

Firstly, recalling that the motivation for this study stems from the idea that the widespread adoption of effective blended learning practices is necessary for realising the promise of blended learning as an institutional response to current competitive and tough economic conditions, it becomes evident that the idea of widespread adoption of effective blended practices suggests that Rogers’ (1962) diffusion of innovations is relevant to the present study. Secondly, it was noted that achieving widespread adoption of effective blended learning practices is proving a challenge, because using technology together with face-to-face teaching for effective learning is a complex task and usually requires significant course redesign and creation of new activities and assessment methods. The idea of course redesign implies a change which is related to the idea of evolution of teaching practice. Rogers’ (1962) diffusion of innovations and the idea of evolution of teaching practice are detailed in the following sections 4.3.1 and 4.3.2.

### 4.3.1 Diffusion of innovations

Rogers’ (1962) diffusion of innovations theory is concerned with the widespread adoption of innovative practices. ‘Diffusion’, as defined by Rogers (1995, p. 5), is “the process by which an innovation is communicated over time among members of a social system”. Diffusion of innovation is conceptualised by Rogers’ (1962) as a series of five stages. In the
first stage, the knowledge stage, individuals are aware of the existence of the innovation but are not motivated to seek further information about the innovation. It is only in the second stage, persuasion, that individuals become interested and actively seek information. Following the persuasion stage, the decision stage occurs. In the decision stage individuals weigh up the advantages and disadvantages in order to make a choice about whether or not to proceed with the innovation. Having made the decision to adopt the innovation, the individual enters the fourth stage, implementation. During the implementation stage the individual uses the innovation to varying extents and determines how useful the innovation may be. Finally, in the fifth stage, the confirmation stage, the individual finalises the decision to use the innovation and may possibly continue to use the innovation to its fullest extent.

In the present study, the widespread adoption of effective blended learning practices refers to the diffusion of effective blended practices among academics within the university setting. In attempting to understand how of diffusion of effective blended practices among academics might occur, it is useful to frame effective blended learning practices as innovation and then consider Rogers’ (1962) five stages of diffusion of innovation. Applying the five stages of diffusion of innovation to the current study suggests that in the knowledge stage, academics becoming aware of the existence of the blended learning and what it can be used for. In the second stage (persuasion), blended learning is viewed with a favourable attitude. This stage is followed by academics’ commitment to use the blended
learning (decision). The innovation is then used (implementation) and finally, the decision to use the blended learning is reinforced by successful outcomes (confirmation).

Rogers (1962) postulates that five qualities determine the success or failure of the spread of innovation: relative advantage, compatibility, complexity, trialability and observable results. Relative advantage refers to the idea that individuals are more likely to adopt an innovation if they perceive it to provide some advantage over other methods. Compatibility is how consistent the innovation is with the individual’s values, prior experiences and needs. The quality of complexity refers to the simplicity or difficulty of using the innovation. The ability to undertake limited experimentation with the innovation is captured in the quality of trialability, and observable results refers to the extent to which the results of using the innovation are visible.

Using Rogers’ (1962) five qualities in the context of the present study provides some useful insights. It would be expected that the widespread adoption of blended practices is likely to occur if academics perceive blended approaches to hold relative advantage over other methods, that is if blended approaches are considered to be superior to other approaches. If blended learning strategies are considered compatible or congruent with academics’ existing values, past experiences and needs, then the rate at which the spread of effective blended practices occurs is increased. Furthermore, the extent to which blended learning practice requires academics to acquire new knowledge and skills will influence their
perceptions of simplicity and ease of use and would be expected to impact on the rate of spread of effective blended practices. Effective blended learning practices will thus be less readily adopted than other practices requiring the use of an existing knowledge base. Applying Rogers’ (1962) notion of trialability suggests that those academics’ that have opportunities to trial blended learning strategies in minimal risk situations are likely to increase adoption. Finally, successful attempts (observable results) at implementing blended learning strategies is an important factor determining if the practice will be adopted on a larger-scale.

Rogers’ (1962) recognises that the process of adoption of an innovation varies among individuals and so within social groups various members will be at different stages of adoption. Five categories of adopters are identified by Rogers (1995, pp. 283-284):

(1) innovators (2) early adopters, (3) early majority, (4) late majority and (5) laggards.

Rogers (1962) maintains that the distribution of various categories of adopters will follow the classic bell shaped curve, with the innovators and laggards in minority.

Applying Rogers’ (1962) five categories of adopters to academics, in the process of the diffusion of effective blended practices through universities, one might expect to find groups of academics with differing degrees of uptake of blended practices. It would be anticipated that some of the academics would be at the cutting edge of the use of blended learning strategies and according to Rogers’ (1962) would be considered innovators.
Rogers (1962) theory leads one to expect that the ‘innovator’ academics take the risk of plunging into trying blended learning approaches and are willing to accept the occasional drawback and thus serve the critical role of ‘launching’ the idea, but due to their risky and rash behaviour, are not likely to gain much respect from their peers. However, those academics that would be considered early adopters by Rogers (1962) will seek advice before adopting blended learning practices and are thus not considered so rash and gain some respect from their peers. Occupying the middle ground is the group of academics that would be classified as the early majority by Rogers (1962). This group make the deliberate decision to adopt blended learning practices. In contrast, the late majority group do not adopt blended learning deliberately but rather, are prompted to do so perhaps out of ‘economic necessity’ or due to increasing peer pressure. Finally, those academics who are more sceptical and lacking leadership will be the last to adopt the blended learning would be identified as Laggards by Rogers (1962).

4.3.2 Evolution of practice

Rogers’ (1962) theory is primarily concerned with change and innovation at a group level. The present study relates to change at the level of individual academics’ practices in teaching with technology. Literature suggests the use technology for teaching, much like the diffusion of innovation, occurs in an evolutionary progression of stages. Although the existing literature relates to school teachers, the concept that teachers move through a series of evolutionary stages in their use of technology is useful when considering academics as
teachers. Evidence of stages of evolution in the use of technology for teaching has been observed by a number of authors including Goddard (2002), Sandholtz, Ringstaff, and Dwyer (1997), and Toledo (2005). The number and name of stages identified varies with different authors but Sandholtz, Ringstaff, and Dwyer’s (1997) five stages capture the essence of the idea of evolution of stages and is adopted in the present study as part of the conceptual framework to help understand the extent to which academics are using technology for teaching and learning. The first stage, termed ‘entry point’ by Sandholtz, Ringstaff, and Dwyer (1997) begins with awareness of the existence of technology for teaching though it is not used in teaching. In the second stage, the adoption stage, technology is used in the teaching context but primarily for increasing efficiency. In the third stage, there is some limited use of technology in learning strategies, usually for supplemental reasons and has minimal impact of practice. In the fourth and fifth stages, appropriation and invention, technology is progressively embedded in learning strategies to a greater extent and leads to transformation of practice.

The idea of evolution of practice is not dissociate from ideas presented in technology acceptance models. Evolution of practice relates to experience and the effect of those experiences. The technology acceptance models (Venkatesh & Bala, 2008; Venkatesh & Davis, 2000; Venkatesh, Morris, Davis, & Davis, 2003) include experience as influencing constructs such as perceived ease of use, perceived usefulness and behavioural intent.
Thus far, ideas embedded in the study motivation and definition of blended learning have helped identify the following components of the conceptual framework: constructivism as a guiding philosophy; the technology acceptance models, which address the dimension of predicting adoption of blended learning practices; and diffusion of innovations and evolution in practice, which address the desired widespread use of effective blended practices and the associated change strategies. The final component of the theoretical framework is identified by considering the research question.

4.4 Concepts embedded in the research question

The primary research question asks: ‘Why do some academics tend to use technology together with their face-to-face teaching to achieve blended teaching strategies to support learning, while others do not?’ The research question thus indicates that the study concentrates on the academics as teachers and the teacher characteristics that influence the teaching strategies. Literature indicates that teaching style (Grasha, 1996), teacher competencies (Mishra & Koehler, 2006), and self-efficacy (Bandura, 1986) are characteristics that influence the types of strategies teachers tend to use.

4.4.1 Teaching style

When considering a contrast in strategies used by academics, their teaching style, an inner quality that impacts on how they characteristically design the instructional process (Grasha,
1996), is an important consideration. It follows that when technology is used as part of the instructional process, teaching style will have bearing on how the technology will be used (Zisow, 2000; Weitkamp, 2006).

Some of the literature suggests that those with teaching styles more aligned with constructivist ideals are more likely to use technology for achieving learning related objectives (Judson, 2006) rather than for administrative or supplemental purposes. For example, Preston, Phillips, Gossers, McNeill, Woo and Green (2010) used Trigwell and Prosser’s (2004) Approaches to Teaching Inventory to profile teachers and found that those teachers who viewed the main goal of teaching as simply delivery of content were likely to consider web based technologies not useful for learning and therefore did not use technologies for learning activities. However, Palak and Walls (2006, p. 436) point out that “teachers’ beliefs and practices are context bound” and thus belief in constructive ideals alone does not necessarily result in student centred use of technology. Supporting this argument, Florini (1989) maintains that the personal models teachers use for determining appropriate technology use is the result of interplay between awareness of personal teaching style, understanding of the characteristics of the media, and the context of use.

### 4.4.2 Teacher competencies

Congruent with the idea that teachers’ use of technology is not the result of a single or simple characteristic such as teaching style, Mishra and Koehler (2006) assert that how
teachers use technology for teaching is determined by competency in three knowledge areas: pedagogy, technology, and content. The framework, shown in Figure 4.8, emphasises that the three bodies of knowledge—pedagogy, technical, and content—are not separate. Rather, there is a “complex interplay” (Mishra & Koehler, 2006, p. 1025) among these three bodies of knowledge when teachers teach using technology. Mishra and Koehler (2006) maintain that teachers must possess technical knowledge and pedagogical knowledge as well as content knowledge as a pre-condition for the design and use of effective strategies for using technology to achieve learning objectives. For example, teachers with good content knowledge and good pedagogical knowledge do not necessarily have the skills required to effectively use technology to create learning activities that support curriculum objectives (Thornton, 2008).
4.4.3 Self-efficacy

Self-efficacy as described by Bandura (1994, p. 3) refers to “belief’s in one’s capabilities to organise and execute the courses of action required to produce given attainments”.

As a predictor of behaviour, self-efficacy is highly relevant to the present study. In fact, self-efficacy occurs as determinant construct in the technology acceptance model, TAM 3. According to Bandura (1986), self-efficacy exerts an influence on behaviour in terms of:
• cognitive processes: the greater the self-efficacy the higher the goal and the greater persistence in the face of adversity
• motivational processes: the driving force to accomplish a goal
• affective processes: the manner in which a person copes with feelings of stress and anxiety produced when undertaking a task

and

• selection processes - individual making the choice, or having the willingness to undertake the task

4.5 Summary
The ideas embedded in the definition of blended learning, the study motivation and the research question helped identify the components of the conceptual framework used for the present study. The conceptual framework is comprised of: (1) constructivism (Piaget, 1952), (2) Davis’ (1986) technology acceptance, (3) diffusion of innovations (Rogers, 1962), (4) evolution of teaching practice (Sandholtz, Ringstaff, & Dwyer, 1997), and (5) teacher characteristics of teaching style (Grasha, 1996) which include self-efficacy (Bandura, 1986) and competencies (Mishra & Koehler, 2006). This conceptual framework now provides a firm foundation for the development of the research model, as detailed in the next chapter.
Chapter Five: RESEARCH MODEL

5.1 Introduction

This study seeks to find a model of factors predicting whether academics are likely to use blended strategies in their current practice and their intended use of blended strategies in the future. The conceptual framework established in the previous chapter plays a critical role in generating the potentially significant constructs that constitute the proposed theoretical research model as shown in Figure 5.1.
In this chapter, the constructs are explained in detail and the proposed research model is presented.

Figure 5.1  Initial model constructs emerging from the conceptual framework
5.2 Initial research model constructs and hypotheses

The initial research model assumes that the predictors of current and future use of blended learning are: normative influences, perceived usefulness, perceived ease of use, perceived feasibility, prior teaching experience, self-efficacy and teaching approach.

Before graphically presenting the initial research model, each of the predictor constructs are described as follows:

Normative influences

Normative influences refer to an individual’s belief about whether or not people important to them think the behaviour should or should not be enacted (Fishbein & Ajzen, 1975). In determining whose opinions are important for academics one might expect that, in an organisational setting, it would be supervisors and peers. Examining some of the literature related to professional support shows this to be a reasonable expectation. For example, in a paper reporting on the implementation of online assessment as an institutional strategy at the University of Glamorgan (Chew, Jones & Blackey, 2010), it was found that having senior university staff members using blended strategies had a generally positive influence on the uptake of blended learning by more junior faculty members. According to Chew, Jones & Blackey (2010), the influential role of peers became obvious when certain faculty members who were using blended practices were publicly cast in the role of ‘blended learning champions’ within each faculty. When other faculty members were made aware of what ‘blended learning champions’ were doing in their classes and could consult them
about their blended learning experiences, there was a positive influence on the uptake of blended learning by faculty members.

There is also evidence to suggest that students should be included in the set of persons whose opinions have the potential to influence academics’ use of technology. The most compelling evidence for this view is found in the large volume of blended learning literature concerned with the student opinions of blended strategies (for example: Mitchell & Forer, 2010; Salmonson & Lantz, 2005; Richardson & Turner, 2000). In the academic context of the present study, it is reasonable to consider that academics might be influenced by the views about blended learning held by students, university administration, and peers.

Prior research on the acceptance of technology has investigated the role that normative influences play in academics’ acceptance of technologies but not how the technology is used in current practice. The results of acceptance studies have been mixed. Some studies, such as that by Chang, Lieu, Liang, Liu and Wong (2011) found that normative influences did not significantly impact of acceptance of technology while other studies such as Tarcan, Varok and Toker (2010) have found normative beliefs influence acceptance of technology. The role of normative influences on technology acceptance by academics remains unclear. However, the question of what influence, if any, normative beliefs have on whether academics’ use technology with face-to-face teaching to create blended strategies is largely unexplored, and so is addressed in this study. Given that some technology acceptance
studies have found a positive impact of normative influences, and that the Unified theory of acceptance and use of technology (Venkatesh, Morris, Davis & Davis, 2003, p. 447) (Figure 4.7) includes social influences as a factor, the first research hypothesis is stated as:

**H1:** The academic’s perceived normative influences in using technology with face-to-face teaching are positively and significantly associated with their intentions regarding current and future use of blended strategies.

**Perceived ease of use**

In the present study, ‘perceived ease of use’ refers to the amount of effort an academic believes he or she needs to expend to implement teaching strategies that require the use of both technology and face-to-face teaching. Research on academics’ acceptance of technology has often found perceived ease of use to be a determinant of technology acceptance. Ahmad, Madarsha, Zainuddin, Imsail, and Nordin (2010), in their study of 731 faculty members in a public Malaysian university found perceived ease of use to be one, (but not the only) factor influencing academics adoption of technology. Similarly, a study by Halawi and McCarthy (2000) showed the important influence of perceived ease of use on technology use. Halawi and McCarthy (2000) sought to determine if a relationship existed: (1) between faculty use of a learning management system (Blackboard) and the constructs of perceived usefulness, and perceived ease of use, and (2) between perceived usefulness and perceived ease of use. Using regression analysis on data collected from a survey completed by 28 faculty members, the authors concluded that faculty would use the
system if “they perceive it to be useful and if they perceive the technology is easy to use and supports their needs” (p.164). Similarly, Kripanont and Tatnall (2009) surveyed academics in Business Schools in Thai public universities (N= 455), and used structural equation modelling to demonstrate that perceived ease of use significantly influenced usage behaviour. The impact of perceived ease of use on how academics will use technology is not addressed in the literature. However, prior research shows perceived ease of use to influential in regard to technology acceptance, and furthermore, perceived ease of use is a core construct of technology acceptance models (Figure 4.5, Figure 4.6, Figure 4.7). Thus it is considered likely that perceived ease of use exerts a positive effect on how technology is used. The following hypothesis is therefore formulated:

**H2: The academic’s perceived ease of use in using technology with face-to-face teaching is positively and significantly associated with their intentions regarding current and future use of blended strategies.**

**Perceived usefulness**

In the context of the present study, perceived usefulness is the degree to which academics believe that using technology together with face-to-face teaching strategies will enhance teaching effectiveness. In existing research about technology acceptance among academics, perceived usefulness is consistently found to be a significant determinant of whether or not an academic will use technology in teaching. For example, Halawi and McCarthy’s (2010) study, described in the subsection above, found perceived usefulness, in addition to
perceived ease of use, to be a significant factor influencing academics’ use of the Blackboard learning management system. The study by Chang et al. (2011) provides further evidence for the importance of perceived usefulness as a influence on academics adoption of technologies. Chang et al. surveyed academics from four public and five private universities in Taiwan (N= 258) and sought to test a proposed causal model that they developed to investigate academics’ acceptance of technology. They found perceived usefulness to be one of the significant factors affecting academics’ intention to use technology. Similarly, Tarcan, Varol and Toker (2010) collected data via a questionnaire given to academics (N= 510) in Turkish universities and conducted structural equation modelling, also identifying perceived usefulness as a significant factor influencing intention to use technology. It is conceivable that perceived usefulness also plays a significant role in how the technology is used. Given that perceived usefulness is a core construct of the technology acceptance models that positively affects behavioural intention to use technology (Figure 4.5, Figure 4.6, Figure 4.7 ), then the third hypothesis arises:  

**H3: The academic’s perceived usefulness in using technology with face-to-face teaching is positively and significantly associated with their intentions regarding current and future use of blended strategies.**

**Perceived feasibility**

An academic’s perception of the availability of necessary resources to implement technology with their face-to-face teaching is captured in the feasibility construct. The
unified theory of technology acceptance (Venkatesh & Bala, 2008) includes feasibility as a predictor of usage behaviour. Feasibility conditions have been the focus of a number of technology acceptance studies among academics and others in the teaching profession in the past. Feasibility conditions such as time, infrastructure, professional support, technical support, and funding have been identified as factors determining technology acceptance in both original technology acceptance models (Figure 4.5, Figure 4.6, Figure 4.7), and by academics in existing studies such as those by Bagher, Marek and Sibbald (2007), Davis and Fill (2007), Kistow (2009), Ocak (2010), Stewart, Bachman and Johnson (2010), and Wang (2009). Research is lacking into how perceptions of feasibility conditions influence whether or not academics use technology together with face-to-face teaching for the creation of blended strategies. Given that implementing blended approaches generally requires a significant investment of time and resources, it is likely that academics’ perceptions of feasibility conditions such as time, funding, support, and infrastructure play a role in shaping the extent to which technology is used by academics in their teaching, and thus the fourth hypothesis for the present study is stated as:

**H4:** *The academic’s perceived feasibility in using technology with face-to-face teaching is positively and significantly associated with their intentions regarding current and future use of blended strategies.*
Prior teaching experience

Experience as an influence of usage behaviour has been identified in the technology acceptance models described in the previous chapter. However, the impact of prior teaching experience on the manner in which technology is used for teaching is unexplored and requires further investigation. Experience in teaching leads to the accumulation of a greater set of skills and knowledge which, as Sandholtz, Ringstaff and Dwyer (1997) note, assist teachers to progress through the stages of technology use. In the present study it is therefore hypothesised that

$H5a$: The academic’s prior teaching experience is positively and significantly associated with their intentions regarding current and future use of blended strategies.

and

$H5b$: The academic’s current blended practice is positively and significantly associated with their intentions regarding future use of blended strategies.

Self-efficacy

Following Bandura’s (1986) idea of self-efficacy as the belief in one’s capacity to achieve an undertaking, self-efficacy as used in the present study refers to academics’ belief in their own ability to implement teaching strategies, in a specific content area, using both technology and face-to-face teaching. The construct of self-efficacy in this study has been framed in terms of the technology, pedagogy, and content knowledge framework (Mishra &
Koehler, 2006) described earlier in section 4.4.2. Hence, self-efficacy in this study is conceptualised in terms academics’ beliefs about their ability to:

- use technology (technical knowledge);
- design effective teaching strategies (pedagogical knowledge);
- understand course content (content knowledge);
- make good decisions about teaching approaches appropriate to teaching the content (pedagogical-content knowledge);
- identify which technologies can be used in the content area (technological-content knowledge);
- understand the attributes of the technology and how they can be used to form new teaching strategies (pedagogical-technological knowledge);
- identify the attributes of technology as well as design new strategies using those attributes to best teach the required content knowledge (technological-pedagogical-content knowledge).

Integrating the idea of self-efficacy with Mishra and Koehler’s (2006) idea that for teachers to use technology effectively they must possess technological, pedagogical and content knowledge leads to the sixth hypothesis:

**H6: The academic’s perceived self-efficacy is positively and significantly associated with their intentions regarding current and future use of blended strategies.**
Researchers such as Nathan (2009) and Albion, Jamieson-Proctor and Finger (2010) have previously applied the idea of framing self-efficacy in terms of the technology, pedagogy, and content knowledge framework (Mishra & Koehler, 2006) to explore primary teachers’ use of technologies in the classroom, both studies finding generally low levels of teacher confidence in personal ability to implement technology for teaching and learning. The research to date is concerned with teachers’ use of technology in school contexts. In the present study, the framework is applied to academics in the university context and presents an interesting extension to existing literature given the differences between teachers and academics. Although both teachers and academics are engaging in teaching activities there are a number of factors which make the two contexts very different. For example, teachers hold teaching qualifications, whereas many academics do not; academics are specialists in their fields and usually teaching within their specialist discipline, whereas teachers teach across discipline areas; the student cohorts taught by school teachers are also very different in age, experience and expectations, from the student cohorts encountered by academics.

*Teaching approach*

Aligned with Grasha’s (1996) conception of teaching style, the ‘teaching approach’ construct is used in the present study to refer to the characteristic manner in which individual teachers design the instructional process. Some prior research has shown that constructivist teaching approaches seem to be conducive to using technology as an intrinsic
part of learning activities (Judson, 2006; Grasha, 1996; Weitkamp, 2006), and thus the final hypothesis for the present study is stated as:

\textit{H7: The academic’s constructivist teaching approach is positively and significantly associated with their intentions regarding current and future use of blended strategies.}

\section*{5.3 The proposed research model}

The proposed research model is founded on the core constructs of the technology acceptance framework: perceived ease of use, perceived usefulness, behavioural intent and actual system use. In addition, gender is considered, not as a predictor construct, but rather as a moderating variable on each of the constructs. The rationale for using gender as a moderating variable stems from two sources. First, gender appears as a moderating variable in the Unified theory of acceptance and use of technology (Venkatesh, Morris, Davis & Davis, 2003) described earlier in chapter four (Figure 4.7). Secondly, existing studies have reported gender differences as playing an important role in factors influencing faculty use of technology. For example, Lumpe and Chambers (2001) found that female instructors were more likely than male instructors to perceive that an individual’s success with using technology is mostly influenced by external factors such as professional development and equipment. Some studies such as that by Briesser (2006), Markauskaite (2006), and Volman and Van Eck (2001), have found differences between female and male teachers in relation to areas such as extent of technology integration, skill, and skill self-perceptions.
The proposed research model is shown in Figure 5.2 (‘+’ indicates a positive relationship).

**Figure 5.2** The proposed research model

In the research model, use behaviour (UTAUT, Figure 4.7) appears as the current use of blended strategies and behavioural intention (UTAUT, Figure 4.7) appears as the intended future use of blended strategies. Unlike the original technology acceptance models.
4.5, Figure 4.6, Figure 4.7), where actual use is predicted by behavioural intent, actual use (current use of blended strategies) is incorporated in the proposed research model as a potential predictor of future behavioural intent, that is, the intended future use of blended strategies. This variation of the original technology acceptance models is necessary because it is academics’ current practices that are of interest, rather than only the intended practices.

5.4 Summary

The conceptual framework given in the previous chapter has provided a basis for proposing the constructs in a model that predicts academics’ use of blended strategies in their current practice and their intention to use blended learning in the future. The research model presented in this chapter incorporates seven constructs which are potentially important in predicting if academics will use technology together with face-to-face teaching to develop blended learning strategies. As indicated in the model (Figure 5.2), the hypotheses for the present study are:

H1: The academic’s perceived normative influences in using technology with face-to-face teaching is positively and significantly associated with their intentions regarding current and future use of blended strategies.

H2: The academic’s perceived ease of use in using technology with face-to-face teaching is positively and significantly associated with their intentions regarding current and future use of blended strategies.
H3: The academic’s perceived usefulness in using technology with face-to-face teaching is positively and significantly associated with their intentions regarding current and future use of blended strategies.

H4: The academic’s perceived feasibility in using technology with face-to-face teaching is positively and significantly associated with their intentions regarding current and future use of blended strategies.

H5a: The academic’s prior teaching experience is positively and significantly associated with their intentions regarding current and future use of blended strategies.

and

H5b: The academic’s current blended practice is positively and significantly associated with their intentions regarding future use of blended strategies.

H6: The academic’s perceived self-efficacy is positively and significantly associated with their intentions regarding current and future use of blended strategies.

H7: The academic’s constructivist teaching approach is positively and significantly associated with their intentions regarding current and future use of blended strategies.

In addition to the above hypotheses, gender is considered as a moderating variable.

The methodology for developing the predictive model from the proposed research model is the concern of the next chapter.
Chapter Six: QUANTITATIVE METHODOLOGY

6.1 Introduction

The theoretical research model proposed in the previous chapter embodies constructs that are possible predictors of the likelihood of an academic using technology with face-to-face interaction for the purpose of implementing blended learning strategies. Further developing the proposed theoretical model necessitates the collection and analysis of data. This study uses a two phase approach to data collection. In the first phase of the study, a survey instrument was designed and distributed to academic staff within Griffith University. Using the data collected from the survey, regression modelling was undertaken to develop a model predictive of academics’ blended learning practices. Other statistical methods were also used to gain insights into academics’ perceptions of blended learning and the nature of their practices. In the second phase, a subsample of survey respondents was interviewed. The selection of interview participants was based on the quantitative results. Outlier sampling was used to purposefully select interview participants from the pool of survey respondents willing to participate in interviews. The qualitative data yielded from the interviews was used to give add depth to the understanding of the quantitative findings.
Chapter Six: Quantitative methodology

The present chapter deals with the first phase — the collection of quantitative data achieved through the use of a survey instrument designed specifically for this study. The survey consists of a number of different components, each designed to collect data needed to answer specific research questions. This chapter begins by making explicit the link between research questions and the survey components and the method of analysis. Each component of the survey is then detailed and discussed.

6.2 The structure of the survey instrument

The survey instrument was developed to collect data related to each of the research questions along with basic demographic data such academic group, gender, class sizes, and number of offerings of courses. Table 6-1 shows which research question was being targeted by each of the survey components, and the statistical method used to analyse the data arising from each component.
Table 6-1

Research questions matched to survey components, and the applied statistical method

<table>
<thead>
<tr>
<th>Research question</th>
<th>Survey component(s)</th>
<th>Statistical method</th>
</tr>
</thead>
<tbody>
<tr>
<td>What factors predispose an academic to using technology with face-to-face teaching to implement blended strategies in their - current blended practice? - intended future blended practice?</td>
<td>Measure of predictors of current use and intended future use of blended strategies consisting of an entry area to record number of years teaching experience, and six sets of seven-point Likert scale items to measure: - normative influences (four items), - perceived ease of use (three items), - perceived usefulness (five items), - perceived feasibility (four items) - self-efficacy (seven items). - teaching approach (four items),</td>
<td>Regression modelling preceded by item analysis</td>
</tr>
</tbody>
</table>

Measure of current use (actual) of blended strategies by using a matrix of technologies, extent of use and purpose of use.

Measure of intended future usage of blended strategies by using seven, seven point Likert scale items.
<table>
<thead>
<tr>
<th>Research question</th>
<th>Survey component(s)</th>
<th>Statistical method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do academics wish to change the extent of their use of blended strategies in the future?</td>
<td>Measure of <em>perceived current</em> use of blended strategies using seven, seven point Likert scale items.</td>
<td>Paired t-test</td>
</tr>
<tr>
<td></td>
<td>Measure of <em>intended future</em> usage of blended strategies</td>
<td></td>
</tr>
<tr>
<td>Which feasibility condition(s), if any, do academics perceive to be most important to the realisation of their future plans to implement blended teaching strategies?</td>
<td>Measurement of feasibility conditions perceived as important for realisation of <em>intended future usage</em> of blended strategies using five seven point Likert scale items.</td>
<td>Tukey’s HSD test</td>
</tr>
<tr>
<td>Which teaching tools are being used by most academics? For each purpose, which tools are most academics using?</td>
<td>Measure of <em>current use (actual)</em> of blended strategies</td>
<td>Descriptive statistics</td>
</tr>
</tbody>
</table>

For the items in Table 6-1 that use a Likert scale, a seven point scale was used because the reliability of a scale increases dramatically with divisions until seven, after which there is little value increasing the number of divisions (Nunnally, 1978). For measures of actual current use, perceived current use, perceived feasibility and intended future use academics
were asked to nominate a particular course and respond to the items in relation to their practice in that course.

The contents and the development of each of the survey components are described in more detail in the following sections.

6.2.1 Measurement of predictors of actual current use and intended future use of blended strategies

In chapter five, section 5.2, the predictors of actual current use and intended future use of blended strategy were identified and defined from existing literature, after which, the research model was presented (Figure 5.2). The predictors of actual current use and intended future use of blended strategy were hypothesized to be normative influences, perceived ease of use, perceived usefulness, perceived feasibility, self-efficacy, teaching approach and prior teaching experience. The predictor, ‘teaching experience’ is simply a numerical figure, and was entered into the survey by participants. However, measuring the other predictors all required the generation of sets of Likert scale items. Initially, the pool of 31 items shown in Table 6-2 was generated.
Table 6-2

The initial pool of 31 items to measure constructs predicting current and future use of blended practice

<table>
<thead>
<tr>
<th>Construct items</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Normative influences (Norm)</strong></td>
<td></td>
</tr>
<tr>
<td>NORM1. Many of my peers believe academics should use tech with face-to-face teaching</td>
<td>Researcher generated (Draws on literature from chapter five, section 5.2)</td>
</tr>
<tr>
<td>NORM2. Students have the expectation that I will use technology together with face-to-face teaching in this course.</td>
<td>Researcher generated (Draws on literature from chapter five, section 5.2)</td>
</tr>
<tr>
<td>NORM3. Industry expects students will study courses that use both technology and face-to-face teaching</td>
<td>Researcher generated (Draws on literature from chapter five, section 5.2)</td>
</tr>
<tr>
<td>NORM4. The university would like academics to use technology together with face-to-face teaching</td>
<td>Researcher generated (Draws on literature from chapter five, section 5.2)</td>
</tr>
<tr>
<td><strong>Perceived ease of use (PEOU)</strong></td>
<td></td>
</tr>
<tr>
<td>PEOU1. It is easy for me to use various technologies together with face-to-face interaction in my teaching.</td>
<td>Researcher generated (Draws on literature from chapter two Table 2-1, and chapter five, section 5.2)</td>
</tr>
<tr>
<td>PEOU2. When I use technology for teaching I do not worry that things will go wrong</td>
<td>Researcher generated (Draws on literature from chapter two Table 2-1)</td>
</tr>
</tbody>
</table>

PhD thesis by Geraldine Torrisi
Chapter Six: Quantitative methodology

<table>
<thead>
<tr>
<th>Construct items</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PEOU3.</strong> It is easy for me to see how I can apply the characteristics of various technologies to teach core content, ideas and skills.</td>
<td>Researcher generated (Draws on literature from chapter two Table 2-1)</td>
</tr>
<tr>
<td><strong>PEOU4.</strong> It is easy for me to identify the strengths and weaknesses of various technologies for teaching different content.</td>
<td>Researcher generated (Draws on literature from chapter two Table 2-1, and chapter five, section 5.2)</td>
</tr>
<tr>
<td><strong>Perceived usefulness (PU)</strong></td>
<td></td>
</tr>
<tr>
<td><strong>PU1.</strong> I can provide students with a richer set of experiences when I use technology</td>
<td>Researcher generated (Draws on literature from chapter four, section 4.2.1 and chapter five, section 5.2)</td>
</tr>
<tr>
<td><strong>PU2.</strong> Using technology together with face-to-face teaching enables my students to discuss and collaborate whenever they need to</td>
<td>Researcher generated (Draws on literature from chapter four, section 4.2.1 and chapter five, section 5.2)</td>
</tr>
<tr>
<td><strong>PU3.</strong> Using technology together with face-to-face teaching is useful for increasing efficiency.</td>
<td>Researcher generated (Draws on literature from chapter four, section 4.2.1 and chapter five, section 5.2)</td>
</tr>
<tr>
<td><strong>PU4.</strong> Using technology together with face-to-face teaching enables me to use better teaching strategies that I would otherwise not be able to use.</td>
<td>Researcher generated (Draws on literature from chapter four, section 4.2.1 and chapter five, section 5.2)</td>
</tr>
<tr>
<td><strong>PU5.</strong> Technology is useful for supplementing for my face-to-</td>
<td>Researcher generated (Draws on literature from</td>
</tr>
</tbody>
</table>

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### Construct items

<table>
<thead>
<tr>
<th>Construct items</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>face teaching</td>
<td>chapter four, section 4.2.1 and chapter five, section 5.2</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PU6.</th>
<th>Using technology together with face-to-face teaching allows my students a greater degree of control over their learning (deleted after first round)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Researcher generated (Draws on literature from chapter four, section 4.2.1 and chapter five, section 5.2)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PU7.</th>
<th>Teaching allows me to design learning activities that better target desired graduate outcomes (deleted after first round)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Researcher generated (Draws on literature from chapter four, section 4.2.1 and chapter five, section 5.2)</td>
</tr>
</tbody>
</table>

### Perceived feasibility conditions (PercFeas)

<table>
<thead>
<tr>
<th>PercFeas1.</th>
<th>The available professional support allows me to use technology together with face-to-face teaching.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Researcher generated (Draws on literature from chapter five, section 5.2)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PercFeas2.</th>
<th>Teaching spaces are well equipped to allow the possibility of using technology together with face-to-face teaching.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Researcher generated (Draws on literature from chapter five, section 5.2)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PercFeas3.</th>
<th>I have enough time to use technology together with face-to-face teaching.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Researcher generated (Draws on literature from chapter five, section 5.2)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PercFeas4.</th>
<th>The technical infrastructure of the university enables me to use a variety of technologies</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Researcher generated (Draws on literature from chapter five, section 5.2)</td>
</tr>
</tbody>
</table>
### Self-efficacy (SE)

<table>
<thead>
<tr>
<th>Construct items</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>I can see how I can use technology combined with face-to-face teaching to implement strategies appropriate to the course objectives.</td>
<td>Modified TPACK item (Teschannen-moran &amp; Woolfolk, 2001)</td>
</tr>
<tr>
<td>I am confident in my ability to include technology in teaching to enhance how I teach and engage students.</td>
<td>Modified TPACK item (Teschannen-moran &amp; Woolfolk, 2001)</td>
</tr>
<tr>
<td>I am confident I can solve my own technical problems</td>
<td>Modified TPACK item (Teschannen-moran &amp; Woolfolk, 2001)</td>
</tr>
<tr>
<td>I am able to select effective teaching strategies to guide student thinking.</td>
<td>Modified TPACK item (Teschannen-moran &amp; Woolfolk, 2001)</td>
</tr>
<tr>
<td>I have up to date knowledge of the content area.</td>
<td>Modified TPACK item (Teschannen-moran &amp; Woolfolk, 2001)</td>
</tr>
<tr>
<td>I can use a wide range of teaching approaches.</td>
<td>Modified TPACK item (Teschannen-moran &amp; Woolfolk, 2001)</td>
</tr>
<tr>
<td>I am able to easily select technologies suited to understanding content in my content area</td>
<td>Modified TPACK item (Teschannen-moran &amp; Woolfolk, 2001)</td>
</tr>
</tbody>
</table>
Construct items | Source
--- | ---
**Teaching approach (TA)**
TA1. I encourage students to generate their own notes. | Modified from Grasha-Riechamann Teaching style survey (Grasha, 1996)
TA2. I believe a lot of teaching time in this course should be used to question student ideas | Modified from Grasha-Riechamann Teaching style survey (Grasha, 1996)
TA3. I guide students work by asking questions, exploring options. | Modified from Grasha-Riechamann Teaching style survey (Grasha, 1996)
TA4. I use group discussions to help students think critically about content. | Modified from Grasha-Riechamann Teaching style survey (Grasha, 1996)
TA5. I encourage students to restructure their knowledge in terms of new ways of thinking about the course. | Modified from Grasha-Riechamann Teaching style survey (Grasha, 1996)

**Total items:** 31

In generating the items shown in Table 6-2, two considerations needed to be addressed. Firstly, items had to be clear, unambiguous, precise, non-leading, able to be answered by participants, not double-barrelled and not negative (Janes, 1999, pp. 322-323). Secondly, since the items are designed specifically for this study, a method for assessing reliability and validity needed to be implemented. The method chosen for the present study is the Q-
sort method. The Q-sort method is derived from Q-Methodology developed by Stephenson (1953). Based on factor analysis, Q-methodology is sometimes called Q-factor analysis. The Q-sort method has been traditionally used for investigating individual’s subjective views by examining correlations between individuals across a sample of items. However, Nahm, Solis-Galvan, Rao, & Ragu-Nathan, (2002) have shown how to use the method to test items after they have been generated from the literature, and before they are distributed as a survey. The Q-sort method, as described by Nahm, Solis-Galvan, Rao, & Ragu-Nathan, (2002) is a simple yet effective method of assessing construct reliability and validity, and is therefore adopted in this study. Before detailing how the Q-sort method was applied to the items for this study, a brief overview of the Q-sort method is now given.

**Brief Overview of the Q-Sort method**

Q-sort uses an iterative process in which the item set is progressively refined on the basis of the outcome of a pair of independent judges sorting each item into each of the construct categories as they see fit (Nahm et al., 2002). The fundamental idea underlying the Q-sort method is that if an item is a reliable and valid measure of a construct, then the independent judges will both place the item into the correct (intended) construct. If a set of items has a high level of reliability and validity then one would expect that the large majority of items would be placed in the correct construct by both independent judges. It is possible to determine the extent to which both judges place all items in the correct construct by simply dividing the number of placements judges make correctly by total number of possible
placements (Moore & Benbasat, 1991). However, as Nahm et al. (2002) point out, agreement between judges may occur purely by chance. Cohen’s Kappa coefficient is a measure of joint agreement excluding chance agreement. Cohen’s Kappa assumes: (1) independence of units (2) nominal scale categories are independent and mutually exclusive and (3) judges undertake sorting independently of each other (Nahm et al., 2002).

Calculation of Cohen’s Kappa requires knowledge of the three values: (1) the total number of items which both judges place in the same, but not necessarily correct, construct; (2) the total number of placements made in the correct construct by judges and (3) the total number of items. The formula to calculate Cohen’s Kappa is given in Equation 1:

\[ \kappa = \frac{N \cdot X_{ii} - \sum_i (X_{i+} X_{+i})}{N^2 - \sum (X_{i+} X_{+i})} \]

**Equation 1**

Where:

- \(N\) : total number of items
- \(X_{ii}\) : number of items agreed on by two judges
- \(X_{i+}\) : total number of placements made in the correct construct by judges

Landis and Koch (1977 cited in Nahm et al., 2002, p. 2) suggest that a value of Kappa between 0.76 - 1.00 is indicative of excellent agreement beyond chance and that a value

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between 0.4 and 0.75 indicates a moderate level of agreement beyond chance. A value of Cohen’s Kappa less than or equal to 0.39 is indicative of poor level of agreement and suggests that the items sets are not good measures of constructs.

On the basis of the value of Kappa for the first iteration, ambiguous items should be re-worded or deleted before the second iteration occurs with a second pair of judges. The process of sorting is repeated with a second set of judges and the procedure repeated, until satisfactory levels of agreement are achieved.

Application of the Q-Sort method to the present study

The Q-sort procedure for this study consisted of two iterations. For each of the iterations, the items were randomised and listed in an Excel spreadsheet. The study constructs formed headings for rows and the survey items formed column headings. An extra row for cases where a judge could not decide what construct an item belonged to was added. Academics from Australian universities were chosen as judges because to gain insight into how future survey participants might conceptualise the questions, it was important to select judges that were representative of the group to whom the survey would be distributed. Judges were able to ask any questions to make sure they understood the requirements of the procedure. Full details of each of the iterations undertaken are now given.
Q-Sort Iteration 1

For the present study, the first Q-sort iteration began with the initial pool of 31 items in total. The initial 31 items were shown in Table 6.2 at the beginning of section 6.2.1. One of the pair of judges used for the first iteration came from Griffith University and the other from Swinburne University. The two judges were independently asked to categorise items into what they believed was the intended construct by placing X in the construct row of the spreadsheet. To facilitate obtaining the values required to calculate Cohen’s Kappa the outcome of the judges’ sorting was used to construct the two matrices, Figure 6.1 and Figure 6.2.

Figure 6.1 shows the items as placed by each of the judges. It should be stressed that the matrix in Figure 6.1 does not record if placements are in the correct or incorrect construct, it records only the judges’ placements with no consideration of correctness. For example, from Figure 6.1 it can be seen that there were two instances in which judge 1 placed the item in the teaching approach construct while judge 2 placed that same item in the perceived usefulness construct. Adding the numbers in the diagonal of Figure 6.1 provides the first value required to calculate Cohen’s Kappa - the total number of items that both judges placed in the same, but not necessarily correct construct. In this instance the number of items judges agreed upon is 23.
Figure 6.2 shows the number of items, as placed by judges with the *diagonal showing correct* placements and the *off-diagonal showing incorrect* placements. For example, from Figure 6.2 it can be seen that judges made three placements of perceived usefulness items correctly, three placements *incorrectly* in the teaching approach construct, and three in undecided column. Adding the numbers in the diagonal of Figure 6.2 provides the second value required to calculate Cohen’s Kappa - the total number of items that judges placed in the *correct* construct. In this instance the number of correct placements made by judges is 45.
**Figure 6.1** The number of item placements in each (not necessarily correct) construct as made by judge 1 and judge 2 for iteration 1 of the Q-sort procedure.

<table>
<thead>
<tr>
<th></th>
<th>Judge 1</th>
<th></th>
<th>Judge 2</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Teaching approach</td>
<td>Perceived usefulness</td>
<td>Perceived ease of use</td>
<td>Normative influences</td>
</tr>
<tr>
<td>Teaching approach</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td>Perceived usefulness</td>
<td>3</td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Perceived ease of use</td>
<td>2</td>
<td></td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Normative influences</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Perceived feasibility</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-efficacy</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Undecided</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Figure 6.2
The judges’ placement of items relative to the correct constructs for iteration 1 of Q-sort procedure

<table>
<thead>
<tr>
<th>Correct constructs</th>
<th>Teaching approach</th>
<th>Perceived usefulness</th>
<th>Perceived ease of use</th>
<th>Normative influences</th>
<th>Perceived feasibility</th>
<th>Self-efficacy</th>
<th>Undecided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching approach</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived usefulness</td>
<td>3</td>
<td>8</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived ease of use</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>Normative influences</td>
<td></td>
<td></td>
<td></td>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived feasibility</td>
<td></td>
<td>3</td>
<td></td>
<td></td>
<td>5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>1</td>
<td>1</td>
<td></td>
<td></td>
<td>12</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Chapter Six: Quantitative methodology

The three values required for calculating Cohen’s Kappa have now been identified:

- total number of items which both judges place in the same, but not necessarily correct, construct is 23;
- the total number placements made in the correct construct by judges is 45
- total number of items is 31

Inserting the values into Equation 1 yields a value of 0.73 for Cohen’s Kappa which is a moderate degree of agreement.

Although Cohen’s Kappa indicates a moderate degree of agreement items indicating have an acceptable degree of validity, the items can be further improved by an examining of the off-diagonal elements in Figure 6.3 to identify clusters of items that are problematic. An examination of the off-diagonal in Figure 6.3 reveals three problem areas:

1) *There were three placements of perceived usefulness items in the teaching approach construct and three placements of perceived usefulness items in undecided column.*

The confusion between items for perceived usefulness and items for teaching approach is understandable. Given the term teaching approach is somewhat an umbrella term, encompassing beliefs and practices, it is conceivable that, with poor wording, perceived usefulness items can be interpreted as belonging to the teaching approach construct. For example, the perceived usefulness item PU1 (Table 6-2)
which reads “I can provide students with a richer set of experiences when I use technology with face-to-face teaching” was interpreted as belief related to teaching approach rather than as a statement about perceived usefulness. Prior to repeating the sorting exercise with a second pair of judges (Iteration 2), perceived usefulness items were reworded to include the word ‘useful’ in attempt to direct attention to the idea of usefulness. PU1 then became “Technology together with face-to-face teaching is useful for enriching students’ learning experiences”. PU2 and PU4 were modified in a similar manner, becoming: “I find technology together with face-to-face teaching is useful for increasing students’ opportunities for discussion and collaboration” and “Technology and face-to-face teaching is useful for implementing more effective strategies”, respectively. PU6 and PU7, in Table 6-2, seemed to be most confusing to the judges with both judges placing PU7 as undecided and one judge placing PU6 as undecided. Both these items were removed.

2) There were three occurrences of the perceived feasibility items being placed in the perceived ease of use construct;

The reason for the confusion between perceived feasibility and perceived ease of use occurred because feasibility and ease of use are closely linked ideas. Inadequacy of conditions to support an activity makes the activity difficult to conduct. For
example, it was intended that perceived feasibility item PercFeas2, “teaching spaces are well equipped to allow me to use technology together with face-to-face teaching” would convey the idea that the features of teaching spaces play a role in making the use of blended strategies possible. However, PercFeas2 (Table 6-2) can be easily be interpreted as perceived ease of use, if thought of in terms how features of teaching spaces make implementing blended strategies easier or more difficult, rather than simply possible. Rewording PercFeas2 (Table 6-2) to use of the phrase, ‘allow possibility’ so it reads “Teaching spaces are well equipped to allow the possibility of using technology together with face-to-face teaching” should result in better outcomes in the second iteration because the phrase directs clear attention to the concept of possibility rather than degree of difficulty. PercFeas4 (Table 6-2) was re-worded in a similar fashion to PercFeas2.

3) **The judges believed three of the perceived ease of use items belonged to the self-efficacy construct;**

Just as perceived feasibility and perceived ease of use are closely related concepts, self-efficacy and perceived ease of use are also related. Efficacy directly affects perceived ease of use (Igbaria & Iivari, 1995). Confusion of perceived ease of use items as self-efficacy items is thus a possibility in the presence of poor wording. For example, PEOU1, “It is easy for me to use various technologies together with face-to-face teaching” is likely to be interpreted as an efficacy item, especially since the
item uses the phrase ‘It is easy for me’, in a way that suggests confidence or efficacy on the part of the academic. Since ease of use refers to the amount of effort individuals need to expend to achieve their objectives, PEOU1 was reworded to use the phrase ‘it does not take much effort’, so that it became “It does not take much effort to use various technologies together with face-to-face teaching”. PEOU3 and PEOU4, in Table 6-2, were changed by removing the words ‘for me’.

4) One judge placed a self-efficacy item as perceived usefulness and another judged placed the item as perceived ease of use;

The phrase, ‘I am able to easily select’ is used in the misplaced self-efficacy item, SE7. Using the word ‘easily’ could have suggested the item was related to perceived ease of use and so the confusion is understandable. Rewording by removing the word ‘easily’ removes the suggestion ease of use.

Iteration 1 resulted in the removal of two items from perceived usefulness (PU 6 and PU 7 in Table 6-2) and the rewording of other items as described above. The 29 items used for iteration 2 are shown in Table 6-3.
Table 6-3

*Items for each construct used for Q-Sort, iteration 2*

<table>
<thead>
<tr>
<th><strong>Normative influences (Norm)</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>NORM1. Many of my peers believe academics should use tech with face-to-face teaching.</td>
<td></td>
</tr>
<tr>
<td>NORM2. Students have the expectation that I will use technology together with face-to-face teaching in this course.</td>
<td></td>
</tr>
<tr>
<td>NORM3. Industry expects students will study courses that use both technology and face-to-face teaching.</td>
<td></td>
</tr>
<tr>
<td>NORM4. The university would like academics to use technology together with face-to-face teaching.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Perceived ease of use (PEOU)</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PEOU1. It does not take much effort to use various technologies together with face-to-face in my teaching.</td>
<td></td>
</tr>
<tr>
<td>PEOU2. When I use technology for teaching I do not worry that things will go wrong.</td>
<td></td>
</tr>
<tr>
<td>PEOU3. It is easy to match the characteristics of various technologies to teach core content, ideas and skills.</td>
<td></td>
</tr>
<tr>
<td>PEOU4. It is easy to identify the strengths and weaknesses of various technologies for teaching different.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Perceived usefulness (PU)</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PU1. Technology together with face-to-face teaching is useful for enriching students’ learning experiences.</td>
<td></td>
</tr>
<tr>
<td>PU2. I find technology together with face-to-face teaching is useful for increasing students’ opportunities for discussion and collaboration.</td>
<td></td>
</tr>
</tbody>
</table>

*PhD thesis by Geraldine Torrisi*
PU3. Using technology together with face-to-face teaching is useful for increasing efficiency.

PU4. Technology with face-to-face teaching is useful for supplementing face-to-face strategies.

PU5. Technology is useful for supplementing for my face-to-face teaching.

**Perceived feasibility (PercFeas)**

PercFeas1. The available professional support allows me to use technology together with face-to-face teaching.

PercFeas2. Teaching spaces are well equipped to allow me to use technology together with face-to-face teaching.

PercFeas3. I have enough time to use technology together with face-to-face teaching.

PercFeas4. The technical infrastructure of the university enables me to use a variety of technologies in my face-to-face teaching.

**Self – efficacy (SE)**

SE1. I can see how I can use technology combined with face-to-face teaching to implement strategies appropriate to the course objectives.

SE2. I am confident in my ability to include technology in teaching to enhance how I teach and engage students.

SE3. I am confident I can solve my own technical problems.

SE4. I am able to select effective teaching strategies to guide student thinking.

SE5. I have up to date knowledge of the content area.

SE6. I can use a wide range of teaching approaches.
SE7. I can identify specific technologies suited to understanding the content in my content area.

**Teaching approach (TA)**

TA1. I encourage students to restructure their knowledge in terms of new ways of thinking about the course.

TA2. I guide students work by asking questions, exploring options.

TA3. I use group discussions to help students think critically about content.

TA4. I encourage students to generate their own notes.

TA5. I believe a lot of teaching time in this course should be used to question student ideas

**Total items: 29**

**Q-Sort Iteration 2**

The sorting procedure used in iteration 1 was repeated using the revised item set in Table 6-3 with a different pair of judges than was used in iteration 1. The judges consisted of two academics from Griffith University. As for iteration 1, the two judges were presented with Excel spreadsheets and asked to classify each of the items into one of the constructs. To calculate Cohen’s Kappa the procedure used before for iteration 1 was repeated.

The placements made by both judges were used to construct two matrices (Figure 6.3 and Figure 6.4) so as to facilitate the calculation of the values required to establish Cohen’s Kappa. Summing the diagonal in Figure 6.3 yields the total number of items which both judges place in the same, but not necessarily correct and is, in this instance, 27.
Summing the diagonal in Figure 6.4 gives the total number placements made in the correct construct by judges, and is 58. The total number of items used for this iteration was 29. Using Equation 1 yields a value of 0.93 for Cohen’s Kappa. A value of 0.93 is excellent and suggests that the items are reliable and valid measures of the intended constructs.
Figure 6.3  The number of item placements in each (not necessarily correct) construct as made by judge 1 and judge 2 for iteration 2 of the Q-sort procedure

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<table>
<thead>
<tr>
<th>Judges</th>
<th>Teaching approach</th>
<th>Perceived usefulness</th>
<th>Perceived ease of use</th>
<th>Normative influences</th>
<th>Perceived feasibility</th>
<th>Self-efficacy</th>
<th>Undecided</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teaching approach</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived usefulness</td>
<td></td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived ease of use</td>
<td></td>
<td></td>
<td>5</td>
<td></td>
<td></td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Normative influences</td>
<td></td>
<td></td>
<td></td>
<td>8</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Perceived feasibility</td>
<td></td>
<td></td>
<td>1</td>
<td></td>
<td>7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-efficacy</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>14</td>
<td></td>
</tr>
</tbody>
</table>

**Figure 6.4**  The judges’ placement of items relative to the correct constructs for iteration 2 of Q-sort procedure

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Although the items Table 6-3 have now been shown to be reliable and valid measures of intended constructs two items were deleted after iteration 2: PEOU 4 in Table 6-3, was deleted from perceived ease of use construct because it was considered to express the same idea as PEOU3, and TA5 was deleted from teaching approach because ‘thinking critically’ component of TA5 captures the idea of questioning student understanding that is expressed in TA3. The result of the deletions is the final pool of 27 items shown in Table 6-4.

Table 6-4

*Final items used to measure of predictors of current and intended future blended strategy*

<table>
<thead>
<tr>
<th>Construct</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Normative influences</strong></td>
<td>Many of my peers believe academics should use technology together with face–face teaching.</td>
</tr>
<tr>
<td></td>
<td>Students have the expectation that I will use technology together with face-to-face teaching</td>
</tr>
<tr>
<td></td>
<td>Industry expects students will study courses that use both technology and face-to-face teaching.</td>
</tr>
<tr>
<td></td>
<td>The university would like academics to use technology together with face-to-face teaching</td>
</tr>
<tr>
<td><strong>Perceived ease of use</strong></td>
<td>It does not take much effort to use various technologies together with face-to-face teaching.</td>
</tr>
<tr>
<td></td>
<td>When I use technology for teaching I do not worry that things will go wrong.</td>
</tr>
</tbody>
</table>
**Perceived usefulness**

Technology together with face-to-face teaching is useful for enriching students' learning experiences.

I find technology together with face-to-face teaching is useful for increasing students' opportunities for discussion and collaboration.

Technology together with face-to-face teaching is useful for increasing efficiency.

**Perceived feasibility conditions**

The available professional support allows me to use technology together with face-to-face teaching.

Teaching facilities allow the possibility of using technology together with face-to-face teaching.

I have enough time to use technology together with face-to-face teaching.

The technical infrastructure of the university makes it possible to use a variety of technologies in my face-to-face teaching.

**Self-efficacy**

I can see how I can use technology combined with face-to-face teaching to implement strategies appropriate to the course objectives.

I am confident in my ability to include technology in teaching to enhance how I teach and engage students.

I am confident I can solve my own technical problems.
I am able to select effective teaching strategies to guide student thinking.

I have good, up to date knowledge of the content area.

I can use a wide range of teaching approaches.

I can identify specific technologies suited to understanding the content in my content area.

<table>
<thead>
<tr>
<th>Teaching approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>I use group discussions to help students think critically about content.</td>
</tr>
<tr>
<td>I guide students’ work by asking questions and exploring options.</td>
</tr>
<tr>
<td>I encourage students to generate their own notes.</td>
</tr>
<tr>
<td>I encourage students to restructure their existing knowledge in terms of new ways of thinking.</td>
</tr>
</tbody>
</table>

In the distributed survey all of the items in Table 6-2 were presented using a seven-point Likert scale, an example of which is shown in Figure 6.5.
Figure 6.5 Example of Likert scale items for the ‘teaching approach’ construct

### 6.2.2 Measurement of actual current use of blended strategies

An objective measure of current blended practice was obtained using the matrix shown in Figure 6.6. The matrix was designed to enable academics to select their extent of usage of face-to-face strategies and the extent of usage of various technologies. The list of technologies was created using the tools available in Learning@Griffith (Learning@Griffith is Griffith University’s teaching and learning management system). Academics were then also able to select the purpose of use for face-to-face teaching and the purpose of use for any technologies being implemented. For purpose of use, respondents were able to select from: efficiency, accessibility, understanding concepts, practice skills, sharing ideas and communication. Respondents could select more than one purpose if they wished to. A consideration of the case study literature (for example, (De George-Walker &
Keeffe, 2010; Sancho, Corral, Rivas, Gonzalez, & Chordi, 2006; Shen, Wang, Gao, Novak, & Tang, 2009) encountered in chapter two assisted with determining the main reasons why academics use technology together with face-to-face teaching.

![Matrix to measure actual blended strategy use](image)

**Figure 6.6** Matrix to measure actual blended strategy use
The measure of current use of blended strategies for each respondent was obtained by converting each academic’s responses in the matrix to a single score. The method used to obtain the single score will now be described.

To understand how data from the matrix in Figure 6.6 was used to arrive at a score for current use of blended learning, it is important to recall the definition of blended learning used for the study that was presented in chapter three. According to the blended learning definition, for the use of technology with face-to-face teaching to be considered a blended approach, the technology must be used to make a contribution to the enriching the learning experience; if the learning experience is enriched then there are more opportunities for learners to understand concepts. The use of technology with face-to-face teaching for purposes such as efficiency, access, skill practice, and communication does not qualify as a blended strategy according to the definition of blended learning used in this study. Hence, the first step to obtaining a measure of the current use of blended strategies from the matrix was to allocate a weighting of 1 to the purpose of understanding concepts, and the weighting of 0 to all other purposes.

The second step to obtaining a score of current use of blended strategies is to consider the extent of use of the technology. Take for example, the case in which hypothetical academic X makes a great deal of use of technology A for the purpose of enabling students to gain understanding of concepts; another academic Y also uses technology A to help students
understand concepts, but only rarely. Both academic X and Y are using blended strategies but academic X is using blended strategy to a greater extent than academic Y. The current use of blended strategy score for X should thus be higher than Y’s score. To enable a calculation of a score for usage, a weighting of 0 was allocated to ‘no usage’, a weighting of 2 was allocated to ‘some usage’ and a weighting of 4 was allocated to ‘much used. Academics who embrace blended learning may well take advantage of multiple technologies in their attempt to help students understand concepts. Thus, the number of technologies used for the purpose of understanding concepts will also contribute to the measure of extent of blended practice. Thus, for each academic, the score for each technology used (given extent of usage and its use to help students understand concepts) is summed.

Consider Table 6-5 which gives an example of a fictitious Academic A and the usage pattern they showed given the matrix in Figure 6.6.

Table 6-5

*Fictitious data for Academic A*

<table>
<thead>
<tr>
<th>Tool</th>
<th>Usage</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wiki</td>
<td>Much used</td>
<td>Understanding concepts, sharing ideas</td>
</tr>
<tr>
<td>Lecture capture</td>
<td>Much used</td>
<td>Efficiency, accessibility</td>
</tr>
<tr>
<td>Interactive objects</td>
<td>Some usage</td>
<td>Understanding concepts</td>
</tr>
</tbody>
</table>
Academic A uses Wikis and Interactive objects to help students understand concepts, stating that the former is “much used” and the latter has “some usage”. For usage of Wikis, the score is 4 and for Interactive objects it is 2, yielding a total score of 6 for Academic A.

Now consider Table 6-6 which gives an example of a fictitious Academic B and their usage pattern.

Table 6-6

*Fictitious data for Academic B*

<table>
<thead>
<tr>
<th>Tool</th>
<th>Usage</th>
<th>Purpose</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wiki</td>
<td>Some usage</td>
<td>Understanding concepts, sharing ideas</td>
</tr>
<tr>
<td>Lecture capture</td>
<td>Much used</td>
<td>Efficiency, accessibility</td>
</tr>
<tr>
<td>Online assessment</td>
<td>Much used</td>
<td>Efficiency</td>
</tr>
</tbody>
</table>

The only technology Academic B uses to help students understand concepts is Wikis, with some usage, yielding a score of 2. Of course, there may be other ways to capture different levels of blended learning usage, but this method seems, at least on the face of it, to capture extent of usage. Examining Academic A and D it certainly seems reasonable to score Academic A higher than Academic B on extent of blended learning usage.
6.2.3 Measurement of perceived current use and intended future use of blended strategies

In order to address the question, ‘What is the general trend, among academics, in the extent of their use of blended strategies?’ academics’ perceived current use of blended strategies needs to be compared to the measure of academics intended future use of blended strategies. Academics’ perceived current use of blended practice is an academics’ subjective judgement about their current practice. This is different from the more objective measure of actual current practice obtained by the survey component previously described in section 6.2.2 above. To facilitate the comparison between academics’ perceived current use of blended strategies, and intended future practice the two survey components shown in Figure 6.7 and Figure 6.8 were developed. Note that to enable the comparison to be made both survey components use the same seven items. The seven items enabled respondents to indicate the extent to which they would like to use technology to achieve certain practice objectives in their nominated course.
Chapter Six: Quantitative methodology

Indicate the extent to you use technology with face-to-face teaching to do each of the following:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Not at all</th>
<th>Extensively</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address areas in which students experience difficulty</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Achieve course objectives.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Present ideas in different ways.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Provide learning activities.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Implement assessment tasks closely aligned with real world contexts.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Provide a high degree of individual autonomy for students.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Develop innovative strategies.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>

Figure 6.7 Measure of academics’ perceived current use of blended strategies

Indicate the extent to you would like to use technology with face-to-face teaching, in the future, to do each of the following:

<table>
<thead>
<tr>
<th>Activity</th>
<th>Not at all</th>
<th>Extensively</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address areas in which students experience difficulty</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Achieve course objectives.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Present ideas in different ways.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Provide learning activities.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Implement assessment tasks closely aligned with real world contexts.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Provide a high degree of individual autonomy for students.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
<tr>
<td>Develop innovative strategies.</td>
<td>1 2 3 4 5 6 7</td>
<td></td>
</tr>
</tbody>
</table>

Figure 6.8 Measure of academics’ intended use of blended strategies

PhD thesis by Geraldine Torrisi
The practice objectives forming the items in the two survey components (Figure 6.7 and Figure 6.8) were generated by considering the definition of blended learning used in this study and identifying the core reasons why technology is used with face-to-face in blended strategies. Recall the definition of blended learning used in this study:

Blended learning refers to enriched, student-centered learning experiences made possible by the harmonious integration of various strategies, achieved by combining face-to-face interaction with technology.

Using the definition of blended learning, the three core reasons why technology is used together with face-to-face in a blended strategy are:

A. to support course objectives and so is an important component of learning activities (and therefore transforms practice),

B. to provide an enhanced learning experience (enrichment) and

C. to facilitate the use of student-centred practices found in constructivist ideals (such as individual learning styles, authentic learning activities, self-pacing and individual pathways through content).

In Figure 6.7 and Figure 6.8 the practice objectives of ‘achieve course objectives’, ‘provide learning activities’ and ‘develop innovative strategies’ emerge from core reason A;
the practice objective ‘address areas in which students experience difficulty’ relates to core reason B; and ‘present ideas in different ways’, ‘implement assessment tasks closely aligned with real world contexts’ and ‘provide a high degree of individual autonomy for students’ relate to core reason C.

6.2.4 Measurement of perceived relative importance of feasibility conditions

Academics’ perceptions of the relative importance of feasibility conditions was measured by asking respondents to rate various feasibility conditions on how important they would be for realising future implementations of technology in their teaching, (Figure 6.9). The individual feasibility conditions, namely, professional support, technical support, time, teaching facilities, and funding, arose from findings of existing literature related to factors inhibiting or facilitating academics’ acceptance of technology with face-to-face teaching (for example, Bagher, Marek, & Sibbald, 2007; Davis & Fill, 2007; Kistow, 2009; Ocak, 2010; Stewart, Bachman, & Johnson, 2010; Wang, 2009).
## How important are each of the following in enabling the technology use you would like for future offerings of the course:

<table>
<thead>
<tr>
<th>Professional support</th>
<th>Not at all important</th>
<th>Very unimportant</th>
<th>Somewhat unimportant</th>
<th>Neutral</th>
<th>Somewhat important</th>
<th>Very important</th>
<th>Extremely important</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical support</td>
<td>Not at all important</td>
<td>Very unimportant</td>
<td>Somewhat unimportant</td>
<td>Neutral</td>
<td>Somewhat important</td>
<td>Very important</td>
<td>Extremely important</td>
</tr>
<tr>
<td>Time</td>
<td>Not at all important</td>
<td>Very unimportant</td>
<td>Somewhat unimportant</td>
<td>Neutral</td>
<td>Somewhat important</td>
<td>Very important</td>
<td>Extremely important</td>
</tr>
<tr>
<td>Suitable teaching facilities</td>
<td>Not at all important</td>
<td>Very unimportant</td>
<td>Somewhat unimportant</td>
<td>Neutral</td>
<td>Somewhat important</td>
<td>Very important</td>
<td>Extremely important</td>
</tr>
<tr>
<td>Funding</td>
<td>Not at all important</td>
<td>Very unimportant</td>
<td>Somewhat unimportant</td>
<td>Neutral</td>
<td>Somewhat important</td>
<td>Very important</td>
<td>Extremely important</td>
</tr>
</tbody>
</table>

**Figure 6.9** Measure of perceived relative importance of feasibility conditions

### 6.1 Survey distribution

#### 6.1.1 Institutional context

The survey was distributed to academics within Griffith University. Griffith University is a large multi-campus university with over 43,000 students and 1,715 academic staff, spread across five campuses in South East Queensland, Australia. Griffith’s structure includes four academic groups: Science, Environment, Engineering and Technology; Health; Business; and Arts, Education and Law.
Griffith University has adopted an institution-wide approach to blended learning, developing a blended learning strategy alongside an implementation plan (2009-2011). The blended learning strategy rationalises the adoption of blended learning in terms of: improving and enriching the quality of teaching and the learning experience for diverse groups of learners, increased flexibility, attracting high quality students, competitiveness, and cost-effectiveness (Griffith Blended Learning Strategy: 2008- 2010, 2008).

The strategic intent is to support the institutional learning and teaching priorities, as outlined in *Academic Plan 3: Learning for Success*, to ensure that Griffith achieves distinctiveness and excellence in its program offerings and in the quality of the student experience and learning outcomes (Griffith Blended Learning Strategy: 2008- 2010, 2008, p.3).

The institutional implementation plan for blended learning identifies three goals:

- “To systematically embed blended learning approaches in the teaching and learning activities of all programs by 2011, including the provision of support to staff and students;
- To develop a campus environment capable of supporting blended learning;
- To extend the university’s quality assurance framework to support blended learning approaches.” (Griffith University Implementation Plan:2009-2011, 2009, p. 1).

In the interests of promoting institutional uptake of blended learning, Griffith University employs blended learning advisors attached to each of the academic groups. The blended
learning advisors work on an individual basis with academics engaging in blended learning and also provide workshops and other professional development activities. The Griffith Institute of Higher Education along with Information Services provides an additional bank of resources and professional development support to assist academics with blended learning.

### 6.1.2 Distribution method

Quantitative data was collected via an online survey constructed using the Qualtrics survey maker. The target number of respondents was 50. After obtaining ethical clearance (Ethics approval: GU Ref No: ICT/02/11/HREC), the URL was distributed via email to academics within Griffith University. The survey email included a cover letter outlining the research and the voluntary nature of participation as well as other requirements as stipulated by University ethics committee. The initial mail out resulted in a response rate of 23 academics. To increase the number of respondents, the mail out was followed by random door to door distribution of hard copies of the surveys. A total of 53 respondents completed the survey.

### 6.2 Summary

This chapter has described the structure and development of the online survey instrument designed to gather the quantitative data required primarily to develop the theoretical
research model, but also to provide insights into the perceptions academics hold about blended learning, and the nature of their practice. Chapter seven presents the results of statistical analysis of the data collected with the survey instrument.
Chapter Seven: QUANTITATIVE RESULTS

7.1 Introduction
In this chapter, the results of analysing the data collected via the survey instrument, which was described in the previous chapter, are presented. This chapter begins by describing the demographics of survey respondents. To further describe the study context, descriptive statistics are used to determine which tools are used by most academics, and also the tools most used by academics to achieve a particular purpose (efficiency, access to content, understanding concepts, practising skills, sharing ideas and communication). Attention is then directed towards the theoretical model proposed previously in chapter five, and the predictor constructs it is composed of. It is first established that because groups of multiple items are used to measure each of the predictor constructs, item analysis is necessary to determine whether items in each group are a reliable measure of the intended construct. After item analysis has been completed regression modelling is undertaken in order to refine the proposed theoretical model. Following the regression modelling, a comparison (paired t-tests) is made between the means for academics’ perceived current use of blended strategies and the means for intended future use of blended strategies in order to establish whether academics are considering changing the extent of their blended strategy use in the
future. Finally, given that the realisation of academics future plans for the use of blended strategies depends in part upon their perception of feasibility conditions, paired t-tests are undertaken to ascertain which, if any, feasibility conditions the academics considered to be most important.

7.2 Demographics of respondents

Table 7-1 summarises the demographic details of the 53 academics who responded to the survey.

Table 7-1

Demographics of respondents (N=53)

<table>
<thead>
<tr>
<th>Number of participants of each gender:</th>
<th>Male: 26</th>
<th>Female: 27</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of participants in each age group:</td>
<td>&lt; 35 years: 7</td>
<td>35-54 years: 34</td>
</tr>
</tbody>
</table>
### Chapter Seven: Quantitative results

<table>
<thead>
<tr>
<th>Number of years teaching experience in higher education:</th>
<th>Range:</th>
<th>1 - 40 years</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean:</td>
<td>13.31 years</td>
</tr>
<tr>
<td></td>
<td>Standard deviation:</td>
<td>10.54 years</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Respondents with teaching experience outside higher education (e.g. secondary teaching, TAFE teaching):</th>
<th>Count:</th>
<th>30</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Range:</td>
<td>1-25 years</td>
</tr>
<tr>
<td></td>
<td>Mean:</td>
<td>4.63 years</td>
</tr>
<tr>
<td></td>
<td>Standard deviation:</td>
<td>6.07</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of participants in each Academic group:</th>
<th>Science, Environment, Engineering and Technology:</th>
<th>28</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Griffith Health:</td>
<td>13</td>
</tr>
<tr>
<td></td>
<td>Griffith Business:</td>
<td>7</td>
</tr>
<tr>
<td></td>
<td>Arts, Education and Law:</td>
<td>5</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Number of participants teaching classes with class sizes of:</th>
<th>&gt;=100 students</th>
<th>23</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>60-99 students</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>30-59 students</td>
<td>8</td>
</tr>
<tr>
<td></td>
<td>&lt; 30 students</td>
<td>14</td>
</tr>
</tbody>
</table>
From Table 7-1, it is observed that just over half of the respondents were from the Science, Environment, Engineering and Technology academic group, and the sample represented a good balance of gender. The majority of respondents were middle-aged and had, on average, been teaching in higher education for 13.3 years.

7.3 Tools used by most academics and the purpose of use

To describe the teaching context of respondents, it is useful to consider the number of academics using various teaching tools (tools include both face-to-face teaching and technology), as well as the purposes for the tools were being used. To collect data needed to establish which tools were being used by most academics; academics were first asked to nominate a course in which they were making most use of technology. Academics were then able to record in a matrix (Chapter six, section 6.2.2, Figure 6.6) details about technologies used, the extent of use of each technology, and the main purpose served by technology. Data collected by this method was then used to answer two of the research questions as detailed below.

(1) Which teaching tools are being used by most academics?

Simple descriptive statistics were used with data collected reveal whether face-to-face strategies or technology centred strategies are most used by most academics. A count of the number of respondents using each tool listed in the matrix (Chapter six,
section 6.2.2, Figure 6.6) was undertaken, and the results tabulated in order from most to least number of academics. The results are shown in Table 7-2.

Table 7-2

The number of academics using the tools, arranged from most to least

<table>
<thead>
<tr>
<th>Tool</th>
<th>Number of academics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face-to-face lectures</td>
<td>51</td>
</tr>
<tr>
<td>Email</td>
<td>50</td>
</tr>
<tr>
<td>Face-to-face small groups</td>
<td>42</td>
</tr>
<tr>
<td>Lecture capture</td>
<td>32</td>
</tr>
<tr>
<td>You tube</td>
<td>30</td>
</tr>
<tr>
<td>Discussion board</td>
<td>29</td>
</tr>
<tr>
<td>Online assessment</td>
<td>28</td>
</tr>
<tr>
<td>Wikis</td>
<td>18</td>
</tr>
<tr>
<td>Blogs</td>
<td>13</td>
</tr>
<tr>
<td>Interactive clickers</td>
<td>12</td>
</tr>
<tr>
<td>Other technologies</td>
<td>9</td>
</tr>
<tr>
<td>Wimba</td>
<td>7</td>
</tr>
<tr>
<td>Face book</td>
<td>6</td>
</tr>
<tr>
<td>Virtual classroom</td>
<td>6</td>
</tr>
<tr>
<td>Online Peer/Self assessment</td>
<td>6</td>
</tr>
<tr>
<td>Podcasting</td>
<td>5</td>
</tr>
<tr>
<td>L@G Expo tool</td>
<td>5</td>
</tr>
<tr>
<td>Mobile technologies</td>
<td>4</td>
</tr>
<tr>
<td>Video conferencing</td>
<td>3</td>
</tr>
<tr>
<td>Live chat</td>
<td>3</td>
</tr>
<tr>
<td>L@G Group management tool</td>
<td>2</td>
</tr>
<tr>
<td>Twitter</td>
<td>1</td>
</tr>
<tr>
<td>Interactive learning objects</td>
<td>1</td>
</tr>
</tbody>
</table>
Table 7-2 clearly shows that the teaching context is dominated by face-to-face lectures. Face-to-face small groups, although not used by as many academics as lectures were still used by a substantial number of academics. Of the technologies, almost all respondents used email and the majority of academics used lecture capture, You-tube, discussion boards, and online assessment.

(2) For each purpose, which tools are most academics using?

Further insight into the characteristics of the teaching context of respondents is gained by considering the purpose for which tools were used. A tabulation of the tools used and the number of academics who used the tool for each purpose is presented in Table 7-3, with each the highest count for each purpose shown in bold. For efficiency, access to content, and understanding concepts the highest count is for face-to-face lectures. For practising skills and sharing ideas the tool with the highest count is face-to-face small groups. For communication the tool with the highest count is email.
### Table 7-3

The count of academics using a tool for a particular purpose

<table>
<thead>
<tr>
<th>Tools</th>
<th>Efficiency Count</th>
<th>Access to content Count</th>
<th>Understanding concepts Count</th>
<th>Practising Skills Count</th>
<th>Sharing Ideas Count</th>
<th>Communication Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Face-to-face lectures</td>
<td>32</td>
<td>28</td>
<td>45</td>
<td>17</td>
<td>30</td>
<td>34</td>
</tr>
<tr>
<td>Face-to-face small groups</td>
<td>14</td>
<td>12</td>
<td>30</td>
<td>26</td>
<td>31</td>
<td>27</td>
</tr>
<tr>
<td>email</td>
<td>22</td>
<td>21</td>
<td>7</td>
<td>2</td>
<td>11</td>
<td>43</td>
</tr>
<tr>
<td>Lecture capture</td>
<td>20</td>
<td>23</td>
<td>14</td>
<td>3</td>
<td>7</td>
<td>19</td>
</tr>
<tr>
<td>Discussion board</td>
<td>9</td>
<td>12</td>
<td>15</td>
<td>6</td>
<td>18</td>
<td>21</td>
</tr>
<tr>
<td>Online assessment</td>
<td>24</td>
<td>15</td>
<td>9</td>
<td>10</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>YouTube</td>
<td>4</td>
<td>9</td>
<td>25</td>
<td>3</td>
<td>13</td>
<td>5</td>
</tr>
<tr>
<td>Wikis</td>
<td>5</td>
<td>7</td>
<td>6</td>
<td>6</td>
<td>13</td>
<td>11</td>
</tr>
<tr>
<td>Group Management tool</td>
<td>17</td>
<td>8</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>13</td>
</tr>
</tbody>
</table>
## Chapter Seven: Quantitative results

<table>
<thead>
<tr>
<th>Tools</th>
<th>Efficiency</th>
<th>Access to content</th>
<th>Understanding concepts</th>
<th>Practising Skills</th>
<th>Sharing Ideas</th>
<th>Communication</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Count</td>
<td>Count</td>
<td>Count</td>
<td>Count</td>
<td>count</td>
<td>count</td>
</tr>
<tr>
<td>Blogs</td>
<td>4</td>
<td>5</td>
<td>6</td>
<td>1</td>
<td>8</td>
<td>9</td>
</tr>
<tr>
<td>Other</td>
<td>6</td>
<td>5</td>
<td>8</td>
<td>4</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Clickers</td>
<td>4</td>
<td>4</td>
<td>10</td>
<td>3</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Wimba</td>
<td>3</td>
<td>3</td>
<td>6</td>
<td>4</td>
<td>5</td>
<td>6</td>
</tr>
<tr>
<td>Virtual classroom</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>Interactive learning objects</td>
<td>4</td>
<td>3</td>
<td>6</td>
<td>6</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Peer</td>
<td>3</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Podcasting</td>
<td>3</td>
<td>3</td>
<td>3</td>
<td>1</td>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>Video conference</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>chat</td>
<td>2</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Face book</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Mobile technology</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>2</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Expo</td>
<td>1</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>3</td>
</tr>
<tr>
<td>Twitter</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
</tr>
</tbody>
</table>
7.4 Predicting current and future use of blended strategies

Recall that one of the main objectives of the present study was to develop a model which predicts the likelihood of academics using blended strategies in their current practice and the likelihood that they intend to use blended strategies in the future. Towards achieving this objective a research model predicting current and future use of blended strategies was proposed in chapter five. In this section regression is used to refine the research model. However, before proceeding with regression it is important to recall that the measure of six of the predictor constructs in the research model (normative influences, perceived ease of use, perceived usefulness, perceived feasibility, self-efficacy and teaching approach) were designed by the researcher for the present study, and data was obtained using the sets of Likert scale item given in chapter six, Table 6-4 (p.138). Given that the items were researcher generated it is necessary to confirm instrument validity. Since sets of several items, rather than single items, were used as measures of individual constructs, before applying regression it is necessary to confirm that each item in each of the item sets is valid; that is, that each item in the set a good measure of the construct it intends to measure. According to Colten and Covert (2007, p. 92) the “primary quantitative approach” for demonstrating item validity is item analysis (factor analysis is an alternative approach). Item analysis will confirm uni-dimensionality and reliability of items in each group on the basis of the collected data (De Vaus, 2002). That is, item analysis confirms if item, in each of the sets, is indeed a reliable measure of the intended construct. Thus, item analysis is used to demonstrate instrument validity in the present study.
7.4.1 Item analysis of the construct item groups

The two principal values of interest when conducting an item analysis are Cronbach’s alpha and the corrected item-total correlation. Cronbach’s alpha is a measure of internal consistency, that is, Cronbach’s alpha is a check to see if all the items that intend to measure the same construct produce a similar score. Evidently, if any of the items in the group produce a score that is radically different than other items, then the data for that item should be excluded from further analysis as it most likely not a reliable measure of the construct. Hair, Black, Babin and Anderson (2010) recommends that the lower limit value of Cronbach’s alpha is 0.6. The item-total correlation checks if any item is inconsistent with averaged behaviour of other items in the group. The minimally accepted value of the item-total correlation is 0.3 (De Vaus, 2002; Hair et.al, 2010). The results of the item analysis for the items measuring the constructs to predict academics’ use of blended strategies are presented in Table 7-4.

Table 7-4

Results of item analysis

<table>
<thead>
<tr>
<th>Construct</th>
<th>Cronbach’s alpha</th>
<th>Construct items</th>
<th>Corrected Item-total correlations</th>
<th>Cronbach’s alpha if item deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normative influences</td>
<td>0.620</td>
<td>NORM1</td>
<td>.480</td>
<td>.484</td>
</tr>
<tr>
<td>(Norm)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>NORM2</td>
<td>.421</td>
<td>.534</td>
</tr>
<tr>
<td>Construct</td>
<td>Cronbach’s alpha</td>
<td>Construct items</td>
<td>Corrected Item-total correlations</td>
<td>Cronbach’s alpha if item deleted</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>------------------</td>
<td>-----------------</td>
<td>-----------------------------------</td>
<td>----------------------------------</td>
</tr>
<tr>
<td>Perceived ease of use (PEOU)</td>
<td>0.784</td>
<td>PEOU1</td>
<td>0.630</td>
<td>0.718</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PEOU2</td>
<td>0.676</td>
<td>0.648</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PEOU3</td>
<td>0.608</td>
<td>0.746</td>
</tr>
<tr>
<td>Perceived usefulness (PU)</td>
<td>0.866</td>
<td>PU1</td>
<td>0.571</td>
<td>0.877</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PU2</td>
<td>0.915</td>
<td>0.778</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PU3</td>
<td>0.640</td>
<td>0.850</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PU4</td>
<td>0.745</td>
<td>0.834</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PU5</td>
<td>0.656</td>
<td>0.847</td>
</tr>
<tr>
<td>Perceived Feasibility (PercFeas)</td>
<td>0.752</td>
<td>PercFeas1</td>
<td>0.548</td>
<td>0.704</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PercFeas2</td>
<td>0.510</td>
<td>0.715</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PercFeas3</td>
<td>0.554</td>
<td>0.707</td>
</tr>
<tr>
<td></td>
<td></td>
<td>PercFeas4</td>
<td>0.629</td>
<td>0.647</td>
</tr>
<tr>
<td>Self – efficacy (SE)</td>
<td>0.816</td>
<td>EFF1</td>
<td>0.369</td>
<td>0.849</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EFF2</td>
<td>0.551</td>
<td>0.796</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EFF3</td>
<td>0.310</td>
<td>0.825</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EFF4</td>
<td>0.828</td>
<td>0.736</td>
</tr>
<tr>
<td></td>
<td></td>
<td>EFF5</td>
<td>0.750</td>
<td>0.758</td>
</tr>
</tbody>
</table>
An examination of the Cronbach’s alpha values in Table 7-4 show that values for all constructs meet the base value of 0.6 as recommended by Hair et. al (2010).

Inspection of the corrected item-total correlation values in Table 7-4 for each of the items in the constructs reveals the normative construct item, NORM 3 ("industry expects students will study courses that use both technology ad face-to-face teaching") has a value of 0.252. This value is less than the minimally acceptable 0.3 (De Vaus, 2002; Hair et.al, 2010) and must therefore eliminated before proceeding with further data analysis. Further supporting the decision to remove NORM3 from the normative influences item group is the observation that removal of NORM 3 will result in an increased value of Cronbach’s alpha from 0.620 to 0.644. Recalling that the minimum base value of Cronbach’s alpha is 0.6 the

<table>
<thead>
<tr>
<th>Construct</th>
<th>Cronbach’s alpha</th>
<th>Corrected Item-total correlations</th>
<th>Cronbach’s alpha if item deleted</th>
</tr>
</thead>
<tbody>
<tr>
<td>EFF6</td>
<td>.722</td>
<td>.762</td>
<td></td>
</tr>
<tr>
<td>EFF7</td>
<td>.513</td>
<td>.800</td>
<td></td>
</tr>
<tr>
<td>Teaching approach (TA)</td>
<td>0.701</td>
<td>TA1 .557</td>
<td>.597</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TA2 .645</td>
<td>.560</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TA3 .431</td>
<td>.679</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TA4 .404</td>
<td>.702</td>
</tr>
</tbody>
</table>

---

*PhD thesis by Geraldine Torrisi*
increase in its value due to removal of the Norm3 item improves the reliability of the remaining items as measures of the normative influences construct.

7.4.2 Refining the research model

Now that item analysis for the predictive constructs is complete it is possible to proceed with regression in order to refine the research model presented in chapter five and thus identify the constructs which predict academics’ current blended practices and their intended future blended practice.

Consider first academics’ current blended practice. The research question to be addressed is:

Research question:

What factors increase the likelihood of an academic using blended teaching strategy in their current practice?

The research model presented in chapter five embodied seven potential predictors of current blended practice namely, normative influences, perceived ease of use, perceived usefulness, perceived feasibility, prior teaching experience, self-efficacy and teaching approach. To refine the research model regression modelling was undertaken using the R statistical package (http://cran.r-project.org/bin/windows/base/old/2.9.2/). To arrive at the final model, there was progressive elimination of predictors when the value of the estimated coefficient was less than the value of the standard error (Bresnan & Ford, 2010). The analysis showed that all interactions, except for gender interacting with perceived
usefulness and gender interacting with efficacy, could be eliminated because the magnitude of the estimated coefficients were less than the standard error. Similarly, normative values, teaching experience outside of higher education and teaching approach were also eliminated. The resultant model is presented in the Table 7-5.

Table 7-5

Model parameters for current use of blended strategies

| Fixed Effects                                      | Estimate coefficient | Std. Error | t value | Pr(>|t|) |
|---------------------------------------------------|----------------------|------------|---------|----------|
| (Intercept)                                       | -5.50264             | 7.97975    | -0.690  | 0.4940   |
| Gender = female                                   | -5.40926             | 10.30914   | -0.525  | 0.6024   |
| Perceived usefulness                              | 2.57841              | 1.04254    | 2.473   | 0.0172 * |
| Teaching experience in higher education           | -0.15763             | 0.07296    | -2.160  | 0.0361 * |
| self-efficacy                                     | 1.22298              | 1.43084    | 0.855   | 0.3972   |
| Perceived feasibility                             | -1.35281             | 0.97083    | -1.393  | 0.1703   |
| self-efficacy : Gender = female                   | 4.82572              | 1.80222    | 2.678   | 0.0103 * |
| Perceived usefulness : Gender = female            | -3.36219             | 1.55028    | -2.169  | 0.0354 * |

Significance codes: 0 *** 0.001 ** 0.01 * 0.05 . 0.1 ’ ’ 1
In Table 7-5, positive estimate coefficients (unstandardized\(^1\)) indicate a favouring of the use of blended strategies. The positive estimate coefficient for perceived usefulness indicates that a high score for perceived usefulness predisposes academics towards using blended strategies in their current practice. In contrast, teaching experience in higher education has a negative coefficient, so that those academics who have been teaching in higher education for longer tend to have a lower score for current use of blended strategies. Interestingly, there are also two significant interactions with gender. Firstly, blended strategy use by female academics is influenced by self-efficacy. As indicated by the positive coefficient of the self-efficacy : gender interaction, females with high self-efficacy with regard to the use of blended strategies, are more likely to use blended strategies in their current practice. For male academics, on the other hand, self-efficacy is not important. Secondly, although there is a main positive effect of perceived usefulness, the perceived usefulness : gender interaction has a negative coefficient, and denotes that perceived usefulness is not as important for female academics as a determinant of blended strategy, as it is for male academics.

---

1. The reason most people would want standardized coefficients is because they have read that, if coefficients are standardized, their effect sizes can be compared. John Fox (R help archives, February 7, 2007) cautions that it is not really appropriate to try to compare the standardized coefficients of different variables in a regression, because standardizing them does not guarantee that they are really of the same magnitude. Most R statisticians stay away from standardized coefficients.”(Larson-Hall, p.89)
Having established the factors which predict academics’ use of blended strategies in their current practice, the factors which predict academics future use of blended strategies are now considered by addressing the next research question:

Research question:

What factors predispose an academic to the intent of using blended teaching strategies in their future practice?

Recall the potential predictors of intended future use of blended strategies in the research model proposed in chapter five (Figure 5.197) were: current blended practice, normative influences, perceived ease of use, perceived usefulness, perceived feasibility, prior teaching experience, self-efficacy and teaching approach. Analysis to develop the proposed research model and so identify predictors of intended future use of blended strategies followed a similar procedure to that used for identifying predictors of current usage. The resulting model parameters are shown in Table 7-6.
Table 7-6

Model parameters for intended future use of blended strategies

| Fixed effects                      | Estimate coefficient | Std.Error | t value | Pr(>|t|) |
|------------------------------------|----------------------|-----------|---------|----------|
| (Intercept)                        | -0.71953             | 1.99170   | -0.361  | 0.7198   |
| Gender = female                    | 2.55681              | 2.83239   | 0.903   | 0.3721   |
| Perceived usefulness               | 0.81384              | 0.17064   | 4.769   | 0.0000 ***|
| Current use score                  | 0.09387              | 0.02508   | 3.742   | 0.0006 ***|
| Perceived feasibility              | -0.86361             | 0.27757   | -3.111  | 0.0034 **|
| Normative influences               | 0.42743              | 0.23285   | 1.836   | 0.0739 . |
| Teaching approach                  | 0.04828              | 0.19796   | 0.244   | 0.8086   |
| Perceived ease of use              | 0.14647              | 0.14591   | 1.004   | 0.3215   |
| Number course offerings            | 0.23738              | 0.20866   | 1.138   | 0.2620   |
| Self-efficacy                      | 0.25206              | 0.24958   | 1.010   | 0.3186   |
| Teaching approach: gender = female | -0.72585             | 0.48000   | -1.512  | 0.1383   |
| Perceived ease of use : gender = female | -0.37108       | 0.25728   | -1.442  | 0.1570   |
| Perceived feasibility : gender = female | 0.67729         | 0.31988   | 2.117   | 0.0405*  |

Significance codes: 0 *** 0.001 ** 0.01 * 0.05 . 0.1 ’ ’ 1

As shown by the estimate coefficients in Table 7-6, there is a main positive effect of perceived usefulness and current use on academics’ use of blended strategies in the future. Perceived usefulness, which was a significant predictor of current blended practice, is also
a highly significant predictor of the future use of blended strategies. The positive estimate coefficient for perceived usefulness, indicates that those academics who perceive the technology with face-to-face teaching as useful are predisposed to the intention to use blended strategies in the future. Table 7-6 also shows a positive coefficient for current use of blended strategies as a significant predictor of future use of blended strategies. Thus, those academics currently using blended strategies are more likely to use blended strategies in the future.

Now consider perceived feasibility. Note that the coefficient is found to be negative. This suggests that those academics who perceive blended strategies to be more feasible will be less likely to use blended strategies – clearly this seems a counter-intuitive result. There are two things that can be noted about this. First note that perceived feasibility interacts with gender and the perceived feasibility : gender = female interaction has a positive coefficient. In other words, female academics with high feasibility scores are more likely to hold the intent of using blended strategies in the future. Second, perceived usefulness is more important for male academics’ for current use of blended strategies. Thus, it may be that if male academics do not consider blended strategies to be useful they will not be inclined to use blended strategies even though they perceive the use of blended strategies to be feasible. This emphasis on feasibility for females but usefulness for males warrants future investigation.
Turning attention to normative influences, it is noted that normative influences are not significant predictors but trending towards having a positive influence on the intent to use blended strategies in the future.

7.5 Extent of use of blended strategies in the future

It has been shown that a predictor of future use of blended strategies is current use. It is therefore appropriate to consider if there exists a significant difference between academics’ perceived current use of blended strategies, and their intended future use of blended strategies. A paired samples t-test was thus conducted to address the following research question:

Research question:

*Do academics wish to change the extent of their use of blended strategies in the future?*

Measures of academics’ perception of their current blended practice, and their intentions about their future use of blended strategies, was obtained by asking respondents to indicate the extent to which they were currently using, and would like to use in the future, technology with face-to-face to achieve specific practice objectives as described in Chapter six, section 6.2.3 (p. 146). Since the same practice objectives and scales were used for both current and future intended use of blended strategies, comparison of perceived current and future use of blended strategies was made possible.

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The comparison of perceived current use and future use of blended strategies was achieved by using a paired samples t-test. A paired samples t-test compares the means of two variables. It allows for computation of the difference between the two variables in each case to test if the average difference is significantly different from zero. In this study, the mean ratings academics gave to each pair of current and future intention purpose objectives were compared to establish if academics intended to increase their use of blended strategies in the future. The results of the paired samples t-test are shown in Table 7-7.

Table 7-7

*Results of paired samples t-test for perceived current and intended future practice objectives*

<table>
<thead>
<tr>
<th>Perceived current practice</th>
<th>Mean</th>
<th>Intended future practice</th>
<th>Mean</th>
<th>Sig.(2-tailed) *</th>
</tr>
</thead>
<tbody>
<tr>
<td>Address areas in which students experience difficulty</td>
<td>4.32</td>
<td>Address areas in which students experience difficulty</td>
<td>5.38</td>
<td>.000</td>
</tr>
<tr>
<td>Achieve course objectives</td>
<td>5.21</td>
<td>Achieve course objectives</td>
<td>5.53</td>
<td>.034</td>
</tr>
<tr>
<td>Present ideas in different ways</td>
<td>4.89</td>
<td>Present ideas in different ways</td>
<td>5.62</td>
<td>.000</td>
</tr>
<tr>
<td>provide learning activities</td>
<td>4.98</td>
<td>provide learning activities</td>
<td>5.57</td>
<td>.000</td>
</tr>
</tbody>
</table>

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From Table 7-7, it can be seen there is a statistically significant difference between the means for all current practice objectives and the corresponding means for future usage objectives. In other words, generally the respondents wished to change their extent of blended strategy use in the future towards more blended approaches.

**7.6 Important feasibility conditions for realisation of future plans.**

Although the paired t-tests described in the previous section showed that academics generally intend to increase their use of blended strategies in the future, it is important to recognise that realising future intentions are dependent, in part, on feasibility conditions. It is possible that academics may consider some feasibility conditions to be of more importance than others, and thus the following research question is addressed:
Research question:

*Which feasibility condition(s), do academics perceive to be most important to the realisation of their future plans to implement blended teaching strategies?*

The survey required academics to complete a seven-point Likert scale to rate the importance of each of the feasibility conditions: professional support, technical support, time, teaching facilities, and funding, in terms of realisation of future intentions for blended practices. On the scale, a rating of 1 indicated the condition was not all important and a rating of 7 indicated extremely important. The means for feasibility conditions are shown in Table 7-8.

Table 7-8

*Feasibility condition means*

<table>
<thead>
<tr>
<th>Feasibility condition</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Professional support</td>
<td>5.94</td>
</tr>
<tr>
<td>Technical support</td>
<td>6.30</td>
</tr>
<tr>
<td>Time</td>
<td>6.43</td>
</tr>
<tr>
<td>Teaching facilities</td>
<td>6.32</td>
</tr>
<tr>
<td>Funding</td>
<td>5.79</td>
</tr>
</tbody>
</table>
To ascertain whether there is any statistically significant difference between each of the feasibility conditions, a one-way analysis of variance (ANOVA) was first performed using the software, Statistical Package for Social Sciences (SPSS) Version 18. The results of the one way ANOVA are shown in Table 7-9.

Table 7-9

*Results of one way ANOVA on feasibility conditions*

<table>
<thead>
<tr>
<th></th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>16.060</td>
<td>4</td>
<td>4.015</td>
<td>3.31</td>
<td>.011</td>
</tr>
<tr>
<td>Within Groups</td>
<td>315.283</td>
<td>260</td>
<td>1.213</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>331.343</td>
<td>264</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Significant at 0.05 level

From Table 7-9, it can be seen that there is a statistically significant difference between feasibility conditions with (F(4,260) = 3.31, p = .011). Levene’s Test of Homogeneity of Variance indicated that the assumption of homogeneity of variances is met and so Tukey's HSD (Honesty Significant Difference) test could then be performed. Tukey’s HSD is a multiple comparison procedure and was used to determine which of the means of the feasibility conditions were significantly different from each other. The results of Tukey’s HSD are shown in Table 7-10.
### Table 7-10

**Tukey’s HSD results**

<table>
<thead>
<tr>
<th>(I) Factor</th>
<th>(J) Factor</th>
<th>Mean Difference</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Professional Support</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technical Support</td>
<td>-.358</td>
<td>.451</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>-.491</td>
<td>.150</td>
<td></td>
</tr>
<tr>
<td>Teaching facilities</td>
<td>-.377</td>
<td>.397</td>
<td></td>
</tr>
<tr>
<td>Funding</td>
<td>.151</td>
<td>.955</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Technical Support</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional Support</td>
<td>.358</td>
<td>.451</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>-.132</td>
<td>.972</td>
<td></td>
</tr>
<tr>
<td>Teaching facilities</td>
<td>-.019</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>Funding</td>
<td>.509</td>
<td>.124</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Time</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional Support</td>
<td>.491</td>
<td>.150</td>
<td></td>
</tr>
<tr>
<td>Technical Support</td>
<td>.132</td>
<td>.972</td>
<td></td>
</tr>
<tr>
<td>Teaching facilities</td>
<td>.113</td>
<td>.984</td>
<td></td>
</tr>
<tr>
<td>Funding</td>
<td>.642*</td>
<td>.025*</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Teaching facilities</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional Support</td>
<td>.377</td>
<td>.397</td>
<td></td>
</tr>
<tr>
<td>Technical Support</td>
<td>.019</td>
<td>1.000</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>-.113</td>
<td>.984</td>
<td></td>
</tr>
<tr>
<td>Funding</td>
<td>.528</td>
<td>.101</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Funding</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Professional Support</td>
<td>-.151</td>
<td>.955</td>
<td></td>
</tr>
<tr>
<td>Technical Support</td>
<td>-.509</td>
<td>.124</td>
<td></td>
</tr>
<tr>
<td>Time</td>
<td>-.642*</td>
<td>.025*</td>
<td></td>
</tr>
<tr>
<td>Teaching facilities</td>
<td>-.528</td>
<td>.101</td>
<td></td>
</tr>
</tbody>
</table>

* significant at 0.05 level

---

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An inspection of Table 7-10 reveals that there is a statistically significant difference (0.642) between the means for Time (6.43) and Funding (5.79) factors. It is hence reasonable to conclude Time is a more important factor than funding for the realisation of future use of blended strategy implementations.

7.7 In summary
Analysis of the quantitative data reveals a teaching context dominated by face-to-face strategies as the tool of choice, especially for the purpose of understanding concepts. However, there is evidence of increasing interest in the use blended strategies.
The quantitative results of the relationship between variables in the research model (Table 7-5 and Table 7-6), with coefficients and p-values is shown in Figure 7.1

**Figure 7.1 The relationship between constructs in the research model, showing coefficients and p-values, as revealed by regression modelling**

The model parameters (Table 7-5 and Table 7-6) showed perceived usefulness and teaching experience in higher education to be two of significant predictors of academics’ use of blended practices in their current teaching practice. Those academics currently using blended strategies are likely to have a strong belief in the perceived usefulness of blended strategies. A greater the number of years teaching experience in higher education tends to
decrease the likelihood of using blended strategies in current practice. It was very interesting to find gender differences among the predictor constructs: If the academics are female, the higher their self-efficacy the more likely they are to use blended strategies; perceived usefulness as predictor of current blended practices is more important to male academics than it is to female academics.

The regression model also identified current practices and perceived usefulness as significant predictors of the intent to use blended strategies in the future. Thus, those academics already using blended strategies in their current practices are likely to hold the intent of using blended strategies in the future will tend to be. Similarly, academics with high perceived usefulness cores will be more likely to intend to use blended strategies in the future. Again, an interesting gender difference was uncovered. If the academics are female then those with higher perceived feasibility scores are more likely to intend to use blended strategies in the future.

Returning to the hypotheses stated in chapter five, the results of the empirical test of hypotheses can now be summarised as shown in table 7-11
Table 7-11

Results of empirical test of hypotheses

<table>
<thead>
<tr>
<th>Hypothesis</th>
<th>Finding for current use of blended strategies</th>
<th>Finding for future use of blended strategies</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>H1: The academic’s perceived normative influences in using technology with face-to-face teaching is positively and significantly associated with their intentions regarding current and future use of blended strategies.</em></td>
<td>Perceived normative influence is not a significant predictor of current blended strategy use.</td>
<td>Perceived normative influence is not a significant predictor of future blended strategy use, but it is trending towards significance.</td>
</tr>
<tr>
<td><em>H2: The academic’s perceived ease of use in using technology with face-to-face teaching is positively and significantly associated with their intentions regarding current and future use of blended strategies.</em></td>
<td>Perceived ease of use is not a significant predictor of current blended strategy use.</td>
<td>Perceived ease of use is not a significant predictor of future blended strategy use.</td>
</tr>
<tr>
<td><em>H3: The academic’s perceived usefulness in using technology with face-to-face teaching is positively and significantly associated with their intentions regarding current and future use of blended strategies.</em></td>
<td>Perceived usefulness is a significant, positive, predictor of current blended strategy use, but a significant gender : perceived usefulness interaction shows that the positive effect is only true for males.</td>
<td>Perceived usefulness is a significant, positive, predictor of future blended strategy use.</td>
</tr>
<tr>
<td><em>H4: The academic’s perceived feasibility in using technology with face-to-face teaching is positively and significantly associated with their intentions regarding current and future use of blended strategies.</em></td>
<td>Perceived feasibility is not a significant predictor of current blended strategy use.</td>
<td>A significant gender : perceived feasibility interaction shows that for females, but not males, perceived feasibility is a positive predictor of future blended strategy usage.</td>
</tr>
<tr>
<td>Hypothesis</td>
<td>Finding for current use of blended strategies</td>
<td>Finding for future use of blended strategies</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------</td>
<td>-----------------------------------------------</td>
<td>---------------------------------------------</td>
</tr>
<tr>
<td><strong>H5a:</strong> The academic's prior teaching experience is positively and significantly associated with their intentions regarding current and future use of blended strategies.</td>
<td>Teaching experience is a significant, negative, predictor of current blended strategy use.</td>
<td>Teaching experience is not a significant predictor of future blended strategy use.</td>
</tr>
<tr>
<td><strong>H5b:</strong> The academic's current blended practice is positively and significantly associated with their intentions regarding future use of blended strategies.</td>
<td>Current use of blended practice is a significant, positive, predictor of future blended strategy use.</td>
<td></td>
</tr>
<tr>
<td><strong>H6:</strong> The academic's perceived self-efficacy is positively and significantly associated with their intentions regarding current and future use of blended strategies.</td>
<td>A significant gender : perceived self-efficacy interaction shows that for females, but not males, perceived self-efficacy is a positive predictor of current blended strategy usage.</td>
<td>Perceived self-efficacy is not a significant predictor of future blended strategy use.</td>
</tr>
<tr>
<td><strong>H7:</strong> The academic's constructivist teaching approach is positively and significantly associated with their intentions regarding current and future use of blended strategies.</td>
<td>A constructivist teaching approach is not a significant predictor of current blended strategy use.</td>
<td>A constructivist teaching approach is not a significant predictor of future blended strategy use.</td>
</tr>
</tbody>
</table>

A more complete understanding of the quantitative findings is provided in the next chapter by discussing quantitative data in the light of qualitative data obtained from interviews with a subset of survey respondents.
Chapter Eight: A QUALITATIVE PERSPECTIVE

8.1 Introduction

The purpose of the qualitative data in the present study is to validate, and clarify the meaning of, quantitative results. According to King (1994), interviews are most appropriate to the purpose of validation and clarification of quantitative results. Thus, the aim of this chapter is to increase the depth of understanding of the quantitative findings, uncovered in chapter seven, through a discussion of interview data. Prior to the detailed discussion of interview data, a description of the sampling and the interview method is given.

8.2 Sampling

Respondents to the online survey were required to indicate their availability for follow-up interviews by choosing a “Yes” or “no thanks. Those respondents who chose “Yes” were asked to provide preferred contact details. Twenty-one of the fifty-three respondents indicated agreement to an interview on the survey. From the pool of twenty-one respondents agreeing to an interview, eight were chosen. In accordance with Creswell (2009, p. 179), in that the eight interview participants were purposefully selected to best assist understanding of academics’ current blended practices and the factors which
influence those practices. Since the purpose of the interviews was to enrich the understanding of the quantitative findings (Hesse-Biber, 2010), interview participants were chosen on the basis of the constructs found to be significant as a result of regression modelling in the previous chapter. The decision of which respondents to select for the interviews was thus made by identifying those respondents whose scores for the significant predictor constructs lay near to the ends of the distribution. Such “outlier sampling” allows for comparability across cases and yields rich information (Teddlie & Yu, 2007, p. 81).

The mean scores for the significant constructs, for each of the eight interview participants, are shown in Table 8-1
Table 8-1

The mean score for each construct for each interview participant

<table>
<thead>
<tr>
<th>Participant</th>
<th>Gender</th>
<th>Perceived Usefulness (PU)</th>
<th>Perceived Feasibility (PercFeas)</th>
<th>Self-efficacy (Eff)</th>
<th>Current use score (CUscore)</th>
<th>Future use score (FUscore)</th>
<th>Perceived current use score (PerCUscore)</th>
<th>Years teaching experience in higher education (TchExpHiEd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>P04</td>
<td>F</td>
<td>6.0</td>
<td>6.3</td>
<td>6.4</td>
<td>10</td>
<td>6.4</td>
<td>6.3</td>
<td>12</td>
</tr>
<tr>
<td>P06</td>
<td>M</td>
<td>4.6</td>
<td>4.0</td>
<td>6.4</td>
<td>2.0</td>
<td>5.1</td>
<td>4.1</td>
<td>28</td>
</tr>
<tr>
<td>P13</td>
<td>M</td>
<td>5.2</td>
<td>5.5</td>
<td>5.7</td>
<td>0.0</td>
<td>3.7</td>
<td>2.9</td>
<td>2</td>
</tr>
<tr>
<td>P18</td>
<td>F</td>
<td>6.0</td>
<td>3.7</td>
<td>4.6</td>
<td>4.0</td>
<td>5.3</td>
<td>4.4</td>
<td>10</td>
</tr>
<tr>
<td>P22</td>
<td>M</td>
<td>4.8</td>
<td>4.0</td>
<td>6.4</td>
<td>0.0</td>
<td>5.2</td>
<td>3.7</td>
<td>38</td>
</tr>
<tr>
<td>P25</td>
<td>F</td>
<td>7.0</td>
<td>5.5</td>
<td>6.4</td>
<td>14</td>
<td>7.0</td>
<td>6.7</td>
<td>6</td>
</tr>
<tr>
<td>P31</td>
<td>F</td>
<td>7.0</td>
<td>6.5</td>
<td>6.7</td>
<td>20</td>
<td>6.1</td>
<td>5.7</td>
<td>11</td>
</tr>
<tr>
<td>P45</td>
<td>F</td>
<td>6.4</td>
<td>2.3</td>
<td>3.3</td>
<td>2.0</td>
<td>7.0</td>
<td>3.0</td>
<td>1</td>
</tr>
</tbody>
</table>
For the purpose of comparing the values in Table 8-1, the means for each construct, taken over all fifty-three of the study participants are shown in Table 8-2.

Table 8-2

*Construct means across all study participants (N = 53)*

<table>
<thead>
<tr>
<th>Construct</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Perceived usefulness</td>
<td>5.58</td>
</tr>
<tr>
<td>Perceived feasibility</td>
<td>4.81</td>
</tr>
<tr>
<td>Self-efficacy</td>
<td>5.40</td>
</tr>
<tr>
<td>Current use score</td>
<td>7.20</td>
</tr>
<tr>
<td>Future use score</td>
<td>5.42</td>
</tr>
<tr>
<td>Perceived current use score</td>
<td>4.61</td>
</tr>
<tr>
<td>Number of years teaching experience in higher education</td>
<td>13.31 years</td>
</tr>
</tbody>
</table>

8.3 **Conducting the interviews**

The interviews were guided by open-ended questions, prepared prior to the interview, and most importantly, based on the survey responses for each participant. For example, participants who had scored perceived usefulness highly were asked: “*Not all respondents felt technology was very useful for teaching. Could you tell me more about how you find technology useful in your teaching?*”. Guiding questions such as this served to keep focus on information of interest, and provided an anchor for prompts and probing questions aimed at explaining the quantitative responses to the survey. To enhance the quality of the interviews, careful attention was given to the avoiding jargon and complex, biased, or
leading questions (Robson, 2002). The interview was recorded and notes taken using a Livescribe Pen, which was capable of recording both written notes and linked audio. The interviews were later transcribed.

8.4 Discussion of interview data

Before discussing the qualitative data, in relation to the predictive model (Table 7-5; Table 7-6), it is worth noting that, upon conclusion of the interviews, there remained three memorable impressions that contribute somewhat to the qualitative perspective of quantitative findings.

Firstly, regardless of their current use of technology, all academics interviewed greatly valued face-to-face interaction as an effective method of teaching, mainly for the spontaneous and reactive interactions it makes possible. This was not surprising given the dominance of face-to-face approaches found in quantitative data but it was remarkable how strongly this was expressed in interviews. Comments [1], [2] and [3] below are typical of statements that were made by interview participants in regard to the value of face-to-face teaching.

[1] “A lot of these online things can be useful but they really don’t replace the old-fashioned face-to-face” (P18);

[2] “There’s nothing intrinsic about the technology that’s going to lead students to interact...face-to-face is more appropriate for this” (P22);
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[3] “This subject can’t be taught any other way – just have to talk the talk” (P13).

A second memorable impression was that the implementation of blended strategies was perceived as requiring a significant investment of time and effort, and most definitely not considered an easy task, as evidenced by comments such as [4] and [5]

[4] “Does it [blended learning] require effort? YES!” (P06);

[5] “It took me a lot effort to research them [clickers], to get money to get them and work out how to use them. It’s not trivial” (P18).

The third memorable impression was that participants were clearly highly motivated to improve both their teaching, and the learning experience of their students.

[6] “I’m thinking of ways I can improve my teaching” (P22);

[7] “My teaching philosophy is engagement, engagement, engagement...I’ll do what’s necessary to do that” (P25);

[8] “The whole thing is about everyone learns differently so you’ve got more options” (P45).

These three broad impressions provide a backdrop to the following detailed discussion of the qualitative data as it relates to the quantitative findings.
8.4.1 Current usage

It is useful to review significant predictors of current blended practices presented in chapter seven (Table 7-5) prior to discussing the relevant qualitative data. It was found that academics with high perceived usefulness scores are more likely to use blended strategies in their current practice. In contrast, the greater the number of years teaching experience the less likely it is that academics are using blended strategies in their current practice. Two gender differences were identified. Firstly, female academics are more likely to be using blended strategies in current practice if they score highly on self-efficacy. Conversely, female academics with low self-efficacy scores are not likely to be using blended strategies in current practice. Self-efficacy was found to be unimportant for male academics. Secondly, the interaction of perceived usefulness with gender yielded a negative coefficient for gender = female. Thus, perceived usefulness, as predictor of current practice, is less important to female academics than it is for male academics. These findings will now be discussed in the light of interview data.

8.4.1.1 Perceived usefulness

In the light of qualitative data, a noteworthy distinction emerged between perceived usefulness for the purpose of teaching and learning versus perceived usefulness in terms of administrative efficiency or ease of access. Throughout the interviews, it became extremely clear that it is only when the use of technology with face-to-face teaching is seen as useful for improving teaching and learning that the academic will be more likely to use blended
strategies. Furthermore, the extent to which the academics believe the use of technology is useful shapes how it is used and how they would like to use it in the future. It would be expected that those academics who do not perceive technology with face-to-face teaching as useful will be using little or no blended strategies. This seemed to be the case among those interviewees with low perceived usefulness scores. For academics with low perceived usefulness score, the usefulness of adding technology to their teaching was seen in terms of administrative efficiency or for reasons of access to content rather than for enhancing understanding of content. Consider comments [9] through to [11].

[9] “It’s [technology] nothing more than an administrative device which enables me to get things out more easily to students” (P22, Male, PU=4.8, CUScore=0);

[10] “My main motivation for using it [technology] is that we have a large cohort of students and we’re not easily accessible to them. We also used a team place to ... make it easy for tutors to get familiar with content...It (technology) is pretty useful, at least that way I don’t need to use the board as much and I use the internal communication thing on Blackboard” (P13, Male, PU=5, CUScore=0).

[11] “Recording lecture audio as podcasts is useful [for student to access]” (P06, Male, PU = 4.6, CUScore = 2).

For the academics with higher perceived usefulness scores, the idea of usefulness included efficiency and access but unlike those academics with low perceived usefulness scores, P31, P25 and P04 also believed in the capacity of technology with face-to-face teaching to enhance the learning experiences as is evidenced in comments [12] through to [16]

[12] “I had to drop administrative costs. Technology helped with this. It doesn’t take as long to mark etc...We have students who can’t always make it uni for various reasons – it’s all there...I use videos and questionnaires to complete during lecture using Google forms
and then we discuss. [Technology helps] get students thinking and helps [my] understanding [of] what students are thinking and where they are coming from “(P25; Female; PU=7; CUScore=14).

[13]: “Having things set up online frees up a lot of my time because there’s a lot of things I would have done manually in the past which I don’t have to do manually anymore because it’s taken care of by the technology” (P04; Female; PU = 6; CUScore = 10);

[14] “For example, online exams have a number of benefits for students and me. I don’t have to mark their papers and they get their marks straight away” (P31; Female; PU = 7; CUScore = 20);

[15] “I upload previous student essays and get them to mark them and explain why so they engage in discussion about this [discussion boards]...they get marks for this...I also use online case studies that’s linked to book chapters and question banks. It’s very integrated...I found it [technology] very useful ...as we move through the course I see them [students] challenging each other...The online discussion feeds into the face-to-face teaching and learning” (P31; Female; PU=7; CUScore=20);

[16] “It’s a marriage of tech with face-to-face making it the best outcome” (P04; Female; PU=7; CUScore=10 ).

Comments [12] through to [16] also suggest that academics with high perceived usefulness scores, unlike those with low perceived usefulness scores, carefully consider how the attributes of both face-to-face teaching and technology could be best exploited to benefit student learning.

8.4.1.2 Number of years teaching in higher education

The regression model in chapter seven (Table 7-5) shows that increased number of years teaching in higher education decreases the likelihood of academics using blended strategies. In relation to this finding it is interesting to note that P22, the interview participant with the most years teaching experience (38 years), considers technology to be competing with face-
to-face teaching in the ‘which is better’ stakes, and he clearly questions the potential value of using technology instead of solely face-to-face teaching in the comment:

[17]. *There’s nothing about technology that is particularly useful [for learning]... Is it [technology] better than carefully planned face-to-face teaching ...I’m not a computer phobe, but not confident, I’ve seriously thought about trying to understand computer systems, it’s not my job...Can it be shown that bringing in technology is going to improve the learning experience?* (P22, Male, PU=4.8, Eff=5.1, CUScore=0)

In contrast to P22, P45 and P13 who have less teaching experience, do not question whether technology is better than face-to-face teaching but rather recognise that in the appropriate situation technology can be used to improve the learning experience, as evidenced in the following comments:

[18] *“It’s the whole thing about everyone learns differently, you’ve got more options [using technology with teaching]”* (P45, Female, PU =6.4, Eff = 3.3, CUScore = 2).

[19] *“This subject can’t really be taught any other way, you just have to talk the talk, if it was a different type of subject then there would be more that could be done with the technology”* (P13; Male, PU=5.2, Eff=5.7, CUScore=0)

P22’s statement in comment [17] suggests that he greatly values face-to-face teaching as an effective method over technology. The high value placed on face-to-face teaching was often expressed during the interview by P22. In contrast P45 and P23 placed a more equal value on face-to-face teaching with technology and often emphasised the value of technology when used appropriately. Perhaps P22, because of longer experience teaching in higher education, when technology was not readily available, has developed a deep-rooted
belief in the value of face-to-face teaching. This is one possible explanation of why the regression model shows that more experience in teaching higher education does not necessarily increase the likelihood of adopting blended strategies in current practice.

8.4.1.3 Gender differences

Recalling now that quantitative analysis also unearthed a salient difference in the predictors of blended learning strategy adoption across genders - notably, self-efficacy is a significant predictor of current blended strategy adoption for female academics but not for male academics; and perceived usefulness is a significant predictor of current blended practice adoption for male academics, but is not as important for female academics.

Comments [20] and [21] from female academics, P25 and P04, support the finding as self-efficacy as significant factor increasing the likelihood of female academics adopting blended strategies:

[20] “I’ve got the skills and if don’t have the skills then I take the time to learn to do them ...., if it’s too difficult or complex then I don’t bother” (P25, Female, PU = 7, Eff = 6.4, CUscore = 14).

[21] “Most problems I come across I can now fix”. (P04, Female, PU = 6, Eff = 6.4, CUscore = 10).

The power of self-efficacy, as an important predictor of female academics’ current blended strategy use is best highlighted by those interviewees who, despite high perceived
usefulness ratings, were currently low adopters of blended strategies. P45 clearly agrees with the usefulness of technology, for reasons beyond simple efficiency and content access:

[22] “It’s the whole thing about everyone learns differently, you’ve got more options [using technology with teaching]” (P45, Female, PU = 6.4, Eff = 3.3, CUscore = 2).

However, despite P45’s belief in usefulness of blended strategies, her current usage of blended strategies is low and she has a low self-efficacy score. P45 goes on to make the comment [23] which suggests her low self-efficacy score, and subsequent low blended strategy adoption score, could be attributed to lack of support related to what is available and how it could best be used:

[23] “I’m pretty new here, it’s a constant battle to find out what I can do and what’s available and how to use it... I feel quite comfortable doing stuff once I find out” (P45; Female, PU = 6.4, Eff = 3.3, CUscore = 2).

Lending strength to the argument that availability of technical support influences self-efficacy for female academics, it was observed that those female interviewees with higher perceived usefulness scores and higher current usage scores frequently highlighted the good availability of technical support when conversing about self-efficacy. P31 considered herself to be a novice and still learning to use technology for teaching [24], but note that she scores herself high on self-efficacy and had a high score for current usage. It is from apparent in her comment [24] that she felt she had readily available support.

[24] “I’m still learning... things go wrong. If things go wrong I use the tech person, he’s very good. If I can’t get him I use my colleagues who also have those skills so it’s no problem” (P31, Female, PU= 7, Eff = 6.7, CUscore = 20.)
Similarly, P04 stated:

[25]. “I know technology and I know things go wrong but when things go wrong I know there is someone around who can sort it out... (P04, Female, PU=7, CUScore 10, Eff=6.43)

In keeping with the results of regression modelling, it was found that the female academics interviewed tended to elaborate greatly on self-efficacy and the role of technical support but the male academics did not. Noticeably, the male academics interviewed seemed more directly concerned with usefulness. The three male participants did not raise the issue of self-efficacy and support but rather made direct statements focusing on usefulness as a driver for using blended strategies, as is suggested by comments [26] and [27].

[26]. “You shouldn’t use it just for those reasons anyway (efficiency). I mean I it is something you can do better with technology? That’s really the question” (P06, Male, PU4.6, Eff=5.43, CUScore= 2).

[27]. “This subject can’t really be taught any other way, you just have to talk the talk, if it was a different type of subject then there would be more that could be done with the technology...This subject doesn’t lend itself well to incorporating technology” (P13; Male, PU=5.2, Eff=5.7, CUScore=0).

Note how P13 in [27] justifies his decision to use face-to-face teaching in terms of the lack of usefulness of technology for teaching the content in his particular course:

8.4.2 Intended future use of blended strategies

Directing attention now to the factors found to be significant predictors of the intention to use blended strategies in the future, the regression model developed in chapter seven (Table 7-6), showed that the intent to use blended strategies was determined largely by
perceived usefulness and current practice. Those academics with higher perceived usefulness and current blended practice scores were more likely to hold the intention of using blended strategies in the future. Interestingly, as for the predictors of current blended practice, a gender difference was found for future blended practice. For female academics, perceived feasibility was found to be an important predictor of future intent. Those females who feel the use of blended strategies is feasible are more likely to intend to implement blended strategies in the future. The regression model for intended future use of blended strategies also showed normative influences to be tending towards being a significant factor predicting the use of blended strategies in future practice. The interview data supported, and contributed significantly, to the understanding of these findings as is discussed in the following sub-sections.

8.4.2.1 Perceived usefulness

Regression analysis of the quantitative data showed that perceived usefulness was a highly significant predictor of the intent to use blended learning strategies in the future. As was established earlier in this chapter (section 8.4.1.1), it became clear during interviews that when the use of technology with face-to-face teaching is seen as useful for improving teaching and learning academics will be predisposed to use blended strategies. When discussing future plans for the use of technology in teaching, those academics with higher perceived usefulness scores who believed in the value of technology for enhancing learning discussed plans to use technology in ways that increasingly supported the learning
experience whilst those with lower perceived usefulness scores tended to consider only how technology could make teaching more efficient in the future as is evidenced in comments [28] and [29].

[28] “In 2013, we are working towards getting [more] of the knowledge building online so both on campus and off campus students have access to this any time” (p25; Female, PU=7, CUScore=14, PerCUScore = 3, FUScore=7).

[29] “Would be good to see assignment submission integration with learning at Griffith as a way of checking for plagiarism and making it quicker etc” (P13; Male, PU=5.2, PerCUScore = 2.9, FUScore=3.7).

8.4.2.2 Current use of blended strategies

Quantitative analysis also showed that those academics with high current usage were likely to want to make more extensive use of blended strategies in their future teaching while those with lower current usage will be less likely to want to implement blended strategies in the future. The impact of current use was clearly evident in conversations with interview participants. Interviewees often told stories of how the course had evolved to use more technology in ‘better ways’ over a number of offerings. They frequently recounted previous experiences with first time use of a technology and it was clear how these experiences impacted on its subsequent use. For example, in comment [30], P31 describes her positive experience of discussion boards and how she continues to use them:

[30] “I upload case studies and ask them to respond to that..[in another course] I upload previous student essays and get them to mark and explain why so they engage in discussion about this…I’ve found it [discussion boards] quite useful…I use them in another course [with case studies]” (P31, Female, PU=7, EFF=6.7, CUScore=20, PerCUScore=5.7, FUScore=6.2).

As indicated in [30], P31’s experience of using discussion boards has been positive,
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however P18’s experience of using discussion boards has been negative as evidenced in comment [31].

[31] “I don’t use discussion boards [anymore]...they [students] just used them to complain or ask when marks were coming out or things like that... I have used online quizzes. It worked but it wasn’t that useful because they’d [students] sit in the library [with] a set of computers. One was Googling and the other be doing the test” (P18, Female, PU=6, CUScore=4, PerCUScore=4.4, FUScore=5.3)

It is clear from [30] that, on the basis of positive experiences, P31 is currently using discussion boards quite extensively in her course and plans to use them in the future. In contrast, P18 had negative experiences in the past and has now abandoned use of discussion boards. Notably, tales of negative experiences were more prevalent among the lower usage interviewees, for example P22 relates some of his negative experiences in comment [32]

[32] “I once borrowed a roving microphone to use with Lectopia. It was so complicated to use I never used it...Once [when the technology went wrong] I had to apologise to a large class. A lock up like that rips out lots of time”; “I’ve set up discussion groups...but students remained silent and didn’t use them” (P22, Male, PU=4.8, EFF=5.1, CUScore=0, PerCUScore=3.7, FUScore=5.2).

8.4.2.3 Importance of time as a feasibility condition

When academics were questioned about factors that they perceived were most important to help them to realise their intended use of blended strategies in the future, ‘time’ was identified as an important perceived feasibility condition among all, except one, of the interviewees. This is consistent with the identification of time as the most important factor using Tukey’s HSD analysis (Table 7-10) in chapter seven.
A notable characteristic of interview discussions related to feasibility was the ‘cost-benefit’ mentality that became evident among some interview participants when they were discussing time, an example of which is given in [33]:

[33] “When does it [using technology] become worth it on a cost-benefit basis. Is it [technology] better than carefully planned face-to-face teaching?” (P22, Male, PU=4.8, PercFeas = 4.0, CUScore=0)

The interview participants framed ‘benefit’ in terms of improving the learning experience and ‘cost’ usually framed in terms of time. For academics to determine the outcome of the ‘cost-benefit analysis’, perceived usefulness came into play as an important predictor of blended learning practice. It seems that academics are likely to be willing to make a considerable time investment if they perceive the endeavour to be useful for improving the learning experience. As shown in [34], P22 feels the time invested in using discussion boards has very little value in terms of student outcomes.

[34] “I don’t use discussion boards because it means I’ve got to go in there and read them and that’s very time consuming...they just used them to complain or ask when marks were coming out or things like that” (P22, Male, PU=4.8, PercFeas = 4.0; CUScore=0)

On the other hand, P25 scores perceived usefulness at the maximum rating of 7 and says:

[35] “My focus is student-centric, make it fun, engaging, keep my students, I’m prepared to do what it takes... I make the time” (P25, Female; PU = 7, PercFeas = 6.5, CUScore 14).

Similarly, P18, (PU=6, PercFeas= 3.7) related (comment [36]) that her motivation for using clickers during lectures came from reading a paper that provided evidence that using
clickers improves student learning. P18’s view that clickers are useful for improving learning has lead to her making a significant investment of time in preparing for their use.

[36] “I read a paper that proves using clickers improves their learning...I did all the background running around, it took me a lot of time and effort”. (P18, Female, PU=6, PercFeas= 3.7)

P18 makes it clear that implementing the strategies required a heavy expenditure of time, but goes on, in [37], to say that the time she has available restricts the implementation of future plans:

[37] “Any plans I have for the future involve more work for me – that will require a lot of extra effort and time. There’s lots of things I’d like to do, but I need to draw the line somewhere” (P18, Female, PU=6, PercFeas= 3.7).

Tabulating the key instances of academics referring to time during interviews as in Table 8-3 shows that references to time were made in terms of preparation time, implementation time, efficiency and time wasted. Preparation time included time to discover possibilities and learn the skills to use technologies. Implementation time referred to the time consumed during actual use of the technology. Efficiency referred to how much time using the technology would take to achieve a teaching goal and was usually expressed as a comparison with the time it would take using other methods. ‘Time’ wasted referred to time lost due to technical failures. From Table 8-3 it can be seen that the most common reference made to time was in terms of preparation time, that is, the investment of time required to learn skills and time for planning.
Table 8-3

**Key references made to time by participants during interviews**

<table>
<thead>
<tr>
<th>Participant (Gender)</th>
<th>Time related comment</th>
<th>Preparation time</th>
<th>Implementation time</th>
<th>Efficiency</th>
<th>Wasted time</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Female academics</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>P04 (F)</td>
<td>Having things set up online frees up a lot of my time. but once it’s set up it takes less time because things are streamlined</td>
<td>X</td>
<td></td>
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<td></td>
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<tr>
<td></td>
<td>Having X [blended learning advisor] there means I have more time... means I know what facilities are there</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P18 (F)</td>
<td>Discussion boards – don’t use “because that means I’ve got to go in there and read them and that’s very time consuming”</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td></td>
<td>There was help but I tried to get other staff interested but they said they didn’t have time.</td>
<td>X</td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Participant (Gender)</th>
<th>Time related comment</th>
<th>Preparation time</th>
<th>Implementation time</th>
<th>Efficiency</th>
<th>Wasted time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I did all the background running around, I had to do all that</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Any plans I have involve more work for me to prepare – that will require a lot of extra effort/time</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P25 (F)</td>
<td>But I knew which tool to use..I think that’s the issue” “If I don’t know..” it takes time to learn how to use it</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>“It’s all about time [to prepare]”</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>My time in [setting this up] this has been huge</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P31 (F)</td>
<td>I don’t find time an issue for implementation just more time to learn how to use it</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>More time [to prepare]</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Time to enable me to learn what it can do</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P45 (F)</td>
<td>Again its time, if someone would come to me and say well here’s all your options that’d be great</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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### Table: Time-related comments and participant perceptions

<table>
<thead>
<tr>
<th>Participant (Gender)</th>
<th>Time related comment</th>
<th>Preparation time</th>
<th>Implementation time</th>
<th>Efficiency</th>
<th>Wasted time</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Time and effort relate more to finding out what’s there than implementing it</td>
<td>X</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>At the moment it is such an effort just to get lectures done and out let alone anything else Additional effort, got to have lectures done and then work on improving</td>
<td>X</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male academics</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>P06 (M)</td>
<td>Technology has ‘gotten in the way’ of student engagement to a certain extent, fiddling and messing around can slow you down, equipment can fail and nothing happen, so it has risks; in terms of a lecture does it really make you do more, I don’t think so</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>Compared to baseline – still creation of ideas and synthesis (academic part) then all this stuff you do to present it to modern standards Does it save time NO</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

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<table>
<thead>
<tr>
<th>Participant (Gender)</th>
<th>Time related comment</th>
<th>Preparation time</th>
<th>Implementation time</th>
<th>Efficiency</th>
<th>Wasted time</th>
</tr>
</thead>
<tbody>
<tr>
<td>P22 (M)</td>
<td>“I read a paper by someone in ...who was marking group discussion contributions...she said she spent over 140 hours over a semester... I was thinking about it but as soon as I read that it just turned me off that -I don’t have time for that.</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>Things go wrong all the time ... I had to apologise to a large class – a lock up like that rips out 100’s of hours.</td>
<td></td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td></td>
<td>I haven’t got time to use technology with face-to-face ... if I want to use the full potential and turn it into a proper teaching system need 6 months to get up – don’t have that time</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>I have a feeling I can use technology to teach and teach well, but I think it requires a terrific investment from the academic and other people – I really wonder how efficient it is.</td>
<td></td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td></td>
<td>When does it [using technology] become worth it on a cost-benefit basis. Is it [technology] better than</td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>
Participant (Gender) | Time related comment | Preparation time | Implementation time | Efficiency | Wasted time
---|---|---|---|---|---
| | carefully planned face-to-face teaching?” | | | |
8.4.2.4 Perceived feasibility and gender

Recall that the regression model in chapter seven (Table 7-6) showed perceived feasibility to be a significant predictor of the intent to use blended strategies in the future for female academics, comments in Table 8-3 are now considered with reference to gender. From Table 8-3 it is seen that when female academics mentioned time, they tended to discuss in greater detail other perceived feasibility conditions, particularly, the need for support as an important time saving mechanism. Male academics, on the other hand, mentioned time only briefly and usually only in relation to lost time due to technical failure or in terms of efficiency. Furthermore, when gender is considered, it can be seen that most of the preparation related comments in Table 8-3 were made by female academics. Closer inspection of the preparation related comments made by female academics in Table 8-3 reveals that they felt having professional support to help them find out what options were available to them would save them time. Female academics’ concern for feasibility conditions, especially time, emerged strongly during interviews with female academics talking at length about it. In contrast, most male academics only briefly mentioned time and, rather than expressing the need for professional support, were focused on lost time due to technical failure or efficiency.

8.4.2.5 Normative influences

The interview data discussed so far supports the quantitative findings that perceived usefulness, current use, and perceived feasibility (for female academics) are predictors of
the intent to use blended practices. On analysing the interview transcripts, the construct of normative influences was commonly mentioned by the interviewed academics. Although normative influences were not identified as significant in the regression model, that construct was tending towards significance, with $p = 0.073857$, and given that it was often mentioned in interview data, it warrants some further exploration. The interview comments relating to normative influences are summarised in Table 8-4:

Table 8-4

*Interview participants' comments on normative influences*

<table>
<thead>
<tr>
<th>Participant</th>
<th>Normative influence related comment</th>
<th>Normative Influence</th>
</tr>
</thead>
<tbody>
<tr>
<td>P04</td>
<td>They [students] expect to have all the other supporting materials online</td>
<td>Student expectations</td>
</tr>
<tr>
<td>P06</td>
<td>...all this stuff you have to do to present it to modern standards. Students expect it.</td>
<td>Student expectations</td>
</tr>
<tr>
<td>P18</td>
<td>But they’re sort of demanding we have it [lecture capture], it’s become the norm</td>
<td>Student expectations</td>
</tr>
</tbody>
</table>
Looking at comments relating to normative influences in Table 8-4, it is apparent that student expectations are a reoccurring theme. The comments related to student expectations in Table 8-4 suggest academics perceive that students expect technology to be used for the purpose of providing easy, flexible access to content in a ‘modern’ format. It appears that academics interviewed do not perceive students expect technology to be used for improving learning.
8.5 Summary

The interview data obtained from eight purposefully selected survey respondents has supported quantitative findings and added depth of understanding to the quantitative data.

Qualitative data has contributed to the understanding of perceived usefulness as a predictor of both current and intended future blended strategies. It became very clear, in the interviews, which those academics scoring perceived usefulness highly, held the view that technology used with face-to-face teaching was not only useful for efficiency and content access but could be used together with face-to-face teaching to better engage students and help them understand content.

The integration of quantitative findings with qualitative data has strongly supported the presence of gender differences present in the predictive model, and has contributed to the understanding of the nature of the gender differences. Notably, those female academics with higher self-efficacy scores and resultant higher current use scores indicated in the interviews that they had access to good support mechanisms, both technical and pedagogical. In contrast, female academics with lower self-efficacy scores, expressed uncertainty about where to get support, and despite high perceived usefulness scores rated lower on current usage of blended learning. During interviews, Female academics often elaborated greatly on the time as an important feasibility condition. They clearly expressed the view that professional support was critical to reduce time needed for preparation and
thus increase the feasibility of implementing blended strategies. Male academics also mentioned time as a feasibility condition but mostly in terms of time wasted due to technical failure and they did not make reference to support.

Interview data also strongly supported the importance of current practices as a determinant of future practices. In particular, the success or failure of past attempts was revealed in interviews as shaping future practices.

In the present chapter, qualitative data has been discussed in relation to quantitative findings to add depth of understanding to the quantitative findings. The understandings gained makes way for the next and final chapter of this thesis, in which the research questions are revisited, implications for practice are highlighted, and the theoretical contribution of the study is brought to the fore.
Chapter Nine: DISCUSSION AND FUTURE DIRECTIONS

9.1 Introduction

The journey of discovery documented in this thesis began with the acknowledgement of the current challenges faced by higher education due to a difficult economic climate and an increasingly competitive global market. The observation was made that higher education institutions are making a considerable investment into blended learning, as an intuitional strategy with the potential to address current challenges. However, fulfilling the potential of blended learning for higher education rests, to a significant extent, on the widespread adoption of effective blended teaching practices by academics, and this has generally failed to happen. It was then argued that the knowledge base informing the design of much-needed support to help academics achieve effective blended teaching practices was not adequate because very little literature related to explaining academics’ current blended practice. To make a contribution to the body of knowledge related to academics’ current blended practices, this study was designed to explore the question of ‘why some academics tend to use technology with face-to-face teaching to achieve blended teaching strategies to support learning, while others do not?’. 

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In this final chapter, the research findings are summarised and the theoretical contribution of the study is made evident. On the basis of research findings, recommendations related to professional support for academics’ blended learning practices are then made. Finally, the limitations of the study are identified and suggestions are made for areas of further research.

9.2 The predictive model

As presented in chapter one, two of the questions addressed by the present study are:

What factors predispose an academic to using technology with face-to-face teaching to implement blended strategies in their current practice?

and,

What factors predispose an academic to the intent of using technology with face-to-face teaching to implement blended strategies in their future practice?

The findings relating to both these questions are presented in the predictive model arrived at in chapter seven (Table 7-7 and Table 7-6). The predictive model is an important contribution of the present study and is shown graphically in Figure 9.1. The “+” in Figure 9.1 indicates that a high score for that factor increases the likelihood of high usage. For example, a higher perceived usefulness score increases the likelihood of high usage of blended learning in the future. The “-“ sign indicates that a high score for the factor decreases the likelihood of usage of blended learning. For example, the greater the number
of years teaching experience in higher education, the less likely it is that academics will be currently using blended learning strategies.

![Figure 9.1](image-url)  
*The predictive model for academics’ current, and intended future use, of blended strategies.*

In considering the primary research question of ‘why some academics tend to use technology with face-to-face teaching to create blended strategies while others do not?’, the model shows gender differences must be considered. This is one of the more intriguing features of the model. Differences between genders are rarely mentioned in studies of adoption of technology by academics and appear to be completely neglected in the
extremely small quantity of literature concerned with explaining academics’ blended practices. Thus, the finding gender differences in the factors predicting academics’ use of blended strategies is an important contribution to the knowledge base surrounding academics’ blended practices.

The model in Figure 9.1 (derived from chapter seven, Table 7-7 and Table 7-6) shows three factors for which gender must be taken into account. Firstly, unlike male academics, female academics, which have higher self-efficacy, are more likely to be using blended strategies in their current practice. In other words, female academics with low self-efficacy are unlikely to be using blended strategies in their current practice. The second predictive factor current blended practice that is subject to gender differences is perceived usefulness. Male academics scoring perceived usefulness highly are more likely to be using higher blended strategies in their current practice. The same is not necessarily true for female academics. That is, female academics scoring perceived usefulness highly will not necessarily be more likely to be using blended strategies in their current practice. The third factor for which a gender difference exists relates to the intended use of blended strategies in future practice. Female academics who perceive the use of blended strategies to feasible are more likely to hold the intent of using blended strategies in their future practice, whereas for male academics perceived feasibility is unimportant. Thus, female academics with a high perceived feasibility score are more likely to intend to use blended strategies in
the future. However, male academics’ with a high perceived feasibility score are not necessarily more likely to intend use blended strategies in their future practice.

Examining Figure 9.1 (derived from chapter seven, Table 7-7 and Table 7-6) shows that not all of the factors present in the model are subject to gender differences. Teaching experience in higher education negatively affects the likelihood of using blended strategies in current practice, irrespective of gender. That is, the greater the number of years teaching experience in higher education, the less likely it is for academics to be using blended strategies in their current practice. With respect to the intent to use blended strategies in future practice, both perceived usefulness and current use of blended strategies positively affects the likelihood of intending to use blended strategies. That is, academics of both genders scoring perceived usefulness highly are more likely to have the intention of using blended strategies in the future. Conversely, the likelihood of intending to use blended strategies in the future practice is decreased when academics give low sores to perceived usefulness. Furthermore, academics of both genders with high levels of use of blended strategies in their current practice are more likely to intend to use blended strategies in their future practice, while those with low blended strategy use are less likely to intend to use blended strategies in the future.
Chapter Nine: Discussion and future directions

9.3 Other findings

Focus on the features of the model aside, the study yielded five other findings which have bearing on the features of the model. The findings are summarised as follows:

1. Increased understanding of perceived usefulness

As shown in Figure 9.1, perceived usefulness is a significant predictor of blended strategy use. It was found that those academics, who perceive the usefulness of technology with face-to-face teaching only for the purpose of efficiency or access, do not tend to integrate technology with face-to-face teaching to create blended strategies. In contrast, academics who perceive technology with face-to-face teaching is useful for increasing opportunities for student learning were inclined to implement blended strategies. Hence, exploration of the construct of perceived usefulness through qualitative data highlighted that it is important to make a distinction, between perceived usefulness of technology in teaching for the purpose of student learning, and perceived usefulness of technology with face-to-face teaching for the purpose of efficiency or convenient access to content. Existing blended learning literature tends to deal with perceived usefulness without making a clear distinction between usefulness for efficiency and usefulness for learning.
2. Trend towards increased use of blended strategies

The model (Figure 9.1) shows current practice is predictive of future use of blended strategies. The research question initially posed in chapter one of “Do academics wish to change the extent of their use of blended strategies in the future?” was investigated in chapter seven. A statistically significant difference (chapter seven, Table 7-7) was found between means for academics perceived current practice and intended future practice, indicating academics generally wish to change the extent of use of blended strategies in the future. The change in blended practice was towards a modest increase in the use of blended strategies in the future.

3. The importance of time to the realisation of intended future use of blended strategies

Arising from awareness that the realisation of academics’ plans for use of blended strategies in the future would, in part, be determined by feasibility conditions (time technical support, professional support, suitable teaching facilities, and funding), the following research question was asked “Which feasibility condition(s) do academics perceive to be most important to the realisation of their future plans to implement blended teaching strategies?” Statistical analysis in chapter seven revealed the availability of time as the important feasibility condition (Table 7-10). Qualitative data also suggested time as important to academics’ realisation of their intended future use of blended strategies.
4. *Time as a feasibility condition and the importance of professional support for female academics*

Further consideration of the question of “Which feasibility condition(s) do academics perceive to be most important to the realisation of their future plans to implement blended teaching strategies?” together with the model in Figure 9.1, shows that for female academics, perceived feasibility is a significant predictor of the future use of blended learning strategies (Figure 9.1). In keeping with the finding, interviewed female academics, unlike male academics, discussed at length the lead in time needed to research, plan and develop blended strategies. From qualitative data it emerged that female academics held the view that a significant time saving would be achieved by having professional support available to help them identify the best available options for their courses. It was also noted that those academics scoring perceived feasibility highly, were able to access professional support services.

5. *Self-efficacy and the importance of technical support for female academics*

In the model (Figure 9.1) self-efficacy features as a predictor of current blended strategy use for female academics. Exploring the data through qualitative analysis, lead to the identification of technical support as being an important factor for female academics in terms of their self-efficacy. Some of the interviewed female academics with higher self-efficacy scores were currently implementing blended strategies and often mentioned the readily accessible and available technical and professional support. In contrast, female
academics with lower efficacy scores and with currently low blended strategy implementation expressed the desire for support but did not know where or how to obtain it.

9.3.1 Enhancing the model

A more complete response to the primary research question of ‘why some academics tend to use technology with face-to-face teaching to create blended strategies while others do not’ is achieved by bringing together the model and other findings as shown in Figure 9.2. The “+” in Figure 9.2 indicates that a high score for that factor increases the likelihood of high usage, and conversely, a lower score for the factor decreases the likelihood of high usage. The “−” indicates that a high score for that factor will not necessarily increase the likelihood of high usage of blended learning.
Figure 9.2 The predictive model enhanced with a summary of other findings


9.4 Recommendations

At the beginning of this thesis it was explained that the ultimate purpose of the present research was to contribute to the body of knowledge that informs the formulation of professional support and development. Thus, on the basis of the findings summarised above, four key recommendations for professional support are made:

1. *Professional development initiatives must consider gender differences.*

   Gender differences in the factors predicting the use of blended strategies are an important feature of the model (Figure 9.1). It is therefore critical that those involved in supporting academics are made aware of the existence of gender differences so that blended learning support initiatives can be designed to address the differences between genders.

   Consider the predictors specific to female academics – self-efficacy and perceived feasibility. For female academics, greater self-efficacy increases the likelihood of current blended strategy use, and increased perceived feasibility raises the likelihood of the intent of using blended strategies in the future. Although self-efficacy and perceived feasibility are necessary considerations for professional support for all academics, for female academics, professional support must especially direct attention to increasing self-efficacy and perceived feasibility.
It was found that availability of technical support plays a substantial role in increasing female academics’ self-efficacy. Thus, not only does technical support infrastructure need to be put in place but, critically, blended support staff must disseminate to information about where and how to access that support. Ideally, and if possible, a specific support person may be allocated to individual academics or particular groups of academics. Academics’ attendance at any professional development activities should be followed up by arranged contact with appropriate technical support individuals in order to establish contact before support is required in practice. It is suggested multiple avenues for support are established, both formal and informal. For example, formal technical support may be available through central technical services, through faculty based technical services. One possible approach that may be particularly useful to female academics is to provide informal technical support through a ‘buddy system’. The ‘buddy system’ involves pairing the academic with a colleague of greater technical knowledge or relevant experience, so that the ‘buddy’ can be called upon for assistance as required.

With respect to perceived feasibility, female academics frequently expressed the view that availability of time, especially preparation time, is an important determinant of realising their future plans for the use of blended strategies. However, female academics held the view that time requirements would be greatly reduced by provision of professional support that would identify the options best
suited to their teaching context. It is thus recommended that professional support staff work with female academics, from initial contact, to identify ‘best options’ suited to the academic’s individual teaching context, rather than simply presenting large showcase of blended learning approaches. A showcase approach shows what is available but, academics’ preparation time is not greatly reduced because it is left to the individual academic to make the connection with their teaching context, acquire technical skills and design the strategy.

Now consider male academics. The model (Figure 9.1) shows perceived usefulness is a predictor of current blended practice for male academics. However, perceived usefulness is also a predictor of intended future practice for academics of both genders, and therefore warrants consideration when providing professional support to academics of both genders. Perceived usefulness is thus addressed in the next recommendation – emphasis on pedagogy not the technology.

2. *Emphasis on pedagogy not on the technology.*

At the crux of addressing the issue of raising the perception of usefulness of blended strategies, is the observation made in chapter eight, that academics are highly motivated to improve the learning experience for their students, and that as shown in the enhanced model (Figure 9.2) academics scoring perceived usefulness highly, held the view that technology was useful for improving student learning. In

*PhD thesis by Geraldine Torrisi*
contrast, those academics with low perceived usefulness scores did not see the use of technology as useful for improving student learning, but considered it useful only for efficiency and convenience of access. That is, academics with low perceived usefulness scores held the view that incorporating technology offered no ‘relative advantage’ (Rogers, Diffusion of innovation, 1962) for student learning, over traditional face-to-face methods. It is also interesting to note that during interviews, some academics with low perceived usefulness scores expressed the view that blended learning was more about pushing technology than good teaching.

It is recommended that professional support is approached from a teaching rather than technology perspective. It is recommended that when blended support staff approach academics, they do not begin by presenting a ‘showcase’ of all technology available at the institution, without relating the options presented back to the specific teaching context of the academic, for two reasons. Firstly, academics may be overwhelmed by the range of options and struggle to identify those which are applicable to their context. Secondly, beginning the interaction between academic and support staff with a showcase potentially reinforces the view that blended learning is a ‘sales pitch’ for technology. Rather than beginning with a showcase, blended support staff should approach blended learning from a ‘student learning needs’ or course design perspective. On a practical level, it is useful if professional support relationships with academics began by mapping learning objectives to the
strategies and technologies that are currently being used. Using the information recorded in the mapping forms the basis for discussion about what strategies are working and what improvements or changes are needed. Figure 9.3 shows an example mapping produced by the researcher while working with academics to develop a course in the field of Human Services.

Figure 9.3  Example of mapping some pedagogical requirements to tools for an academic’s course in Human Services (Torrisi-Steele, 2002)
Arriving at the mapping in Figure 9.3 first required identification of the learner outcomes for the course and the needs of the students. A consideration of the available technologies arose only after a discussion of strategies that would satisfy the requirements of learning outcomes and student needs.

3. Iterative approach to implementation of blended strategies

Quantitative analysis revealed that academics’ generally intended to make modest increases their use of blended strategies in the future. Rogers (1962) notion of ‘trialability’ applies and blended learning support staff should initially make simple suggestions, using perhaps a single technology, and design strategies that, in the unlikely event of technical failure, the consequence is small. For example, if an academic wishes to introduce the use of clickers, they may begin with one of their smaller classes and only use clickers for a short, non critical, activity rather than begin by basing a lecture sequence on the use of clickers. As the academic gains experience and confidence in using clickers use can expand to larger classes or to critical activities and to more sophisticated use of the functionality they offer.

4. That professional support staff make use of tools from the present study to gather knowledge about the current practice of the academics they are supporting, and use that knowledge to provide appropriate support.
The study has shown current practices of future practice as a significant predictor of future practice. It is therefore necessary that professional support staff gather knowledge about the current practices of the academics they will be supporting. Significant results have been from the tools, used in the present study, to collect data, showing the data collection tools are appropriate and useful for collecting data related to academics’ blended learning practices. It is therefore recommended that tools used for data gathering in the present research are used by support staff to gain knowledge about the blended practices of academics.

A possible scenario for using the tools from the present research is collecting information in professional development workshops for groups of academics. Prior to the workshop beginning, participating academics are asked to complete the actual use matrix (Figure 6.6) – note the tool list in the matrix needs may need modification, depending on the technologies used at the institution. The data collected enables workshop leaders to see what technologies are being used and the purpose for which they are being used. The workshop can then be structured so that academics can engage in discussion about their experiences using those technologies and workshop leaders can be better prepared with information about relevant strategies. In addition to collecting information about which tools are being used in academics’ current practice, the survey used in the present study to measure constructs (Table 6-4) is administered to identify specific areas to target in
professional development. Used with individual academics, the outcomes of the survey will help support staff identify areas for focus. For example, the survey may reveal an academic to have low self-efficacy in using technology and thus, convenient and reliable access to technical support should be arranged, and the offer training in use of the technologies the academic will be made.

9.5 Study limitations and Future Research

The present study has increased understanding of how various factors shape academics’ use of technology with face-to-face teaching. However, there are four main limitations to the study which need to be considered in relation to the ability to generalise the research results, and which also raise awareness of the need for further research:

Firstly, Griffith University has a strategic focus on blended learning and is taking measures to facilitate the use of blended strategies across all courses. The use of blended learning advisors is one of these strategies. The extent to which the institutional focus on blended learning and the availability of blended learning advisors has impacted upon the practices and views of 53 academic participants has not been explored and thus, further research in more varied university contexts is needed to determine if the results of this study generalise to other universities. For example, results of the study may be different using academics from a university which, unlike Griffith University, has no institutional blended strategy.
and does not provide explicit support for blended teaching through the use of blended learning advisors. The question of the extent to which the institutional strategy is impacting at the academic practice level is worth addressing.

Secondly, Griffith University is a large multi-campus Australian university; the effect of the institution being embedded in the culture of different country is not addressed. The need for cross-cultural studies of a similar nature to this study is self-evident.

Thirdly, an obvious limitation of the study is sample size. Whether or not other factors would become significant with a much larger sample size remains unknown. Furthermore, one cannot ignore the possibility that those academics that chose to respond to the survey, and volunteered for interviews, were already interested in the use of blended strategies to some extent. The results may have been perhaps influenced the results.

Fourthly, how disciplinary differences impact on factors predicting blended strategy use was not explored in this study. It would a valuable exercise to conduct comparative studies across disciplines to determine if the predictive factors found in this study apply in the same way across different disciplines. This study could be extended in future research to develop a better understanding of how disciplinary differences impact on the way technology is used within courses. One might ask: whether there are distinctly different models of blended strategies used across different disciplines or, whether there are...
differences in the uptake of blended learning strategies across different disciplines and if so why?

In considering how the present study might be extended, it is worth remembering that human belief systems are extremely complex, with a myriad of factors having an impact on human actions. This study is limited by the seven factors proposed in the initial model and there is room to extend the study to include other factors or to examine in more depth relationships among factors.

An extension to this study is a longitudinal study tracing the development of blended strategy use and any changes in perceptions in individual academics over a period of time. This would provide in-depth insights into how various experiences with current practice translate into actions in future practice.

9.6 Conclusion

This research was initially inspired by the authors’ interest in understanding academics’ blended practice, and subsequently fuelled by the recognition that success of blended learning, as an institutional strategy important to the survival of universities in the current economic setting rests on widespread adoption of effective blended practices. Responsive to these motivations, the mixed methods research documented in this thesis has sought to shed light on the factors impacting on academics’ use of technology with face-to-face
teaching. In the initial research model it was proposed that: (1) academics’ disposition towards using blended strategies in their current practice could be predicted by seven constructs (perceived usefulness, perceived ease of use, perceived feasibility, teaching approach, feasibility, teaching experience and normative influences); and (2) academics intention of using blended practices could be predicted by the same seven constructs along with current practice.

Development of the initial research model using regression, on data collected via a survey, has shown that not all of the constructs proposed in the initial model were significant predictors of blended practices, and revealed significant differences between genders in the factors predicting the use of blended strategies. In terms of current blended practices, perceived usefulness of technology for the purpose of learning was found to be a significant predictor for male academics, but less important for female academics that were influenced by self-efficacy. Irrespective of gender, academics with a greater number of years teaching experience in higher education were found to be less likely to be using technology with face-to-face teaching for implementing blended strategies. The significant predictors positively influencing the intent to implement blended practices in the future were found to be current practice and perceived usefulness, for both genders, while perceived feasibility was found to be significant only for female academics.
Other findings pertinent to the model emerged from the study and included: the importance of making the distinction between perceived usefulness for purposes of efficiency and access and perceived usefulness for the purpose of student learning; the trend towards academics increasing their use of blended strategies in the future; time as an important feasibility condition; professional support to increase perceived feasibility for female academic staff; and the role availability of technical support plays for self-efficacy of female academics’.

The findings of the study provided a basis for practical action in the form of four key recommendations for supporting academics’ blended teaching practices: (1) Professional development initiatives must consider gender differences; (2) Emphasis on pedagogy not on the technology; (3) Iterative approach to implementation of blended strategies; and (4) Professional support staff use tools from the present study to gather knowledge about the current practices of academics they are supporting, and use that knowledge to provide appropriate support.

Although this study was framed within the context of the exploiting the potential of blended learning to help higher education meet the challenge of remaining viable in the global competitive market and in tough economic times, the research has firmly directed attention back towards, ‘ground level’- at the academics and the importance of understanding their current practices.
References


*PhD thesis by Geraldine Torrisi*


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References


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*PhD thesis by Geraldine Torrisi*
References


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APPENDIX A: SURVEY WITH COVERSHEET
Academics use of technology with face-to-face teaching

SURVEY & QUESTIONNAIRE COVERSHEET

Ethics approval:
GU Ref No: ICT/02/11/HREC

Are you currently teaching classes, at any year level?
If so, the researchers below would appreciate your participation in this PhD research (details follow), by completing the 10-15 minute electronic survey at the following URL

Follow the link below to the Survey or copy and paste the URL into your internet browser:
https://qasiasingleuser.qualtrics.com/SE/?SID=SV_eK7TzWMDV05C4wQ

Who is conducting the research?

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PhD thesis by Geraldine Torrisi
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**About this research**

Blended learning is attracting a great deal of attention in higher education. The main physical feature of blended learning is the use of both technology and face-to-face in teaching.

Literature suggests blended learning has the potential to impact positively on the quality of higher education. It is recognised professional support for academics is essential to fully realise this potential.

This PhD research will contribute to the development of more effective professional development, curriculum design and institutional support for academics using technology together with face-to-face in their teaching. This research is aligned with Griffith University’s focus on blended learning as part of teaching and learning strategy.

**If you are currently conducting classes and using any aspect of technology in your teaching** I would appreciate your time in completing and submitting the following electronic survey and questionnaire available at the following URL

https://qasiasingleuser.qualtrics.com/SE/?SID=SV_eK7TZwMDV05C4wQ

Responding to the survey and questionnaire is voluntary. It will in no way impact on your relationship with the university.
Expressing consent

If the potential participant completes and returns the questionnaire, they will be deemed to have consented to their participation in the research. Please print this sheet and retain it for your later reference.

Your confidentiality

Course curriculum information is necessary to establish how technology and face-to-face teaching is being used. Respondents to this survey will be identifiable, during data collection, to researchers only via course curriculum information. However, reporting of results of the research will be conducted in a manner that ensures individuals are not identifiable either directly or by inference.

If you would like to ask further questions or require further information about the study please contact researchers using the contact details at the top of the coversheet.

Griffith University conducts research in accordance with the National Statement on Ethical Conduct in Human Research (2007). If potential participants have any concerns or complaints about the ethical conduct of the research project they should contact the Manager, Research Ethics on 3735 5585 or research-ethics@griffith.edu.au.
SURVEY [as a word document, actual survey appeared as Web Page]

*Blended learning PhD research*

*Geraldine Torrisi_Steele*

*Academics’ usage of technology with face-to-face teaching.*

Thank you for choosing to participate. This survey takes 10-15 minutes to complete.

**Gender**

- Female
- Male

**Drag EACH of the sliders below to show the number of years teaching experience.**
What is your age bracket?

- 18-25
- 26-34
- 35-54
- 55-64
- 65 or over

Indicate the extent to which you agree with each of the following statements

[NOTE: in actual survey these items were randomised]

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<th>Disagree</th>
<th>Somewhat disagree</th>
<th>Neutral</th>
<th>Somewhat agree</th>
<th>Agree</th>
<th>Strongly agree</th>
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</thead>
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<td>I use group discussions to help students think</td>
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<td>○</td>
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<td>critically about content.</td>
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<td>I guide students’ work by asking questions and</td>
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<td>○</td>
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<td>I encourage students to restructure their</td>
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<td>I encourage students to generate their own notes.</td>
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<td>Technology together with face-to-face teaching is useful for increasing efficiency.</td>
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<td>Technology and face-to-face teaching is useful for implementing more effective strategies.</td>
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<td>Technology is useful for supplementing face-to-face teaching.</td>
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<td>Technology together with face-to-face teaching is useful for enriching students' learning experiences.</td>
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<td>face-to-face teaching is useful for increasing students' opportunities for discussion and collaboration.</td>
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<td>Students have the expectation that I will use technology together with</td>
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<td>Many of my peers believe academics should use technology together with face–face teaching.</td>
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<td>'The university' would like academics to use technology together with face-to-face teaching.</td>
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<td>Industry expects students will study courses that use both technology and face-to-face teaching.</td>
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<td>I have enough time to use technology together with face-to-face teaching</td>
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<td>The technical infrastructure of the university</td>
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PhD thesis by Geraldine Torrisi
<table>
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<th>Strongly disagree</th>
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<th>Neutral</th>
<th>Somewhat agree</th>
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<th>Strongly agree</th>
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<td>makes it possible to use a variety of technologies in my face-to-face teaching</td>
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<td>Teaching facilities allow the possibility of using technology together with face-to-face teaching.</td>
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<td>The available professional support allows me to use technology together with face-to-face teaching.</td>
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<td>I am confident I can solve my own technical problems.</td>
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<td>I can use a wide range of teaching approaches.</td>
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<td>I have good, up to date knowledge of the content area.</td>
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<td>I am confident in my ability to include technology in teaching to enhance how I teach, and engage students.</td>
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<td>I can identify specific technologies suited to understanding the content in my content area.</td>
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<td>I can see how I can use technology combined with face-to-face teaching to implement strategies appropriate to the course objectives.</td>
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<td>I am able to select effective teaching strategies to guide student thinking.</td>
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PhD thesis by Geraldine Torrisi
Name ONE course you teach for which you believe you make MOST use of technology combined with face-to-face teaching
  Course code (e.g. 1611ICT)______________________

  Course name (e.g. Introduction to multimedia)

___________________________________________________

Academic group to which the course belongs:
  ○ Arts, Education and Law
  ○ Griffith Business School
  ○ Griffith Health
  ○ Science, Environment, Engineering and Technology

Class size
  ○ 30-59
  ○ 60-99
  ○ 100+

Approximate number of times you have offered the course (including current offering).
  ○ 1
  ○ 2 - 3
  ○ 4+
For the course, complete the following table by making entries in **both** the 'Usage' column and, if applicable, the 'Purpose used' column.

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<th>much used</th>
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<th>Accessibility</th>
<th>Understanding concepts</th>
<th>Practice skills</th>
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For the CURRENT course offering indicate the extent to which you use technology to do each of the following:

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<td>Address areas in which students experience difficulty.</td>
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<td>Implement assessment tasks more closely aligned with ‘real world’ contexts.</td>
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<td>Provide a high degree of autonomy for students.</td>
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<td>Develop innovative strategies.</td>
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For FUTURE course offerings indicate the extent to which you WOULD LIKE to use technology to do each of the following:

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<tr>
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<tr>
<td>Implement assessment tasks more closely aligned with ‘real world’ contexts.</td>
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<tr>
<td>Provide a high degree of autonomy for students.</td>
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<tr>
<td>Develop innovative strategies.</td>
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</tbody>
</table>
How important are each of the following in enabling the technology use you WOULD LIKE for FUTURE offerings.

<table>
<thead>
<tr>
<th></th>
<th>Not at all important</th>
<th>Very Unimportant</th>
<th>Somewhat Unimportant</th>
<th>Neutral</th>
<th>Somewhat Important</th>
<th>Very Important</th>
<th>Extremely Important</th>
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</thead>
<tbody>
<tr>
<td>Professional support</td>
<td>☐</td>
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<tr>
<td>Technical support</td>
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<td>Time</td>
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<td>Suitable teaching</td>
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<td>facilities</td>
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<td>Funding</td>
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</tr>
</tbody>
</table>

Some respondents may be asked for face-to-face 30 minute interviews. Please indicate if you would be available for an interview
☐ Yes, my preferred contact details are: ____________________
☐ No thanks

END OF SURVEY
THANK YOU.