School of Media, Culture and Creative Arts

Department of Information Studies

Delivering Mobile Library Services: Competency Implications for Vocational Education and Training Library Staff

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DECLARATION

To the best of my knowledge and belief this thesis contains no material previously published by any other person except where due acknowledgement has been made.

This thesis contains no material which has been accepted for the award of any other degree or diploma in any university.

Signature: 

Date: **27 August 2013**

ABSTRACT

The global, economic imperative for a highly-skilled, flexible workforce has resulted in institutions of higher learning investing heavily in sustainable infrastructure for information and communication technologies in education. Mandatory integration of technology into all aspects of education has resulted in a proliferation of computing hardware within learning spaces and a focus on professional development and support for teaching staff to enable effective use of technology. Research shows the current usage trend is towards technologies that allow individual mobility and, increasingly, contextualisation, and this is expected to continue. Academic libraries have long featured at the forefront of technological advances, as demonstrated in the magnitude and complexity of new technologies informing operational and strategic decision-making. However, the development of library services delivered to mobile technologies appears ad hoc and inconsistent. The library and information science profession needs to demonstrate competence in the implementation of mobile technologies and resultant service delivery in order to maintain relevancy in a rapidly-changing technology environment. The lack of professional capabilities and preparedness of library staff as a contributing factor to the ability to leverage the potential of mobile technologies has attracted minimal investigation. The importance of providing empirical evidence of acceptance and use of technology by the academic library profession is crucial in ensuring future delivery of uniformly-high quality education. Information on the impact of mobile technologies on vocational education and training sector libraries in Australasia is virtually non-existent and this creates a barrier to progress. The present research addresses these issues by examining the mobile technology competencies and knowledge required of vocational education and training (VET) sector library staff and their preferred methods of acquiring such expertise.

A qualitative approach was considered most useful for understanding the problem under investigation. The research design involved a constructivist epistemological perspective, wherein meaning is constructed by participants rather than discovered. It included a phenomenological methodological perspective involving the collection of large amounts of rich data, which seeks the opinions and interpretations of participants and focuses on contextual description and analysis. An inductive enquiry approach was followed, allowing patterns to emerge suggesting relationships from analysis of the data. Grounded theory was selected as an appropriate research methodology, as it allowed for a process of generating theory through procedures involving constant comparison and testing of emergent concepts. Triangulation of data collection methods enabled data to be collected from the purposefully-selected sample of library staff and student library users across 42 VET sector libraries. Data

was collected through in-depth interviews and self-administered online survey tools. Repeated comparative analysis of the data resulted in a theoretical continuum being established which led to the development of an integrated theoretical model.

Key findings from the research established that library staff, particularly longer-serving staff, were keen to acquire mastery of mobile devices. Competency acquisition was considered crucial to working effectively in the mobile environment and to offering the sorts of services and assistance expected by students. Staff believed attitude, adaptability and a willingness to experiment were important. They considered access to mobile devices and time to experiment with them to be crucial to success. The ability to link new technologies with new opportunities and to be able to deliver service through a different medium was also regarded as critical. Length of employment was revealed as an unsuitable gauge for effort to learn new technology competencies. The role of professional position appeared as a stronger influence on perceptions of ability to learn new technology. Personal levels of competency with mobile devices were not shown to be a major influence on staff attitudes; however, greater technology competence was associated with increased expectation that the organisation would provide the necessary supporting infrastructure to enhance successful technology rollout. Preferred methods of professional development delivery were hands-on, self-paced learning with guidance or training provided by a trusted, expert colleague available to assist at point of need. The study findings highlighted the complexity of the relationships that influence technology acceptance and organisational outcomes. Recommendations are offered for additional testing of the integrated theoretical model developed, continued research into the area of library service delivery, and expanding the findings of the present Australasian VET sector study through comparative investigations to inform decision-making into mobile library service delivery.

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LIST OF PUBLICATIONS RELATING TO THIS THESIS

1. Book Chapter

Saravani, S.-J. A., & Haddow, G. (2012). Staff preparedness to implement mobile technologies in libraries. In G. Needham & M. Ally (Eds.), *M-libraries 3: Transforming libraries with mobile technology* (pp. 75-83). London: Facet.

2. Journal Articles

Saravani, S.-J. A., & Haddow, G. (2011). The mobile library and staff preparedness: Exploring staff competencies using the Unified Theory of Acceptance and Use of Technology model. *Australian Academic & Research Libraries, 42*(3), 179-190. Kingston, ACT, Australia: Australian Library and Information Association.

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CHAPTER ONE

BACKGROUND TO THE STUDY

General Introduction

The vocational education and training (VET) library sector has attracted minimal empirical research. Some work exists on the continuing professional development needs of Australian and New Zealand library sectors, including the VET group of libraries, however, to date, no study has been undertaken investigating the impact of technology upon the VET library sector and its response. Given the national focus on developing the knowledge society (Loveder, 2005), it is important to understand whether those whose daily work involves the provision of access to knowledge resources are fully prepared for the demands of ubiquitous access. It is therefore timely to explore the perceptions and response of VET sector library staff to technology impact, with particular focus upon future developments in mobile service delivery.

This study investigated the competencies required of VET sector library staff in Australia and New Zealand to deliver services to mobile technologies. The study focused on the current state of preparedness of VET libraries to deliver mobile services within a framework of innovation and technology adoption. It examined how library staff respond to the concept of the mobile technology library (m-library) and their perceived levels of confidence and capability within this environment. It also sought to discover how best to address any competency gaps identified in a systematic and replicable manner. The study arose from an interest in the extent to which academic libraries had progressed towards implementation of service delivery to the mobile devices students were carrying. There is a paucity of information relating to the VET library sector and the impact of mobile technologies upon this sector remains restricted to anecdotal reporting. It was assumed that a contributing factor to the apparent slowness in the uptake of mobile service delivery was a lack of confidence and competence amongst the library staff themselves. It is critical that VET library and information professionals are appropriately prepared to realise the nascent potential of mobile technologies in the workplace. This is an imperative for staff development, service improvement and student benefit. The present research addressed these issues by examining mobile technology acceptance and service delivery by VET library staff. It was anticipated the information generated from the investigation would inform a greater understanding of issues affecting the sector in relation to technology impact. With the availability of detailed analysis of factors determining intention to use technology in the work environment, library

decision makers are provided with the opportunity to have a greater body of information at their disposal.

This chapter introduces the research topic by providing context around mobile technologies within the education environment, with a focus on their impact on library services. The role of professional development in determining and supporting staff competencies is briefly covered. An overview of the VET sector in Australia and New Zealand follows, which includes positioning the library within this sector. The research investigated the juxtaposition of the three areas outlined above, namely the preparedness of VET library staff to deliver service to mobile technologies.

The scope of the research is discussed, as is the significance of the investigation and its contribution to the fields of librarianship, information management, mobile technologies, professional development and the VET sector. Key concepts presented throughout the thesis are defined and a brief overview of the research design follows. Finally, the structure of the thesis is presented.

1.1 Background and Context

This research acknowledged that both technologies and expectations of their capabilities are changing rapidly; it attempted to define mobile technology and to explore its impact within the context of the VET library environment. The premise was accepted that the current usage trend is towards technologies that allow individual mobility and, increasingly, contextualisation (Younas & Mostéfaoui, 2011), and this is expected to continue. It was also accepted that, with regard to technologies, 'mobile' generally means portable and personal, as opposed to shared and static, although such dimensions can still be included within the larger concept of mobile technology (Naismith, Lonsdale, Vavoula, & Sharples, 2004, p. 3). Students accessing library services are increasingly familiar with the mobile learning environment; they expect that this environment will have the capacity to meet both their learning and information needs.

1.1.1 Mobile Learning

The uptake of mobile internet is allowing many more people to engage with information services whilst on the move. Use has increased of sophisticated smartphones, iPods tablets, touchscreen technologies to enable connection to social networking sites, information sites, leisure activities, work files, communication software and crucial services (Kneebone & Angus, 2011).

The concept of learning has increasingly focused on features supporting the body of information being transmitted. Place, time, context, technology, compatibilities, synchronicity, learner-centeredness and individual requirements have gained momentum in the educational realm. Powerful computing devices of limited size have become commonplace and open up opportunities for learning to take place in novel and meaningful ways (Green, 2011; Johnson, Smith, Willis, Levine, & Haywood, 2011; Kneebone & Angus, 2011; Kukulska-Hulme, 2007).

Mobile learning (m-learning) has been defined against the considerations of space, that is, physical location such as home or workplace, different areas of life, for example, work demands, leisure activities, and variations in time (Vavoula & Sharples, 2002, p. 152). Good m-learning makes the most of being on location, providing immediate access, being connected, and acknowledging learning that occurs beyond (and in conjunction with) formal learning settings, in places such as the workplace, home, and outdoors (Sharples, Taylor, & Vavoula, 2005, p. 2).

Research indicates an increase in students entering higher education equipped with handheld devices containing powerful computing capacity in addition to telecommunications functions (Wagner, 2005). In addition to being highly-personal devices, they also provide the opportunity to learn in a new way, to replace traditional learning with mobile, nomadic learning. Given the integral part mobile devices play in the social lives of students, extension into the sphere of learning appears a natural progression. In order to gain a clearer understanding of how students are using mobile devices, a growing number of institutions are surveying their student cohort and applying the information to planning processes. University libraries, in particular, have been active in studying student mobile phone use in relation to library services (Booth, 2009; Mills, 2009; Paterson & Low, 2011). The findings revealed students showing preference for using mobile devices within the context of higher learning and holding very definite opinions on what they regarded as useful services to access through a mobile device and those that are of little or no interest.

Enabling staff to develop skills in the use of mobile technologies has not been easy. Higher education (HE) institutions have invested significantly in creating an environment to support mobile learning, and, although there is a lack of supporting data, it is reasonable to assume VET institutions have taken a similar approach. Surveys conducted across the HE sector to investigate how teaching staff have incorporated mobile devices into their teaching design and the impact this has had on student satisfaction or achievement have revealed a lack of uniformity in the acceptance and deployment of mobile technology into work practices

(Cochrane, 2005; Corlett & Sharples, 2004; Perlman, 2005; Wagner, 2005). Discrepancies abound and generally reflect the five adopter categories raised by Everett Rogers (1962): innovators, early adopters, early majority, late majority, and laggards (Rogers, 2003). The review of literature in the field under study, sees the terms 'early' (sometimes otherwise known as champions) and 'late' adopters regularly appearing as staff describe themselves or their colleagues vis-à-vis technology adoption within their work environment.

The rapidly increasing demand for flexible, mobile learning across the VET sector resulted in an investigation, between 2000 and 2004, and best practice recommendations by the Flexible Learning Leaders Project (Fergusson, 2009). Findings from the project indicated the effective use of 'champions', who assisted embedding the use of technology into teaching and learning practices, and management buy-in and support were crucial. Involvement by a responsive IT department also enhanced the likelihood of successful m-learning implementation. Practitioners required practical assistance, training programmes and time to experiment. A whole-of-organisation approach was promoted as appearing to offer the best chance of success (Fergusson, 2009).

1.1.2 Impact of Mobile Technologies on Library Service Delivery

The mobile technology library (m-library) concept "occupies similar … territory with mobile learning; a territory where technology expertise meets academic expertise … and where clearly defined communities of practice are … starting to emerge" (Traxler, 2008, p. 47). Their record of service delivery beyond physical environs has well positioned libraries to understand and develop upon the concept of lowering barriers to access. The range of m-library users: students or faculty in the field or on distant campuses, distance education, face-to-face and blended learning students using mobile devices for learning activities both within and outside the classroom, is indicative of the approach to m-learning being tested and adopted across campuses world-wide (Lippincott, 2008a).

As yet, there appears to be little common ground being demonstrated across the library community. Technology-enhanced services offered to library patrons appear piecemeal, disconnected and indicative of sketchy strategic planning in the area. Uniformity across the sector may not be achievable in the area of emerging technologies, nevertheless, the lack of consensus over what is critical to libraries in future planning requires addressing if the profession is to progress. The growing ubiquity of mobile devices, which shows no evidence of declining, should resonate with library decision-makers as they undertake environmental scanning to inform their planning (Association of College and Research Libraries (ACRL) Research Planning and Review Committee, 2012; Emanuel, 2010).

The question arises as to whether libraries are constrained or encouraged in their move into the area of mobile delivery as a consequence of staff confidence and competence with mobile technologies. Examined from another angle, it could be asked to what degree are libraries not pursuing the option of innovative service delivery utilising mobile technologies because staff lack the knowledge, skills or confidence to plan and implement such initiatives? The spectre of well-intentioned projects doomed to failure through inadequate planning should deliver a warning to others (Arneberg, Keegan, Lõssenko, Mázár, Michels, Paulsen, Rekkedal, & Zarka, 2007).

Library planning for delivery of services to mobile devices will be influenced by the institutional mobile strategy. At a minimum, libraries need to be informed of such strategy, and the opportunity to contribute expertise to any decision-making across campus is preferable. Libraries are in a unique position with their direct, daily involvement with students, to understand why the future of delivery will, or should, be student- rather than IT-focused. This focus is what Hitch and McCord (2004, p. 7) described as the "switch from an assessment of "how well the campus supports what it has provided" to "how well the campus supports my personal technology needs"". Placing focus on the library user and service access requires that the processes enabling such service delivery meet existing performance standards.

1.2 Staff Professional Development

It is widely recognised that effective staff change within the work environment requires professional development opportunities (Chan & Auster, 2006; Cossham & Fields, 2006; Kloppenborg & Lodge, 2010). Professional development plays a definitive part in ensuring that skills, knowledge, expertise and other characteristics of competency are developed and maintained. Within the Australian higher and vocational education library sectors, there is clear evidence of the strategic value of staff being enabled to develop necessary capabilities and to improve their effectiveness within the workplace setting (Hallam, 2009).

Literature examining VET staff development has highlighted unfamiliarity with technological advances as having a detrimental impact upon the sector (Loveder, 2005, p. 1). Three overarching categories frame the required competencies for integrating technology successfully into the workplace: coping with change, social and relationship skills, and IT-related skills (McDonald, Cullen, & Comrie, 2009, p. 5). Staff ownership of technology appears as a critical factor in effective use (Kukulska-Hulme & Traxler, 2005) with an action learning approach offering greater opportunity for learner control of activities relating to

immediate role requirements and technology. The importance of having time to experiment and authenticity of task, coupled with the opportunity for reflection, are recognised as key to successful staff development (Olney & Lefoe, 2007).

1.2.1 Role of Professional Development for Libraries

Assessment of library staff capabilities in relation to environmental change is well documented (McNeil & Giesecke, 2001; WebJunction, 2009). A number of surveys conducted throughout the various library sectors over the years illustrate the importance the profession places on ensuring its members are prepared to respond appropriately to change (Haddow, 2012; Howard, 2010). The literature reveals academic libraries to be well aligned to organisational priorities and supported both internally through professional development provision and externally through internationally-agreed best practice guidelines, such as those promoted by the International Federation of Library Associations (IFLA) (Varlejs, [2010]).

Investigations into staff development across VET sector libraries have been limited (Bannister & Rochester, 1997; Costa, 2007; Hallam, 2009) and have concentrated on reviewing performance measures. A more recent study of Technical and Further Education (TAFE) libraries (Kloppenborg & Lodge, 2010) has linked changes in the technology environment of libraries with the physical and social spaces for student learning.

1.2.2 Responsibilities for Staff Development

The goal of staff development is change in the knowledge, behaviours, beliefs and skills of staff employed within the organisation. This requires long-term commitment from the entire organisation and professional development should, ideally, be embedded within strategic planning, promoted as an investment with demonstrable benefit and offered within a context conducive to change (Stokker & Hallam, 2009).

A variety of methods have been employed to assess critical library staff competencies, including such quality assessment tools as Insync and LibQual+. These have been employed to provide detailed information on expertise requirements, expectations of workplace systems, current competencies and areas for development or change (Hallam, 2008, 2009; WebJunction, 2009). For libraries, guidance in this area has been provided by sector, regional, national, international professional bodies with the aim of ensuring library and information professionals globally are competent to meet the various pressures of the modern information environment. The array of competencies identified include library management, public services, technical services, core technologies and systems, and IT and

also such personal and interpersonal soft skills as innovativeness, flexibility and organisational skills (McNeil & Giesecke, 2001). The impact of change has resulted in a shift of professional competence towards higher skill levels, particularly focused on the use of technology. Given the rapid advances in technology, this impetus can be predicted to continue.

Professional development programmes take time; they require motivation and a belief that the effort put into up skilling will result in tangible personal and professional benefits (Carlson & Gadio, 2002; Chan & Auster, 2006; Lawrence, 2008). Achieving a balance, for example, between the solidarity of tradition in library practice and the flexibility to absorb future shock through focusing on universal competencies rather than the differences that new technologies bring is proposed as a constructive way of proceeding with professional development (Gutsche, 2010).

1.3 Vocational Education and Training

The Australasian VET sector (Australia and New Zealand), including the Technical and Further Education (TAFE) and Institutes of Technology and Polytechnics (ITP) sectors, is distinguished by close links with business and industry. The sector concentrates on equipping graduates with practical, immediately-applicable training and workplace skills. The traditional boundaries between vocational education and higher education are becoming more blurred; increasingly, higher level qualifications are being offered by VET institutions in both countries, in New Zealand to doctoral level.

1.3.1 Vocational Education and Training Sectors

Vocational education is defined in the UNESCO Convention on Technical and Vocational Education (1989) as "all forms and levels of the educational process involving, in addition to general knowledge, the study of technologies and related sciences, the acquisition of practical skills, know-how, attitudes and understanding relating to occupations in the various sectors of economic and social life" (United Nations Educational, Scientific and Cultural Organization (UNESCO), 1989, Article 1, para. a).

Registered training organisations (RTO) provide vocational training in Australia; these include TAFE and other government providers, multi-sector higher education institutions, registered community providers, and publicly-funded delivery by private providers. In addition, there exist some fee-for-service private providers and some secondary schools (Australian Bureau of Statistics, 2011). The VET sector includes more than 4500 RTOs operating within schools, universities, enterprise RTOs, community providers, other private

providers and the fifty-eight TAFEs. The system provides a national training framework consisting of the Australian Quality Training Framework, Australian Qualifications Framework and Industry Training Packages that define the assessment standards for the different vocational qualifications.

New Zealand vocational education is provided by eighteen Institutes of Technology and Polytechnics (ITP), Private Training Establishments, and Te Wananga. A body of thirty-five Industry Training Organisations (ITO) purchase training from the providers as well as set standards and aggregate industry opinion about skills in the labour market. The New Zealand government funds the ITPs to provide professional and vocational education and training, including a variety of degree, pre-degree and post-graduate courses ranging from introductory studies through to full degree programmes. Many qualifications have integrated work experience components involving on-the-job training. In 2010, the ITP sector enrolled 50,000 Equivalent Full-Time students at non-degree level, and 18,000 at bachelor's level and above (Tertiary Education Commission, 2010, p. 26).

1.3.2 VET Library Sector

Key issues and trends occupying the TAFE libraries consist of reductions in funding and staffing, an aging staff, promotion opportunities, changing emphasis on library space utilisation, the integration of technology across all operations, staff development, exploration of social media impact and knowledge management (Australian Library and Information Association (ALIA) TAFE Library Advisory Committee, 2009a; Hallam, 2008, 2009).

1.4 Research Problem

Libraries have a significant record of implementing technology to assist their operational and planning processes. They have been active in the promotion of online content and contexts, social networking and web content such as Web 2.0 or Library 2.0. The mobile library has been defined as providing access to users who are constantly on the move, anywhere at any time (Ally, 2008a, p. 38), but the critical role is with the librarians who need to assist the nomadic user "to access the right information at the right time and to ensure the information has high integrity" (Ally, 2008a, p. 43).

The literature suggests there is widespread acceptance that nomadicity of library users is a phenomenon that will continue to increase (Aldrich, 2010; Hitch & McCord, 2004; Lippincott, 2008b). It is also accepted that such mobility will affect both user expectations and library services. The issue is one of impact and response; that is, how prepared are libraries to respond to the challenges/opportunities that the latest wave of technology

advancements is presenting. In particular, how prepared are library staff, and how confident and capable are they to respond to those challenges? To date, there is little reported research on the impact preparation for mobile delivery has had on libraries and, in particular, on staff members, from the viewpoint of planning, processes and professional development. Examination of mobile library research reveals a focus on innovation, on projects designed to realise the considerable potential mobile technologies offer libraries and their users (see for example Houghton, 2012; Kroski, 2013; Sheikh & Mills, 2012). The paucity of technology impact studies on mobile library service delivery is addressed in the present research.

1.5 Purpose, Objectives and Research Questions

The purpose of this study was to investigate the current state of preparedness of VET sector library staff to deliver mobile services to students and, from the findings, to offer recommendations to assist planning for successful, sustained mobile technology library (m-library) initiatives. It is anticipated that through providing new insights into the impact of technology upon libraries and their services, increased knowledge of technology competencies required, and evaluative models to demonstrate the likelihood of technology acceptance, library planners will be assisted in ensuring staff capabilities are closely aligned with technology advancements. Such an outcome may contribute to success in implementing mobile library services.

1.5.1 Research Questions

The investigation addressed the following research questions:

> What skills, knowledge and competencies are required by library staff to develop and deliver mobile technology services in the vocational education sector?
>
> What specific on-the-job training is required by library staff in the vocational education sector to acquire the skills, knowledge and competencies to effectively develop and deliver mobile technology services?

1.5.2 Specific Objectives of the Investigation

The specific objectives of the investigation were to:

i) Investigate library staff confidence in using mobile technologies
ii) Determine the skills and knowledge required by library staff in order to develop library services to mobile technologies
iii) Examine professional development opportunities available to library staff

iv) Determine preferred method of library staff engaging in professional development

v) Investigate student perceptions of, and preferences for, the current and future state of mobile library service delivery

In order to address the two overarching questions, and the objectives, VET library staff were requested to:

1. Identify the library services most effectively and appropriately delivered through mobile technologies to vocational education and training students

2. Identify gaps between the existing and the required knowledge and capabilities of library staff in relation to delivering mobile services

3. Determine the most effective means of ensuring library staff engaged in mobile delivery have opportunities for professional development and workplace learning programmes and activities

VET students who used library services were asked to:

1. Identify which library services they were aware of

2. Indicate mobile library services they might use

The diagram below illustrates the context, design and conduct of the investigation. The highest level reveals the initial impetus for the investigation – the increasing number of students on campus using mobile devices for a range of activities, both social and learning-related. This level, which filters through the mobile devices being used, affects the operating environment of the library. Within the library workplace environment a range of services is offered by library staff to library users. Underpinning this environment is the deployment of a technology platform upon which library service delivery is dependent. Mobile technologies comprise a component of the technology platform. For the purposes of this study the focus was on staff engagement with, and adoption of, mobile technologies and the impact this had upon the development and delivery of mobile library services. In investigating staff capabilities in this area, the staff attributes of position, service length and technology competence selected for the study had direct impact upon the four main areas of investigation. Findings from these areas of investigation indicated mobile technology usage

by staff participants which, in turn, impacted upon library users in the form of mobile library services to users.

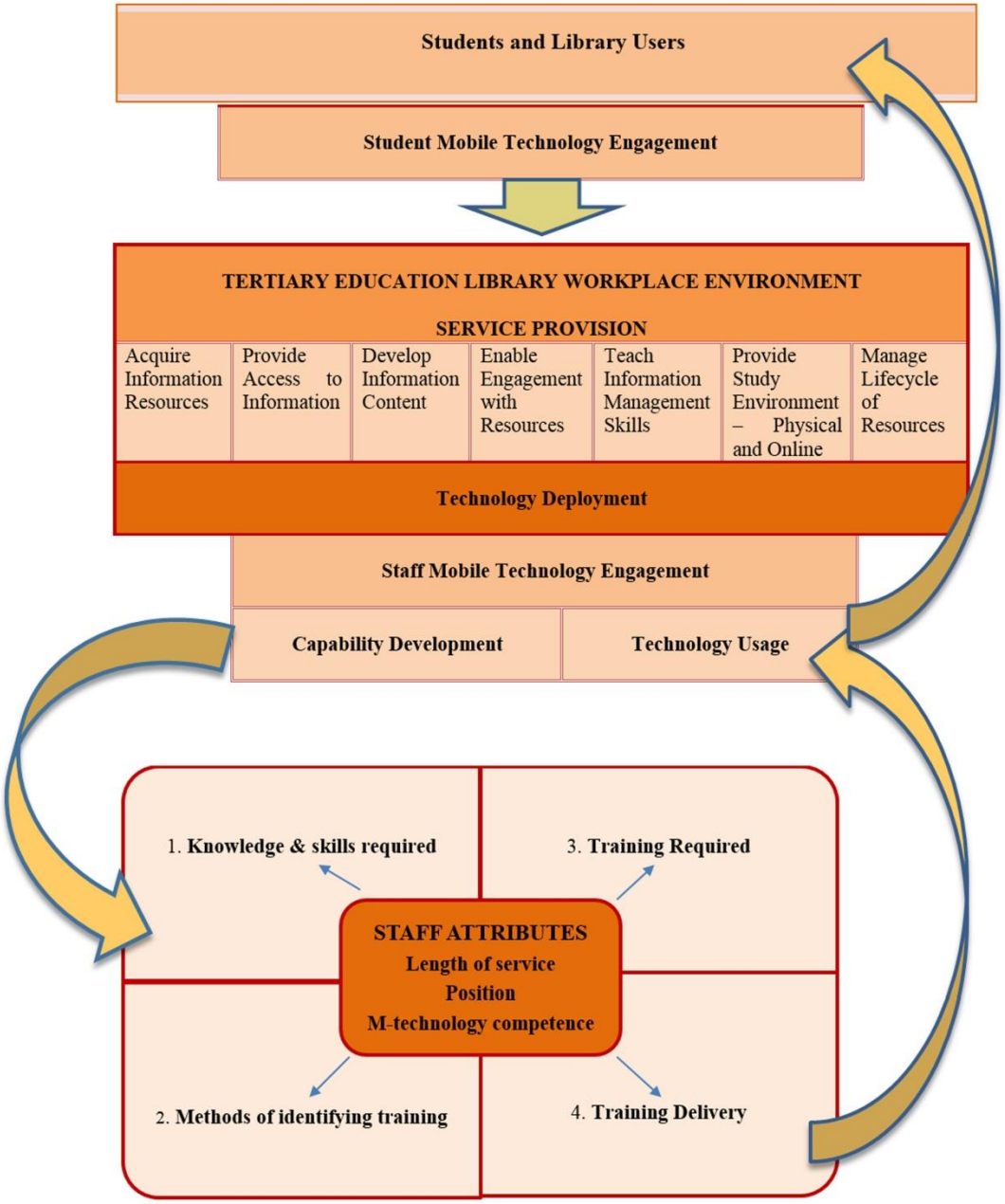


Figure 1.1 Conceptual model of study components

1.6 Research Approach

A qualitative approach was considered most useful for understanding the problem under investigation. The research design involved a constructivist epistemological perspective, wherein meaning is constructed by participants rather than discovered (Gray, 2004, p. 17).

This perspective provided the basis for deciding what kind of knowledge would be sought and how it would be approached. The theoretical perspective adopted in order to discover what was actually happening within the problem under investigation was interpretivism, which deals with complex human judgments and values (Birks, 2014, p. 19). The interpretivist approach includes a range of varying perspectives that deal with the actions of the individual within their social environment. The phenomenological perspective has as its centre the question "What is the meaning, structure and essence of the lived experience of this phenomenon for this person or group of people?" (Patton, 2002, p. 132).

Phenomenology involves the collection of large amounts of rich data, seeks the opinions and interpretations of participants and focuses on contextual description and analysis (Gray, 2004, p. 28). It favours an inductive enquiry approach, which allows patterns to emerge suggesting relationships from analysis of the data. Grounded theory was selected as an appropriate research methodology, as it allows for a process of generating theory through procedures involving constant comparison and testing of emergent concepts. It involves the analysis of large amounts of raw data through a set of coding procedures designed to remove speculation or force-fitting of predetermined theories, and enables building rather than testing of theories (Glaser & Strauss, 1999, p. 4; Patton, 2002, p. 126). The timescale planned was a brief snapshot of activities and events over four months of data collection, which identified the investigation as a cross-sectional study involving the collection of data over a very short point of time. This type of approach lends itself to specific data collection methods, typically including surveys and interviews.

The intention to enable rich data to emerge during the analysis required participants to be selected according to their relevance to the research topic (Flick, 2009, p. 91). Purposive sampling was used in the selection of participants. The sample included specific categories of qualified librarians working in a particular type of academic library employing a specified minimum number of staff. This sampling technique allows for the selection of "individuals or groups according to their expected level of new insights into the developing theory in relation to the state of theory elaboration to date" (Flick, 2009, p. 118). Forty-two qualified library staff were interviewed. Additionally, data was collected from 95 VET students using the non-probability sampling method. Triangulation was employed to generate depth and validity of data.

1.7 Assumptions

A knowledge of the sector being investigated and professional experience in the ITP library environment resulted in the study being approached through the lens of four assumptions.

Firstly, library staff who lack confidence and competence in the use of mobile technologies will be unlikely to develop or deliver services for these devices. This assumption was based on general workplace observations, not restricted to the library profession. Secondly, longer-serving staff would be less likely to be confident with technology. This assumption was based upon anecdotal information and readings on adopter categories and conversations around the digital native versus immigrant debate (Kennedy, Dalgarno, Bennett, Judd, Gray, & Chang, 2008; Prensky, 2001). Thirdly, through conversations with professional colleagues, the researcher believed there is general uncertainty across the library world regarding how best to approach the mobile technology wave. Fourthly, libraries with larger staffing levels would be more likely to have implemented mobile services. This assumption was based upon the view that mobile services were different from basic traditional library services, such as cataloguing, reference, acquisitions, information literacy and would be possible only where sufficient staffing or resourcing allowed innovation and experimentation. It had also been influenced by Rogers' work on diffusion of innovations (DOI) which included the theory that larger organisations were more innovative (Rogers, 2003).

1.8 Significance of the Research

It is the contention underlying this research that staff confidence and competency with mobile technology is vital, that it does have an impact upon organisational outcomes that has not been adequately explored so far, and it frequently exists within a wider context of inconsistent infrastructural support. To date, investigations into the deployment of mobile technologies in the learning environment have not adequately explored the potential for a hesitant uptake of mobile devices for learning or information access to result from staff lacking capability or competence with mobile technology.

This research investigated two emerging areas of research and practice in VET librarianship: what mobile delivery skills are needed by library staff and what specific, on-the-job training is required to deliver those skills. Neither has been consistently explored to date. There is a pressing need to obtain empirical support for the planning, processes and professional development required to develop confident and capable staff in this area. Analysing the link between knowledge, acceptance and use of technology innovation will benefit the outcomes and goals of institutional capability development and professional expectations. The findings of the research will inform strategic planning processes, in detail, how staff respond to the concept of the m-library, their perceived levels of confidence and capability within this environment, their actual levels, and how best to address any gaps identified in a systematic and replicable manner.

The significance of this study lies in its contribution to the fields of library and information services, the Australasian VET sector, professional development, and technology adoption. The outcomes are four-fold. Firstly, through the provision of detailed information on the current technology capability of Australasian VET sector library staff and students, an area not extensively studied, understanding of specific aspects of the VET sector is enhanced. Secondly, analysis of factors that influence prediction of technology acceptance and usage offer an exemplar of how pre-planning for implementation can be informed by provision of empirical data. Thirdly, increased understanding of factors that influence workplace behaviour, particularly response to change, have the potential to be applied to other settings where the development of staff competencies is crucial. Finally, it is intended the findings and recommendations of this study contribute to the body of knowledge in the broader field of library and information science with particular reference to mobile libraries, workplace training, technology adoption and library service provision.

1.9 Definition of Key Concepts

The following brief list introduces some of the key concepts that are clarified and explored at greater length throughout this study.

Innovation

Rogers, whose corpus of work has focused on exploring innovation, diffusion and adoption, defines innovation as " an idea, practice, or object that is perceived as new by an individual or other unit of adoption" (Rogers, 2003, p. 12).

Qualified library staff

For the purposes of this investigation, qualified library staff were defined as employees of a library who have graduated from a formal programme of study through an accredited library and information studies tertiary education provider. This research focused on qualified library staff employed in a VET sector library.

Mobile learning

Mobile learning has been used to indicate "learning that is facilitated and enhanced by the use of digital mobile devices that can be carried and used anywhere and anytime" (O'Connell & Smith, 2007, p. 3).

Mobile library

The term "mobile library" is not new, it has existed for decades, describing a library on wheels; an outreach activity that physically took library resources and services to the user. The definition being explored in this study encompasses Foster and Evans' (2008) concept of introducing mobile applications into the library environment in a seamless way, integrating Wireless Application Protocols technology, developing appropriate gateways and browser functionality to route information seekers to appropriate information using a variety of devices from wherever they are located.

Mobile technology

For the purposes of this study, mobile technology describes highly portable, hand-held, web-enabled devices, of small screen size that allow the user to move from place to place while still accessing information. Such devices may include a number of features that allow contextualisation of information, for example, the inclusion of audio, image and video files, GPS, RSS feeds, social media and email access.

Nomadicity

The chief attributes of nomadicity include "independence of location, of motion, of platform and with widespread presence of access to remote files, systems and services … the ability to automatically adjust all aspects of the user's computing, communication and storage functionality in a transparent and integrated fashion" (Kleinrock, 1995, p. 37).

Professional development

The following definition has been considered useful for the purposes of this study:

> During training, PD may be focused on the development of competencies, knowledge, skills, and proficiencies, whereas subsequent developmental tasks center on the refinement of these competencies or on specialization. Later in practice, PD may refer to furthering skill development and attaining or updating of knowledge or to preventing the erosion of competencies as a part of lifelong learning. PD may also reflect efforts to expand, deepen, generalize, or redirect competencies and knowledge into expertise in areas beyond those encountered in formal education and training. PD activities may be promoted in classrooms, workshops, or continuing professional education programs or through professional and personal experiences such as reading, mentoring, and consultation. (Elman, Illfelder-Kaye & Robiner, 2005, p. 368)

Service delivery

Library services involve functionalities that include collecting, organising, preserving and making accessible a range of information resources. The delivery of these services to users is changing. This research focused on the move from physical provision of services to electronic, incorporating use of networking technologies to allow users to link to relevant information rather than having it provided for them.

Technology adoption model

Technology adoption or acceptance models are employed in studies aimed at predicting, explaining and increasing user acceptance of technology. The models measure and explain intentions in terms of attitudes, subjective norms, perceived usefulness and ease of use (Davis, Bagozzi, & Warshaw, 1989).

Vocational education and training sector

Traditionally, the VET sector in Australasia has provided practical, hands-on training, frequently linked with workplace training through apprenticeships and workplace experience (Australian National Training Authority, 2001a). It shares similarities with the Further Education (FE) sector in the United Kingdom; the closest corresponding sector in the United States is the community college. Where higher education (HE) is mentioned, reference is to the university sector. The VET sector maintains a close relationship with industry and local communities. Increasingly, the delivery of distance education is employing innovative use of technology to ensure equity of access to skills, knowledge and information.

Workplace training

Sometimes referred to as "on-the-job" learning:

> Workplace training provides employees with the required hands-on experiences necessary to develop the specific skills that are relevant to [an organisation's] needs. In practice, on-the-job learning typically involves using the participants' normal work-related tasks as a focus for learning, and recognising the skills that they develop through these tasks … Its primary intended outcome is performance improvement. It can involve all types of learning modes from self-initiated research through to discussion, demonstration and practise of work tasks (Clayton & Saravani, 2009, p. [136]).

1.10 Overview of Thesis Structure

The thesis is structured into seven chapters as follows:

Chapter One: Background to the study

The chapter introduces the problem under investigation and the rationale for the present study. It provides a contextual overview and outlines the aims and objectives, the research methodologies employed, definition of key concepts and the contribution of the findings to the field of library and information science.

Chapter Two: Mobile technologies, libraries and workplace skills development

The chapter reviews the literature related to the mobile learning environment, libraries engaging with mobile service delivery, distinguishing features of the VET sector, and the role of professional development in the acquisition of competencies. This chapter provides the context for the present study and illuminates the problem under investigation.

Chapter Three: Innovations and technology acceptance theories

This chapter considers the concept of innovation diffusion and theories developed to predict the likelihood of technology acceptance. It provides an overview of a range of theories and their development, while exploring one model in particular, the Unified Theory of Acceptance and Use of Technology (UTAUT). The component features of the UTAUT model, its determinants and moderators are examined. These models contribute to an understanding of the factors influencing an individual's acceptance and use of new technologies. Rogers' diffusion of innovations work is considered from an organisational viewpoint, to expand the view of innovation acceptance from the individual level to the unit or organisational level.

Chapter Four: Methodological framework and research design

Chapter Four describes the research philosophy, research design and methodological approach, including the design and implementation of the sample selection, data collection and analysis phases. It explains the rationale for adopting the specific qualitative methods and various techniques deployed in the course of the investigation.

Chapter Five: Findings

Chapter Five presents the findings from the two staff data collection methods using the grounded theory approach. The findings are presented in narrative form and the emergent themes are explained. The development of a theoretical concepts continuum based upon the

data analysis is discussed. Findings from the student survey data are presented and comparisons with staff observations highlighted.

Chapter Six: Interpretation and discussion of research findings

The major findings of the study are discussed and interpreted in Chapter Six. The integrated theoretical model that was developed through comparative analysis is presented. A modified version of this model based upon the technology acceptance and adoption theories that influenced the design of the investigation is also presented and discussed. The chapter highlights areas in which the findings reflect, differ from, reinforce and extend current knowledge of the field.

Chapter Seven: Conclusions and recommendations

The final chapter draws together and summarises the various findings of the study. It reflects on the process and significance of the investigation's contribution and identifies areas of future research.

CHAPTER TWO

MOBILE TECHNOLOGIES, LIBRARIES AND WORKPLACE SKILLS DEVELOPMENT

2.0 Introduction

This chapter examines and appraises a range of scholarly research and opinion pieces relevant to the several fields investigated in the present research, including: the impact of mobile learning upon vocational and higher education environments; the concept of the mobile library, with particular focus on the VET sector libraries: student culture and expectations of library service: professional development in relation to workplace skills development and attitudes towards technology usage; and the development and application of technology acceptance models. It is intended to provide both broad and in-depth coverage of factors germane to the present study. When examining the wider institutional environment in relation to mobile technologies, libraries have been viewed as a subset of their larger parent environment. Some of the particular staff challenges and issues resulting from the introduction of technology into the learning environment are likely also to exist within the context of the library and the applicability of the findings can be transferred to inform library decision-making.

Section one examines technology and its implications within the post-secondary education setting. The section focuses particularly on the place of mobile learning and the challenges for educationalists in harnessing opportunities successfully, on organisational infrastructure and supporting the mobile learner. The wider education environment provides the context within which academic libraries operate and the types of workplace, professional development issues faced by faculty contain similarities to those impacting upon library staff. The contextual focus is predominantly on the higher education sector, owing to limited VET sector sources, however, there is no doubt that both sectors are grappling with very similar issues regarding technology-related impact. Section two explores the mobile library and discusses the emergence and impact of mobile service delivery. Section three extends the investigation into the VET sector libraries and explores the unique attributes and challenges of this particular sector both within Australia and New Zealand. Section four discusses higher and further education student culture to position the expectations of library service delivery within a demographic framework. Section five examines professional development planning within the workplace, changes in work practices, how staff are motivated to learn and the best methods of delivery as discussed in the field. The impact of

technology upon organisational training is analysed and particular focus is placed upon the development of mobile technology skills acquisition. The final section closes with an examination of library staff competencies and their unique characteristics, as well as the use of mobile learning by library organisations within the broader library environment.

2.1 Technology and the Learning Environment

Institutions of higher learning, on a global scale, have recognised the importance of technology to educational delivery and have invested heavily in developing information and communication technologies in education (Evans, 2005; Facer, Faux, & McFarlane, 2005; Kim, Mims, & Holmes, 2006). This has been demonstrated by mandatory integration of technology into teaching at all levels of education and the rapid rate at which information, communication and technology (ICT) tools have increased in complexity and range. The proliferation of computing hardware within classrooms and the focus on professional development and support for teaching staff to enable effective use of technology within the curriculum has followed (Herrington, Herrington, Mantel, Olney, & Ferry, 2009; Ottenbreit-Leftwich, Brush, Strycker, Gronseth, Roman, Abaci, … & Plucker, 2012). The ability to offer learning that defies the traditional constraints of time and location has opened up new scenarios of educational delivery. The technologies that enable this to occur have been adopted with alacrity by some tertiary education providers eager to acquire the technology without necessarily first planning how it should best benefit students (Bhati, Mercer, Rankin, & Thomas, 2010, p. 6; Gaskell & Mills, 2009, p. 8; Jasinski, 2007; McDonald et al., 2009; Traxler, 2007a).

Governments around the world are acknowledging the contributory benefits of an educated, highly-skilled workforce to economic prosperity; this has resulted in life-long learning being universally accepted as a suitable model for attaining such a goal (Jasinski, 2007, p. 91). At the centre of this model are the learners; and surrounding and interfacing with these learners is a spectrum comprising traditional learning, workplace learning, informal learning and point-of-need learning. The ability to learn anywhere, anytime is increasingly regarded as a business-as-usual approach for many HE and VET institutions. In other words, the learner need not be divorced from their normal activities or routines, learning will be delivered in a manner that either enhances such activities or allows them to occur in tandem with the process of learning. The convenience that this type of learning offers adds to the appeal and the trend globally is towards the delivery of education through mobile devices that free up the time, the place and the means of the learning exchange (Sharples et al., 2005, pp. 2, 4; Traxler, 2008; Valk, Rashid, & Elder, 2010).

Organisational commitment at all levels to technology implementation emerges as a commonly-identified factor critical for the realisation of potential benefits. This commitment is of primary importance and is evidenced through developing strategic management initiatives, planning for technology implementation, having the supporting information technology (IT) infrastructure in place, enabling staff to engage in the necessary activities to incorporate technology effectively and meaningfully, and allocating funding to develop and maintain the technology-enhanced environment (Hodgins, 2008; Kirkland & Sutch, 2009).

2.1.1 Concept of Mobile Learning

Mobile learning continues to be regarded as an emerging field of research, with greater emphasis on the anecdotal than the theoretical or methodological (Muyinda, 2007). Researchers have described it as being "still in the period of criticism" and attribute the lack of integration of mobile learning into mainstream training and education to telecommunications developers seeing no commercial potential and, therefore, not investing in the development of educational applications (Keegan, 2005). The concept of mobile learning underpins the present study. The library operates within the organisational landscape and it is likely that those VET institutions that have understood and addressed the concept of mobile learning within their planning and objectives will have provided a conducive environment which enables active library contribution. The fact that many institutions, both higher and vocational education, are struggling to define the concept of mobile learning has had an impact upon library operations.

Educators have debated what aspects of mobile learning actually distinguish it from other forms, such as e-learning or traditional learning, that also allow the learner a variety of functionality options. It is widely held that a precise, universally-agreed definition is unlikely to be accepted, but certain key features do receive recognition by many working in the field. There is general agreement that mobile learning includes "learning using mobile and wireless computing technologies in a way to promote learners' mobility and nomadicity nature" (Lee, 2007, section 4.1).

In exploring the complexity of mobile learning, some scholars have focused on distinguishing contextual aspects (Huang, Kuo, Lin, & Cheng, 2008; Ting, 2013). Sharples et al. (2005) contested that mobile learning was more than simply a focus on technology and its characteristics. They offered a pedagogically-focused approach in that the learner and their experiences, background and context informed the characteristics of mobile learning, such that:

> Good m-learning uses good teaching and learning practices and makes the most of being mobile. It is the learner who is mobile rather than the device, and this key principle should inform all other m-learning principles (Sharples, Taylor, & Vavoula, 2005, as cited in O'Connell & Smith, 2007, p. 5)

and

> By placing mobility of learning as the object of analysis we may understand better how knowledge and skills can be transferred across contexts such as home and school, how learning can be managed across life transitions, and how new technologies can be designed to support a society in which people on the move increasingly try to cram learning into the interstices of daily life. (Sharples et al., 2005, para. 4)

A focus on the device distinguished the Australian Flexible Learning Framework's *Guide to working with m-learning standards* for use in Australia's VET sector. The Guide included handheld devices commonly in use and intentionally excluded the larger, more educationally-employed devices. It stated that:

> while 'mobile learning' could encompass all kinds of activities where learning happens out of a formal classroom situation, the terms 'mobile learning' … refer specifically to learning that is facilitated and enhanced by the use of digital mobile devices that can be carried and used anywhere and anytime. Such devices include: mobile phones, PDAs (personal digital assistants), iPods, MP3 players, smart phones. (O'Connell & Smith, 2007, p. 3)

Geddes (2004) defined mobile learning as:

> The acquisition of any knowledge and skill through using mobile technology, anywhere, anytime, that results in an alteration in behaviour. (Geddes, 2004, p. 214)

The eLearning Guild focused on the learner, interactivity and outcomes and offered the definition of:

> Any activity that allows individuals to be more productive when consuming, interacting with, or creating information, mediated through a compact digital portable device that the individual carries on a regular basis, has reliable connectivity, and fits in a pocket or purse. (eLearning Guild, 2008, p. 7)

From the various definitions and concepts that have been proposed by educationalists and theorists there appears to be general agreement that good mobile learning makes the most of location, providing immediate access, enabling connectivity, and acknowledging that learning occurs beyond (and in conjunction with) formal learning settings, in places such as the workplace, home, public spaces and the outdoors.

2.1.2 Mobile Learning in Higher Education

Higher and vocational education institutions have realised the potential power of tapping into telecommunications networks in order to reach students both for learning and communication opportunities where geographic and spatial realities cease to constrain interactions. The trends of mobile phone usage provide compelling evidence for the need to align strategic planning with new market opportunities. Growth in the development of mobile applications across public and private higher education sectors in the United States has been steady and in some cases, dramatic (Dahlstrom, 2012), and this is a global phenomenon (MobiThinking, 2013).

Mobile phone subscriptions in North, Central and South America have continued to skyrocket, going from 300 million in 2003 to approximately 750 million in 2008 and to 5.9 billion in 2011 (International Telecommunication Union, 2009, 2011). Sophisticated mobile connectivity has burgeoned exponentially (Benítez Juan, Clavero Campos, Codina Vila, & Pérez Gálvez, 2011) with, for example, more smartphones being sold in 2011 than personal computers (PCs), and, in the first half of the year, mobile Facebook use growing 166%, while mobile Twitter grew nearly 300% (MobileFuture, 2011, p. 10). The use of smartphones and other handheld wireless devices in New Zealand has grown from 7% in 2007 to 27% in 2011 (Smith, Gibson, Crothers, Billot, & Bell, 2011), while 52% of Australians over the age of 16 were using a smartphone in 2012 (CHOICE, 2013). Studies into student usage of cell phones reveal widespread ownership. A 2010 survey of 36,000 students across 120 United States' universities and colleges, found over 89% of students owned a laptop or netbook, and over 60% owned an internet-capable handheld device (Smith & Borreson Caruso, 2010, p. 9). Given these data were collected three years ago, it is reasonable to expect both these figures will have risen in the meantime.

The importance for higher education institutions to produce graduates capable of contributing to the modern workforce and society has prompted educational institutions to assume responsibility for promoting the adoption of new technologies and offering the benefits to their students (Meere, Ganchev, Ó Droma, Ó hAodha, & Stojanov, 2012, p. 182). In order to remain relevant in the information age, a transformational shift in vision has

swept across the education landscape. The learner has become the primary centre of focus. The new model being offered appears to focus on the learner demanding and the technology supplying seamlessly, differing from the traditional model of the technology defining and pushing with the learner accepting as their mobile device permits. The inversion of focus from technology delivery to student demand has forced a radical shift in planning and carries major implications for libraries shaping future service delivery.

Provision of support for mobile learning is multifaceted and a carefully-planned and delivered technology infrastructure needs to be considered. However, for both higher and further education providers, rebuilding the campus infrastructure to support mobile devices is expensive. Campus wireless systems involve easy access, persistent single sign-ons and the bandwidth and capacity to serve mobile users (Tamarkin & Rodrigo, 2011). This will include provision of telecommunications networks for connectivity, an online learning system and the development of content suitable for learning in a variety of circumstances. Additional requirements extend to the provision of trained instructors competent in designing material for online delivery to mobile devices and learners, and the availability of skilled support staff working closely with online course material and capable of delivering services to mobile technologies. From the learner's perspective, support structures may include access to appropriate devices and connection systems that permit mobile learning, and a network of supportive friends, family, employers, work colleagues and fellow students (Gaskell & Mills, 2009).

No common approach appears to characterise HE institutional mobile technology implementation. A number of HE institutions have first sought student views to guide evaluating the usefulness of the undertaking (Bennett, Bishop, Dalgarno, Waycott, & Kennedy, 2012; Booth, 2009; Gaskell & Mills, 2009, p. 9; Smith & Borreson Caruso, 2010). Debate has grown around the criticism that technologies have been introduced for their own sake and have failed to demonstrate any known benefit (Damodaran & Olphert, 2000; Ellsworth, 2000 as cited in Lawrence, 2008, p. 4; Gaskell & Mills, 2009, p. 23); a point of view that is related to the argument that pedagogy should drive the selection of online tools not the reverse (Bhati et al., 2010, p. 14; Gaskell & Mills, 2009, p. 65). The change in the concept of the learning environment from the traditional lecture theatre or classroom to the "anywhere" context extends the concept of learning from the classroom to the real world (Alexander, 2004, p. 31; Broda & Baxter, 2002). As a result, HE institutions have questioned whether to continue to invest in physical infrastructure or whether the funding would be better served in creating spaces with wireless, mobile connectivity (Alexander, 2004, p. 31; Middleton, 2011). The challenge for higher education is to provide the technological

infrastructure to enable easy access to learning resources by 'nomadic learners' (Kleinrock, 1995). These learners are using devices that were not initially designed as educational equipment (Clough, Jones, McAndrew, & Scanlon, 2009; Kukulska-Hulme, 2007: Muyinda, 2007; Peters, 2007; Traxler, 2007b) and their expectations that such devices will now handle this requirement need to be met seamlessly (Koole, 2006).

2.1.3 The Mobile Campus

The mobile campus does not exist as an isolated concept; it comprises the confluence of staff, students and technology combined to produce effective learning outcomes, and relies upon multi-layered support, including technically-competent staff. Technical competency of faculty and support areas is a potential indicator of greater institutional ability to meet student expectations. However, despite the overwhelming evidence of mobile devices forming part of the daily experience of learners, institutions of higher learning still appear to be hesitating in embracing the changes required to accommodate these devices in online and traditional classes (El-Hussein & Cronje, 2010; Little, 2011). A number of authors have argued that the reasons behind such slow uptake across the tertiary education sector include the lack of technical familiarity on the part of the teaching staff (Herrington & Herrington, 2006; Smith & Borreson Caruso, 2010; Tatum & Morote, 2007), a focus on administrative rather than pedagogical activities when attempting to incorporate into classroom activities (Simpson, Payne, Munro, & Hughes, 1999), the rapid change in learning practices but the slow change in learning theories that support educational practices (El-Hussein & Cronje, 2010), and the pervasive view that mobile devices are disruptive and encourage poor learning behaviours (Eliasson, Pargman, Nouri, Spikol, & Ramberg, 2011; Frohberg, Göth, & Schwabe, 2009; Sharples, 2003).

Students expect staff to be skilled in integrating technology into the curriculum. A number of qualitative studies into university student perception of technology integration into courses revealed dissatisfaction both with the level of technology skills among teaching staff and the way in which technologies or social software were being integrated into the educational context (Gosper, Malfroy, & McKenzie, 2013, p. 278; Jones, Blackey, Fitzgibbon, & Chew, 2010, p. 781; Kukulska-Hulme, 2012). Research has shown that the benefit to students in using new technologies is greatly dependent on the technological skills of the teacher and the teacher's attitudes to the presence of technology in teaching (Gibson, 2001).

Other authors have queried Prensky's (2001) suggestion that a digital divide exists between those who have grown up with a familiarity and comfort with technology (digital natives) and those who have had to acquire such familiarity through overcoming resistance and habit

(digital immigrants) (Margaryan, Littlejohn, & Vojt, 2011). An Australian study across three universities revealed that such a divide did not exist; that teaching staff, far from demonstrating resistance towards technology, were, in fact, highly skilled and knowledgeable and positive in their attitudes (Waycott, Bennett, Kennedy, Dalgamo, & Gray, 2010) and that age and gender had no impact upon Web 2.0 technology use (Kennedy et al., 2008). The research revealed the important results that students, likewise, did not fit into the expected mould and showed no strong desire to engage with mobile-enhanced learning. The value of these findings was in highlighting the fact that theory could too often cloud reality by fostering myth and, consequently, delay useful progress. Extrapolation from controlled and rigorous testing allows a sector a more uniform level of understanding.

A defining aspect of mobile learning on the HE campus is where the learners can learn with the technologies rather than from them (Herrington et al., 2009; Kim & Reeves, 2007; Smith & Borreson Caruso, 2010). The inclusion of authentic scenarios that foster critical thinking and personal investment in the experience is critical (Dede, 2005). The classroom, as a physical space, along with the library and other mentoring spaces, is rendered obsolete by mobile learning. The virtual learning space, including wireless networking and digital content, has replaced the former traditional location (Brown, 2005).

2.1.4 Challenges and Opportunities

Acknowledging and addressing challenges and opportunities in changing environments assists successful change management. At the highest level, lack of standards and lack of senior management endorsement appear among the main barriers to effective implementation of mobile learning in HE (eLearning Guild, 2008). Managers who have demonstrated commitment on both the tactical and the operating strategic levels have a crucial impact upon the acquisition and implementation of technology within an organisation (Haro-Domı´nguez, Ortega-Egea, & Tamayo-Torres, 2010). This can be far-reaching in the ability of an organisation to prioritise or resource activity, or for staff to believe that benefits can be achieved through involvement in that activity.

Lack of instructor confidence and lack of training and technical difficulties with devices have been reported by HE and further education institutions as limiting uptake and implementation (Baylor & Ritchie, 2002; Berthelsen, 2008: Bhati et al., 2010; Jones, 2004; Kukulska-Hulme & Pettit, 2007). Other limiting factors have been identified as age and ability of teachers and trainers (Al-Qeisi, 2009; Facer et al., 2005; Hall & Mansfield, 1975; Herrington & Herrington, 2006; Morris & Venkatesh, 2000; Peters, 2007; Porter, 1963; Walsh, 2008).

Facer, Faux and McFarlane (2005) studied the challenges and opportunities of mobile learning and identified a general lack of confidence in teaching with handheld devices ranging from uncertainty amongst educators in relation to technical aspects through to understanding how best to utilise the technology in a meaningful way within the curriculum (2005, p. 4). Staff familiarity with technology appears to be crucial to effective service delivery. It is the contention of this investigation that such familiarity is crucial in all areas of the institution, in support as well as teaching areas. Gaining skills in the workplace is a key to success, and successful implementation depends upon competence.

A range of approaches facilitates the implementation of mobile learning within the educational setting. The 'champions' approach, that incorporates early adopters testing and trialling the deployment of instruction, has been adopted by many HE institutions (Bothma & Cant 2011; Kennedy Manzo, 2010; Whitworth, Garnett, & Pearson, 2012). While this approach allows for flexibility of implementation, it can suffer from lack of support and planned infrastructure, leading to short-term projects that may eventually founder through lack of sustained resourcing (Keegan, 2005). The appointed champions run the risk of finding themselves overloaded with work and expectations for which they are unprepared and under-resourced. The use of champions has also emerged from research into the Australian library and information workforce, with such positions being identified as internal mentoring or informal work buddies (Hallam, 2009, p. 87). The NeXus report showed 43% of the TAFE libraries surveyed supported internal mentoring programmes (Hallam, 2009, p. 88).

Mobile web best practice has been addressed by the Australian Flexible Learning Framework for the VET sector. The reports recommended basic principles of resource creation for mobile devices to assist learners, teachers and course designers in judging whether the mobile learning developed was good practice. These included whether mobile learning enhanced the context or authenticity of learning, enabled flexible and convenient use, leveraged the power of mobile devices, supported equal access to learning, responded to the diversity of the learner group, and increased the availability of m-learning resources to the community likely to use them (Low, 2007; O'Connell & Smith, 2007, p. 8). Such recommendations as these include rationale and best practice that are applicable to the library setting in the effective development and delivery of library services to mobile devices. Similar guidelines to inform practice and policy regarding emerging technologies and the Net generation in higher education arose from the premise that current HE staff were ill-equipped to educate the new digitally-oriented generation of learners (Kennedy,

Dalgarno, Bennett, Gray, Waycott, Judd, … Chang, 2009). Again, the ill-preparedness of staff in relation to technology and student expectations is a situation affecting more than faculty, it extends to the library and other support areas facing the requirement to up-skill.

To be effective, mobile learning must be seen to add benefit. A number of projects designed to highlight the benefits of including mobile learning have been implemented in HE institutions world-wide and have suffered disappointing results when they have proved unsustainable and non-transferable across the institution (Gaskell & Mills, 2009; Keegan, 2005). In some cases, the institutions have concluded this stemmed from a technology/learner mismatch. In other words, the learners did not perceive the mobile learning opportunities created for them met their needs or provided any additional benefits. Avoidance and lack of take up was the response, with students proving disinclined to engage with the opportunities (Booth, 2009; Kern & Stephens, 2008; Koole, 2006). This issue has been raised in an opinion piece by Lippincott (2008a) on the unique situation that arises when technology regarded by the user as personal and individualised needs to be integrated with institutionally-based systems, with user frustration resulting from failure to do so seamlessly.

The majority of published research and opinion pieces on mobile learning have identified exciting opportunities. Constant connectivity, location-awareness, limitless access and interactive capabilities are benefits offered by the mobile web (Kroski, 2008). Increased freedom and flexibility for learning can lead to greater collaboration, motivation and to personalisation of learning (Gaskell & Mills, 2009). Findings from a number of studies have indicated that students equipped with internet connectivity and a range of learning applications on their mobile devices will engage more meaningfully with both learning opportunities and their fellow students (Kennedy Manzo, 2010; Kim, et al., 2006; Naismith et al., 2004); a hallmark of authentic learning environments (Herrington & Herrington, 2006; Traxler, 2007b, p. 18). The augmented range of learning environments enables interaction with a variety of contexts that can be shared, including students working in the field, at a distance, within the workplace, home, laboratory, classroom, library, in transit, between classes, and which facilitate crucial outcomes such as independent learning.

2.1.5 The Nomadic Learner

One of the challenges higher education institutions face today is meeting the requirements of increasing numbers of learners whose lifestyles are nomadic (Milrad, 2006). The nomadic condition has been represented as universal in that all people are mobile and communicate, and desirable as a result of the independence offered in place, time and device (Kleinrock,

1995). This apparent independence relies upon robust computing and telecommunications infrastructures with the essence of a nomadic environment being the ability to adjust automatically all aspects of the user's computing, communications, and storage functionality in a transparent and integrated fashion (Farance, 1996; Kleinrock, 2001). Five areas are identified as being crucial to nomadicity: location of the user, communication device being used, communication bandwidth available, the computing platform and whether or not the user was in motion. Kleinrock (1995) acknowledged the context or surroundings impacting upon the nomadic user as contributing to the logical parts of a nomadic system. This model promotes user demand rather than technology push and has challenged many information technology departments to develop policies and infrastructures that include ease of access from a variety of locations on a range of devices.

Alexander (2004) gave his opinion on the convergence of technology and expectation bringing into focus those who were using mobile devices within HE and expecting to access the services. He saw the new generation of students challenging traditional infrastructures through being:

> creative, communicative participants rather than as passive, reception-only consumers. We lack a term for describing the world as a writable and readable service, encompassing mobile phones forming communities, P2P handheld gaming, moblogging, and uploading to RFID chips. For now, and to retain the educational focus, I will use *m-learning*….The physical vs. the digital, the sedentary vs. the nomadic - the wireless, mobile, student-owned learning impulse cuts across our institutional sectors, silos, and expertise-propagation structures. (Alexander, 2004, pp. 29, 34)

Alexander posed the question of whether the traditional education environment was ready to accommodate the "digitally nomadic swarms of arriving students" (2004, p. 34) thereby implying that providing such students with the flexibility they were expecting remained a work in progress.

In summary, mobile technology has caused major impact upon the education environment. Powerful, networked technology is accompanying students onto campus; students are engaging with this technology in meaningful ways, and they expect to incorporate it within their learning. Educators face the challenge to remain relevant and effective within this changing environment. They need to learn the capabilities of the technology, to become competent in its use and to tailor learning materials to suit. The traditional boundaries have

fallen away; the concept of physical space is altered, the means of delivery have changed. In many cases, staff are constrained by lack of competence and training, varying degrees of awareness of potentialities of the new environment and, possibly, limited knowledge of student expectations. The following section focuses upon the role of libraries within this changing environment.

2.2 Mobile Libraries

Libraries across all sectors have seen a steady rise in the implementation of mobile services (Ally, 2008b). Initially the trend gathered momentum within the medical library sector with the need for both up-to-date information and mobility required within the health environment (León, Fontelo, Green, Ackerman, & Liu, 2007; Roberts, 2006; Spires, 2008; Tao, McCarthy, Krieger, & Webb, 2009) and slowly began to filter into the public and academic sectors (Douch, Savill-Smith, Parker, & Attewell, 2010; Murray, 2010; New Media Consortium. Educause Learning Initiative, 2008). Momentum gathered pace as studies revealed that high numbers of students attending tertiary education owned mobile devices (Booth, 2009; Wishart & Green, n.d.). Mobile library initiatives also began to feature across campuses and Kroski's report on libraries and mobile technology (2008) provides an excellent coverage of potential and existing activities and planning.

The mobile library is faced with many of the challenges described earlier in the overview of mobile learning. It has also attracted a range of definitions as researchers attempt to define the essence of the mobile library. An understanding has been sought as to what characteristics distinguish it from the traditionally-understood library with its physical presence and acknowledged custodianship of knowledge (Traxler, 2008, p. 48), and what aspects embed it within future models of information access. Once again, the impact of technology has been emphasised, such as in the statement that "m-libraries are libraries that deliver information and learning materials on mobile devices such as cell phones, PDAs, palm top computers, and smartphones to allow access by anyone from anywhere and at any time" (Ally, 2008b, p. liii). The wireless connectivity aspect has been emphasised by other authors who have offered that m-libraries are "e-libraries without the need of cables" (Jaradat, 2012, para. 3). A comprehensive shift has been noted, not only in technology and access but also in the structuring of services, collections, organisational collaboration and integration. The suggestion has been made that the mobile library "occupies a similar and possibly overlapping territory with mobile learning; a territory where technology expertise meets academic expertise, where "know" meets "know-how" (Traxler, 2008, p. 44).

A distinguishing feature of the mobile library is the presence of a wireless environment (Raisinghani, 2002; Shaw, 2006). The availability of RFID to enable fast access to information is also likely to feature (Miura, Kunifuji, Shizuki, & Tanaka, 2005). The digitisation and storage of information and training materials, already well underway with the advent of computerised learning systems, will continue and include enabling access by mobile devices (Ally, McGreal, Schafer, Tin, & Cheung, 2008). The ability to utilise personal, powerful computing devices suggests that student users will approach their learning differently and, not unreasonably, expect a unified provision of support across the entire institution. For example, when a tutor utilises systems that set assignments involving video capture, file transfer and assessment by handheld devices and storage on local servers, then the expectation is that other areas of the institution will also enable similar utilisation of mobile devices and data access.

As yet, there is little common ground being demonstrated across the library community in relation to mobile technologies. An increasing number of libraries are undertaking research to understand the potential opportunities enabling mobile access to services offers, while others, subject to a variety of constraints, have preferred to wait and watch (Cao, Tin, McGreal, Ally, & Coffey, 2006, p. 1289; Carlucci Thomas, 2010).

2.2.1 Mobile Technologies and the Academic Library

Worldwide, libraries have been in the vanguard of initiatives to digitise and preserve physical materials, to store them in online repository systems and to make them freely-accessible via the Web (Aldrich, 2010; Emanuel, 2010). A growing body of research indicates the academic library sector has engaged in early and sustained ventures into assessing the changing nature of the library, its response to a range of pressure points and the future shape of service provision. The introduction of computing technologies, provision of online delivery and planning for altered physical spaces appears well embedded. Not all studies agree with this view, however, and in urging the key benefit of mobile learning as being its potential for increasing productivity by learning available anywhere, anytime, researchers warn it is a resource that relatively few academic libraries are taking advantage of (Cao et al., 2006, p. 1289; Lever & Katz, 2007). This view is echoed by Arms, Calimlim and Walle (2009) who make the claim that, in a world in which rapid technological change is the norm "All libraries are inflexible and digital libraries are no exception. They require big investments of time and money and react slowly to changing circumstances" (para.7). The challenge to enable digital access to users on the move combined with the presence of students with handheld devices integral to their personal lives and learning environments has focused many library administrators on the implications of this phenomenon.

Institutional-level mobile strategy and policies influence a library's approach to planning for library service delivery to mobile devices. Knowledge of institutional planning is essential and involvement in planning is preferable (Lippincott, 2010). Libraries are in a unique position, with their direct, daily involvement with learners, to understand the importance of the future of delivery being learner-, rather than IT-management, focused and to take a proactive approach to mobile development (Canuel & Crichton, 2010). Their knowledge of service provision brings an understanding of considering not so much "how well the campus supports what it has provided" but rather "how well the campus supports [the student's] personal technology needs" (Hitch & McCord, 2004, p. 7).

Gaining a clear understanding of the features of their unique faculty and student culture is recommended as the first place for libraries to commence planning (Booth, 2009; Lippincott, 2008a, p. 2). Acquiring information on the various student cohorts, their context within the campus, level of study or research is a basic starting point. Additional requirements such as technical access needs, mode of learning, preferred learning style, access to and familiarity with technology should be collected (Canuel & Crichton, 2010). Once this range of data has been gathered and analysed, only then should libraries commence planning for content and service development for mobile devices. This requirement echoes the institutional need to acquire such detail discussed earlier.

As higher and further education institutions gather pace in the creation of course delivery for mobile devices, opportunities arise for libraries to contribute through the provision of mobile content and services, instruction and quick reference guides, loan of mobile devices possibly preloaded with digital content, mobile-formatted reference materials and video casts, formatted request forms, and access to large repositories of digital content (Lippincott, 2008a). Similar opportunities arise to collaborate closely with faculty, e-learning and IT staff in the provision of secure, accessible and stable digital learning resources (Latham & Poe, 2012; Newton, Miller, & Bracke, 2011). This may raise issues as to the best configuration of academic support services (Dempsey, 2008, p. xxviii). Challenging traditional library structure through lateral connections and diminishing departmental boundaries is a potential result of technology integration (Mbambo-Thata, 2010).

2.2.2 Development of Mobile Services

The literature reveals academic libraries are well under way with investigating, developing or implementing mobile services. Examples such as the Open University (UK), Universities of Bath, Oregon, North Carolina State, Duke, Ryerson, Yale, and Athabasca demonstrate

how libraries are influencing the direction their parent institutions are taking with mobile learning. A 2010 survey of academic and public libraries revealed 44% academic libraries were currently offering services for handheld devices with another 21% planning to offer (Carlucci Thomas, 2010). Libraries have traditionally been promoters of ease of access, creators of information resource availability, engagers with communities, social networkers, developers of systems and services, connectors of tools, people, technologies and information. Libraries have long delivered services to distance learners and so the concept of learners who want access to information at any time, from anywhere and to any device does not constitute a major shift in focus or planning (Raubenheimer, 2012).

As information becomes increasingly mobile and social (Walsh & Godwin, 2012) it is important that libraries understand user requirements as regards information delivery to mobile devices. If they are successfully to offer the online services their users are increasingly expecting, libraries need to leverage the technology their patrons are comfortable and familiar with (Kroski, 2008; Mbambo-Thata, 2010, p. 467). They will be assisted in this task by an awareness of the types of devices students own, the manner in which they use them - whether for educational or social purposes, any usage problems and information on whether students who use mobile devices also access library services. This means surveying users, analysing data, developing a clear understanding of the local culture, expectations and requirements and planning how best to meet these needs (Dresselhaus & Shrode, 2012). Such manner of research is being completed more frequently, usually employing a qualitative approach. Booth (2009, p. 23) has observed that the "vast majority of library research is practical, observational, descriptive and nonexperimental in character, and is conducted to varying degrees of intensity based on local needs, buy-in and resources"; a view confirmed in the literature examined to inform the present study.

Technological changes have a major impact on libraries and require a sizeable commitment. According to Seeman (2002), technology is not here to make things easier for librarians; it is here to make things easier for the end-users. The many different users, all with different needs, and the impetus of technological change challenge libraries to keep current (Cunningham, 2010). Bradley University surveyed 766 US academic librarians in 2008 to investigate their awareness of how patrons were using handheld devices. Fifty per cent didn't know how their patrons were using mobile devices, 59% had not reformatted library content, and only 2.1% of academic libraries surveyed were committed to providing services to mobile devices (Spires, 2008). Four years later this scenario had changed. From 74 academic libraries across the states of Idaho, Washington and Oregon, about 50% offered a mobile-friendly version of their website and/or catalogue, 38% offered reference assistance through

text messaging/SMS and 18% offered other mobile services. Approximately 31% of the academic libraries participating did not offer any mobile services (Ashford & Zeigen, 2012).

Three general areas of opportunity have received the most attention from HE libraries in redeveloping services to students: mobilising content, mobile services, and systems and environment (Choy, 2010; Lippincott, 2008a). Content requires reformatting, relicensing, redesigning, and customising to enable access by small mobile devices. Many libraries choose to start their mobilisation project with the library website, the first point of access with the library for many students (Aldrich, 2010; Dresselhaus & Shrode, 2012). Through the main web page the majority of libraries offer access to the catalogue, a range of databases, information or news about the library, physical location details, help files, tuition resources and reference assistance (Aldrich, 2010; Bridges, Rempel, & Griggs, 2010; Houghton, 2012; Little, 2012). Given the limitations of some mobile devices, a number of HE libraries surveying their students have found not all aspects of the library site are equally useful, requiring a decision as to what to reformat and offer to a range of devices (Spires, 2008; Wilson & McCarthy, 2010). The need for web services that "are easy to read, easy to navigate, and that provide timely information" was highlighted by Ball State University Libraries (West, Hafner, & Bradley, 2006, p. 103).

Athabasca University, Canada's Open University, has implemented a range of digital resources and library services suited to mobile devices: the digital reading room (DR), the digital references center (DRC), the digital thesis and project room (DTPR) and AirPac (mobile library catalogue application). The format of the library website was rendered appropriately to mobile devices through the development of auto detect and reformat (ADR) (Cao et al., 2006, p. 1290; Tin, Sheikh, & Elliott, 2008). Oregon State University Library developed their mobile web site in stages based upon usage statistics from the desktop website, stakeholder feedback and scanning the literature on mobile library trends. Their approach included initial development of location-based information, and later expanded to include catalogue searching with additional functionality (Bridges et al., 2010, p. 314). Kroski (2008) has summarised numerous academic library mobile initiatives.

The continuing development and incorporation of mobile applications, although heavily resource-dependent, indicates the strong commitment of Australian HE libraries to mobile delivery of services and resources (Yee, 2012). The services readily identified with libraries in general include mobile library tours and instruction, online catalogues, proprietary databases, e-books, learning materials, text messaging, audio tours and web sites available either through in-house conversion or auto-convert services (Kroski, 2013; Traxler, 2008).

Value-added services for library users include mobile service surveys (Raubenheimer, 2012), moblogging, RSS alerts, wikis, podcasts and videoconferencing via Skype Mobile with a member of the library staff (Abram, 2005; Chandhok & Babbar, 2012). With most cell phones now including a camera, the provision of QR codes to provide context-awareness has become common practice both within the physical and digital library presence (Carlucci Thomas, 2010; Cartwright, Cummings, Royal, Turner, & Witt, 2012; Raubenheimer, 2012; Walsh, 2009).

Library staff appear to have taken note of which mobile services students were accessing and gradually responded to this in their service delivery (Ashford & Zeigen, 2012; Little, 2011). While the majority of academic libraries have pursued the option of website redesign (Murray, 2010; Sheikh & Mills, 2012), some have developed specific applications for iPhone or Android smartphones (Connolly, Cosgrave, & Krkoska, 2010; Dawei, Qiang, & Xianyun, 2012). In designing content for mobile devices, certain criteria should drive strategy; including ensuring a simple and intuitive design, removing any non-essential information, simplifying navigation and offering touch friendly design (Greenall, 2010). Prototypes are essential in testing layouts (Moffatt, 2012). Users may be using the technology in a range of situations that compromise accessibility: on the move, poor lighting or visibility, in a crowded situation, in a hurry. These factors need to be taken in to account when redesigning content and web sites (Ally, 2008a; Dempsey, 2008; Kleinrock, 1996). In addition, authentication methods need to work seamlessly with single sign-on a mandatory feature; a requirement often hampered by difficulties with institutional protocols, firewalls and proxy servers, and third party content provider software not working with the institutional sign-on (Sheikh & Mills, 2012).

2.2.3 Impact and Implications of Mobile Service Delivery

Libraries face a range of considerations when planning for successful service delivery to mobile devices. Meeting students' needs as customers has been identified as a long-term challenge by Further Education (FE) library staff (JISC, 2011). Data-informed assessment is required of the actual benefits offering a range of mobile services provides to students. The noted lack of research on the sustained impact of technology on learning (Kennedy Manzo, 2010) is pertinent to the library profession and its approach to the impact of technology on service delivery.

The absence of an institutional digitisation strategy might indicate that influential members of staff are insufficiently convinced of the importance of a unified approach, and this will

have an impact upon the library's endeavours. The Joint Information Systems Committee (JISC) Attitudinal Survey 2008 of head and senior learning and librarian staff from 201 United Kingdom FE institutions (comparable to the Australasian VET sector) found over half the FE institutions had no digitisation strategy in place and almost a quarter of the library staff surveyed were unsure whether their institution had developed such a strategy (JISC, 2008, p. 5).

Earlier e-learning implementations in HE have been marked by a lack of understanding about future directions or next steps to take (Chesemore, Van Noord, Salm, & Saletrik, 2006, p. 4). It appears a similar situation exists in mobile learning, where much discussion of trends or ad hoc projects has occurred but evidence of actual, systematic planning for implementation is sparse (Association of College and Research Libraries (ACRL) Research Planning and Review Committee, 2012). Standards develop slowly and library planners face the issue of paucity of frameworks or standards informing design of library service delivery to mobile devices and nomadic learners at a national or international level (Kroski, 2008, p. 7). Where libraries struggle to understand the best approach, options of limiting their activities may be useful. These include not attempting to mobilise all services, but to leverage what others have developed and to focus development on the dominant types of mobile devices (Menefee, 2011). This advice is also relevant to those libraries with limited resources.

In planning the development and delivery of mobile services, library managers face a range of financial challenges. Many libraries are facing the issues of moving services into the mobile environment at a time of funding reductions and a requirement to deliver the same or improved level of service with less resourcing (Carlucci Thomas, 2010, 2012; Houghton, 2012). The impact of these constraints is a focus on more efficient, streamlined business processes and includes technologies that free up staff time, make existing systems more efficient and cost effective. Costs associated with technology-related services need to be established realistically so that value for money can be calculated (JISC, 2011, p. 5).

Identifying and developing competencies for the twenty-first century library and information science (LIS) professional has emerged as a major and continuing concern (ACRL Research Planning and Review Committee, 2012). The JISC report, referred to above, highlighted one of the greatest challenges facing the sector was keeping up-to-date with new technologies and incorporating them into library services (JISC, 2008, p. 4). This challenge appears not to have been addressed for, when surveyed two years later, library staff remained of the same opinion (JISC, 2011, p. 8). Training and development of staff in the use of technology

emerged as the third most-acknowledged concern across the FE sector in the UK (JISC, 2011, p. 9). Specifically, the requirement for additional training for library staff in how to develop and deliver high quality mobile learning resources and services, combined with improving/maintaining the quality of existing provision of services, continued as a critical factor. This issue had been noted in other studies where a lack of highly-skilled, continually retrained staff members remained a crucial factor to be addressed in an organised manner (Chesemore et al., 2006, p. 5; Cunningham, 2010). A WebJunction survey of American library professionals found respondents identified skills training as crucial. This included synchronous, facilitator-led asynchronous, or self-paced training. Respondents reported learning by trial and error, and needing a significant amount of training and support to move to an e-format (Chesemore et al., 2006). The provision of professional development to address the impact of increased use of ICT was identified as important by 70-80% of TAFE library staff in a survey of Australian library sectors (Hallam, 2009, p. 86).

2.2.4 Personalisation of Library Services

Students enter the HE education environment equipped with devices integral to their lifestyles, personal interests and social networks (Kukulska-Hulme, 2012; Lippincott, 2010). When the answer to "Why go mobile?" is "The users" (Menefee, 2011) much of the current focus on the future direction of services becomes clearer. Studies of student use of handheld devices have shown the perceived benefits are immediate, personalised access to information at point of need (Menefee, 2011). It would appear students are using their internet-enabled smartphones for a range of web and mobile communication purposes. Findings by Booth (2009) caution that a connection should not be made between student technology adoption and the use of technology-based tools that enable research and information help (p. 94). Knowing the user's context is crucial (Booth, 2009; Lippincott, 2008a; Menefee, 2011). While libraries gather information on user preferences through analytics or usage data, much of the activity students are engaging in through their interconnectedness relates to targeted services. Such services provide relevance, are meaningful to the consumer and this is a feature that libraries are urged to consider. Dempsey (2008) surveyed user consumption and learned that convenience was a key factor. The findings indicated that students would increasingly seek resources that were relevant, socialised, personalised, location-aware, synchronised and syndicated, and which could be customised to the users' preferences (p. xxxvi). As students increasingly skimmed across information, academic libraries were encouraged to consider adapting their resources to accommodate this pattern, through atomising, recombining, reformatting and providing socialising layers (Dempsey, 2008, p. xxxix), enabling a dynamic dimension to the traditional resource discovery layer. The movement involved in experimenting with dynamic, collaborative, user-generated content

and social tools for provision of web-based library services has been termed 'Library 2.0' (Broady-Preston, 2009: Casey & Savastinuk, 2006; Griffis, Costello, Del Bosque, Lampert, & Stowers, 2007; Kim & Abbas, 2010).

2.2.5 Barriers to Mobile Services

The continuing challenge facing libraries is what constitutes an effective mobile library and what role it should play in relation to supporting mobile learning and teaching (Cao, Ally, Tin, Schafer, & Hutchinson, 2008; Lippincott, 2008b, 2010). As mobile devices become both more common and more capable, with users not only seeking and consuming information but also reformatting and generating information, fundamental questions are raised about the continuing relevance of the academic library. At the same time, however, opportunities abound for the library to take a lead within the institution, from provision of content, devices, storage, access and learning spaces, to task force leadership role (Lippincott, 2008a, p. 4).

In 2008, Lippincott noted few libraries were offering licensed content for mobile devices. This situation has changed in the intervening five years, although the lack of funding indicated as a barrier in earlier e-learning studies (Chesemore et al., 2006), remains relevant in the mobile environment. The development of libraries working closely with aggregators and content providers has seen a move towards making aggregated online database information available to handheld devices, although technical problems, such as file size, format and readability, still remain (McGreal, Cheung, Tin, & Schafer, 2005; Ryan, 2010).

Lack of funding, staff time and expertise have previously been identified as barriers to the implementation of e-learning activities such as information literacy programmes by library staff, with specific mention of the difficulty in gaining release time to prepare material and develop programmes (Chesemore et al., 2006, pp. 4-5). The literature on the impact of mobile learning upon staff capabilities and internal operations of the library has been less conclusive in specifying barriers (Carlucci Thomas, 2010; Mbambo-Thata, 2010; Saravani & Haddow, 2012; Yee, 2012). However, it is the contention of the present study that lack of expertise will be an influential factor in the development of mobile service delivery.

2.3 Vocational Education and Training Sector Libraries

According to Bundy (2012, p. 139) "the role and status of Tafe libraries remains a pedagogical and funding challenge and quite variable across Australia. There are no national standards for their provision". The diversity of operational arrangements distinguishes the TAFE library sector from the HE sector. Of the 74 providers in Australia there is no unified

national structure but rather arrangements that include alignment under State federations, co-operative arrangements, standalone bodies, joint use facilities and dual sector institutions (Kloppenborg, 2009, and 2010). This results in uncertainty as to how the TAFE student will access library services. Many TAFE libraries house special collections as a result of the close alliance to practical teaching and industry engagement. The role of the librarian has expanded to become a facilitator in the learning process, a conduit to using technology and resources and a teacher in information literacy and research skills, and a provider of technical support (Kloppenborg, 2009, p. [10]; Pang & Johanson, 2008, p. 12). A similar emphasis has occurred in the ITP library sector as the impact of multiple and increasingly-sophisticated technologies has resulted in reassessment of roles and practice (Saravani, 2008).

The VET sectors in Australia and New Zealand have not been extensively investigated in regard to the impact of technology and VET sector libraries remain virtually unexplored. Given that New Zealand has experienced the same government directive as Australia towards a skilled, work-ready population and an emphasis on life-long learning, this is an area that would benefit from study. The issues facing the TAFE library sector are in evidence across the Tasman in New Zealand ITP libraries; the two sectors display commonalities of culture and practice (Vocational Education and Training Workforce. 2011).

A review of performance measures for New South Wales TAFE libraries in 1997 criticised the scarcity of literature on both the subject and the sector (Bannister & Rochester, 1997) and, since then, it would appear this deficit has not been strongly addressed. While the National Centre for Vocational Education Research has disseminated research and statistics on the VET sector; this has not included the library and information field.

The VET Policy Advice Project in 2001 investigated Australia's progress in regard to using ICT in flexible learning and delivery of a customer-focused product. In dealing with the sort of educational changes that would be required to accomplish this shift, a range of issues were identified, including opportunities for teachers to learn about technology, access to technology and library resources, and creation of appropriate educational resources (Australian National Training Authority, 2001b).

In 2008, the TAFE libraries' mission was identified as supporting the development and training of skilled workers and professionals in the Australian workforce through the 70 Institutes. A shift in role of TAFE libraries was noted with a move to a supportive environment for workplace learning. Library staff were described as becoming facilitators to

learning, assisting in the use of technology, providing information literacy instruction and access to learning resources (Hannan, 2008, p. 10).

The move to develop Web 2.0 technologies into library services highlighted the challenge of staff within one TAFE library finding time to develop and maintain new resources (Summers-Morrow, 2008, p. 12). The study found staff displayed enthusiasm for some of the new software that enabled online resources to be developed and offered as part of a more social learning environment for students accessing the library. However, problems with institutional IT policies locking the library out of access to social sites such as Facebook, YouTube and any form of chat or messenger service caused frustration for staff. On the other hand, enthusiasm was expressed by libraries in TAFE NSW committed to embracing new technologies, interactive learning, distance education and adapting to the new challenges of training delivery methods (Debenham, 2008, p. 21).

A Peak Bodies Forum Paper produced in 2009 by the Australian Library and Information Association (ALIA) TAFE Libraries Advisory Committee, collated information from across the sector relating to key issues and trends and future directions. What consistently emerged were reductions in funding and staffing, an aging staff, a move to technology for resource delivery, declining use of physical library space, developing roles in Web 2.0 technologies, ICT training and support, and in knowledge management, copyright and intellectual property (ALIA TAFE Library Advisory Committee, 2009b). A review of the impact of higher education provision within TAFE mixed sector institutions (institutions that offer VET and HE provision) revealed libraries were reshaping their services in response to the new demands with the need to access increased funding emerging as an issue (Kloppenborg, 2010).

2.3.1 Staffing

As noted above, the VET library sector comprises an aging staff. This feature is not unique to the VET sector; the literature on the library profession generally indicates that when people enter the profession they remain within it for considerable time. For example, Chan and Auster (2006) in their study into Canadian public libraries reported over half of librarian respondents (58.1%) had been employed for 15 years or longer (p. 160). Similar trends of lengthy tenure are evident throughout the HE and FE sectors. Reduced staff numbers and low recruitment rates have resulted in an aging VET workforce (Toner, 2010). Library sectors across Australia have shown similar trends, with a majority of staff being employed for more than 16 years across all library sectors (46.8% for TAFE libraries) (Hallam, 2008). This feature has implications for professional development as discussed later in the chapter.

Lower staffing levels, in comparison with HE institutions, was a feature of the TAFE and ITP library sectors (Kloppenborg, 2010). In 2010, for example, in the State of Victoria there were 546 TAFE library staff across 18 institutions compared with 1115 university library staff across eight (Victorian Association of TAFE Libraries & Australian Library and Information Association, [2012]). Reduced staffing levels have an impact upon ability to experiment or innovate (Toner, 2010), and this is important when considering the increasing and expanding roles in Web 2.0 technologies and ICT training and support mentioned by Kloppenborg (2010) earlier. Reduced staffing levels do not equate to reduced workloads, or optimised resources and services. VET library staff have noted an increase in the range of services as a consequence of new media environments but with no corresponding reduction of outdated services (Pang & Johanson, 2008, p. 11). The researchers also found evidence of increasing demand on libraries for technological services, allied with increased demands for technical skills in library staff, a situation addressed either by professional development or recruitment (2008, p. 13).

2.3.2 VET Student Demographics

The student population that VET library staff provide services to comprise a younger age group, studying from Certificate up to Bachelors level programmes. In 2011 there were 1,881,900 full-time enrolled students in the Australian VET sector, the majority of whom were enrolled in Certificate level programmes (NCVER, 2012). Subject areas covered the range of sciences and arts with an industry/trades focus. The demographic features of VET students show approximately a 50/50 split between male and female. Age grouping reveals a younger cohort with 26.1% aged 19 years and under. 17.1% aged 20-24 years, 36.3 % students in the 25 to 44 years age range and 18.8% aged 45 to 64 years. Students preferred to study in urban settings, with approximately 77.5% students located either in or close to major cities.

A summary of the ITP sector in New Zealand in 2009 outlined the student population as characterised by predominantly lower level qualifications, high rates of non-completion, vocational fields of study, and part-time study (Pells & Zucollo, 2011). A total of 77,493 equivalent fulltime students were enrolled in 2011, with 53% female and 47% male enrolments. Age groups again show a younger cohort of students attending study with 26.3% under the age of 19 years, 26.3% in the 20 to 24 year age group, 27.4% in the 25-39 age range and 20% aged 40 years and over (Education Counts, 2012). Students were enrolled in a range of courses from Certificate to Masters level, with a quarter enrolled at Bachelors

level. Similar to the Australian VET sector, the range of courses available covered the sciences and arts fields.

2.4 Student Experience of Libraries

The Net Generation (born 1978 to 1994), digital natives or neomillenials, as they have been termed (Dede, 2005), expect to move within the virtual environment and to include their learning there. Interest in the student demographic of age appears to stem from Prensky's (2001) theory of the digital native/immigrant dichotomy. By 2009 he had refuted this theory and spoke of the distinction becoming obsolete with the lengthening era of digital technology and that digital wisdom would become the goal (Prensky, 2009). In the meantime, the Net Generation had been examined at length in a series of qualitative studies by educators anxious to place context around their learning requirements (Brown, 2005; Gibbons, 2007; Lippincott, 2008b; Kennedy, et al., 2007; McNeill, Diao, & Gosper, 2011; Oblinger & Oblinger, 2005; Prensky, 2001). It has been claimed "Convenience, connection and control are the factors driving the Net Generation's take up of information and communication technologies" (Borreson Caruso, 2004, cited in Goerke & Oliver, 2007, p. 64). Institutions planning implementation of mobile learning have surveyed students on which devices they are using, how these are being used, and issues relating to delivery of learning resources and activities (Gray, Kennedy, Waycott, Dalgarno, Bennett, Chang, … & Krause 2009). A 360° report on the status of mobile learning confirmed that students of all age groups who used mobile devices rated access to entertainment the highest type of usage, while mobile learning rated the lowest (E-Learning Guild, 2008). The use of mobile devices for recreation and work-related activities other than teaching and learning activities emerges in a range of studies of staff and students (Corbell & Valdes-Corbell, 2007).

Library studies into student culture are well documented across the HE sector, again, fewer have been completed within the further education (FE) sector (Gibbs, 2005) and no comparative studies have been undertaken across the VET sector. The implications may be extrapolated, however. The importance for both faculty and support staff to understand the student culture within their own institution has been stressed by a number of researchers (Booth, 2009; Cummings, Merrill, & Borrelli, 2010; Gibbons, 2007; Gosper et al., 2013; Kennedy, et al., 2007; Kennedy, Judd, Churchward, Gray, & Krayse, 2008; Kuh, 2003; Lippincott, 2008a; Smith & Borreson Caruso, 2010). The conclusions from these studies have urged the necessity for policy makers not to make assumptions on student engagement with technology without either including students in decision-making or gaining an accurate picture of their academic and social practices. Surveys of HE students by libraries, either directly or through website analytics, have revealed students interacting with library

resources and services but not always in the ways library staff might have predicted (Booth, 2009; Mills, 2009; Paterson & Low, 2011; Sheikh & Mills, 2012; Smith & Borreson Caruso, 2010; Wilson & McCarthy, 2010). Findings have indicated a range of awareness levels in student interaction with the library, with some students showing awareness of library services accessible from mobile devices, while others reveal little awareness.

Booth's empirical, qualitative study investigating student interest in emerging library technologies specifically aimed to create an accurate picture of the library culture of the institution's students and defined this as "consisting of student attitudes, perceptions, needs and expectations on respect to library facilities and information resources" (2009, p. 67). The student library culture Booth discovered showed some unexpected facets with younger students, although heavy users of mobile and social tools, not associating using these for educational purposes. Similar findings have emerged from other studies such as at the Rector Gabriel Ferraté Library where mobile devices were being used for social purposes, or to book a group study room or laptop, but not for searching library resources (Benítez Juan, Clavero Campos, Codina Vila, & Pérez Gálvez, 2011). Kennedy et al. (2007) found that first year students at three Australian universities did not engage with technologies to the extent predicted, although older students were more likely to be receptive to library technology even though they did not engage with technology to the same degree as their younger colleagues.

The ECAR investigation of undergraduate students and information technology also revealed age-related differences in students had less impact on technology usage, that technology adoption was strongly associated with use and experience of IT both in general and in the academic context. Students were creating and sharing content, using social, interactive communication tools, and showing a preference for using both the library website and the learning management system with a desire for moderate IT component within courses (Smith & Borreson Caruso, 2010). Other research has found varying degrees of student enthusiasm for accessing mobile library services (Cummings et al., 2010; Dresselhaus & Shrode, 2012; Wilson & McCarthy, 2010). This should act as a warning to any library staff of the "if we build it they will come" school of thought (Booth, 2009, p. 11) and emphasise that collection of accurate information on student patrons can result in improved service delivery and save time, money, effort and disappointment. In general, what emerges from student responses is a requirement that library services are relevant to their immediate needs, easy to use and free from technical problems.

2.4.1 Technology Ownership

The literature indicates that students entering higher education regard their mobile devices as an integral part of contemporary life and expect to be able to use them without undue hindrance. Of critical immediacy for education programme and support service planners is gathering accurate information on the types of devices tertiary-level students use, how and why they use them and their expectations of educational leverage of these devices. Such information is not available for the VET sectors across Australia and New Zealand.

Lack of empirical evidence upon which to base decision-making around student use of technologies has resulted in a growing field of research in the area (Beckmann, 2010; Booth, 2009; Gosper et al., 2013; Kennedy, Judd et al., 2008; Margaryan et al., 2011; Smith & Borreson Caruso, 2010). The qualitative studies have revealed growing use of mobile devices by students across all institutions surveyed. A 2010 study of undergraduates at 127 higher education institutes in the US and Canada revealed that 62.7% of the 36,950 students surveyed reported owning an internet-capable handheld device (Smith & Borreson Caruso, 2010, p. 9). Mills (2009) found over 60% of survey respondents at the Open University (UK) and Cambridge University owned internet-capable mobile devices (2009, p. 7), and Cummings et al. (2010, p. 29), surveying students at Washington State University, found 54.9% had either or both a web-enabled cell phone or a PDA. Smartphone ownership by Ryerson University students was 20% in 2008 and was expected to rise to around 80% by the end of 2011 (Wilson & McCarthy, 2010), while in 2011, Edinburgh University students reported 67% smartphone ownership rate (Paterson & Low, 2011). A survey of students at Macquarie University, the University of Western Sydney and the University of Technology, Sydney showed 50% students using internet-enabled mobile phones (Gosper et al., 2013), and an earlier study had shown Australian first-year students were not using technologies as intensively as expected (Kennedy, Judd et al., 2008). The trends predicted within the studies, particularly where longitudinal data collection was planned, suggest that the number of students owning a smartphone will continue to grow rapidly.

2.4.2 Library Service Expectations

The student library use survey results discussed following relate to higher education and cannot be compared to the VET sector without similar investigations being carried out for accurate comparison. However, it is likely that strong comparisons exist.

Studies of student use of mobile library services have, to date, revealed mixed results. The universities of Cambridge (Mills, 2009), Edinburgh (Paterson & Low, 2011), Washington State (Cummings et al., 2010), Ohio (Booth, 2009) and the California Digital Library (Hu &

Meier, 2010) found approximately half their student library users were interested in accessing the library catalogue. Ohio University's qualitative survey results showed students searching the library website for database articles, books and journals and DVDs and music. They were more likely to use specific library technologies such as toolbars, Facebook and SMS than MySpace or web calling. Older and graduate students were more likely to engage in the services described. Far from being indifferent to their lack of library awareness, results revealed students were either pleasantly surprised or slightly offended to realize how little they knew about library services (Booth, 2009, p. 95). Ryerson University Library learned its students used internet-enabled mobile devices for email, Facebook and browsing the internet. They preferred to make calls, texts, take photographs and listen to music (Wilson & McCarthy, 2010). The University of Edinburgh library, yet to develop mobile services, discovered students were not interested in reading or writing reviews, sharing items, using library maps, receiving alerts or library statistics. However, students undertook mobile activities in a variety of locations; they multitasked with related and unrelated library tasks while they were in the library and were enthusiastic about the idea of mobile library services (Paterson & Low, 2011, pp. 420-1). The Patron Profiles report, published biennially on use of academic online library resources by students, found 24.5% were regular users, with 44.4% occasional users. Students mainly used online services for research and assignments (59%), with preference for accessing e-books, online databases and journals (around 80% for all three services) (Library Journal, & Patron Profiles, 2012). The study across three Sydney universities found students preferred to use well-established technologies such as Google search engines, text or SMS messaging, email and voice calls in their everyday life for social and work purposes (Gosper et al., 2013, p. 276).

The library website is a crucial focus for students seeking information. Several qualitative studies showed a similarity in searching behaviour by their students, for example, 89% Ohio University respondents reported having visited the library website while 11% had never done so (Booth, 2009, p. 67). Likewise, the research study by Smith and Borreson Caruso found 94.2% students engaged with their university/college website (2010, p. 57). Breakdown of library website use revealed 71.8% of students accessed the library catalogue at least once per term. These findings compare closely with the Washington State University library survey which found, of those students who used the library catalogue most months, 54% indicated willingness to access the library OPAC using a mobile device, while 46% responded negatively (Cummings et al., 2010, p. 30). The study showed students were slightly more interested in undertaking research for an assignment via mobile device, with 64.4% showing interest and 35.6% unlikely to do so. Additionally, 56.7% students were

likely to search via mobile device for electronic books and journal articles while 43.3% were unlikely.

Students preferred mobile library services to be of immediate relevance to their study needs. University of Edinburgh students clearly indicated their preference for certain mobile library services intended to optimise their user experience, with 93% of students believing searching the library catalogue as a mobile service to be of use and 90% also keen to be able to search library databases (Paterson & Low, 2011, p. 418).). These findings varied from results from Cambridge and Open Universities, where 55% of students wanted the ability to access the OPAC from their mobile device (2009, p. 8) but virtually no students were interested in the ability to access e-books and e-journals from mobile devices, with 90% expressing lack of interest in such services (2009, p. 9). Her recommendation was not to put development resources into delivering such content to mobile devices at present. A study of handheld device use by first year students at Curtin University showed students disengaging from using the devices through institutional ICT infrastructure failures. The PDA devices were judged inconvenient, limiting creativity and costly while the poor wireless connectivity added to the overall result of students ceasing to use the devices for educational purposes (Goerke & Oliver, 2007, p. 64).

What seems to be emerging from the research on mobile service expectations is that students differentiated between using their mobile devices for social needs and learning (Gosper et al., 2013; McNeill et al., 2011). In general, they demonstrated interest in services that were perceived as being of immediate relevance to their learning. The findings discussed above demonstrate quite clearly that students at higher education institutions had not commenced using mobile library services quickly despite having the technical means to do so.

2.5 Workplace Skills Development

In order to ensure relevance in a technologically-changing environment it is important that library and information professionals are properly prepared to accept new technologies that will feature increasingly in their work places and in their interactions with library users. A primary focus of this research is on those aspects of staff workplace development that facilitate staff willingness to change their behaviour in response to the impact of mobile technology.

A study of the literature examining VET staff development has highlighted lack of current or relevant industry knowledge, coupled with unfamiliarity with technological advances, as having a detrimental impact upon the sector (Loveder, 2005). A number of themes emerge as

key priorities to be addressed by staff development. These include use of technology and flexible learning, pedagogical expertise, instructional design and course adaptation, client focus, planning, management and administration, and personal qualities and attributes (Lockwood & Latchem, 2004).

A goal of staff development in any organisation is change in individuals' knowledge, understanding, behaviours, relationships, skills, values and beliefs (Bolt, 2009; Isberg, 2011). For lasting, dependable results, training and development should be regarded as a long-term commitment in order to respond to environmental pressures and individuals' needs as they acquire and demonstrate expertise in new ways. This process requires commitment from all levels of the organisation and needs to be demonstrated in order to achieve credibility. It is not a quick or cheap process and success depends upon a range of factors, including a clear demonstration of personal responsibility, a supportive, rewarding environment, wide range of professional development options and a demonstrable benefit to all staff (Berthelsen, 2008; Jasinski, 2007; Lawrence, 2008; Varlejs, [2010]; Walsh, 2008).

Any process of change creates disconnect. Within an organisation this is usually manifested in the area of expectations, competencies, processes and systems, some technical and others human. A range of tools have been developed in different fields to assist organisations to assess competencies critical for success. In general, such assessment tools cover areas such as competency skills analysis, competency assessment and development, training assessment. Of particular interest to this study are those tools that focus on staff willingness to adopt changed behaviours and to accept innovation in their sphere of activity or influence. Intention to change behaviours and actual change of behaviours can be predicted using models of adoption and models of technology acceptance.

Professional development programmes take time, they require motivation and a belief that the effort put into up-skilling will result in tangible personal and professional benefits (Carlson & Gadio, 2002; Chan & Auster, 2006; Lawrence, 2008). Achieving a balance, for example, between the solidarity of tradition in library practice and the flexibility to absorb future shock through focusing on universal competencies rather than the differences that new technologies bring is proposed as a constructive way of proceeding with professional development (Gutsche, 2010). Competencies are reinforced and validated through anticipation, adaptation, acceptance and adoption. The Special Libraries Association (USA) has provided a framework which includes a variety of tools and procedures to assist members in their professional development (Abels, Jones, Latham, Magnoni, & Gard Marshall, 2003; Piggott, 2006).

2.5.1 High Level Motivators for Change

Higher education institutions generally set the pace for educational innovation and it is expected that those in higher education will adapt to meet the demands of a changing educational climate (Stewart, Bachman, & Johnson, 2010, p. 598). Institutional planners have promoted the learning economy as the future of education and training (Hodgins, 2008, p. 70) and provided the necessary ICT structure to demonstrate preparedness. The imperative has been placed on educators to understand and incorporate technologies into their instruction to ensure learners graduate in a state of employability. Research has highlighted that the technologies students use in their personal lives are largely absent from the classroom (Kukulska-Hulme, 2012, p. 247).

In response to national expectations, in 2006 the Department of Education and Training, Australia, rolled out the Queensland Skills Plan to invest in improving the quantity and quality of training through TAFE institutes to meet labour market needs (Lawrence, 2008, p. 1). The Plan focused on the impact of ICT in vocational training to improve learning accessibility, flexibility, efficiency and learning outcomes (Lawrence, 2008, p. 2).

2.5.2 Evolution of Working Practices for Library Staff

The impact of technology adoption has expanded working practice and, for some, has caused a complete reassessment of their profession. For library and information professionals, the impact of technology has been far-reaching.

Staff roles are evolving. The emergence of hybrid roles which span traditional role boundaries has increasingly been noted, and the needs of such role changes require support through professional development (McDonald et al., 2009). Blurring the boundaries between different sectors, levels of practice and roles has gathered pace (Broady-Preston & Preston, 2007; Choi Wakimoto & Hsiung, 2000; Graham, 2012; Whitchurch, 2009). Opportunities have emerged for librarians to work collaboratively with specialists such as e-learning designers, IT technicians, and academic staff. Traditional job functions have expanded and integrated often apparently-disparate specialities within the one role, for example, the fusing of academic or professional disciplines with e-learning competencies. This blending of traditional academic and professional roles has been termed the ‘third space’, providing crucial operational and strategic benefits to the organisation but often within a state of invisibility (Graham, 2012, p. [2]; Whitchurch, 2008). New job titles have emerged, such as e-learning advisor, educational designer, digital services manager, and emerging technologies librarian. There appears to be huge potential for such roles to increase in variety and frequency (McDonald et al., 2009, p. 27). Contradictory findings appeared in the 2006

qualitative survey of Australian library and information professionals where traditional job titles prevailed across the sector. The most consistently reported job title was Librarian (36% of respondents) with only 2.3% of respondents reporting as Systems Librarians (Hallam, 2008, p. 40). There would appear to be lack of uniform practice in changing job titles to suit altered functions.

Where staff have taken the initiative and developed their own professional capacities they may have discovered their roles changing as a consequence. Being identified as a local expert with recognised capabilities and knowledge creates expectations amongst colleagues, with such roles coming to be expected and relied upon for assistance, often through an unwritten psychological contract (McDonald et al., 2009, p. 28). The potential result is the development of a mismatch between official job specifications, unofficial expectations and resourcing. This situation emerged in a 2010 survey of US public and academic libraries where lack of technical expertise among existing staff was identified as a barrier to development of mobile services (Carlucci Thomas, 2010). The consequence was an unwieldy burden placed upon those staff with the requisite skills, who possibly lacked the time and resourcing to maintain technology for the library. It also resulted in libraries deferring technological decisions and actions to others assumed to have more expertise. The flow on effect was libraries being constrained by what their IT departments would or would not let them do and, consequently, curtailed opportunities for innovation (Carlucci Thomas, 2010). Effective staff development should address not only technology needs but also skills relating to change, social and relationship skills, the softer skills which enable staff to perform new technology-enhanced working practices effectively (McDonald et al., 2009, p. 29).

2.5.3 Innovation, Technology and Staff Development

Innovation is driven by consumer demand (Toner, 2010). It is also disruptive. Studies have described innovation as a fluctuation which disturbs the system to some degree; if it is dampened the system remains stable, if the innovation is amplified, it can help transform the system (Jasinski, 2007, p. 32). Fostering a culture of innovation is an important, often difficult, undertaking that should be supported by a progressive institution (Cervone, 2010). When innovation, either radical or incremental, is implemented at the organisational level, learning should be driven by practical workforce experimentation. While Rogers' (2003) work on innovation diffusion is well known, other studies have extended it beyond readily-adopted innovation: readily-adopted, challenging and undercover (unknown outside the group of innovators) (Adams, Tranfield, & Denyer, 2006, pp. 27-28). Where organisations require demonstrated competency from staff in the use of innovative technologies it is

required that organisational needs and drivers are fully articulated if staff are to understand the need to change.

It has been argued that three overlapping areas subject to rapid technological change are hardware, software and staff, and all involve costs (Cunningham, 2010). The pressures to keep up with developments in new technologies are often perceived by staff as relentless and overwhelming, It appears to be commonly felt that "In today's western society, technology systems in education and industry require an employee to be continually up-skilling" (Bhati et al., 2010, p. 13). Yet lack of awareness and knowledge of new technologies have long been identified as barriers to teacher involvement in online learning development (Berthelsen, 2008). Mobile technologies carry unique challenges in that the devices are relatively complex tools, due to their multifunctional nature; they are also highly personalised devices whose meaning begins with the user. Educators have been encouraged to shift into a contextual way of thinking that embraces the overlap between formal education and everyday use of personal technologies (Kukulska-Hulme & Pettit, 2008, p. 36).

Where technology has been successfully embedded and institutionalised, faculty have had the opportunity to be involved in early planning, to learn with technology rather than only designing for its use and to take ownership of change (Dunn, 2004, p. 21; Fisher, Higgins, & Loveless, 2006; Kukulska-Hulme, 2012; Lefoe & Olney, 2007; Olney & Lefoe, 2007). The potential of technology is not technical but rather human; integrated well, it can extend rather than direct new learning opportunities. Staff require the opportunities to make the connections between their technology training and demonstrated results of improved student learning (Jasinski, 2007; Kukulska-Hulme, 2012; Raiti, 2007). Therefore, in addition to mastering new technologies and new teaching strategies, educators need to adopt new perspectives about teaching and learning to be successful users of new educational technology (Feist, 2003; Jasinski, 2007; Kirkwood & Price, 2013).

Library professionals are faced with similar imperatives to up-skill with technology and to foster a culture of innovation. Library staff are reminded that innovative or emerging technologies for one area, such as the library, may be mature technologies for another, such as commercial enterprise (Cervone, 2010). The provision of institutional support for library staff enables them to have the opportunity to experiment and innovate with new technology-enhanced services and processes (Cervone, 2010).This recommendation has been echoed by Rowley, who notes the lack of discussion of innovation and its processes in the information management professional or academic literature, and urges library staff to adopt an holistic

approach to innovation, whereby the development of staff capabilities and culture are a crucial component of the overall innovation strategy (Rowley, 2011).

2.5.4 Professional Development Delivery Characteristics

Successful professional development characteristics that enable staff to acquire the desired competencies and attitudes are, to a high degree, generic and transferable across professional environments. The VET sector faces similar challenges to other education sectors regarding staff development. A model has been suggested for the TAFE environment based upon three interrelated dimensions of facilitated, guided independent and social and collaborative learning. An evaluation model accompanies the professional development model to ensure the needs of participants are met (Lawrence, 2008, pp. 10-12). The RIPPLES survey of the VET sector recommended successful training support include time, mentoring, practical hands-on experience, access to networking opportunities and personalised, localised, just-in-time training (Jasinski, 2007, p. 93).

The most effective practice is to provide staff development as a well-planned and structured undertaking, conducted in conjunction with staff well in advance of planned changes (McDonald et al., 2009, p. 27). Focus on developing staff skills with new technologies should extend to include assessing the impact of adopting technology-supported practices. Methods tested across HE institutions have included hands-on, interactive learning (Fisher et al., 2006; Kukulska-Hulme 2012; Powell, 2010), and one-on-one training with ongoing support (Friel, Britten, Compton, Peak, Schoch, & VanTyle, 2009).The use of peer trainers or colleagues with whom rapport has already been established within localised professional development has been offered as a more sustainable form of support than centrally-organised seminars and workshops (Burnett & Meadmore, 2002; Dunn, 2004; Kukulska-Hulme, 2012, p. 248; Kukulska-Hulme & Pettit, 2007; Watson, 2001). The creation of collaborative teams or localised learning communities has been offered as a means of diffusion by which staff could share their personal and professional development experiences (Anderson, 2002; Burnett & Meadmore, 2002; Cox & Richlin, 2004; Kukulska-Hulme & Pettit, 2007; McDonald et al., 2009), while a work-based, action learning framework has been used to provide opportunities to explore and develop new pedagogies through enquiry learning (Kukulska-Hulme & Pettit, 2007; Lefoe & Olney, 2007).

Successful engagement in professional development and subsequent commitment to change requires ongoing staff participation. Motivation is a significant predictor of professional development participation levels (Chan & Auster, 2006, p. 166; Spacey, Goulding, & Murray, 2004). Several studies have investigated what motivates or deters faculty in

engaging in online delivery (Gannon-Cook, Ley, Crawford, & Warner, 2009; Schifter, 2002), responding to new technology (Venkatesh, 1999) and in training (Chan & Aster, 2006; Colquitt, LePine, & Noe, 2000). Motivating factors can include both intrinsic (personal satisfaction, intellectual challenge) and extrinsic aspects (environmental opportunities, job satisfaction, salary increase), while inhibiting factors to technology acceptance are external (lack of support, excessive workload, time, equipment, training, relevance) (Buabeng-Andoh, 2012**;** Gannon-Cook et al., 2009; Samarawickrema & Stacey, 2007). Chan and Auster (2006, p. 165) note that an organisational climate that facilitates participation in professional development activities and provides managerial support creates a positive influence on motivation.

2.5.5 Developing Mobile Technology Skills

The purposeful use of technology is a core competency in a knowledge society (Collis & Moonen, 2005; Jasinski, 2007, p. 5). Successful implementation of technology integration depends on continuing institutional commitment evidenced by a formal maintenance plan (Dunn, 2004, p. 43; Jasinski, 2007; Kirkland & Sutch, 2009). As discussed above, strategies to provide tools for faculty to learn with, time for learning to take place and ongoing support to enable that learning to be translated into practice have been identified as crucial to long-term, embedded institutional change.

Training with technology is a successful technique for acquiring workplace competencies. A professional development initiative at the Open University (UK) which aimed to introduce faculty to the use of smartphones, focused on training *with* rather than *for* mobile devices. Hands-on practice and a buddy system were trialed, which proved successful where colleagues were using the same device (Kukulska-Hulme & Pettit, 2008). Similar findings emerged across the VET sector in the investigation of professional development of vocational education teachers in the pedagogical use of mobile-learning devices. Key findings from Jasinski's (2007) research report recommended an action learning approach as the most suitable framework to support such learning, allowing the learner control of the activities and strategies relevant to the environment and the new technologies. Educators identified the acquisition of technical competencies required provision of competent, service-oriented IT staff, access to up-to-date hardware and software, and reliable, robust systems. Capability was also acquired through motivation, willingness to engage, access to mentors and peers and opportunity to collaborate and experiment (Jasinski, 2007, pp. 93-4).

Research has suggested that faculty may only accept and embrace technology when convinced there are genuine potential benefits for teaching and learning (Jasinski, 2007;

Lawrence, 2008, p. 4). The benefits of staff feeling ownership of technology if they are to make effective use of it has underpinned a number of approaches to staff training (Herrington et al., 2009, p. 8; Kukulska-Hulme & Traxler, 2005). Competence, as a result of comprehensive staff development and support in this area, is defined as enabling educators to focus upon strategies to enhance the curriculum.

A range of large-scale, qualitative studies examining the application of technology to the learning environment, and to the library environment in particular, have focused very clearly on either technologies currently available or on the horizon. The forecasting work of Educause, in particular, has been of critical importance to academic libraries (University College London (UCL). CIBER, 2008; Horizon Report (The New Media Consortium, annual); Kroski, 2008). The parallel approach has investigated how learning or library environments have adopted these technologies and the resulting impact (Iwhiwhu, Ruteyan, & Eghwubare, 2010; Lippincott, 2010; Little, 2011).

2.5.6 Library Staff Competencies

The ability of working environments to cope with change is influenced by the level and suitability of professional development available to staff, and a library that has spent resources efficiently on ensuring staff are confident and competent in a changing environment has addressed an essential component of the library professional's working life (Weir, 2000). With the pressures of technology, communication and evidence-based competencies resulting in the emergence of the 'librarian 2.0' (Abram, 2005; Partridge, Lee, & Munro, 2010), there is impetus for library managers to possess full awareness of staff competence. The development of work-based competencies is crucial for staff to fulfil their responsibilities effectively; the acquisition of a professional qualification in Library Science or Information Management is regarded as simply the beginning of the journey, not the end (Cooke, 2012). A qualitative piece of research by Partridge and Hallam (2004) into the generic capabilities and discipline knowledge required by library and information professionals for the twenty-first century revealed attitude was seen as crucial within generic capabilities and an understanding of problem solving and critical thinking, information literacy, management, lifelong learning, marketing and information technology included as competencies necessary for the modern library professional.

Results of surveys conducted across library sectors to ascertain how libraries were facing the issue of staff professional development (Howard, 2010; Kloppenborg & Lodge, 2010; Piggott, 2006; State Library of North Carolina, 2007) have revealed a strong alignment to

strategic organisational objectives with programmes being accorded significant organisational priority.

Professional development for library staff is well-supported by national advocacy and other peak bodies, including such organisations as the Australian Library and Information Association, the Library and Information Association of Aotearoa New Zealand, the American Library Association, in the provision of guiding principles. On an international level best practice guidelines for assessing the quality and effectiveness of professional development have been established by the International Federation of Library Associations & Institutions. Other bodies and organisations have identified library competencies required to assist the profession meet future needs. WebJunction (2009) compiled a comprehensive list addressing various aspects of librarianship and library type, including competencies related to library management, public services, technical services, core technology and systems and IT capabilities, and personal and interpersonal skills. The guide commented that technology planning is closely tied to other competency areas (2009, p. 62). An assessment of core competencies required by library staff at the University of Nebraska-Lincoln identified twelve core competencies, all of which focused upon soft skills such as innovativeness, flexibility and organisational skills (McNeil & Giesecke, 2001). Technical expertise was later added as a core competency as a result of the systems staff identifying this as necessary for inclusion. The State Library of North Carolina separated technology competencies into three levels of complexity and relegated these levels according to professional responsibilities. The specialised staff working with technology would also be those who assist colleagues with technology training needs (State Library of North Carolina, 2007). Comprehensive surveys were conducted in 2001 and 2006 into the state of continuing professional development and workplace learning practice in the academic and research library sectors in Australian and a sample of U.K. institutions (Sayers, Walton, & Smith, 2008). The surveys found participating libraries demonstrating commitment to upgrading staff skills and knowledge and seeing value in that commitment.

There is clear evidence the library profession has also experienced the blurring of boundaries discussed above for faculty and the emergence of new, hybrid positions (Broady-Preston, 2009; Broady-Preston & Preston, 2007). A longitudinal study over nine years into the qualifications and skills required of professional positions involved in digital resources, services and technologies in academic libraries found the emergence of the digital librarian position requiring specialist core knowledge and competencies (Choi & Rasmussen, 2009). This has implications for the development and revision of professional competencies for library and information staff. In the UK, the move away from discrete, profession-specific

standards was demonstrated with the publishing of a combined suite of National Occupational Standards for libraries, archives and information services and records management (Lifelong Learning UK (LLUK), 2008). A consequence of less-defined professional boundaries is a rise in work-based learning where on-the-job, just-in-time training can be acquired rather than attendance at traditional delivery mechanisms, such as conferences or seminars. These changes also affect universities and further education providers who have traditionally offered formal professional education and development, where it needs to be considered whether the content of qualifications is addressing workplace needs (Choi & Rasmussen, 2009; Haddow, 2012; Hallam, 2007). A survey of Australian libraries in 2006 revealed that librarians believed the education provided in library and information science postgraduate programmes provided new graduates with the requisite knowledge and skills. TAFE sector staff strongly believed this to be the case (71%) (Hallam, 2009, p. 67).

2.5.7 VET Libraries and Staff Development

Staff development programmes across the HE library sector are well documented (Adams, 2009; Kealy, 2009; Zauha & Potter, 2009), while several recent studies into staff skills across the Australian Library and Information Studies (LIS) profession have provided insight into skills required by the modern library workforce (Haddow, 2012; Hallam 2008, 2009: Partridge et al., 2011; Saravani & Haddow, 2011). VET sector libraries face similar challenges to those noted in the studies above in the requirement to develop mobile technology competencies and apply these to the institutional environment. The competencies required in the knowledge society have gained focus across the VET sector and have influenced how some TAFE institutes are reconceptualising their organisational development strategies (Jasinski, 2007, p. 91). This has resulted in support areas such as the library ensuring their professional development programmes are aligned with the institutional capability development framework.

The New Zealand ITP library sector includes two providers of library and information studies offering library studies from diploma and bachelor levels through to a Master of Information Studies (MIS) and doctoral study. There are two national professional associations: the Library and Information Association of New Zealand Aotearoa (LIANZA) and the allied indigenous professional association Te Ropu Whakahau – Maori in Library and Information Management (TRW). The eighteen ITP libraries have formed the ITP Library Managers' Group which has representation on a number of national bodies, including the Strategic Advisory Forum, a peak body established to inform the National Library of New Zealand's policy-making. Professional registration was introduced for all

library and information professionals in 2008 and includes eleven bodies of knowledge (BoK) required to be covered through on-going professional development.

Several papers have been published in recent years on continuing professional development for New Zealand librarians. An overview of the National Digital Strategy, released by the New Zealand Government in 2004, outlined the challenge for information professionals in three areas: digital content, confidence and capability in ICT skills, and access to the ICT infrastructure in the form of fast broadband connectivity (Cossham, Fields, & Oliver, 2006). In the same year, Cossham and Fields conducted an online survey of librarians on their continuing professional development requirements. The need for professional development on electronic resources and information technology was rated most highly by both individual staff and their managers (Cossham & Fields, 2006, p. 243). Overall, their findings revealed a need for better quality, focused professional development directed at specific library sectors, particularly the larger public and academic library markets.

A seminal work *Focus on learning* published for TAFE libraries in 1995, recommended "access to a wide range of well organised and managed learning and information resources through the use of communication technology and other means" (Booker, Murphy, & Watson, 1995, p. 1) to improve the quality of vocational and training education outcomes for learners. Kloppenborg and Lodge (2010) have subsequently examined the professional skills TAFE library staff believed were needed. The authors claimed staff development was neither training nor education but rather a planned set of learning experiences that shaped individuals' skill and job improvement. Amongst the technology-related areas, all respondents noted that Web 2.0 awareness and basic computer trouble shooting were required (Kloppenborg & Lodge, 2010, p. 182). A range of more traditional library service skills, such as service desk training, interpersonal skills, goal setting and leading change were also included. Overall, a co-ordinated learning continuum was recommended for TAFE libraries based on best quality client service (Kloppenborg & Lodge, 2010, p. 173).

A comprehensive, qualitative piece of research into professional development requirements across all Australian library sectors by Hallam showed all TAFE libraries had a strategic planning document (2009, p. 74) although only 60% had a formal policy encompassing their staff development activities (2009, p. 78). Such a policy was more likely to have been developed and administered by the parent institution. In assessing the strategic effectiveness of staff development, nearly 55% of TAFE libraries were likely to conduct such an evaluation (Hallam, 2009, p. 75). Responsibility for staff development was shared between a staff development manager and the library manager in almost 60% of TAFE libraries and all

TAFE libraries had a specific budget allocation for their staff development activities (2009, p. 80). In assessing how much time was allocated per staff member to professional development activities, 14% of TAFE library respondents reported over 30 hours per annum, with 57% indicating the time per staff member was less than 15 hours per annum (2009, p. 82).

TAFE library staff believed the need for professional development training had decreased over the past several years. Forty-nine per cent of TAFE library respondents considered there was a lessened need while 29% of TAFE library respondents felt that the need for professional development activities was increasing. The increased use of ICT within the library was seen to have a major impact on the staff development programmes by 70%-80% of TAFE libraries. In keeping with this concern, it was noted that IT/Systems staff were more likely to receive staff development than other library colleagues (Hallam, 2009, p. 84). Methods of professional development preferred by TAFE library staff included orientation programmes (82%), conference attendance (43%), seminars and workshops (29%) and internal mentoring programmes (43%) (2009, p. 88). Internal professional development programmes covered job-oriented skills, technology skills and customer-service related training (2009, p. 91). TAFE libraries were not keen, however, in allowing staff time off work to attend training, with only 40% allowing this, compared to 90% of HE libraries (2009, p. 91). These figures show a sector very aware of the need for on-going staff development and a particular awareness of the impact of increased use of technology.

2.6 Chapter Summary

Technology is increasingly being integrated into curricula activities as more students arrive at campus carrying small, personalised, extremely-powerful computing devices. On the one hand, the mobile campus enables students to connect to learning from anywhere, at any time, with any device, while on the other, faculty are challenged to leverage the potential of technological facilitation and to be well supported in this goal through professional development.

Seminal investigations into student mobile technology activity have recommended knowledge of local student culture a critical pre-requisite to any planned mobile service delivery. Competencies required of staff have changed, and this is also acknowledged by the library science profession.

Higher education libraries have demonstrated early uptake of content and service delivery to mobile devices. They have shown an awareness of the need to understand the student user

profile in order to tailor services in social and personalised spaces. Traditional roles have evolved and boundaries with other positions are blurring. TAFE libraries are aware of the impact of technology and the need to respond through increased professional training.

CHAPTER THREE

INNOVATIONS AND TECHNOLOGY ACCEPTANCE THEORIES

3.0 Introduction

The present chapter explores factors influencing the adoption of technology. It continues the research reported on in the previous chapter through focusing on factors that influence an individual's acceptance and use of new technologies. The evolution of the innovation diffusion theory propounded by Rogers in 1962 will be traced through to 2003 and the development of the UTAUT model by Venkatesh, Morris, Davis and Davis (2003). The development of a series of technology acceptance frameworks which have sought to extend understanding of the factors that influence this area of research are discussed.

Significant investment is the hallmark of systems implementation and a crucial aspect of successful implementation is employees fully utilising the new technologies. Persuading users to accept and integrate new information technologies (IT) persists as an on-going challenge confronting those responsible for implementing new information systems. Research into the failure to do so suggests compromised outcomes, such as inability to reap expected benefits or jeopardising the long-term viability of the systems (Jasperson, Carter, & Zmud, 2005; Sykes, Venkatesh, & Gosain, 2009; Thong, Hong, & Tam, 2006; Venkatesh, Brown, Maruping, & Bala, 2008; Yi, Jackson, Park, & Probst, 2006). Factors that contribute to an understanding of user behaviour and technology acceptance continue to be investigated and an evolving series of models or frameworks has allowed a theoretical interpretation of behavioural intentions in relation to technology use.

The importance of user adoption of technology in order to realise its potential value has been manifested in the growth of research in the field of technology acceptance theories. Technology acceptance models have been examined in relation to their predictive ability regarding the use of technology, including the acceptance of technologies within the library environment. This examination has taken place within the context of the environmental changes discussed in the previous chapter.

3.1 Technology Acceptance and Adoption Theories

The rate of adoption, or the concept of diffusion of innovations, was propounded in Rogers' seminal work (1962), with particular reference to technological implementation or adoption

within organisations. Rogers introduced the concept of five adopter categories including "innovators", "early adopters" through to, at the other end of the spectrum, "laggards" (Rogers, 2003). Synthesising previous studies examining adoption behaviours, he identified characteristics of innovation involved in a five-step process through which an individual moves from first exposure to an idea or development through to implementation and confirmation (Rogers, 2003, p. 170). These attributes included relative advantage, complexity, compatibility, trialability, and observability (Agarwal & Prasad, 1997; Rogers, 2003). Subsequent studies have challenged Rogers' work on innovation attributes, claiming he focused only on 'readily-adopted' innovations (Adams, 2003; Adams et al., 2006, p. 27). These authors have proposed two additional categories: challenging innovations which are disruptive and complex, and undercover innovations which are notable for lack of management commitment and have little profile outside the innovators.

Building upon the earlier work of Rogers, the Innovation Diffusion Theory (IDT) gathered a following and was examined from the aspect of perception of using an innovation rather than perceptions of the innovation itself (Agarwal & Prasad, 1997; Moore & Benbasat, 1991; Rabina & Walczyk, 2007). In addition, a growing body of quantitative, academic research has focused on examining the determinants of computer technology acceptance and utilisation among users (Moore & Benbasat, 1991; Mathieson, 1991; Davis, 1989; Davis et al., 1989; Taylor & Todd, 1995a). Some of this research has drawn its theoretical underpinnings from the adoption and diffusion of innovations literature, where an individual's perceptions about using an innovation are believed to influence adoption behaviour (Moore & Benbasat, 1991; Rogers, 2003). Other significant theoretical models have attempted to explain the relationship between user attitudes, perceptions, beliefs, and eventual system use, including the Theory of Reasoned Action (TRA, Fishbein & Ajzen, 1975), the Motivational Model (MM, Davis, Bagozzi, & Warshaw, 1992), the Theory of Planned Behavior (TPB, Ajzen, 1991; Ajzen & Madden, 1986), the Combined Theory of Planned Behavior/Technology Acceptance Model (C-TPB-TAM, Taylor & Todd, 1995a), the Model of PC Utilization (MPCU, Thompson, Higgins, & Howell, 1991), the Social Cognitive Theory (SCT, Bandura, 1986; Compeau & Higgins, 1995a), and the Technology Acceptance Model (TAM, Davis, 1989).

Davis (1989) developed a multi-item measurement scale designed to measure the two determinants of information technology acceptance: perceived usefulness and perceived ease of use. He based this upon work by Fishbein and Ajzen (1975) and their Theory of Reasoned Action (TRA), which predicted that a person's performance of a specified behaviour was determined by behavioural intention to perform the behaviour (Davis et al., 1989, p. 983),

and upon his own 1986 doctoral dissertation investigating the Technology Acceptance Model (TAM). The TAM specified causal linkages between perceived usefulness and perceived ease of use and users' attitudes, intentions and actual computer adoption behaviour (Davis et al., 1989). Of the various models, the TAM appears to be the most widely accepted among information systems researchers, perhaps because of its parsimony (few predictors) and the wealth of empirical support it has gained (Agarwal & Prasad, 1999). Studies on the factors contained within the TAM, perceived usefulness and perceived ease of use of a system, have been claimed to predict about 40% of the factors that influence the use of IT (Legris, Ingham, & Collerette, 2003). More recent work has developed and expanded the theme to focus upon the features that appear to challenge efficient progress within the work environment (Nichols, 2008; Nov & Ye, 2008). Technology adoption has increasingly been identified as an area that holds the key to understanding barriers and contributors to technological progress within the workplace. The refinement of technology adoption models continues, supported through empirical investigation to predict the likelihood of technology acceptance by users (Davis, 1986; Davis & Venkatesh, 1996; Venkatesh et al., 2003).

The body of scholarly, empirical work that continues to emerge from this field of investigation has focused on developing a series of frameworks designed to test and explain crucial factors in technology acceptance. As indicated by the discussion above, there is agreement among researchers that system usage represents a key behaviour of interest in studying technology acceptance. Previous research has examined usage in two ways: firstly, by studying the extent of actual system use and secondly, by measuring intentions to use the system in the future. Although intentions can change with the passage of time, they have been shown to be good predictors of actual future use (Davis et al., 1989, as cited in Agarwal & Prasad, 1997, p. 561). These two outcomes have persisted in many different streams of research examining the problem of the acceptance of information technologies.

There are many competing models concerning sets of key determinants of technology acceptance behaviour, each with its own advantages and compatibilities (Al-Qeisi, 2009; Ho, Hung, & Chen, 2012, p. 255). The need of most researchers to apply models to specific contexts has necessitated their selecting the most compatible from amongst the range and either applying the model in its entirety or modifying to suit the nature of the investigation. Amongst the early technology acceptance models seeking to establish more robust measures for predicting and explaining technology use, the Theory of Reasoned Action (TRA) and the Technology Acceptance Model (TAM), along with six others, including Rogers' Diffusion of Innovations Theory (DOI), were reviewed and empirically-compared by Venkatesh et al. (2003). Out of this study, the Unified Theory of Acceptance and Use of Technology model

(UTAUT) was formulated. It contained four core determinants of intention and usage, including user performance expectancy, effort expectancy, social influence and facilitating conditions, as well as four moderators of key relationships which were predicted to significantly influence user acceptance of information technology (Venkatesh et al., 2003). The importance of the contribution of the UTAUT model in the field of technology acceptance is considerable.

The majority of the quantitative studies employing the UTAUT model have examined behavioural intention and usage within the commercial environment (Chiemeke & Evwiekpaefe, 2011; Nysveen, Pedersen, & Thorbjørnsen, 2005; Venkatesh, Thong, & Xu, 2012), to date the educational environment has been less well-explored (Nov & Ye, 2008; Oye, Iahad, & Rahim, 2012; Teo, 2009). Several studies have employed it to investigate student use of an online learning management system (Hsu, 2012; Marchewka, Liu, & Kostiwa, 2007) and this focus of study appears likely to continue. Studies on the use of a technology acceptance model to determine effectiveness of technology training for employees are fewer. Marler, Liang and Dulebohn (2006) investigated the role training played in facilitating employee technology acceptance in organisation-wide IT implementation. Their research employed an extended technology acceptance model that included additional constructs of extent of training, training reactions and employees' resources. The latter construct was considered to be directly influential on intention to use new technology in a mandatory situation (Marler et al., 2006, p. 737). Fewer researchers have attempted to employ the UTAUT model as an instrument forming the basis of a qualitative approach, although a recent study employed UTAUT to study scholarly intention and use of social media (Gruzd, Staves, & Wilk, 2012) and a couple of studies employing a qualitative approach have applied the UTAUT model to the tertiary environment (Dulle, 2010; Xu, 2011).

Library science research has approached the deployment of technology within information provision from a range of approaches. Processes for managing the introduction of new technology into the library were discussed in an early work recommending organisational preparedness as providing the environment for change (Klobas, 1990). The majority of studies, either theoretical or empirical, have investigated the provision of services to mobile devices from the aspect of what services are enabled through technology, how to suit them to small, handheld devices, how to demonstrate innovativeness, what the students want, and how to measure success (Ashford & Zeigen, 2012; Benítez Juan et al., 2011; Carlucci Thomas, 2010; Dresselhaus & Shrode, 2012; Iwhiwhu et al., 2010; Kim & Abbas, 2010; Spires, 2008). Others have investigated the best ways of improving library staff skills in the

online environment (Broady-Preston, 2009; Chan & Auster, 2006; Chesemore et al., 2006; Cossham et al., 2006; Costa, 2007; Graham, 2012; Kloppenborg & Lodge, 2010; McNeil & Giesecke, 2001; Maesaroh & Genoni, 2009) and the knowledge skills and experience required for effective work in the digital library (Choi & Rasmussen, 2009). The methodologies deployed by these studies have predominantly involved online surveys, with subsequent qualitative analysis and reporting.

To date, a limited number of studies in the field of library science have employed a technology acceptance model (Al-Faresi & Patel, 2012; Jaradat, 2012; Park, Roman, Lee, & Chung, 2009; Sheikhshoaei & Oloumi, 2011; Spacey et al., 2004; Thong, Hong, & Tam, 2002). Using the TAM, Jaradat (2012) added social influence and quality (of service) into an investigation of student usage of mobile library service. Information quality was explored within the UTAUT model as a determinant of student usage of digital library service and found to be positively related to intention to use (Rahman, Jamaludin, & Mahmud, 2011).

These studies tested the applicability of the Technology Acceptance Model (TAM) to the digital library. While the TAM is specifically designed to address acceptance of IT, studies have shown it capable of predicting between 30% and 40% of technology usage (Legris et al., 2003; Meister & Compeau, 2002; Venkatesh & Davis, 2000). The UTAUT model has a demonstrated ability to explain as much as 70% of pooled variance in behavioural intention to use a technological innovation (Venkatesh et al., 2003). This enhanced predictive efficiency of the framework constitutes a compelling reason to consider exploring its use within the library and information field. In addition, recognised limitations of TAM are its failure to take into consideration any barriers that would prevent an individual from adopting a particular information systems technology (Taylor & Todd, 1995b), difficulties in accurately predicting actual usage rather than behavioural intention to use (Turner, Kitchenham, Brereton, Charters, & Budgen, 2010), and exclusion of variables such as system design characteristics, training, support and decision marker characteristics (Oye et al., 2012, p. [4]).

In publishing the findings of their ground-breaking study, Venkatesh et al. strongly recommended further work on identifying and testing the additional boundary conditions of the UTAUT model in an attempt to "provide … richer understanding of technology adoption and usage behaviour" in different user groups and organisational and technological contexts (2003, p. 470). Work on different moderating conditions to answer the complex nature of the relationships influencing use behaviour has been recommended.

3.2 The Unified Theory of Acceptance and Use of Technology (UTAUT)

The UTAUT model is one of the most influential and robust in explaining information technology (IT) adoption behaviour. The model has been validated by a number of researchers (Dulle, 2010; Oshlyansky, Cairns, & Thimbleby, 2007; Oye et al., 2012; Sykes et al., 2009; Venkatesh et al., 2003) and has been extended and modified. The UTAUT consolidated previous research on technology acceptance through the integration of prevalent technology uptake models. In seeking to refine a theoretical explanation of factors predicting technology acceptance, Venkatesh et al. (2003) empirically compared eight models to determine their ability to explain behavioural intention: the Theory of Reasoned Action (TRA), the Motivational Model (MM), the Theory of Planned Behavior (TPB), the Combined Theory of Planned Behavior/Technology Acceptance Model (C-TPB-TAM), the Model of PC Utilization (MPCU), the Social Cognitive Theory (SCT), the Innovation Diffusion Theory (IDT) and the Technology Acceptance Model (TAM) (Dulle, 2010, pp. 88-89; Venkatesh et al., 2003, pp. 428-436).

Although the UTAUT has been accepted as a robust, extensible model with powerful explanatory capacity in respect to user intention to accept novel systems, it is not without critics (Abraham, Boudreau, Junglas, & Watson, 2013; Bagozzi, 2007). More specifically, the multifaceted conceptualisation of UTAUT constructs has been described as overly complex and unlikely to measure individual variables by van Raaij and Schepers (2008), who contend that the field of technology acceptance is in need of a paradigm shift. Nevertheless, the model continues to attract interest, if only because of the ongoing relevance of the field. The usefulness of a theoretical model lies in its ability to discuss interrelationships among variables considered important to the study and to assist researchers in postulating and testing certain relationships in order to improve the understanding of the dynamics of the situation (Dulle, 2010, p. 97). To this end, the UTAUT model has contributed to a growing body of knowledge on human factors and information systems.

The UTAUT model had as its goal the ability to understand usage as a dependent variable and the role of intention as a predictor of use behaviour (Venkatesh et al., 2003, p. 427). Based on previous research the model found eight constructs to be significant: four direct antecedent determinants of intention or usage (performance expectancy, effort expectancy, social influence and facilitating conditions) and four key moderators (gender, age, voluntariness and experience). The model excluded three constructs that had been investigated previously: attitude towards technology, self-efficacy and anxiety, as these were theorised as not constituting direct antecedents of intention. The following table provides the formulation of the UTAUT model (Venkatesh et al., 2003, pp. 446-456):

Table 3.1

Determinants of Intention or Usage in UTAUT (Venkatesh et al., 2003)

UTAUT determinant	**Definition**	**Root Constructs**	**Definition**
Performance Expectancy (PE)	Degree to which an individual believes that using the system will help him/her to attain gains in job performance	Perceived Usefulness	Degree to which a person believes that using a particular system would enhance his/her job
		Extrinsic Motivation	Perception that users will want to perform an activity because it is perceived to be instrumental in achieving values outcomes that are distinct from the job itself, e.g. improved performance, pay or promotions
		Job-fit	How the capabilities of a system enhance an individual's job performance
		Relative Advantage	Degree to which using an innovation is perceived as being better than using its precursor
		Outcome Expectation	Consequences of the behaviour, including performance (job-related) and personal (individual goals) expectations.
Effort Expectancy (EE)	Degree of ease associated with use of the system	Perceived Ease of Use	Degree to which a person believes that using a system would be free of effort
		Complexity	Degree to which a system is perceived as relatively difficult to understand and use
		Ease of Use	Degree to which using an innovation is perceived as being difficult to use
Social Influence (SI)	Degree to which an individual perceives that important others believe he/she should use the new system	Subjective Norm	Perception that most people who are important to the person think he/she should or should not perform the behaviour in question
		Social Factors	Individual's internalisation of the reference group's subjective

			culture, and specific interpersonal agreements that the individual has made with others, in specific social situations
		Image	Degree to which use of an innovation is perceived to enhance one's image or status in one's social system
Facilitating Conditions (FC)	Degree to which an individual believes that an organisational and technical infrastructure exists to support the system	Perceived Behavioural Control	Reflects perceptions of internal and external constraints on behaviour and encompasses self-efficacy, resource and technology facilitating conditions
		Facilitating Conditions	Objective factors in the environment that observers agree make an act easy to do, including the provision of computer support
		Compatibility	Degree to which an innovation is perceived as being consistent with existing values, needs, and experiences of potential adopters

The four key moderators were drawn from the body of empirical studies examining influence on intention to adopt new technologies. Such moderating factors as gender, age, experience, and voluntariness of use were introduced. These serve to strengthen the ability of the model to explain the behavioural differences present in different social contexts. Venkatesh et al. (2003, pp. 447-455) hypothesised that performance expectancy would be relevant to men and younger workers who place more importance on extrinsic rewards. It was predicted effort expectancy would be stronger for women and for younger workers, particularly those at early stages of experience. For social influence, it was predicted older women, particularly in mandatory settings and in the early stages of experience, would be more influenced. Finally, facilitating conditions were predicted to be more influential with older workers particularly with increasing experience, who attach more importance to receiving assistance on the job.

The following diagram explains the research model synthesised from the eight tested models:

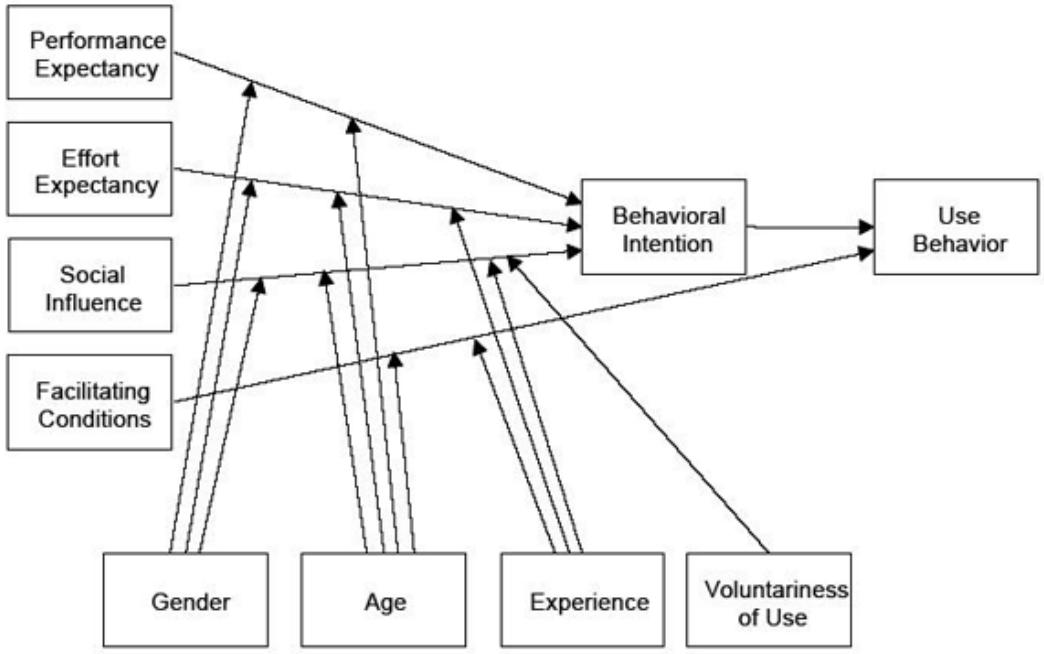


Figure 3.1 Unified Theory of Acceptance and Use of Technology (UTAUT) research model. Adapted from "User Acceptance of Information Technology: Toward a Unified View," by V. Venkatesh, M. G. Morris, G. B. Davis and F. D. Davis, 2003, *MIS Quarterly, 27*(3), p. 447. Reprinted with permission (Refer Appendix H)

3.2.1 Determinants of Technology Use

The ability to predict acceptance and effective use of technology continues to be regarded as crucial for organisations. The significant link between behavioural intention and actual usage has been established by research. Behavioural intention is affected by a variety of direct and indirect factors. In identifying the factors that determine users' adoption of technologies, research in the field has paid particular attention to selection of antecedents likely to increase the intention to adopt a new technology. Intention-based models, which use behavioural intention to predict usage, have focused on such determinants of intention as attitudes, social influences, ease of use and perceived usefulness, and facilitating conditions (Ajzen & Fishbein, 1980; Davis et al., 1989, 1992; Hartwick & Barki, 1994; Mathieson, 1991; Taylor & Todd, 1995b). When investigating the move from intention to use behaviour, benefits arise from longitudinal study as technology users evolve from novice stage to experienced users of the new system (Davis et al., 1989). This is of particular importance as users move from the initial acceptance stage through to the usage stage where decisions regarding the

technology differ considerably over the long term as user experience increases (Davis et al., 1989; Szajna, 1996; Taylor & Todd, 1995a; Venkatesh & Davis, 1996; Venkatesh & Morris, 2000). Endeavours to predict the use of educational and library-specific technologies would require library staff, as a precursor, to understand and accept the role of technology in teaching and learning and service delivery in order to cope effectively with innovation and the continuum of change. A number of variables either encourage or deter the acceptance of technology and these include personal, technical and environmental factors.

Attitude is a mediator between beliefs and intentions to use; it is regarded as an outcome of individuals' beliefs about the characteristics of the system (Agarwal & Prasad, 1997). Attitude, including perceived enjoyment, has been tested in several studies (Ho et al., 2012; Huang, Lin, & Chuang, 2007; Yang & Yoo, 2004), knowledge sharing within peer support networks (Sykes et al., 2009), social value (Brown & Venkatesh, 2005), and post-adoption IT usage through confirmed perceived ease of use and satisfaction (Hong, Thong, & Tam, 2006; Karahanna, Straub, & Chervany, 1999; Thong et al., 2006).

3.2.2 Moderator Constructs

The predictive capability of the UTAUT model is enhanced by the influence of moderator constructs. Moderators have been described as "variables that influence the strength or direction of relationships between [independent and dependent] variables" (Serenko, Turel, & Yol, 2006, p. 23). The UTAUT model employed four moderators: gender, age, experience and voluntariness of use. Selection of the moderators aimed to increase the predictive validity of the model and was informed by previous work in the field. The inclusion of age resulted from studies suggesting younger workers placed more importance on extrinsic rewards, with increased age being shown to be associated with difficulty in processing complex stimuli and allocating attention to information on the job (Plude & Hoyer, 1985, as cited in Venkatesh et al., 2003, p. 450). Gender differences research indicated that men tended to be highly task-oriented and would, therefore, be influential on 'performance expectancy' (Venkatesh et al., 2003, p. 449). Experience, meaning personal experience with the system, influenced 'effort expectancy' in that workers with lesser experience of the system would be more influenced, with social influence declining with greater experience and 'facilitating conditions' having more influence on older, more experienced workers, in that they attached more importance to receiving assistance on the job (Venkatesh et al., 2003, p. 454). Venkatesh et al., noted the importance of testing age and gender as an interrelationship rather than separately.

A substantial body of recent research has addressed the recommended areas of further investigation, including the different technologies, user groups and organisational contexts suggested by Venkatesh et al. (2003, p. 470). In particular, age, gender and experience have been examined in a range of technology acceptance studies (Kim & Garrison, 2009; Pahnila, Siponen, & Zheng, 2011; Schaper & Pervan, 2005; Sykes et al., 2009; Teo, 2009; Venkatesh et al., 2008; Venkatesh et al., 2012) while Spacey et al. (2004) examined gender, age, education, position, computer proficiency, length of time and frequency using the Internet at work in their Technology Acceptance Model (TAM) study of public library staff attitudes towards the Internet. Other studies have focused on deployment of a range of moderators, including demographic variables such as age, awareness, experience, gender, income, perceived risk, technology type and academic position (Ahuja & Thatcher, 2005; Al-Qeisi, 2009; Brown & Venkatesh, 2005; Dulle, 2010; Il, Yongbeom, & Hyo-Joo, 2008; Min, Ji, & Qu, 2008; Morris & Venkatesh, 2000; Wang & Wang, 2010; Wang, Wu, & Wang, 2009) and workforce tenure (Agarwal & Prasad, 1997, 1999). Other work has investigated a potential research model including age, computer experience, skill level, job position, work sector, computer access, work setting and geographic area (Schaper & Pervan, 2004, 2007).

Further research has investigated moderating factors such as characteristics of innovativeness and personality traits (Mandal & McQueen, 2012), attitude, self-efficacy and anxiety (Sievert, Albritton, Roper, & Clayton, 1988; Thatcher & Perrewé, 2002; Xu, 2011), while the UTAUT model has also been extended and tested to investigate students' likelihood to use of mobile library services including the moderators of gender, age and monthly expense (Jaradat, 2012).

3.2.3 Behavioural Intention Influence on Use Behaviour and Service Delivery

Behavioural intention has been defined as goals, aspirations and expected responses to the attitude object (Fishbein & Ajzen, 1975), it "reflects the motivational influences that drive an individual to perform a behaviour" (Sykes et al., 2009, p. 375). The UTAUT model focuses on intention to use technology predicting actual use behaviour. Use behaviour, which may include a post-adoption environment (Jasperson et al., 2005; Karahanna et al., 1999; Rogers, 2003; Thong et al., 2006), is regarded as crucial to sustained technology implementation and viability, moving beyond the first step of adoption (Bhattacherjee, 2001). Continued technology usage is equally as important to an organisation implementing new IT systems as initial adoption as this constitutes the institutionalisation, or normalisation, mentioned earlier where the innovation becomes a routine part of the organisation.

3.3 Diffusion of Innovations

As noted above, even within organisations, the crucial unit of innovation is the individual. Rogers (1962) offered standardisation of innovation adopter categories, creating five categories: innovators, early adopters, early majority, later majority and laggards. These five categories appeared, as a general rule, to follow a bell curve distribution of innovativeness. The innovators were slightly isolated from their peer networks in that they were comfortable in trying out new ideas and working with uncertainty. Their early adopter colleagues were more integrated within their peer system and were looked to for advice and information about an innovation. The early and late majority adopted innovations just before and after the average member of their peer network. The laggards were often as isolated as the innovators but for reasons of suspicion of innovation and dislike of uncertainty. Rogers found inconsistent evidence about the relationship between age and innovativeness but indicated that earlier adopters have a more favourable attitude towards change than later adopters.

In examining the process through which an individual moves in relation to innovation decision-making, the existence of prior conditions leading to the awareness of need for an innovation has been discussed by Rogers (2003, p. 171-2). He has noted the difficulty in stating definitively whether the existence of an innovation creates awareness of a need or whether awareness of an innovation creates a need. The five stages through which the individual passes relate firstly to knowledge – of the innovation, how it works and why, secondly to persuasion, whereby the individual forms either a favourable or unfavourable attitude towards the innovation. The third stage of decision making is the decision stage itself, wherein the individual engages in activities that lead to the decision to accept or reject the innovation. The following, implementation, stage is the first practical, as opposed to the mental exercise of considering, stage wherein the innovation is put into practice. This stage involves the requisite changes in individuals' behaviour to occur and continued use of the innovation. Finally, the confirmation stage is reached wherein the individual seeks reinforcement for the decision already made and will either continue to use or reverse the earlier decision. If use of the innovation is continued the individual will promote it to others (Rogers, 2003, pp. 168-192).

The body of work described above, in the main, examined the individual as the unit of analysis. In many of the studies, the individual is located within a larger unit, such as a social or work group or organisation. It is necessary to acknowledge the link between the individual level of analysis and the work unit or organisational level of analysis. Rogers addressed this facet of innovation in his work when he differentiated between the diffusion of innovations to individuals and the adoption of innovations by organisations (Rogers, 2003). Three types

of innovation decisions were identified: optional – where the individual has the choice to adopt or reject an innovation; collective, where members of a system adopt or reject an innovation through consensus; and authority, where a few, high-level members of an organisation adopt or reject an innovation, and all other employees comply with the decision (Rogers, 2003, p. 403).

The role of champion, a member who espouses and seeks to influence the acceptance of an innovation through the various stages of implementation in an organisation, is noted as being crucial to success. The innovation process moves through five stages of activity. The initiation activity comprises agenda-setting, where the organisational problem that creates a perceived need for an innovation is defined; and matching, where the defined problem is matched with an innovation. At this point a decision is made and the second phase of activity – implementation, commences. Refining/restructuring occurs when both the innovation imported from outside and the organisation's needs and structures change to accommodate each other. The fourth stage, clarifying, involves the innovation being spread across the organisation, with its meaning becoming clearer to the members of the organisation. Finally, routinising takes place when the innovation has been incorporated into the regular activities of the organisation and is accepted as routine activity (Rogers, 2003, pp. 420-435).

As a result of adoption of an innovation, either by an individual or by the organisation, consequences occur. For example, such a consequence in the context of this research could be the resulting change in service delivery through the adoption of mobile technologies by individual members of a library unit, within a vocational education institution that is moving through the innovation process.

3.4 Chapter Summary

The chapter examined a range of technology acceptance studies that have expanded the explanatory range of factors which may influence human acceptance of new technologies. Early work by Rogers in the 1960s paved the way for acceptance of innovation to be viewed through the lens of attitude and motivation, with characterisation such as "innovators", "early adopters" and "laggards" being coined, terms which remain in common parlance fifty years later (Rogers, 2003). The process of innovation adoption at organisational level has also been discussed.

Technology acceptance models have been instrumental in investigating such crucial predictive characteristics as innovativeness and personality traits, attitude, self-efficacy and anxiety. The factors of age and experience have been studied to explain intention to use and

actual computer adoption behaviour. The performance benefits to be gained and perceived ease of use have been identified as factors influencing users' likelihood of adopting a new system. A major advantage of the models outlined in the chapter lies in their ability to be modified and extended according to the field or context under investigation.

CHAPTER FOUR

METHODOLOGICAL FRAMEWORK AND RESEARCH DESIGN

4.0 Introduction

The previous chapters have reviewed existing research in the fields of mobile technology, the learning environment, libraries and technology acceptance and adoption models. This chapter describes the research design, methodology and methods used to collect and analyse data in order to answer the research questions. It will discuss the considerations involved in determining which methods were most appropriate, including the rationale behind the qualitative approach selected, describe the development of research instruments, and detail the stages of sampling, data collection and analysis.

4.1 Research Purpose

The research topic under investigation was the preparedness of libraries to respond to the challenges/opportunities that the latest wave of mobile technology advancements is presenting. In particular, the focus was on how prepared library staff in the VET sector were, and how confident and capable they were to respond to those particular challenges. Two key questions on workplace technology competency were investigated within the VET sector library environment:

> What skills, knowledge and competencies are required by library staff to develop and deliver mobile technology services in the vocational education and training sector?
>
> What specific on-the-job training is required by library staff in the vocational education sector to acquire the skills, knowledge and competencies to effectively develop and deliver mobile technology services?

The research questions were underpinned by three objectives that the study sought to achieve:

1. To identify the library services most effectively and appropriately delivered through mobile technologies to vocational education students

2. To identify gaps in the required and current knowledge and skills of library staff in relation to delivering mobile services
3. To determine the most effective means of ensuring library staff engaged in mobile delivery have opportunities for professional development and workplace learning programmes and activities

An inductive approach was carried out for data collection, analysis, establishing meanings and the construction of theories. The theoretical paradigm essential for the design and implementation of the research topic followed a purely qualitative approach.

4.1.1 Research Philosophy

As mentioned briefly in the section on research approach in Chapter 1, the research paradigm considered most useful by the researcher as a personal philosophical position within which to conduct the present investigation was constructivist and interpretivist. Qualitative research, as a set of interpretative activities, does not encompass a distinct set of integral methods (Denzin & Lincoln, 2000, p. 6); the methods need to be considered and selected by the researcher depending upon the nature of the phenomenon under study. Examination of the range of epistemological and ontological perspectives available to the research community resulted in the researcher considering a constructivist, interpretivist perspective the most useful in enabling understanding of the research problem. Such a paradigm was believed to be pertinent to the present investigation, as the lived experience of the VET library staff and their interpretations of it were fundamental to the study. As all qualitative research is situationally embedded, it is acknowledged that both researcher and participants are located, in all senses, within the data, they cannot dissociate themselves from its conduct and interpretation (Macklin & Higgs, 2010, p. 65). The constructivist perspective focuses on the subject's interactions with the world and their construction of meanings from that interaction (Gray, 2004, p. 17). Interpretivism focuses on situated interpretations of the individual's world (Schwandt, 2000, p. 189) wherein inherent meanings are derived from actions. Interpretivism includes a range of approaches that includes phenomenology, which requires preconceived understandings of phenomena to be put aside and to allow the subjective experience of the individual to speak for itself. According to Denzin and Lincoln (2000, p. 19) "all research is interpretive … guided by the researcher's set of beliefs and feelings about the world and how it should be understood and studied". In the present study the researcher acknowledged her relationship to the context being studied, her professional knowledge which coloured her approach to the research problem and her understanding of participants' meanings and interpretations of their environment. In realising the influence this professional closeness to the participants could have on every aspect of the investigation with the ability

to create the reality of the relational process, the researcher engaged in an ongoing, systematic self-reflection throughout the interpretive process. The potential for an unequal relationship between the researcher and participants was acknowledged. As a library manager approaching other library managers or library staff, the researcher remained conscious of possible perceived or unperceived power influence.

The interpretivist approach provides meaning and is an inductive approach which "seeks to find internal logic of the subject" (Gray, 2004, p. 21). The individual is the unit of analysis; his/her experiences within their "world" and the meanings of these experiences form the focus for the researcher. From the data collected, an understanding of what is happening is pursued by the researcher, with the construction of theories and models forming an inductive approach. Inductive analysis follows a five-phased approach, which includes immersion in the setting, becoming aware of meaning and nuances, moving through an illumination stage, to description and explanation extended to capture the experience of the individual. Finally synthesis brings the individual's story together as a meaningful, lived experience (Janesick, 2000, p. 391). The researcher believed this phased approach would enable substantial insights into the experiences of participants with meaning grounded in their lived experiences.

Grounded theory, as a research methodology, was considered by the researcher as suited to the selected research framework. The process of immersing oneself in the raw data and comparing, considering, categorising and seeking illumination on a progressive basis through to the development of abstract theories that provide insight into human behaviour resonated with the researcher. It was regarded as suitable method by which to seek answers to the problem under investigation. First articulated by Glaser and Strauss in 1967, this qualitative approach provided guidelines for systematic qualitative data analysis with explicit analytic procedures and research strategies (Charmaz, 2000, p. 512). The focus is on theory generation which illuminates human behaviour and the social world (Chenitz & Swanson, 1986, p. 7). In essence, grounded theory uses constant comparison, with raw data being broken down into segments and then formed into themes through coding procedures. These themes are constantly compared, with further data collection and analysis being conducted through to saturation point. With the development of themes or categories, each successive level of comparison results in more abstract categories. As research is a systematic, complex process, not a single event, discovery and construction of meaning is of primary concern.

Three genres of grounded theory have been developed since Glaser and Strauss' seminal work. Traditional grounded theory, whose main exponents are Glaser and Strauss, is

underpinned by postpositivism and focuses on whether the theory fits the data, is relevant, modifiable, and has scope for wider application. Evolved grounded theory is based on symbolic interactionism and has been promoted by Strauss and Corbin (1990). It asks whether the theory demonstrates data and theory quality, whether the research process is adequate and if there is evidence of empirical grounding. Thirdly, constructivist grounded theory, as propounded by Charmaz, is founded in constructivism and asks whether the theory has credibility, originality resonance, and looks for evidence of its usefulness (Mills, Birks, & Hoare, 2014). As reflexivity was an important feature of the present study, with the researcher striving to ensure her existing history in the field under investigation did not unduly influence the analysis of data and consideration of emerging theories, a constructivist grounded theory stance was adopted. This position offered the researcher the opportunity to develop her capacity as an enquiring individual as well as a conductor of research.

Glaser and Strauss identified two basic kinds of theory, substantive and formal. For the purposes of the present study, substantive theory, that which is developed for a substantive, or empirical, area of enquiry (Glaser & Strauss, 1999, p. 32), was considered suitable. The empirical area under investigation was VET library staff, their levels of mobile technology competency and the relationship to service delivery. While grounded theory methods specify analytic strategies and not data collection methods, nevertheless, this approach focuses upon seeking opinions and interpretations of participants through the inductive collection of large amounts of data. Sampling, surveys and interviews are regarded as suitable research methods that enable such data collection.

4.1.2 Research Methods

In order to answer the two research topic questions, semi-structured interviews were conducted with a purposive sample of 42 library staff from VET institutions in New Zealand and Australia. The interviews included a number of demographic questions, as well as key questions that went to the heart of the research aims. The purpose of the demographic questions was to gather information on individual staff levels of technology competency and their length of service in the profession. This information, in addition to the position held within the library, was to be used for comparative purposes and to serve for linkages and trends when analysing the data. Subsequent to the interviews, participants were also asked to complete a short online questionnaire about services their library offered. A student online survey was also conducted; the purpose of this additional information collection was to gather data for comparative analysis between staff and student responses.

The staff interviews were transcribed prior to analysing the responses to each of the key questions. The data analysis process commenced in two phases:

(Initial). Initial coding – fracturing the raw data into segments and comparing, then coding emerging categories

(Intermediate). Focused coding – through continuing comparison, furthering theory generation through the development of themes

The initial coding analysis involved the researcher's immersion in the data, reading and re-reading to identify some of the important elements contained within the responses. This stage commenced with the data being broken into small segments, and then focused into emerging categories. For each of these categories, direct quotes from the transcripts were gathered, attaching position and institutional identifiers to each quote. Categories, particularly those with the most number of responses (described as "major categories" for brevity) were then examined for position, length of service and technology competence to determine whether there was evidence of an association between responses and demographic indicators.

Finally, in completing the triangulation approach (see discussion below), the student survey data were used to examine agreement between staff and student perceptions of mobile library services. Responses from both samples on knowledge of available services and mobile services likely to be used were compared.

4.2 Background Informing Research Approach

The studies reviewed in the previous chapters included a range of data gathering and analysis methods, from which two theoretical approaches emerge. Investigations into the impact of technology and the learning environment on providers and users have been characterised by a qualitative methodological approach, such as the use of open-ended surveys, contextual situations and themed data, (for example, Ashford & Zeigen, 2012; Booth, 2009; Smith & Borreson Caruso, 2010). On the other hand, the majority of studies examining innovation diffusion and technology adoption have sought a positivist, theory-based approach, employing a range of quantitative techniques demonstrating validity of instrumentation, hypotheses-testing and inter-relationships of variables in a population (for example, Davis et al., 1989; Davis & Venkatesh, 1996; Venkatesh et al., 2012).

Investigations into the usage of mobile technology by students engaging in information seeking activities at higher education institutions have typically employed a qualitative approach. A full range of data collection techniques have been employed by researchers, including case studies (Du & Evans, 2011), online and print surveys (Booth, 2009; Cummings et al., 2010; Mills, 2009; Paterson & Low, 2011; Wilson & McCarthy, 2010), and survey task assessment (Krueger, Ray, & Knight, 2004). The method of data collection has varied depending on sample size, availability and convenience.

The wide-ranging studies that continue to emerge from the field of diffusion of innovation (Rogers, 1963) have led to the development of a series of frameworks designed to test and explain crucial factors in technology acceptance. The majority of the studies have focused on behavioural intention and usage within the commercial environment, while the learning environment is less well-explored. Almost without exception, the studies have employed a quantitative approach to the problem, testing and modifying a range of technology acceptance models (Kim & Han, 2009; Nov & Ye, 2008; Pahnila, Siponen, Myyry, & Zheng, 2011; Venkatesh, et al., 2012). A recent action research case study investigating technology adoption in a small business environment employed the UTAUT model and utilised a qualitative approach (Mandal & McQueen, 2012), however, the findings were limited and the conclusions insufficiently supported.

While study of the literature in the field indicated that a very rich source of understanding of the problem posed in this study already lay in the technology acceptance models that had been developed, empirically-validated and tested utilising a quantitative approach, the decision was made to employ a qualitative theoretical and methodological approach.

As discussed previously, the intention to investigate a particular phenomenon, technology competence in the library workplace, and to allow the social interactions, relationships, interpretations and meanings to emerge was seen as suiting an interpretivist approach. In seeking to understand the meanings of the phenomenon, the social, lived experience of the individuals was believed to be crucial. Therefore, a phenomenological approach, whereby the subjective realities of the participants would inform the understanding of how technological competencies were identified and acquired, was considered suitable. A methodology employing grounded theory provided the context within which the collection, analysis and coding of data could occur, and the development of categories and themes focused on understanding what constituted meaning as perceived by participants. Through the constant comparative approach exploring the meanings, interrelationships, diversities and commonalities more abstract thematic concepts were able to be developed. Continued

comparison of abstract themes provided the ability to develop an integrated theory that explained the phenomenon being investigated.

This methodological approach directed choice of research methods and addressed the crucial details of survey design, data gathering techniques, selection of samples, use of triangulation, level of involvement or neutrality of the researcher, collection, analysis and dissemination of data. The result was a research design underpinned by a strong epistemological framework that the researcher believed would enable confidence in the solidarity of the conclusions drawn from the data (Bechhofer & Paterson, 2000).

4.2.1 Triangulation

Reliability and credibility are important issues in research, although strenuously debated by some qualitative exponents (Janesick, 2000, pp. 393-4). In order to decrease the likelihood that misinterpretation of data by the researcher occurs, collection of data from more than one source is useful. This process is known as the mixed methods approach, which seeks to neutralise inherent biases and has led to the concept of triangulating data sources. According to Bradley (1993, p. 442), the triangulation of data methods is valuable as the methods used condition the data collected and yield different types of data, thus permitting fuller exploration of the research problem. Several types of triangulation were identified by Denzin in the 1970s, involving data, investigator, theory and methodological triangulation (Janesick, 2000, p. 391). Triangulation augments the ability to make comparison and lends weight to the validity of the instruments selected and developed from a methodological aspect. The method also allows the interest of the findings to extend to library sectors beyond the VET sector. In Section 4.4.2 below the inclusion of triangulation within the present investigation will be described.

4.3 Sampling Strategy

The research required a sample of library staff and of students at Australasian VET institutions. Criteria for inclusion within the research were a minimum staff of 10, including the three positions of library manager, systems librarian and a qualified librarian. According to Rogers (2003) research has shown larger organisations show greater evidence of innovation. The establishment of the minimum number resulted from the researcher examining staffing numbers for all ITP libraries and being aware of which ones included systems librarians. The majority of libraries with less than 10 staff did not employ systems librarians. Libraries needed also to be prepared to host an online survey for their students to complete. Participation was sought through initial contact with library managers by email. The purpose of the research was explained and, following indication of interest, all

documentation was forwarded and interview schedules arranged. Of the library managers contacted, who met the criteria, 100% agreed to participate in the research.

The selection of a purposive, expert sample of library and information professionals from the VET sector enabled the collection of a body of rich data in the form of unique, personal perspectives and experiences through interviews, surveys, and face-to-face communication. Data were also collected from students who were both attending the same institutions and using the libraries participating in the study. A nonprobability sampling approach was adopted to ensure the suitability of participants to the research problem (Bradley, 1993, p. 440), who would best be able to inform the research (Creswell, 2003, p. 118).

The ability to obtain rich information was considered crucial to the study. The following selected exemplars from the field of technology impact upon staff professional capabilities, discussed previously in Chapter Two, serve to explain the adoption of the purposive approach to participant selection in the present study.

Cossham and Fields (2006) conducted a preliminary SWOT analysis of capability professional development for New Zealand librarians, record managers and archivists, deciding to focus exclusively on librarians as the target group. Another New Zealand study investigating practical approaches for e-learning diffusion selected participants from 14 educational institutions who identified as either e-learning managers or e-learning primary institutional contacts (Nichols, 2008). Maesaroh and Genoni (2009), using an already-tested survey instrument based upon the NeXus survey previously distributed to Australian ILS professionals, selected library staff employed at the 133 Indonesian public universities, identified through the National Library of Indonesia database, as their sample. A similar approach was taken by Kloppenborg and Lodge (2010) in their selection of library managers from the TAFE sector to form their survey sample; they also chose not to employ triangulation methods nor did they survey the student population to obtain such an angle to their research.

The JISC Attitudinal Survey selected head/senior learning and librarian staff from the higher and further education community and specialist colleges for their investigation into future challenges to the library and the impact of the adoption of new technologies within UK further and higher education (JISC Market Research Team, 2009). Participants were approached through identified listserv groups. Listservs were also used by Rabina and Walczyk (2007) to select their participant group in their investigation into information professionals' attitude toward the adoption of innovations in everyday life. Their online

questionnaire was distributed to library-related listservs, thereby ensuring response from a specifically-targeted audience.

Analysis of the above studies revealed that those researchers who determined the parameters of their participant sample group more narrowly required fewer demographic items in their survey instruments. As a strong emphasis on gathering demographic data was not seen as a main focus to the present study the suitability of a purposive approach was strengthened.

Comparative studies investigating mobile technologies in academic libraries have divided into two approaches. The first type of approach has focused on using specific case studies and interviewing members of one or two organisations to gain in-depth qualitative data (Benitez Juan, Clavero Campos, Codina Vila, & Perez Galvez, 2011; Garrison, Anderson, MacDonald, Schardt, & Thibodeau, 2003; Mbambo-Thata, 2010; Pasanen, 2002; Roberts, 2006; Schaper & Pervan, 2005; Starkweather & Wallin, 1999; Walton, Childs, & Blenkinsopp, 2005; Wilson & McCarthy, 2010). The second approach includes studies seeking larger numbers of participants and producing generalisable findings; these have employed online surveys either emailed to respondents or made available through dynamic, interactive online software such as SurveyMonkey (Carlucci Thomas, 2010; Piña, 2008; Rabina & Walczyk, 2007; Spires, 2008; WebJunction, 2009; White, 2001). For example, a purposive study in late 2010 of the Council of Australian University Librarians (CAUL), which also includes New Zealand university libraries, using a survey method, established direct email contact with all 39 members to determine the extent to which mobile technology was being used amongst the members. This approach generated a 58.97% response rate (Yee, 2012). It appears response rates are improved through this kind of sampling.

4.3.1 Sampling Procedures

For the purpose of selecting the sample of library staff across the VET sector, a nonprobability/purposive approach was employed. This approach was considered the preferred method of ensuring high quality data that matched the questions being addressed in the research. Purposive sampling resulted in the study sites and participants being selected based on the considerations that the phenomenon being studied - competence in using mobile technologies and delivering library service to such devices, would be relevant to the sites and the participants (Bhattacherjee, 2012, p. 105; Silverman, 2010, p. 144).

A number of criteria comprised the sampling frame. They were: awareness of mobile technologies in relation to the library, staffing size, inclusion of expert positions, ability to include an online survey on a web page. As mentioned above, the staffing size selection

criterion required a minimum staffing level of 10 and a number of the libraries contacted by the researcher did not meet this requirement. The minimum staffing requirement has shown up as a factor in the diffusion of innovation framework as investigated by White (2001) who identified greater staffing levels as a critical aspect of early adoption. According to White's study of 140 academic libraries the factor of larger staffing included the allocation of more time and funding to develop new services and were more likely to include positions of specific knowledge (White, 2001, p. 176), such as systems librarians. These were identified as crucial factors in the present study.

In selecting the sample, no differentiation was made between male or female staff. Investigation into gender differences was excluded from the present study for several reasons. Firstly, the profession under study is predominantly weighted towards female; a known feature that could influence the results in a manner not considered useful. Secondly, the influence of gender differences on behavioural intention to adopt technology has been subject to extensive investigation but has also been disputed (Agarwal, Sambamurthy, & Stair, 2000; Hong et al., 2002; Wang & Wang, 2010).

As mentioned in Chapter Three, the influence of age on technology acceptance has been studied extensively. Age was not an aspect included in the present study, service length, denoted as experience, was considered more relevant. While it may be expected that longer serving staff are also likely to be older, this may not necessarily hold true. There is a paucity of information relating to service length as a factor in technology acceptance, yet this is a vital factor in every workplace where professionals at all stages of their careers need to be prepared to accept the introduction of new technologies. A number of investigations into information professionals' attitude toward adoption of innovations in their working life and motivation to participate in professional development activities have included the demographic factors of age and number of years working in a library. The findings from one study revealed the employment of fewer older library staff, with a sharp decline in the number of staff employed for over 30 years ((Rabina & Walczyk, 2007), while the other studies have reported the majority of library staff surveyed have been employed in the profession for 15 years or longer (Chan & Auster, 2006; Hallam, 2008). To address the scarcity of research into this factor, the present investigation sought to determine the influence service length may have.

Hierarchical management structures exist across the larger library environments, in keeping with the majority of professional work places. These typically include an upper directorate/management level, lower management, team leaders, and a layer of qualified

professionals holding either a library and information science qualification or equivalent in a related field of study. A further layer will include para-professionals or unqualified staff. Involvement with systems or technology will be a specified component of some professional library positions. Service experience (professional position) has been subject to few investigations to date (Dulle, 2010; Kripanont, 2007; Schaper & Pervan, 2007; Xu, 2011) and it was posited that, given the extant body of work on innovators and early adopters, this variable is likely to be of impact in technology acceptance within the workplace. Sykes et al. (2009, p. 388), in examining organisational social networks and technology acceptance, included organisational tenure in their sample's demographic profile while restricting the study to a single business unit. They did not specifically model organisational position and examine its differential impacts but instead suggested future work should examine all levels of organisational hierarchy. The present research contributes towards addressing this recommendation. The factor Service Experience (Position) includes three distinct positions found within the academic library structure; library manager, systems librarian and qualified librarian. Its inclusion resulted from the paucity of research in this specific area and the consideration that it could offer an important contribution to the body of knowledge relating to technology acceptance.

Finally, staff included in the sample needed to possess some familiarity with mobile technologies, and therefore the factor of technology competence was included in the study. Staff were required to self-assess from the aspect of competence with, rather than degree of exposure to, the new technology. Several studies have included familiarity with mobile devices and users' technology skills as antecedents or facilitators of mobile service use (Koivumäki, Ristola, & Kesti, 2008; Kukulska-Hulme, Evans, & Traxler, 2005; Olney & Lefoe, 2007).

4.3.2 Target Population - Staff

Sampling across the New Zealand Institutes of Technology and Polytechnics (ITP) and Australian Technical and Further Education (TAFE) sectors was undertaken. The inclusion of the two trans-Tasman neighbours, Australia and New Zealand, was due to the similarity in cultural contexts, education systems, employment and economic conditions, the alignment of education provision and the transferability of qualifications between the two. The population available for the study was to be found amongst the potential pool of 63 TAFE libraries and 18 ITP libraries. The aim was to recruit participants from at least one TAFE library from each of the eight Australian states. It was felt such a sample would be fully representative of the sector under investigation, given the influence of state government upon publically-funded institutions in each state and the potentially biased nature of a sample gathered from a

couple of states at most. Contact details for all TAFE libraries were obtained from the Australian Library and Information Association (ALIA) TAFE Libraries Advisory Committee, members of which are elected representatives of the respective government VET provider library associations or networks. Six TAFE libraries participated in the study; two from Queensland and one each from the Australian Capital Territory (ACT), South Australia, Tasmania and Victoria.

Access to the ITP library contacts was obtained through the researcher's own involvement in the sector. From a total 18 ITP libraries, eight met the staffing criteria and all agreed to participate in the interviews. A second criterion for inclusion in the research was the agreement and ability to place the student online survey on the library homepage and promote it to students. All library managers contacted agreed to ensure this happened. The participant sample from each library needed to include three positions (the unit of analysis) within each library: library manager (or equivalent), one staff member who had involvement with systems or IT (for example, a systems librarian) and a professionally-qualified member of the library staff whose duties did not include such IT focus. This requirement was met in all cases, with one institution including, additionally, a library and information studies lecturer (formerly a member of the library). The three positions chosen for the sample formed part of the 'traditional' job titles list of the NeXus report on Australian library and information professionals (Hallam, 2008, p. 40).

Library managers from the institutions which met the inclusion criteria were approached via email with an invitation to participate and an overview of the research (see Appendix A). Where they expressed interest in participating in the study and having two of their staff also involved, all information forms were sent including the questionnaire.

Email correspondence with the 14 participating library managers resulted in agreement that two of their staff in the positions identified could be included in the interview process. In total, 42 staff members across the 14 institutions comprised the primary sample. The purposive sampling technique employed offered a number of advantages to the data collection process. While the three participant positions were selected for their different expertise in the library environment, it was considered that their involvement with mobile technologies would allow a depth of response in the interviews that would assist both the data collection and data analysis phases and also permit greater degree of explanation.

4.3.3 Sample Size

The staff sample group consisted of 42 professionally-qualified library staff: 14 library managers (or equivalent): 14 systems librarians (or equivalent); 13 qualified librarians; and one other (library and information studies lecturer). Across the sample, the employment duration within the library profession ranged from 3.5 to 40 years. As a small subset of the larger VET library sector population, this size of sample was considered sufficient for reliability, for provision of rich information required in a qualitative approach (Bradley, 1993, p. 440), and for practical purposes of interviewing and transcribing data (Silverman, 2010, p. 193). Sample size in studies investigating the impact of mobile technologies or mobile learning has been determined by methodological approach. The online survey approach was used for a potential sample of more than 21,200 eLearning Guild Members and Associates (Pulichino, 2006, p. 3), while, on the other hand, the intention to gather rich data resulted in a study using 10 case studies and two workshops, each workshop including a purposive, expert sample of 18 participants selected on the basis of role, institution and involvement with innovative working practices (McDonald et al., 2009, p. 13). The latter sample size is not dissimilar to that selected for the present research.

4.3.4 Target Population - Student

A different approach was taken to the student sample required for the current research. The sample comprised self-selected students from the institutions participating in the study, all of whom were invited to complete an online survey through SurveyMonkey. A backup print survey was made available subsequently as a consequence of low response rate.

The guiding parameters for this sample included the characteristics of location (participating institution), occupation (student) and behaviour (library user). To this extent, the sample was purposive, beyond this point participants self-selected. It is possible that some influence on the student self-selection process occurred through the manner in which the web page-based survey was displayed. Some participating libraries displayed the survey very prominently on their home pages; others provided a more discrete link. Additional influence on student self-selection occurred when, in some cases although not requested by the researcher, the library staff at the participating institution informed their students of the survey and invited them to participate. This influence became more noticeable when a paper version of the online survey was made available in the libraries.

The intention was that the student sample would include four to eight students currently enrolled in each sample institution (n=64-128) from a range of courses and qualifications, such as certificate/diploma level and degree. Age and gender were not considered critical

factors in student selection, although exposure to, or use of, library services was. No other approach was made to the student body by the researcher prior to the release of the survey. The online and print survey resulted in data being collected from 95 VET students from 13 of the 14 participating institutions.

4.4 Data Collection

4.4.1 Approach

The study investigated library and information professionals in Australia and New Zealand and the sample was treated as a single unit, for the reasons mentioned earlier. The semi-structured interview schedule was designed to collect rich data for comparability of response, and also to allow any differences to emerge from the responses without compromising the usefulness of the data. In order to undertake the analytical process of constant comparison, which forms a component of the grounded theory approach, the data collection phase was completed over a period of four months, October through to January. During this time 42 semi-structured interviews were conducted and data was collected from two online surveys, which contributed data from additional 120 responses.

4.4.2 Data Collection Techniques

Survey design commences with key preliminary decisions about the method of data collection and sampling being made (Czaja & Blair, 2005, p. 11). As discussed earlier, the collection of data through the use of interviews and surveys was integral to the planned grounded theory approach. Two data collection instruments were designed for library staff: a semi-structured interview schedule (see Appendix B) and a short, online questionnaire (see Appendix C). The semi-structured interviews were conducted with staff in order to capture impressions, observations, predictions, assessments, anxieties, discussion of what was already occurring within the workplace, and what potentially could occur in the future. The inclusion of open-ended questions were intended to assist the researcher in obtaining detailed information on the research questions and to ensure the ability to supplement this through clarification and further probing (Babbie, 2010, p. 320). The subsequent online, self-administered questionnaire, using the popular research software SurveyMonkey, asked staff about their awareness of services currently delivered online at their library. Through this approach, the issues outlined previously in the Research Approach section were covered in sufficient depth to enable meaningful analysis.

Data triangulation was integrated into the research methods design through the inclusion of direct semi-structured interviews with participants (library staff) and indirect online surveys of both library staff sampled and a sample of student library users studying at the same

institutions. In this way, the research analysed the same concept of technology within the library but from a different angle, that of library users. Such comparison contributed towards addressing the potential problem of the researcher evidencing inherent biases.

In order to collect data on the same phenomenon from three angles, a second online questionnaire was developed for students at the VET institutions (see Appendix D). In addition to a series of open-ended and closed questions, the online questionnaires utilised a Likert scale response format to gather data on participants' usage of mobile technologies and, for students, the awareness of library services that were currently delivered online. Literature in the field has demonstrated the Likert scale as the most popular form of rating scale employed within the surveys used both in the information and library science studies and also in the technology acceptance investigations (Booth, 2009; Cummings et al., 2010; Kim & Garrison, 2008; Schaper & Pervan, 2005; Thong et al., 2006; Yi et al., 2006).

4.4.3 Demographic Profiling

Survey design informs the inclusion of specific participant information to allow meaningful analysis of the data. The majority of the surveys or interviews analysed as background context to this study included a small range of demographic items. Selection of the best identifying characteristics of the participants, either to yield maximum information or to act as a limiter, are determined by the data analysis technique chosen for the study. Several of the cited studies below provide examples of demographic information that allow informed analysis.

Booth (2009) surveyed student library users and collected information on age, gender, study major and level. In analysing item inclusion she recommended keeping the categories focused rather than open-ended but also allowing sufficient detail to emerge for later analysis. These questions formed the basis for the student survey instrument. Maesaroh and Genoni (2009) included demographic items on age, gender, current status of library qualification and highest level of completed qualification. These demographics allow potentially considerable cross tabulation of results, although the paper presented very preliminary findings only. Cossham and Fields (2006) included several demographic items in their survey including whether the respondent was currently practising, was affiliated to any professional body, the length of time since qualification, urban/rural setting of the library and the type of library. Rabina and Walczyk (2007) developed their demographic picture of respondents through four questions: age, number of years worked in a library, type of library environment respondents worked in and their primary responsibility within that environment.

The latter two questions resulted from the chosen method of promotion and survey distribution.

The present study included two independent demographic variables: knowledge of, and competence in, the use of mobile technologies and years of employment in the library profession. Type of library environment was already known, age was considered of less relevance than length of professional service, service experience expressed as position within the library staffing structure was a factor which also formed one of the selection criteria. As discussed earlier, gender, in a female-dominated profession, was not considered relevant to the study.

4.4.4 Development of the Instruments

Instrument design was informed by data collection methods previously employed for gathering information on professional development of library staff and technology competency requirements. These have favoured self-completion questionnaires distributed to purposively-selected samples (Maesaroh & Genoni, 2009), evaluation sheets and recorded feedback from workshops (Olney & Lefoe, 2007, p. 800), the use of a questionnaire in an action research study at a specific university (Comba, 2009) or, in the case of institutions developing a suite of core technology competencies, interviews with individuals selected on the basis of position and expertise (McNeil & Giesecke, 2001, p. 51). A three-item questionnaire was used as the basis for a JISC-funded project investigating technology-enhanced working across higher and further education in the UK involving two workshops, ten institutionally-led case studies and stakeholder discussions (McDonald et al., 2009). McDonald, Cullen and Comrie's questionnaire informed the staff semi-structured interview schedule developed for this study and included the following items:

1. How has the adoption of new technologies and practices brought about changes within institutional workforces, and how have these changes affected staff attitudes towards their work and also the student experience?
2. How have staff roles, relationships and working practices adapted to accommodate these changes?
3. What new sets of skills are required in order to work in new ways that exploit the benefits (or overcome barriers) afforded by new technology environments? (McDonald et al., 2009, p. 13)

4.4.5 Questionnaire Quality

The interview schedule and the student questionnaire design included introductory background information in order to inform the participants of the purpose of the study. This included details on the purpose of the study, the voluntary nature of participation, confidentiality, contact details of the researcher and appreciation in advance for agreeing to participate. As the way in which the question is posed conditions the response (Bradley, 1993, p. 442), particular attention was paid to the composition of all items included in the questionnaire. The use of familiar wording in the questions and explanations serves to reduce any potential sense of threat in the situation and to enable the respondent to feel more comfortable and more willing to present both factual information and opinions. A fine balance needs to be struck when interviewing participants from the researcher's own professional field to ensure professional jargon or assumptions do not feature in the questions. Efforts were made to ensure the interview schedule (refer Appendix B) and the two questionnaires did not contain items that would offend or mislead participants (Cohen, Manion, & Morrison, 2010, p. 318). Clarity of wording was checked by the researcher and expert review panel for ambiguity, straightforwardness, vagueness and bias, in addition to the length of each question.

The sequencing of the questions in the interview schedule was considered to ensure the desired tone was established at the start and that there was a sense of balance in the interview with natural links in progression. According to Cohen et al. (2010, p. 336), a covert purpose of each question is to ensure that the respondent will continue to cooperate. The four more general, or "environmental context", questions on new technologies and the library formed the first section, followed by a short demographic section. The third section focused on mobile technologies and sought opinions on required competencies with the following section examining how best to obtain these through training. The purpose of the wider scope at the start of the interview was to allow participants to explore those changes that had been occurring, either incrementally or as a more targeted initiative, that could evolve into a mobile environment as a natural extension. Finally, a check was made to ensure that all the issues contained in the research questions had been addressed in the interview schedule as one interview only was planned with the sample.

In keeping with the qualitative approach to data collection, apart from one multiple choice question relating to level of technology competence, the other 11 questions were open ended. In order to encourage participation, the potential length of the interview was considered and an interview length of between 45 to 60 minutes was aimed for.

The online questionnaire designed for library staff contained one open-ended question seeking factual information and three multiple choice questions (refer Appendix C). Again, the questions were checked for clarity and length.

The student online questionnaire (refer Appendix D) comprised an information page, followed by a brief glossary of terms respondents would encounter. The questionnaire consisted of seven sections with a total 22 questions, including closed, multiple choice and open-ended response formats. The first section contained non-threatening, easy to answer, factual questions relating to course of study. Care was taken to avoid using jargon in the phrasing of the questions, although the functionalities described in some of the options were library-oriented, for example 'Receive recall notifications'. A non-library user would possibly not understand such terminology. However, the student participants to the survey were all library users and likely to have encountered this terminology in the course of their library usage. The purpose of this questionnaire was predominantly to gather facts rather than opinions and this approach lent itself to a self-administered questionnaire. The final section sought opinions to three open-ended questions.

4.4.6 Review of Data Collection Tools

To ensure the factor of quality is addressed in all aspects of the data collection tools it is essential to conduct a range of checks. These include:

1. Checking the clarity of questionnaire items, instructions and layout
2. Gaining feedback on validity of questionnaire items, operationalization of constructs and purposes of research
3. Eliminating ambiguities, over complexity or difficulties in wording
4. Gaining feedback on type of question and format (multiple choice, open ended)
5. Identifying omissions, redundant and irrelevant items
6. Checking the time taken to complete questionnaire
7. Identifying motivating/non-motivating, threatening, offensive items

(Cohen et al., 2010, p. 341)

To assist the quality of the three survey instruments, a review panel of eight experts comprising practitioners from the higher education or vocational education sectors was assembled. Their areas of expertise covered the vocational education library sector, the international university library sector, the field of online learning, and quality assessment within the researcher's institution. Each panel member was approached by email with an invitation to form part of an expert review panel with all details of the research project being

provided plus the information that ethics approval to undertake the project had been received from Curtin University Ethics Committee (see Appendix E). Upon agreement being received from all panel members, they were sent the following attachments:

- Letter of invitation – staff sample
- Information sheet – staff sample
- Information sheet – student sample
- Consent form – staff sample
- Interview schedule - staff
- Questionnaire – staff
- Consent form – student sample
- Questionnaire – student
- Research proposal

The panel were requested to examine the survey instruments and to provide feedback on their validity, usefulness, comprehensiveness and focus. The expert panel provided valuable feedback, which informed minor modifications of the research instruments. These included rewording several questions, changing the order of a couple and rewriting one to ensure it elicit the particular information being sought.

4.4.7 Research Instrument Design - Staff

Through examining two aspects of workplace technology competency: the skills, knowledge and competencies required of library staff to deliver mobile technology services and the training necessary to acquire such skills, the study focused on the influence of innovation, change and technology acceptance within a specific professional discipline. The research instrument design sought to obtain reflexive responses from participants through eliciting their observations of the situational context within which technology was having an impact, practices that were becoming manifest, and how these were being responded to.

The instrument design was guided by Dillman's (1978) question content types of behaviour, beliefs, knowledge, attitudes and attributes (quoted in de Vaus, 2002, p. 95). The 12 items created for the interview schedule related to Dillman's question content categories (de Vaus, 2002, p. 95) in the following manner:

Behaviour

- Have library staff observed changes in the student library experience since the new technologies were adopted? Please specify.
- How have (or how do library staff anticipate) staff roles, relationships and working practices adapted or evolved to accommodate the impact of mobile service delivery?

Beliefs

- What impact do library staff believe the adoption of these new technologies is having upon the library staff/workforce?

Knowledge

- What new technologies are library staff aware of that have been adopted by their library in the past two years?
- What skills, knowledge and competencies are/would be required of library staff in order to work effectively in mobile technology environments?
- What method(s) could be used to identify the gaps between the required and current knowledge and skills of library staff in relation to delivering mobile services?
- What specific on-the-job training is required by library staff to acquire the skills, knowledge and competencies to effectively develop and deliver mobile services?
- How would this training best be delivered?

Attitude

- In opinion of library staff, has the adoption of new technologies (identified in Q. 1) affected staff attitudes towards their work?
- What library services do staff believe could be most effectively and appropriately delivered within a mobile environment?

Attribute

- How would library staff describe their knowledge of, and competence in, the use of mobile technologies – [beginner, competent, advanced]
- How long have the staff members been employed in the library profession?

The questions were designed to elicit a mixture of rich textual and numeric (attribute) responses. Narrative responses were sought from the staff, which allowed for sequence of events descriptions (Wengraf, 2002, p. 174). While the first question, looking at technology adoptions over the past two years had the potential to be responded to in a descriptive manner, the researcher used probes to elicit a more narrative response if necessary. Open-ended questions were included for the purpose of allowing respondents to deliver their

opinions freely and to allow clarification or probing by the interviewer where necessary. As one of the selection criteria for inclusion in the sample was expertise, it was considered important by the researcher that respondents should be presented with the opportunity to express the extent of their knowledge.

The first section of the questionnaire was intended to establish the environment within which the technology changes were occurring and contained four questions asking about general technology adoption and its perceived impact upon the library. The second section contained two demographic questions. The third section examined the type of new knowledge required or generated and contained three questions; the fourth section explored capability development and contained three questions which probed the skills and training aspects participants believed to be involved in mobile delivery. The structure of the questionnaire was important in the way data was analysed and this is discussed in detail in the Findings chapter as the categories which developed from the data analysis began to reveal inter-relationships and progression.

An online questionnaire followed the interview, forming part of the staff data collection (refer Appendix C). The four questions contained were a subset of those included in the student questionnaire. This was for the purposes of triangulation, to ascertain what online services library staff were aware of that were offered to students and to enable subsequent examination of agreement between data. The questionnaire commenced with a demographic, open-ended question requesting employer institution and the second question listed 14 library services that could be offered via a library website while the final two items in the survey, asking about availability of certain online services, were accompanied by a Likert verbal rating scale 'No', 'Have offered previously but removed', 'Yes' and 'Future planning'. Dillman's question content categories were again applied to the questions to seek consistency in instrument design and to gain clarity around the type of content the questions would elicit:

<u>Attribute</u>

- By which institution are you employed?

<u>Knowledge</u>

- How many of the following options does your library currently offer? Check all that apply. 14-item scale
- Does your library website offer the following? 17-item scale
- Are the following TEXT/SMS library services available? 7-item scale

4.4.8 Questionnaire Development - Students

The online student questionnaire was modelled on two survey instrument exemplars which had provided useful findings on the use of technology in the academic environment. The research instrument developed and used by Char Booth in her substantial and informative investigation on student interest in emerging library technologies at Ohio University (Booth, 2009) was determined as suitable for adaptation to the present study. Consent was received from Booth to adapt her questionnaire to this study (see Appendix F). Booth also forwarded a yet-unpiloted 28-question survey template that could be used as a means to establish baseline data on student library and technology use, ownership and perceptions. The design of the questionnaire was additionally informed by the 'Students and Information Technology in Higher Education, 2010: Survey Questionnaire' adapted by Smith and Borreson Caruso in the Educause Center for Applied Research's Study of Undergraduate Students and Technology to study student technology ownership and usage (Smith & Borreson Caruso, 2010).

The questionnaire was entitled 'How do students perceive library services?'. The layout included a preliminary page of participant information and consent form whereby students understood they could withdraw from the survey at any time. The second page presented a definition of 'mobile technology' and 'mobile library' for assistance.

The first eight questions sought participant 'Demographic information' including use of technologies and contained a contingency question: "I don't use mobile technology. Please go directly to Q10". The earlier question acted as a filter for the later question, and the later question is contingent upon the earlier question. (Please refer to Appendix D for full details of sections and questions, including number of items or options associated with each question). The second section 'Mobile Devices', included three questions on the type of device(s) student participants used and how they used it in relation to library services. Section 3 'Library Use and Evaluation', included six questions investigating how students used library services and facilities, and used a slightly-modified version of Booth's Likert verbal 8-scale rating ranging from 'Never' to 'Several times a day'. The decision to use an 8-point scale for the survey was strengthened by the advice that there is a tendency for participants to opt for the mid-point of a 5- or 7-point scale (Cohen et al., 2010, p. 327). An identified weakness in questions 10 to 13 in this section, that the researcher was aware of, was their basis upon two assumptions. These assumptions were, firstly, that student participants were aware of the services/facilities listed and, secondly, based upon this awareness they were prompted to make a conscious choice regarding their use. Alternative wording could have addressed this issue but would have added both to the length and

complexity of the questionnaire. Questions 14 and 15, which related to student interest in using library services if they were available to mobile devices, attempted to address this weakness through seeking intention. A slightly-modified version of Booth's Likert verbal 6-scale rating ranging from 'Very Unlikely' to 'Very Likely' accompanied these two questions, as well as the sole question in the section 'Information Use and Evaluation'. Section 7 'Technology Use and Evaluation', sought more demographic, numeric information regarding the temporal use of technology by students. Section 8 'Library Service Delivery' concluded with three open-ended questions, designed to seek student opinions on what library technology options would assist their learning.

As one of the criteria for selection of the student sample was library use, access to the student sample was sought, and in all cases obtained, through the library manager contacted in each institution. Information on the student survey, including the information/consent form plus the survey itself, was provided so all library managers were aware of the nature of the questions to be asked of the students. The questions had been carefully checked to ensure they were not asking students to complain about quality of library service, resources or staff and that there was nothing in the nature of the questions that would be likely to offend the libraries that were hosting the survey on their websites.

Internet surveys are an increasingly-popular form of data collection instrumentation. However, their widespread availability and usage does not mean they do not carry pitfalls for the unbiased collection of data. It is necessary for the researcher to be aware of the possibility that, despite having access to the Internet, the target sample may not be comfortable with the functionalities of the technology delivery (Clayton, 2007; Solomon, 2001), or may respond differently in the online environment than they would in some other data gathering situation (Buchanan, Johnson, & Goldberg, 2005; Kraut, Olson, Banaji, Bruckman, Cohen, & Cooper, 2004). The researcher acknowledged this possibility and offered a contingency solution through the additional provision of print-based questionnaire forms to those libraries that had not registered any student responses. To minimise the potential problem of respondents who did not meet the inclusion criteria completing a publically-available survey, which can compromise the quality of the data (Shannon, Johnson, Searcy, & Lott, 2002), a closed location, SurveyMonkey, was used with no other links to the instrument. The URL was provided by email directly to the participating libraries to place on their library website. By choosing this specific location to host the survey, only those potential respondents who visited the library homepage would have access to the survey. In this manner, it was intended to reduce the likelihood of unsolicited responses being received.

4.5 Data Collection Procedures

A combination of data collection procedures was employed utilising a range of available technologies and software. Thomas (2003, p. 191) has created a set of standards against which to measure the efficiency of different note-taking methods: cost, simplicity, accuracy, completeness, time requirement, acceptability (to people involved in the event), dependability (consistent functionality), which allowed a useful comparison when considering the best approach. The use of contemporary technology benefitted this study in the frequently-laborious processes of data recording and transcription through enhanced speed, accuracy and reliability of instrumentation technologies. Literature on use of technology in capturing qualitative information has focused predominantly on the use of online surveys; discussion on the mixture of technologies used for this study has been hard to locate.

4.5.1 Skype

For the purpose of conducting interviews the videoconferencing software Skype was used. This required agreement from participants, plus the exchange of Skype names where access to Skype was available. Where it wasn't, Skype to telephone was employed. All participants agreed to being interviewed in this manner. Cohen et al. (2010, pp. 380-381) offer a range of benefits and disadvantages to using this particular technology. It is cost effective, stable, and familiar to all participants, enables the researcher to select respondents from a much more dispersed population than if travel to meet interviewees was required, interviewer effects are minimised, it allows greater uniformity in the conduct of the interview, and it is more convenient in reaching respondents at times that suit. All these benefits were considered relevant by the researcher. Skype has the additional benefit of, where a web camera is available, the videoconference meeting more closely approximating a face-to-face interview situation. The problems associated with using this technology include the potential for the respondent to hang up (this did not occur in any of the interviews), the increased possibility of skewed sampling as all respondents need to have access to Skype (in several cases, the institution did not permit the use of Skype and respondents chose to conduct the interview from home at a time that suited), and there is a greater chance of distractions for the respondent (a couple of respondents needed to borrow another staff member's office to have privacy during the interview).

4.5.2 Transcription of Interviews

All respondents were informed that the interview would be recorded and their agreement was sought. This was received in all cases. A 4GB Livescribe Echo APA-00006 Smartpen was used by the interviewer for this purpose. The digital smart pen audio recorded the

interviewer and interviewee and, additionally, captured the notes written on special perforated pages via a camera device located in the nib. The pen enables instant playback of audio recording by tapping anywhere on the written notes and over 400 hours of audio and thousands of pages of script can be stored. A microUSB connector transferred the handwritten notes/synchronised audio files to the computer where they were uploaded as rich text files into LiveScribe Desktop software. This captured the pages as scanned images. From this software the pages were converted to text documents for editing using MyScript for LiveScribe application. The edited results were then saved as a Microsoft Word document. Use of this data recording and transcription technology offered a range of benefits, including efficient, accurate data recording, and proved extremely effective in reducing a labour- and time-intensive activity to a manageable one.

4.5.3 Online Survey Instruments

The web survey software, SurveyMonkey, was chosen for the staff and student questionnaires. It offered a number of benefits to the researcher and respondents, such as the internet being a commonly-used tool for information gathering with all respondents having access, enabling greater numbers of student participants to be reached, with participants being able to complete the questionnaire at a convenient place or time. Conversely, problems associated with online surveys include poor completion rates, inability to seek clarity of meaning, timing, lack of personal contact, technical problems and lack of awareness (Clayton, 2007; de Vaus, 2002; Shannon et al., 2002; Solomon, 2001).

The student surveys were loaded on the participating library home pages from the end of October for a period of three weeks. As events were to prove, timing was significant in relation to response rate. Students were encouraged by their own library staff to respond. There was considerable variation in the manner in which the individual libraries chose to display the survey invitation; some were highly interactive and inviting, others were so discrete as to be barely noticeable by other than the most observant library website visitor. In the event, the response from students was poor. The researcher believed the response rate was possibly a combination of factors: lack of promotion, lack of awareness of the survey, poor timing (at exam time and too close to the end of the year), or lack of incentive to undertake the survey. A contingency plan was then deployed and print versions of the online questionnaire were sent to four institutions to display on their public service desks. Ten copies were sent to each requesting library and a better rate of return resulted. In total, 95 completed questionnaires were received.

4.6 Ethical Considerations

4.6.1 Research Problem

Ethical considerations are implicit throughout the whole research process and there are accepted protocols defining how informed consent to participate is sought, gained and recorded; how data is collected, stored and accessed; and how participants are informed of their rights and compliance by the researcher (Petre & Rugg, 2010, p. 107).

4.6.2 Access to Participants

Gaining access to participants for the research required initial permission to proceed from Curtin University Ethics Committee. Several of the institutions approached also requested that their own ethics committees study the research proposal. Access to participants was gained through official channels. Initial email communication with members of the ALIA TAFE Libraries Advisory Committee and the ITP Library Managers' Group was followed by direct email approach to library managers in selected libraries. The direct email approach has been identified as generating a higher rate of response than a general request for participation on listservs (Chesney, 2006). The introductory email outlined the purpose of the study, the background of the researcher and an invitation to participate. The purpose of offering this information during the initial approach was to establish a rapport with potential participants, a number of whom already knew the researcher through professional activities. As the staff sample component was homogenous, comprising individuals from the same profession as the researcher, trust and information was forthcoming in the early stages of sample selection. An information letter and consent form were made available to the staff sample (refer Appendix A).

4.6.3 Voluntary Participation and Informed Consent

Willing participants in possession of full information is considered a fundamental principle of any research studying human participants. Subjects of research should not be exposed to anything to which they have not previously agreed and should possess a clear understanding of what their granting their consent implies (Abbott & Sapsford, 2006, p. 295).

During the initial approach to the staff sample, participants were encouraged to contribute to the study. They were provided with information outlining their rights to withdraw, the potential of the research to improve their situation, the manner in which the interview would be conducted, how the data would be handled, with a guarantee of confidentiality.

Informing the student sample of their rights was achieved initially, through the provision of promotional material available for libraries to place on their homepages (see Appendix G).

Once the survey link in the promotional material was clicked on, respondents were taken to the first page of the survey which contained three sections: Information about the Study, Declaration to Participants and Consent Form (see Appendix D). Two options were offered at the bottom of the page, a hyperlink to Exit This Survey or a Next button. By clicking this button respondents acknowledged their voluntary consent to participate in the survey. Each page of the survey contained an Exit This Survey button.

4.6.4 Confidentiality, Anonymity and Non-Traceability

Participants accepted the condition of confidentiality; none requested anonymity, which entails a greater degree of privacy whereby the researcher cannot identify the participant from the information provided (Cohen et al., 2010, p. 64). When face-to-face interviews are being conducted this is not a realistic expectation. Interviewing is considered an intrusive activity but boundaries can be imposed, including assurances offered and respected; reporting the data from those interviews in a manner that allows identifiable details to become public is intrusive to an unacceptable degree (Abbott & Sapsford, 2006, p. 295).

The online student questionnaire also included the promise of confidentiality. Within the online environment, a greater degree of confidentiality was able to be offered. While participant details such as institution attended and course of study were obtained, no names or any identifying details were requested and respondents had the option of not responding to the question or withdrawing from the survey. This meant that full anonymity was not possible. Respondents were assured that only the researcher and the researcher's chief supervisor would have access to the raw data collected, the data would be kept in secure storage and destroyed after an allocated period. Non-traceability, the aggregation of data to ensure any personal details are disguised, was applied to both the staff and student samples during the analysis phase.

4.6.5 Interpretation and Reporting

The data analysis and interpretation stages continued the protection of individual confidentiality. All names and identifying details, personal and institutional, were removed and alphanumeric codes applied to staff interview transcripts, the only distinguishing detail that was permitted was the coded professional position of the respondent.

In selecting a qualitative design for the study it was considered important to allow the voices of the participants speak without misrepresenting them. Guba and Lincoln (2008, p. 277) discuss the presence of the researcher's voice in the created text and also the participants' voices speaking for themselves in order to allow the readers to 'hear' them. The researcher

included direct quotes throughout the textual material to illustrate examples and to allow the participants' opinions to emerge and speak to the reader.

4.7 Interviewing Participants

4.7.1 Status of Interviewer

From a theoretical point of view, the researcher was integral to the research process; through the interaction with participants and her own professional experience and role. The researcher engaged in the role of a constructivist grounded theorist. In other words, she entered the field of study with her own histories, theories, and experiences which needed to be acknowledged, while at the same time analysing and constructing meaning in which the experiences and voices of the participants emerged (Charmaz, 2000; Mills, Birks, & Hoare, 2014). A close professional relationship existed between researcher and some participants which required self-monitoring and reflexivity to ensure the findings were not exposed to undue, unintended interference by the researcher.

From a practical point of view, the researcher engaged in a range of roles and activities: initial approach to staff sample, seeking ethical approval from several of the institutions, interviewer, data collector and analyser, and reporter. Throughout these undertakings the researcher also remained a member of the survey community. All these activities included the potential for disruption through bias and it was important to ensure that the influence of bias be minimised as much as possible. To this end, full details of the study were made available to potential participants when invited to participate. Participants were, therefore, aware the interviewer was a manager of a VET library. This did not appear to constitute any problem and none of the participants approached for inclusion in the study declined.

The researcher acknowledged the many contexts and processes of which the participants were part; that they were culturally-situated, they did not exist as a theoretical or abstract entity outside their constructed experiences and interpretations of their particular environment. The relationship of participants to their environment was a key ontological concern of this investigation. The researcher was also a component of this environment; both professionally and from the angle of taking a vantage point within it. Therefore, the design and methods of the research formed an integral part of the way in which reality was construed. As discussed earlier, the researcher engaged in self-reflection throughout the various stages of the investigation and, particularly, when engaging directly with the participants during the interview process and during the data analysis stage. The relationship between participant and interviewer carries the potential for power differentiation in that the interviewer has greater opportunity to control the manner in which the interview is

conducted. The researcher consciously sort to resolve this influence through endeavouring to put the participants at ease throughout the interview, checking whether they were comfortable and relaxed at the commencement, explaining the process and gaining their agreement before moving onto the questioning stage.

One of the benefits of the researcher conducting the interviews was the level of prior knowledge and also the ability to communicate and interact with professional colleagues. This enabled any additional information sought by participants before the interviews to be answered directly and to allow the interviews to develop through the use of probing or prompting. It was also important the interviewer maintained an attitude of being non-judgmental, refraining from offering personal comments and creating an atmosphere where the respondents felt relaxed and in control of the interview. The interviewer was conscious of the need to maintain neutrality, to avoid making unrequired comments on responses and to listen rather than to converse. The topic being investigated was not identified by any participants as containing sensitive issues.

4.7.2 Interview Timetabling

The forty-two interviews were scheduled and conducted over the space of three weeks in October/November with the exception of one which required rescheduling to January. The intention was to complete this phase of the data collection process in one block at a time convenient to the sample. The months October/November comprise the end of the academic year in Australia and New Zealand and many staff have a brief opportunity then to catch up on matters outside routine demands. The researcher identified this as an appropriate period for busy staff to undertake an interview and any preparation involved.

Immediately following the Skype interview all participants were requested to complete the short online questionnaire. More importantly to the data collection phase, the library managers were also requested to add the SurveyMonkey link for the student online survey to their library websites while the student body was still on campus. The survey was to remain open for three weeks, by which time (end of November) the majority of students would have departed for the year. In all cases this action was undertaken by the participating libraries.

4.7.3 Interview Process

The research interview was designed to collect a corpus of rich information on the competence and confidence of library staff in developing mobile library service delivery. The interviews were conducted, directly on a one-to-one basis by the researcher using an appropriate communication technology, Skype, both computer to computer and computer to

telephone. The use of technology was chosen for a logistical reason, to eliminate both time constraints and travel costs. The type of technology deployed was chosen to increase participation rates and reduce telecommunication charges. The information collected addressed several levels of investigation: the individual point of view, a social, collective viewpoint and a management planning perspective.

The duration of interviews ranged from 45 to 90 minutes, with the majority lasting about one hour. The interviewer considered it important to ensure the on-going engagement of the respondents, more of an issue when interviews are not taking place face-to-face and the respondent has a ready termination option. Issues associated with the use of technology in interviews are discussed more fully in the following section. Each interview was captured in two formats, both through the interviewer's notes and by the digital recording device. At the end of each interview the participant was thanked for his or her contribution and the subsequent two online survey steps were explained.

4.8 Validity

Flick (2009) simplifies the concept of validity as being whether researchers see what they think they see (Flick, 2009, p. 371), in other words, whether the researcher's specific constructions are empirically grounded in those whom they studied, to what degree this is made clear to others (Flick, 2009, p. 371) and the demonstrated accuracy and appropriateness of the data (Denscombe, 2010, p. 299). A range of checks should be included to minimise threats to validity at all stages of the research process. These may include selecting appropriate resources, methodology that answers the research question, instrumentation, sample, data analysis techniques and data reporting (Cohen et al., 2010, pp. 144-145).

4.8.1 Methodological Validation

The ability to yield rich insights into the phenomena under investigation, to provide in-depth answers to questions, or generate novel theoretical perspectives underpins the research design and the choice of methodology. Utilising an interpretive approach, the desire to obtain a deep understanding of the participants and their social context, indicates that the researcher will be closely involved in the action of research and will need to employ an ongoing attitude of reflexivity (Lincoln & Guba, 2000, p. 183). The reflexive stance required the researcher to take accountability for the research paradigm employed, her own position of authority in relation to the study and participants, and to assume ethical responsibility relative to representation and interpretation of findings (Dutta, 2014, p. 93). A paradigmatic issue pertaining to validity relates to the fusion of method and interpretation. Lincoln and Guba

(2000) argue for "community consent and a form of rigor … in ascribing salience to one interpretation over another" (p. 178). The methodological criteria deployed in grounded theory are designed to assist the researcher's best analysis but will not ensure replicability of results. What it will allow though, is the applicability of the theory in a similar situation to interpretation, understanding and predicting of phenomena (Chenitz & Swanson, 1986, p. 13). A quality of balance, or non-bias, should be discernible through the presence of all participants' perspectives and concerns in resulting texts, this is defined as fairness by Lincoln and Guba (2000, p. 180) and contributes to the rigorousness or validity of a phenomenological enquiry. The present investigation sought to address these methodological issues through the researcher's engagement in a continuous process of reflexivity and her use of rigorous, tested constructivist grounded theory methodologies.

4.8.2 Validation of Research Instruments

The research concept of content validity, whereby experts evaluate the degree to which items on a test measure the intended objectives (Tashakkori & Teddlie, 1998, p. 83), was undertaken as described in Section 4.4.6 (Review of Data Collection Tools) using a panel of invited experts, both national and international, to check the three data collection instruments for a range of qualities, including content validity. The instruments were adaptations of surveys and questionnaires which (with one exception) had been field tested on substantial numbers of respondents in the higher education sector.

4.8.3 Sample Validity

Ensuring validity of the chosen samples required addressing the issues of sample size, representativeness, rationale for choice. The purposeful selection of samples can be informed by a number of strategies relating to the research question (Bradley, 1993, p. 440), with the generalisable feature of qualitative studies being the opportunity to obtain richness and depth of information. The staff sample was selected purposively, based upon library type and size, expertise, professional position. Given the sample was to be interviewed exclusively by the researcher, forty-two participants was a manageable number. The size of the sample is relevant to the fundamental processes within the research design. Large amounts of data may overwhelm the researcher and not contribute additionally to the saturation of conceptual categories that form the focus of grounded theory procedures (Stern & Porr, 2011 p. 52). The ITP library sector was more heavily represented, with eight from a total of eighteen libraries involved, while six of a possible sixty-three TAFE libraries took part, however, in both sectors, not all of the VET libraries qualified for inclusion on the basis of staffing threshold. Ideally, one TAFE library from each Australian State would have been involved but this expectation proved impossible to meet. Both the TAFE and ITP library sectors demonstrate

operational, philosophical and cultural homogeneity. There is variation in size but commonality in most of their other distinguishing features. This situation suggested the findings from this investigation would find common interest across the sector.

4.8.4 Telecommunications

The particular problems associated with conducting telephone interviews, such as lack of access, lack of cues other than auditory, and memory capability of interviewees, impact upon the relationship between interviewer and respondent (Cohen et al., 2010, p. 153) and relate also to the use of Skype as a communication channel. The auditory component of Skype was predominantly used for the interviews, as many participants either lacked a web camera attached to their desktop computer or undertook the interview at another staff member's workstation. Only three of the forty-two interviews were conducted as a videoconference. The telecommunications issues were acknowledged by ascertaining respondents' access to Skype, which was available in all cases, and their willingness to be interviewed in this manner; again, all respondents were happy. The lack of cues is a more complex problem. On the one hand being able to read body language can assist an interview to proceed effectively, with rapport more easily established between the participants; on the other hand, some interviewees will respond more readily in a situation that is not face-to-face, feeling somewhat protected by a degree of anonymity. There is the added benefit of telephone-style interviews being shorter and more focused, suited to busy working people (Cohen et al., 2010, p. 153).

4.8.5 Interview Data

The degree of authenticity is of concern when collecting data from interviewees, whether, or to what degree, bias is present in responses. The researcher sought to minimise this threat to the validity of responses through the selection of three staff from each institution, each of whom would be commenting on the same environment and culture. Triangulation, examining the evidence from different data sources and using it to build a coherent justification for the findings, was employed. Staff completed an online survey regarding the evidence of technology in their library environments and student library users were similarly asked the same questions at greater length. This allowed comparison of data. Some degree of inconsistency in responses in regard to 'opinion' questions in both the semi-structured interviews and the online questionnaire was to be expected, given the different interpretations the three positions would offer, however the factual information, for example, whether wireless connectivity was available, was expected to demonstrate similarities.

4.8.6 Communicative Validation

The validation of interview data can be further strengthened through returning transcripts to interviewees for agreement with the content of their statements. For the purposes of this study the transcripts were not returned subsequent to the interviews as five steps of validation were afforded through the technology hardware and software employed for data collection. Use of a recording device is recommended when interviewing (Cohen et al., 2010; Flick, 2009; Thomas, 2003). The study acknowledged transcription involved a range of issues inherent in converting a contextual situation to a written one, such as creating a record of data rather than a record of a social encounter (Cohen et al., 2010, p. 365), loss of parts of the valuable, non-verbal information evident in a face-to-face interview through use of an audio recording and the resulting transcription. However, transcribed data were crucial for the type of analytical methods that were to be applied in the present study. The Smartpen used for recording each interview, although not documented in any of the studies investigated, offered a range of benefits in data capture, transcription and subsequent checking:

1. Handwritten notes taken by the interviewer during the interview
2. Video capture of the notes via camera device in the Smartpen nib
3. Audio capture of the interviews
4. Pdf capture of the handwritten notes
5. Word files (checked and corrected against the audio recordings) created from the pdf documents

A tangible benefit of the Smartpen during the transcription and checking processes is the synchronicity of the video and audio recording components, this allows the transcriber to double tap anywhere on the handwritten notes to access the accompanying audio recording. With this level of checking accuracy available, it was not considered of any further advantage to send the transcripts back to the interviewees.

4.9 Data Organisation and Analysis

4.9.1 Purpose of Data Organisation and Analysis

The purpose of data analysis is to understand rather than predict (Westbrook, 1994, p. 245). In the qualitative tradition, large masses of data are collected, subsequently broken down into smaller units and then reassembled to call attention to patterns, themes and concepts (Bradley, 1993, p. 443). Five ways of organising and presenting qualitative data analysis are offered by Cohen et al. (2010) - by groups, individuals, particular issue, research question, and by instrument. Determining which method(s) to employ is governed by the researcher's

background and philosophical preferences, the purpose of the investigation, how the researcher intends to analyse the data, how the data gathering instruments will be utilised and whether the researcher is primarily concerned with presenting a holistic picture or at a more granular level.

Several processes are available for analysing qualitative data. Analytic induction involves an initial scan of the data to generate categories and relationships which are then further refined or reformulated. Constant comparison is a process employed to compare new data with existing data, categories or theories, and was considered to offer the most useful insights for the current investigation. Typological analysis is undertaken through classifying data into groups and subsets on the basis of clear criteria; and, finally, the process of enumeration can be used to count frequencies of words, ideas and codes (Cohen et al., 2010). Comparison of data with emerging categories or concepts, and coding lies at the heart of the constant comparative analysis method which includes three stages of coding, open, axial and advanced or, in the constructivist philosophy, initial, focused and theoretical (Mills, Birks, & Hoare, 2014, p. 114). Throughout the initial data collection phase, when the data collected is broken down into segments and then labelled, with the labelled code being clustered into one or more conceptual categories, the operation of constant comparison is simultaneously in process. Constant comparison is essential to every step of grounded theory as conceptualisation continues through the focused coding stage. In moving to the advanced coding stage, the conceptual categories are expanded and assembled, properties refined and relevance examined. Abstract theorisation can be drawn into the analysis, contributing to in-depth understanding of the data, and increasing the explanatory power of the grounded theory study (Birks & Mills, 2011; Stern & Porr, 2011).

4.9.2 Qualitative Theoretical Framework

As discussed earlier in the chapter, the consideration of a personal philosophical position by the researcher determined the theoretical framework guiding the investigation. A constructivist epistemology focused on participants' construction of meaning within their world was considered suited to the type of investigation being commenced. From an ontological perspective, from wishing to understand what is, an interpretivist position, which seeks understanding of the actions of the individual, was believed to be the best suited to addressing the questions being asked.

Phenomenology is an approach contained within the interpretivist view. It focuses on the lived experience of participants, indeed, of all stakeholders in the research process, thereby allowing meanings and interpretations of phenomena to speak for themselves. A

phenomenological approach enables the "careful and systematic reflective study of the lived experience" (Usher & Jackson, 2014, p. 181). Preconceived assumptions must consciously be laid aside by the researcher. A methodology that aligns well with allowing participants' experiences to speak independently is grounded theory. Grounded theory came into prominence with the publication of Glaser and Strauss' seminal work *The discovery of grounded theory* (1967), in which the attempt was made to close the gap between theory and research. The authors intended to develop guidelines suited to the discovery of theory in social research (Glaser & Strauss, 1999, p. viii). More work on the generation of theory from data followed as a community of grounded theorists emerged, led by the research and writings of Glaser, Strauss, Corbin and Charmaz.

The two main forms of qualitative data analysis are content analysis and grounded theory. Content analysis can be employed equally in qualitative, quantitative, or mixed methods studies. As a method of textual analysis, researchers quantify, analyse presence, meanings and relationships of words and concepts, code and categorise and make inferences from this. The basic analytical methods incorporated within this technique are conceptual or relational analysis which can be used to attain a higher level of interpretation (Devi, 2009).

Grounded theory has a long history of being recognised as one of the best ways of conducting qualitative analysis and has as its underlying principle the emergence of theories from the area under study and empirical data collected rather than the existence of theories prior to the data analysis (Baskerville & Pries-Heje, 1999, p. 5; Charmaz, 2000, p. 522; Glaser & Strauss, 1999, p. 3; Strauss & Corbin, 1990, p. 24). While not without its critics regarding its applicability to social science, and specifically library and information science, research (Seldon, 2005), many of the studies examined as background to this investigation, although not openly stating their analytical approach, have used grounded theory as a methodological design (Mbambo-Thata, 2010; Mills, 2009; Walton et al., 2005). The benefit of grounded theory in the qualitative approach is the ability for themes to emerge from the stories told to the researcher and the drawing of these themes into coherent and meaningful form. The richness of the data is preserved through the structuring process. The emerged theory, based on data rather than assumptions has longevity, "[as it] is too intimately linked to data, it is destined to last despite its inevitable modification and reformulation" (Glaser & Strauss, 1999, p. 4).

The constructivist grounded theory approach uses the variant terminology of initial, focused and theoretical coding (Mills, Birks, & Hoare, 2014, p. 114) and takes the stance that the researcher enters the field of enquiry with their own understandings which will be used in the

construction of the analysis. Such an approach requires sensitivity, possibly even discipline, on the part of the researcher to acknowledge the influence their own perceptions and background are having upon the data and eventual findings. As the researcher was employed within the field under study, she considered such an approach allowed for the influence of her own understandings to be acknowledged rather than ignored.

The intention of employing grounded theory for data analysis through the technique of coding and comparison was to allow meaningful constructs to emerge from the raw data. This method required the collected data to be analysed through a process of close, systematic immersion by the researcher, through constant re-reading and study to ensure an accurate account of the information was provided through the coding. The preliminary analytical step broke the data into small segments which were then coded. As the process of constant comparison progressed, with additional interview and survey data being added and analysed, categories or "abstractions of phenomena observed in the data" (Chenitz & Swanson, 1986, p. 94), started to emerge. The gradual development of conceptual themes formed the next intermediate, or focused, coding phase. During the focused coding phase, the emergence of *impacts* occurred. These impacts, while not a necessary component of grounded theory analysis, proved crucial in the present investigation. They were identified as external pre-emptive factors influencing the abstract themes, each containing potential for disruption and uncertainty within the affected area/theme under consideration. The more abstract themes continued to be compared with other themes, with relationships and meanings being sought. The theoretical concepts that resulted formed an integrated theoretical explanation of the phenomena under investigation.

4.10 Chapter Summary

This chapter sampled previous research in the fields of technology acceptance, library professional competencies, and library user behaviours in relation to technology to examine the range of methodologies employed. The examination informed the decision to conduct a constructivist grounded theory methodological approach employing an interpretive perspective within an overall qualitative inquiry approach. The use of triangulation in the data collection and analysis stages was employed to enable comparison of responses and add to the depth and range of interpretation. A purposive sampling strategy was employed to gather data from a representative section of the Australasian VET library sector.

The development of the interview schedule and questionnaires was informed by previous, large-scale investigations into the use of technology within higher education institutions. Care was taken to ensure the instruments developed were valid through rigorous assessment

by an expert review panel. The use of technology was demonstrated in the collection and transcription phases and this provided both benefits and limitations.

The research design, methodologies and procedures documented in this chapter offered a qualitative approach which builds upon previous studies in the field. The research design could be considered reliable if the connections between those studies that have informed the methodologies of the current project and the outcomes described in later chapters can be clearly identified, considered logical and seen to be both possible and of value in replicating or modifying in subsequent investigations. The findings generated are reported on in Chapter Five.

CHAPTER FIVE

FINDINGS

5.0 Introduction

The overarching focus of this research was the competencies required of Australasian VET sector library staff to deliver services to mobile technologies. The response of library staff to the concept of the mobile technology library, their perceived levels of confidence and their capability within this environment were investigated. As noted in Chapters One and Four, the approach taken in the present investigation was constructivist and interpretivist. Through application of the constructivist, grounded theory approach described in the preceding chapter, sufficient quantities of data were collected to enable examination of the preparedness of library staff to deliver mobile services. Collected data were analysed through a process of close, repeated, comparative engagement. A three-stage approach was taken:

1. The preliminary stage of initial coding, breaking the data into small segments, then comparing, coding and re-analysing leading to the emergence of categories
2. The intermediate, focused coding stage of continuing comparison, furthering theory generation through the development of more abstract themes
3. The development of a theory grounded in the data and serving to explain the phenomenon under investigation.

The analytical process addressed the introduction of technologies into the library environment and its impact upon required knowledge and competencies amongst VET library staff, the perceived requirement for capability development training and the preferred methods for delivering such training. Patterns and relationships were analysed for their effect within their particular area of analysis and also for their effect on other patterns. Data analysis included a description of incidents, discussions, examples, relationships, exclusions, unanticipated classes of data, and alternative explanations. This analysis resulted in a range of categories being formed. These categories were then subjected to continuing analysis during which, related patterns were revealed and reconfigured in increasingly-abstract, conceptual themes. The development of conceptual themes formed the second analytical level; the intermediate, or focused, coding phase. The emergent, more abstract, conceptual themes and, in the present investigation, the crucial presence of impacts, nine in total, upon these concept themes, allowed comparison within and between one another and, as analysis continued, moved into the third, advanced theoretical coding stage. Continual comparison of themes and the emergence of theory eventually reached the point, termed by Glaser and

Strauss, of "theoretical saturation" (Glaser & Strauss, 1999), whereby further analysis adds no new understandings. The insights obtained by the researcher during the final high-level analysis of abstract concepts solidified into an integrated theory, grounded in continual questioning of the data. The researcher believed this theory encompassed the diversity and similarities within the collected data, and offered an interpretation at a theoretical level, enabling connection to past research and suggesting possibilities for further research. The development of a continuum of themes and impacts is discussed in the present chapter; the resulting integrated theory is presented and discussed in the following chapter.

The findings are presented in seven parts. The investigation collected and presented some quantitative data for the purpose of examining and comparing findings from several angles and also to compare with previous technology acceptance findings employing similar demographic features. The first part includes most of these data and presents the profile information of VET library staff participants while also providing context for the later responses. The second part provides details of how the coding and grounded theory analysis was conducted.

The findings in Parts 5.3 to 5.5 are presented under the three major umbrella terms that contribute towards the developing theoretical model. This is intended to assist understanding of the interrelationships that were highlighted and the emergence of the impacts contributing to the theory that will be presented in Chapter Six. Therefore, in the third part, discussing environmental impact, the results of the constant, comparative analysis of the interview data are examined. In this part, the voices of the 42 participant library staff emerge, responding to questions 1 to 4 of the complete set of 12 that comprised the semi-structured interview. The changing technology environment and its impact upon library staff and students were examined. The categories identified through the initial process of repeated reading and immersion in the data by the researcher are presented to demonstrate the issues participants believed were important. At the conclusion of this part the themes that emerged during the intermediate, focused coding stage are presented. This pattern is repeated for Sections 5.4 and 5.5, prior to being presented in total in Section 5.6.

The fourth part, knowledge generation, presents the themed data relating to new knowledge generation and includes participant staff responses to questions 7 to 9, which sought information on workforce competencies and skills, both their identification and acquisition. It includes the findings that relate to the skills that VET library staff viewed as critical and necessary to meet the new technologically-enhanced environment. The section also presents

the findings on the best methods both to identify if skills are lacking and to address any skill deficits.

Part five presents the capability development component of the investigation, questions 10 to 12 – specific training required to develop identified technology competencies, best methods for delivering such training and the impact technology has had upon staff roles and relationships within the organisation and the profession.

Part six presents and explains the continuum of conceptual themes that contributed to the theoretical model. These resulted from the constant comparative methods undertaken throughout the present investigation. The presence of impacts is discussed in preparation for the presentation and discussion of the resulting integrated theory in the following chapter.

Part seven examines the student perception of the library and the delivery of mobile services. Part eight provides a comparison of VET library staff awareness of service delivery and highlights gaps between the student findings and the library staff responses respectively

The final section of the chapter reviews validation of responses.

5.1 Demographic Profile of Library Staff Sample

The data were analysed by position type (library manager, systems librarian and qualified librarian), mobile technology competence, and length of service. Three periods of service length were created by the researcher for the purposes of the present study. The 42 participants covered a wide spectrum of service length: from 3.5 years through to 40 years. The majority fell within the medium service length range of 11-20 years (40.6%), while the 20-year greater service length included 30% of the sample. In analysing this service period further, 21.4% of the sample had been employed in the library profession for between 21-30 years and 16.6% for between 31-40 years. These results may be compared to those shown in the 2006 NeXus survey of TAFE library staff where 15.3% of staff had been employed for less than 5 years, 37.9% for between 6 to 15 years and 46.8% for more than 16 years (Hallam, 2008, p. 36). The present study showed far greater percentage of staff employed for more than 16 years (61.8%).

Table 5.1

Years of Employment in the Library Profession

Service Length	**Years**	**Number**	**Percentage**
	Not given	2	4.8
Shorter	1-5	4	9.5
	6-10	3	7.1
	Sub-total		16.6
Medium	11-15	7	16.8
	16-20	10	23.8
	Sub-total		40.6
Greater	21-25	5	11.9
	26-30	4	9.5
	31-35	4	9.5
	36-40	3	7.1
	Sub-total		38.0
	Total	**42**	**100%**

The second demographic question relating to knowledge of, and competence in, the use of mobile technologies in the questionnaire tool offered participants three choices of competency level: Beginner, Competent and Advanced. In the discussions and analysis that surrounded their self-assessment, participants contributed two additional categories, which were consequently included in the results; these were Average and Competent/Advanced. The figure below reveals that the majority of the sample rated their knowledge of, and competence in, the use of mobile technologies as Competent (35.7%). The second most frequent self-assessment level was Beginner (28.6%).

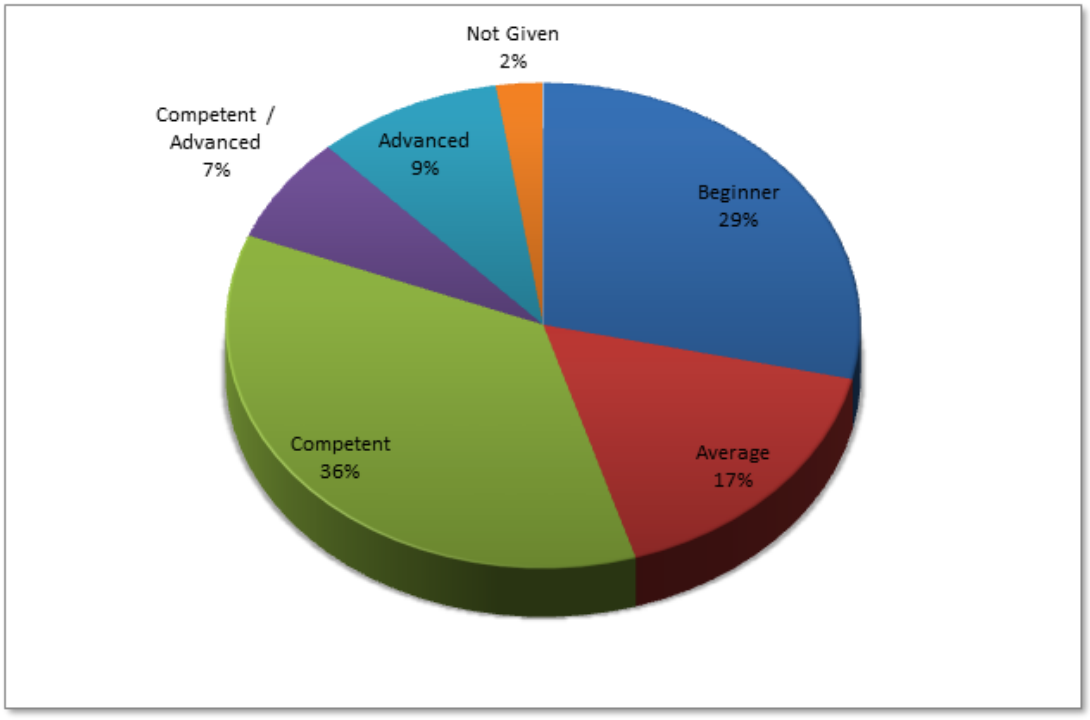


Figure 5.1 Knowledge of, competence in the use of mobile technologies (n=42)

The levels of technology competence self-assessment were analysed by years in the profession to determine whether there was an association between length of service and technology competence. Taking the service length mean, those participants who had been employed in the library profession for the greatest length considered themselves to be of average competence in using technology (mean = 25.6 years), the mean length of service duration for technology beginners was slightly less at 24 years. It was noticeable that the newest participants to the profession were also the most technologically advanced (mean = 8.75 years), although one (a library manager) had a service length of 20 years. Other participants of 20 years' service length are represented in every category of technology competence. Conversely, one participant (qualified librarian) of five years' service length rated herself as a beginner.

The levels of technology competence self-assessment were analysed by Service Experience (Position) to examine association between position type and technology competence. Fifty per cent of library managers considered their technology competence to be at the Competent level, followed by Beginner (41.7%). The majority of systems librarians considered themselves to be Competent (45.5%). The majority of qualified librarians identified with Beginner level of competence (40%), followed by Competent (33.3%). In the table below, it

is acknowledged some of the numbers are too low for the percentages to be meaningful. They have been included for consistency.

Table 5.2

Level of Technology Competence by Service Length and Position

	Level of Technology Competence				
	Beginner	**Average**	**Competent**	**Comp/Advanced**	**Advanced**
Years in the profession	5	Not given	4	15	2
	12	18	9.5	20	3.5
	19	20	10	29	9.5
	20	20	11		20
	20	23	11		
	21	33	12		
	26	40	12		
	30		15		
	31		19		
	33		20		
	34		21		
	36		25		
			25		
			26		
			33		
			33		
Mean	24	25.6	17.9	21.3	8.75

	Level of Technology Competence				
	Beginner	**Average**	**Competent**	**Comp/Advanced**	**Advanced**
Position					
Library Manager	5 (35.7%)		6 (42.8%)	2 (14.3%)	1 (7.2%)
Systems Librarian	1 (9.1%)	2 (18.2%)	5 (45.4%)	1 (9.1%)	2 (18.2%)
Librarian	6 (40%)	3 (20%)	5 (33.3%)	1 (6.7%)	
Other		1 (50%)			1 (50%)

5.2 Themes

The initial coding phase involved breaking the data from the interview transcripts down into segments and then identifying the categories that began to emerge through the process of constant comparison and analysis. The alphanumeric codes created provide geographic and position information about the sample, codes A - H represent New Zealand ITP library staff, codes I – N include Australian TAFE library staff. Library managers are identified as 1, systems librarians as 2 and qualified librarians (librarians) as 3. The participant coded as I1a is a library studies lecturer and the participant coded J1a is a facilitator across a network of campus libraries. When moving into the intermediate, focused coding phase, the researcher continued to examine what was happening within the categories. The themes that began to emerge from that analysis formed the basis for systematic reflection and comparison; the development of these higher level conceptual themes contributed to the early generation of theories. The themes were grouped under three umbrella headings that provided the context within which particular relationships emerged. These headings, environmental impact, knowledge generation and capability development, provide a dynamic structure that is subsequently discussed in the continuum of overarching theories and impacts. This intermediate, focused coding stage is described in the following sections.

5.3 Environmental Impact

The impact of technology advances upon the library profession appears to be a generally-accepted phenomenon. Library users expect to be able to access information held by their library over the internet. Within their workplace environment library professionals work with a range of online systems, dedicated to the storage, maintenance and provision of access to information. The background within which the present investigation took place was one of

technological change. It was necessary to establish how much change was occurring and the awareness participating VET library staff had of this change. The first part of the investigation focused on new technologies that had been introduced in the past couple of years, the resulting impact upon the workforce and upon their attitudes towards their work and whether any changes in the student experience of the library had been observed as a consequence.

5.3.1 Awareness of New Technologies Adopted

The staff sample was asked about new technologies introduced into their library environments during the previous two years. The purpose of this question was to focus respondents on the technology-related changes that had been occurring, major or minor, within their environment. As discussed in Chapter Four, the focus was not specifically on mobile technology. Analysis of the raw data from the interviews resulted in the emergence of sixty-four technologies categories relating to adoption/implementation by the libraries within the past two years. Technology categories mentioned by at least four participants are presented in the figure following. Seventy-three per cent of respondents identified wireless as an introduction into their library environment. For some libraries, wireless was a new introduction "Only recently, actually only one month ago" [K1], while for others, the service was well embedded, for example, one library had offered this service since 2007, while a third library had had their wireless service set up by 3rd year IT students a couple of years earlier.

The second most mentioned technology was laptops/notebooks/COWs (portable charging units on wheels) for student loan (mentioned by nearly half the sample), although analysis showed several participants from the same institutions were noting these technologies. Five of the 14 libraries had assumed the initiative of lending mobile devices to students, at the sixth library both the systems librarian and qualified librarian mentioned their institution had originally introduced loan of laptops to students but the initiative hadn't taken off.

The provision of texting service to students was undertaken by half the sample libraries, with a third of participants mentioning this service. Comments ranged from the library being at the forefront of this type of service to students, "As far as I am aware, the library is the only place that uses texting on a regular basis" [H2], to comments that indicate the library had not been considered in the institutional communications structure, "The broader institute uses SMS for quite a while to advise for class and room changes. I am not certain why we couldn't join the rest of the institution" [N2]. Nearly half the comments came from systems

librarians, who would have involvement in setting up this service either through the library management system or in conjunction with the IT unit in the institution.

Upgrades to the library management system were also mentioned by a third of participants as having occurred during the past couple of years. This is a technological change requiring considerable planning and implementation. Half the comments were from library managers who, certainly, would have been instrumental in negotiating any budgeting requirements necessary to the upgrades. The rollout of the Civica's Spydus library management system across Australian State TAFE libraries is evident in the comments from TAFE library participants, with 10 of the 14 comments specifically mentioning the new Spydus system and the increased functionalities it had supplied, for example, "we have extra tools such as SDI, Syntex, more functionalities" [L1] and "the new one is a huge change to the work environment. We previously kept track of acquisitions though spreadsheets, they are now contained within the system" [I2].

In analysing participant interviews, it became apparent that the VET library environment was in a state of continual and significant change. The number of technology adoptions introduced into the professional environment of the 14 sample libraries appeared substantial, with 64 categories emerging as examples of implementation over the space of twenty-four months. This state of ongoing technological change set the scene for the present investigation. It acted as confirmation of the researcher's impressions prior to the commencement of the investigation, that VET library staff were working in a continually-evolving environment for which they might not be adequately prepared.

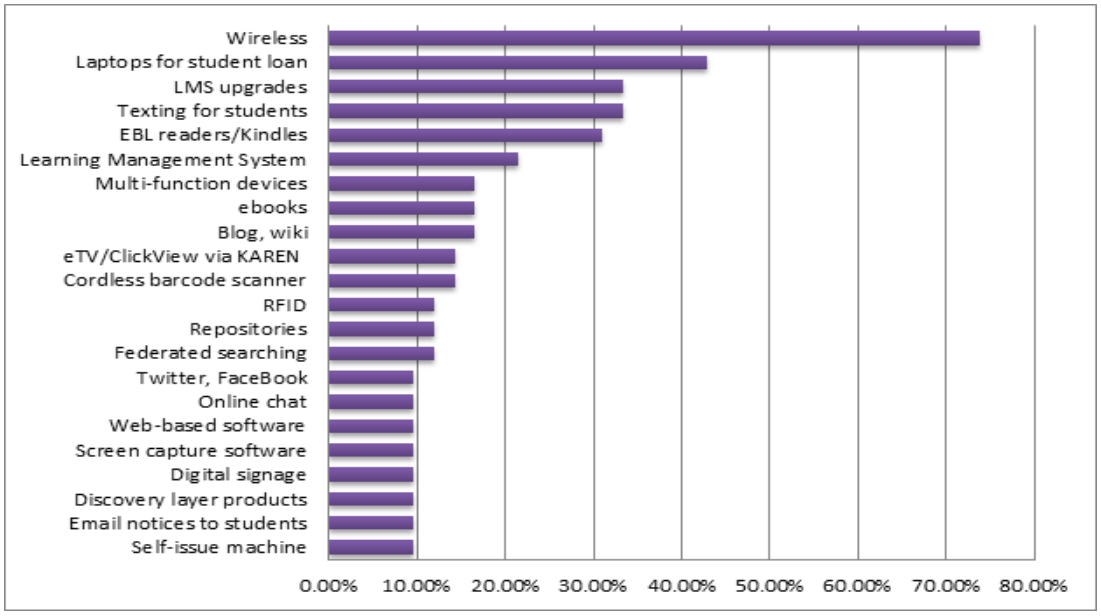


Figure 5.2 New technologies introduced 2009-2010 (%)

Participants identified a wide range of technologies related to their workplace. These included such service-related technologies as text messaging reference services, vodcasts and podcasts, LibGuides, mobile versions of online databases, interactive whiteboards/auxiliary equipment, Clickers for loan, and iPhones. That the library was increasingly being perceived by others in the organisation as technologically innovative was also identified as a new technology adoption by a couple of participants. In several cases, the new technologies were created by library staff themselves. Two library managers mentioned online library orientation tours their staff had created, for example "We have also developed a couple of applications - the Virtual Library Tour and an application called Resource Locator … That is fairly unique and it was designed by one of our multimedia specialists here" [K1], which indicated that new technology adoptions by VET libraries were both external and internal. What seemed to emerge from the participant comments was that new technologies were being introduced into their workplace environment and they were responding by using these technologies to enhance library service delivery. The introduction of QR codes in the catalogue, of vodcast/podcasts, screen capture and voice over software for producing online instructional materials, online chat and a range of social media platforms indicated library staff were consciously surveying the changing technology landscape and selecting, where possible, those technologies that enabled them to offer a new range of services. Interestingly, only two participants from one library mentioned having secured a mobile device for staff to practice on "We have purchased an iPad, it is an experiment at the moment to see the potential" [N2], with, again, a sole comment relating to mobile phones indicating "Technology for the library, is that many of the library staff particularly management have iPhones, supplied by the organisation or those who haven't have bought their own" [J1a]. Collaboration with the institution's IT unit is either not mentioned or appears in terms of unhelpful relationships, "Some of our problems with getting these new things up and running is getting IT to see the educational value of things we want to access" [I1], or "I suggested we create a mobile-friendly library page. The IT department at that stage said unless we can show 2% of library users access web pages by mobile devices they won't go down that track. This was a surprise to us, it might have been in the too hard basket" [C2].

Having completed the preliminary stage of initial coding, the researcher analysed the themes that had emerged and compared them for consistencies, differences and commonalities. The intermediate, or focused, coding stage enabled more abstract themes to develop. These abstract themes were determined by the researcher as consisting of three foci that conceptualised the impact of new technologies upon the VET library workplace. All definitions were created by the researcher for the specific purposes of the present investigation. Their purpose was to merge commonalities discovered within the initial

categories into a single defining aspect in order to provide a coherent approach to that particular aspect of the investigation. These conceptual themes will be discussed later in this chapter as they are analysed further into even higher-level conceptual answers to the questions under investigation. The three themes to emerge from the new technologies adoption component were:

1. Information delivery – defined as the dissemination of information to information users through the implementation and use of software and programmes by information providers
2. Infrastructure - defined as processes, procedures and technologies that enable delivery of services and information
3. Service delivery – defined as enabling the provision of service to clients

The themes are ordered by the number of categories which were encompassed, for example, the majority of categories were integrated into the information delivery theme.

The themes indicate that the VET library staff sample had adopted a considerable range of new technologies whose functionalities enabled the delivery of information to library users. To a lesser extent, the types of technologies they had implemented supported their professional interrelationship with library users and, the least implemented types of technologies related to the delivery of services. This finding is interesting as later results will demonstrate how strongly focused participants were upon service delivery.

5.3.2 Impact of Technology Adoption upon Workforce

Having established the nature of the changing technological environment within which the participants were working, the investigation then focused on the impact the adoption of these new technologies was having upon the library workforce. Forty-three impact categories emerged from the initial segmentation and coding of the data. This is a reasonably-high number of impacts to manifest within a discrete workplace environment and provides some evidence of the level of concern participants felt in relation to the environmental change they were experiencing.

The most major categories that emerged from the data reveal the perceived need for staff to acquire the skills necessary to leverage the potential benefits of the technology their libraries have implemented (see Table 5.3 below). The ‘Need to up-skill’ (mentioned by slightly less than half the sample), evident in responses relating to the need for all staff to acquire the skills needed to master the new technologies, emerged as the impact of most common concern. Staff revealed a degree of urgency in their responses, with comments such as

"There is a requirement to be constantly learning new skills" [F1] and "You have got to keep the skills up, you can't sit back, it's always changing" [I3], indicating that the impact was forcing a response from staff, the option of doing nothing was not seen as possible.

Table 5.3

Technology Adoption Impact by Category

Category	**Position**		
	Library Manager	Systems Librarian	Librarian
Staff need to up skill	5	5	7
Some staff are keen to lead, others prefer to follow	4	5	2
More work has resulted	2	5	1
Better service provision	1	5	2
More technology-related questions are directed to staff	2	1	3
Some staff experiment with technology	3	1	2
Little impact	3	0	3

The concept of early and late innovation adopters, discussed previously with Rogers' innovation adopter categories, emerged in the category 'Some staff are keen to lead [change or adoption of new technologies], others prefer to follow' (a quarter of the sample). Participants observed that "some staff are really motivated to learn, others are a bit apprehensive about taking on new technologies" [I2] and:

> Some staff are okay, are welcoming mobile technologies ... others take longer to get used to the changes. Those who are okay take on a more specialised role, managing and looking after them [J1a].

Participants felt that the new technologies were sorting out the staff who were interested in meeting the challenges from those who delayed developing competence. Terms such as "apprehensive" and "not capable" related to perceived ease of use of a system and the following comment that "More people are asking how to connect to wireless, so library staff have to learn new technologies" [A3] indicated that staff believed there are benefits to be gained from using the system and that, eventually, competency would be standard practice.

This category displays similarities to another commonly-mentioned impact ‘Some staff experiment with technology’, wherein participants described the situation arising in their libraries of individuals or small groups of staff experimenting with technology and gaining self-taught skills in the process. In both these categories, what emerged clearly was the belief that by up-skilling and engaging in innovation, library staff themselves were responsible for the change in behaviour. Respondents across the three position types noted attitude was critical in moving into a new environment. This was regarded by the researcher as indication of intention to work effectively within the mobile technology environment.

Other categories including frequently-mentioned impacts indicate that participants believed a greater amount of work resulted from the adoption of new technologies, and that library users had higher expectations of library staff as a consequence, but the end result was a better provision of services. The following comment provides an example of perceived benefits:

> Information is getting to students easier and quicker. Less library staff are involved in getting information out; it is an instant, easy way of communicating. Quite often we get instant replies, so books no longer just sit waiting. Emailing is now considered out-of-date [F3].

Another frequently-mentioned category, ‘Little impact’, discussed by both library managers and qualified librarians, included comments that suggested either those libraries had already integrated technology sufficiently into their normal workflows that no change or disruption had been obvious, for example:

> Wi-Fi – this has had little impact – the staff are used to the introduction, it is standard work [M3],

or that they had not moved down this path yet,

> There has been a minimal impact of technologies upon our library [J1].

The latter comment does not indicate whether the lack of impact arises from a library management decision or from wider, organisational policies.

Other impacts participants had noticed upon the library workforce included greater involvement of library staff in setting up technology, a blurring of required workplace skills,

which enabled library staff "to collaborate with IT and learning advisors" [F1], frustration in relation to the lack of available technology or resourcing, resulting in:

> A lack of implementation. The lack of new technology hardware is affecting library staff. It is frustrating that we don't have wireless or other mobile or new technologies in general [E2],

or, equally problematic,

> Some staff have access to iPhones, but it's personal access only … The IT unit does not lend out technology devices. We had to write a business case to the CE to purchase an iPad [E3].

A recurrent impact related to the benefits derived from the new technologies. The increased speed of operations was cited frequently throughout the interviews; the greater knowledge and expertise staff had acquired were viewed as advantageous, for example, "the eLearning Librarian … is very comfortable with technology. She doesn't think of technology at all, this is just the way she wants to communicate" [B1]; and the different mind-set needed appeared to be developing staff in positive ways, indicating such opportunities as:

> There are also different ways of doing things we have done before, for example, Chat Reference. There are no visual cues from the student, your style needs to change, you need to adjust to a different environment. People deal with this differently [B3].

Awareness, not only of what students needed but also of how they planned to access that information was seen as another positive impact, attracting comments such as, "We can't be the dinosaur any more, we must be relevant to the students" [N1]. Concomitant with such changes in attitude was the ability to be versatile or accepting of the notion that opportunities were available through a change in focus around processes, positions and expertise, for example:

> There is more demand on staff, infrastructure, IT support, it is giving us a new range of skills and also gives us an opportunity to think of new ways of using old skills, so things that have been around for a while can be used in an educational way than perhaps the way in which they were intended [I3].

The image the library presented of itself, noted one participant, was being altered through the adoption of new technologies, with the impact occurring in the form of how the library was perceived by its stakeholders:

> It is important for us to stay credible as far as IT is concerned, not just be seen as stamping books. If staff and students associate library staff with new technologies this has quite an impact upon our reputation [G3].

Not all impacts discussed by participants were considered beneficial. Frustration emerged in a range of more negative comments. As noted above, categories which emerged from the initial analysis related to technology failing to perform as required and the time involved in dealing with this. A participant noted "There is some tension when wifi wasn't working" [D2] and another expressed the expectation that their organisation and management needed to set directions, "we do have a new manager who has come in place and she has made it quite clear that new technological developments will be very much a part of their future" [J1]. Other participants noted that the implementation of new technologies had resulted in additional workload and their colleagues were dissatisfied with this lack of planning "they are not against technology per se, but in certain instances … [when they are] busy with other duties, they don't want extra things loaded on them" [N2] and, "It all adds to the workload, we don't often get rid of things; when we introduce new things, we also keep the old method" [M1]. Additional comments indicated that some staff were either afraid of, or resistant to, the new technology, for example, "For some, it is very exciting - new possibilities, for others it is a bit scary" [J2], and "Most of the staff who work on the Information Desk seem to be resistant to the chat service" [N2].

On the other hand, apparent lack of organisational commitment had caused problems, such as:

> The staff are frustrated that we do not have the money to do things they would like to do. We don't have cell phones ourselves, we are restricted to having to text through a PC. It can be limiting and a bit frustrating for staff as well. The Library is not seen as involved with technology by a senior manager. There is a cost factor also. The manager sees it as an ongoing cost [D3].

The intermediate, focused coding phase of data analysis established the emergence of four more conceptual themes. These are described below, in order of number of categories

aligning with the theme, from greatest to least. The definitions were created by the researcher for the purpose of the present investigation:

1. Processes and relationships – defined as interpersonal work-related relationships which exist and develop within an organisation, and a range of interrelated work tasks intended to achieve a specified result
2. Attitude – defined as a disposition towards an event, an object or a person
3. Organisational support – defined as employees' perception of their organisation's response to, and acknowledgment of, their individual and group contribution and value
4. Job design – aspects of a job, such as content, methods, and relationships, required to fulfil technological and organisational requirements as well as recognising the contribution of the job holder

The themes indicate that the VET library staff sample were aware of a variety of impacts upon the workforce. It is worth noting the tone apparent within the categories. Of the overall 43 emergent categories, over half indicated a positive view of the impacts, for example, 'Library staff are innovative with technology', about a quarter adopted a more negative, critical tone, for example, 'Lack of technology availability is frustrating', and the remaining were neutral, in the sense that staff were coping as usual and the changes were another iteration of what libraries had always done, providing facilitated access to information for users.

The majority of the impacts related to established processes and the requirement to alter these. Secondly, participants were aware that attitude towards technology was indicative of the staff member's likelihood to use technology effectively. Management-related aspects of organisational support and job design came into sharp focus, possibly as a result of change-related apprehensiveness. The conceptual themes indicate VET library staff were conscious of the immediate consequences of the range of new technology implementations discussed in the previous section.

5.3.3 Technology Adoption Impact upon Attitudes

In continuing with the examination of the workplace environment, opinions were sought on whether staff attitudes towards their work had been affected by the introduction of the technologies discussed in the preceding sections. From the descriptions offered by VET library participants a range of twenty-seven attitude categories emerged, slightly more than half the number of categories identified in workforce impact. Given that attitude had emerged as a workforce impact, participants were being asked to consider this factor further

and drill down into its various constituent components. All participants agreed they had observed an impact upon staff attitudes, only one lone voice suggested no impact (with accompanying proviso), "No, as long as technology is working and staff know what they are doing, it hasn't really changed their attitude towards work" [N3].

The major categories containing the most commonly-mentioned attitudes revealed that library staff believed technology was here to stay, with the majority adopting a positive attitude. A 'Positive attitude' (mentioned by nearly half the sample), evident in the manner in which staff viewed their own responses to technology and also the way in which they believed others viewed them, emerged clearly as being of concern. Comments such as, "There is a positive feeling amongst the staff, they are learning new technologies to solve student enquiries" [A3] and "I think positively. Definitely it is very exciting. The team is very customer-focused. Staff attitudes are positive and they all try their best to meet the student needs" [H2] clearly indicate an enthusiasm to embrace and benefit from technology adoption. The close linkage between staff feeling positive and believing customer service was being enhanced was evident in all comments in this category. This supports the point that emerged earlier in Section 5.3.2 relating to the belief that the new technologies enabled the provision of better services to students and appears repeatedly throughout the responses. The positive attitude was also reinforced when participants believed the perception of the library was being enhanced, such as when others in the organisation recognised the skills held within the library:

> The Library is seen as something of a pioneer in technologies, in the vanguard of the institution. The Library is seen in a positive light, as progressive and with-it, not just an archive of old books [E3].

The second most frequently mentioned staff attitude, 'See benefits for patrons' (mentioned by a quarter of the sample), is an extension of the first. Participants linked technology adoption with student expectations, rather than workplace requirements, evident in comments such as:

> The adoption of new technologies in our institute is always driven by our relationship with our library clients – how can we provide very customer-focused, how can we provide better service, how can we do things more efficiently [K1].

VET staff participants were not interested in implementing new technologies for the sake of being seen to do so, illustrated in the remark, "We are fortunate in not having to learn new

skills for which there is no purpose" [G3]. The purpose appeared to be, above all, the ability to improve library services in a responsive manner.

A number of participants believed attitudes towards the need to acquire appropriate skills were changing. Staff accepted the need to up skill, probably more as an extension of currently-held professional skills rather than the acquisition of completely new sets of competencies, for example, "Most of the library staff are well qualified with the Masters degree, and pretty IT savvy, they relish upgrading their skills and adding to their knowledge" [H1]. Some regarded the effect of the new technologies on attitude as a regular process of improving staffing skills levels and nothing extraordinary.

The following table presents the category segments by position and indicates whether different positions within the library reported particular attitudes. For example, within the 'Positive attitude' category, qualified librarians demonstrated greater awareness of the positive attitude of staff towards the adoption of new technologies, and within the 'Up skilling is required' category, library managers were more conscious of such a need being articulated or demonstrated by staff.

Table 5.4

Staff Attitudes by Category

Category	**Position**		
	Library Manager	Systems Librarian	Librarian
Positive attitude	5	5	8
Regard it as additional work	4	4	2
See benefits for patrons	3	3	4
Looking at how to incorporate technology into their work	3	5	1
Some are positive, some negative	5	3	1
Up skilling is required	5	2	1

Not all responses were positive. Negative attitudes also appeared to be in evidence across most of the VET participating libraries. Some of categories that emerged indicated a degree of staff resistance, such as 'Some resistance', 'Some are positive, some negative', and

‘Divide between early adopters and sceptics’. The last category indicates that Rogers’ innovation adopter categories have been accepted by many staff with comments such as, “There is definitely a divide between the early adopters and those who see it as a fad and won't last” [C1] and “for those staff who are more like early adopters, there are new things to play with, new opportunities. For the others, no, there certainly haven’t been any detrimental effects; it is not affecting their work” [L1]. Both comments were made by library managers, who were, possibly, taking a more overarching view of staff attitudes.

Where uncertainty or ambivalence was perceived, participants typically offered the following type of explanation, “Satisfaction is not uniform across the staff. It is affecting different people in different ways” [F1], or “It depends on the personality and technological ability of the staff” [J2]. For those staff comments included in the category ‘Looking at how to incorporate technology into their work’, systems librarians were most likely to be actively seeking to include technology into their routine work (over half the category responses) and qualified librarians were least likely to express this attitude. Across the 27 categories that emerged from the initial analysis the positive, negative and neutral attitude responses were almost evenly divided. An example of a neutral response is ‘Extension of what is already done’.

The intermediate, focused coding phase of data analysis established three conceptual themes. Again, these are described below, in order of number of categories aligning with the theme, from greatest number to least. The definitions were created by the researcher for the purpose of the present investigation:

1. Skills focus – defined as competence within one’s particular area of workplace practice
2. Technology focus – defined as the use of computing hardware/devices and software to manage the information environment
3. Workplace change focus – defined as instilling new values, attitudes and behaviours within a working environment in order to achieve new ways of doing work and overcome resistance to change

The 27 categories from the initial analysis were spread evenly across the three conceptual themes formed during the intermediate coding stage.

The themes indicate that the VET library staff sample were aware of staff attitudes being affected by the implementation of new technologies in a variety of ways. They were able to observe the consequences technology was having upon their immediate work environment

and relate how they believed staff were responding to these consequences. Technology was seen as a catalyst for change, it separated the early adopters from the sceptics or resisters in a way that perhaps no other aspect of their work environment had done. Technology competency was not considered an end in itself, however, but rather a means to the goal of enhanced service delivery, as offered by a library manager, "We hope that the extra options being offered students are making their study experience more enjoyable and easier to access" [I1]. These findings contribute further understanding towards the environment within which the investigation was conducted.

5.3.4 Impact upon Student Library Experience

One of the original drivers of this investigation was the presence of students on VET campuses using mobile devices as part of their educational experience. These students were using library services as part of that experience and were regarded by the researcher as a crucial aspect of the investigation. As part of the triangulation approach to gathering multiple sources of data, students at the participating institutions were surveyed separately to discover how aware they were of technology developments in their campus libraries (refer Section 5.7). The staff sample was also asked about their observations of any changes in the student library experience as the new technologies were implemented. A range of thirty-nine categories emerged from initial analysis of the responses. This seemed to the researcher a considerable number of responses to be generated for a single stakeholder group, albeit the major one. When the second, intermediate stage of grounded analysis was conducted, the reasons for the large number became clear. Staff were commenting on three quite distinct types of student response. This will be discussed towards the conclusion of this section.

There is no doubt that staff noticed a change in student library experience as a result of new technologies being implemented. They had observed definite uptake of technology amongst student users of the library. Very few respondents commented that 'Student behaviour had not changed much' or 'Some students have low levels of knowledge about IT issues'.

The categories containing the most commonly-mentioned student responses revealed that library staff had noticed a sharp increase in the number of students bringing laptops into the library. This category 'Increase in usage of students' own laptops', mentioned by half the sample, indicates the extent to which the sample were aware of this change, or thought to mention it. Table 5.5 following shows the breakdown of the category by staff position. Systems librarians and qualified librarians were most likely to mention this change. These positions are also the ones more frequently dealing with students on the service desk or assisting with technical queries. One systems librarian commented, "We have definitely

noticed an increase in students bringing in laptops, net books, smart phones" [C2], while a qualified librarian noted the increase in hardwired computers in the library, even though many students were preferring to work on their own devices:

> There has been a noticeable increase in the last two years in students with laptops. Library usage and study space has gone up, we have 60-odd terminals, but a lot of students are working with their own laptops. [D3]

The increase in students bringing their own devices into the library was linked with the availability of wireless. Staff noted students working in social groups and individually on their laptops. One participant indicated that the computer booking system available in their library may have been responsible for the increase in student laptops. Most VET computer booking systems include the imposition of a time limit. Staff noted that most students were bringing laptops, none noted that iPads were being used, in fact one library manager commented that in her library "The wireless doesn't work on iPhones" [K1]. It also appeared that students were keen to use their personal computing devices, with one participant noting:

> We started 2010 with a new configuration of computers, and noticed that while waiting for the desktops to be installed that the students were already bringing in laptops and using them on the desks intended for the desktop computers [M2].

Linking closely with the laptops category was the second most frequently-mentioned change, student usage of wireless, 'Students [perceived as being] positive about wireless availability within the library space'. Staff appeared positive in their observations of this change, possibly as a consequence of feedback received from student library users, offering comments such as:

> The students love the wireless. It is the best thing since sliced bread … they can sit anywhere now with the wifi, have access to their files and the network. They didn't [*sic*] have to wait for a computer to be available [N3]

Frequently reference was made to how huge or popular demand for wireless was, indicating staff had been taken aback by the magnitude of student response, "They are pretty damn happy with wireless. We have had wireless for six months. The uptake has been huge" [L1]. Several staff noted that the library was now being reconsidered by students as relevant to their manner of studying, illustrated with the comments:

> Students are feeling libraries are relevant but some libraries have noticed that younger student numbers were dropping off as a lot of stuff is now online but are now coming back to libraries with wifi and hot spots available [J1a],

> Wifi was introduced at the beginning of 2010. We found that the Learning Centre is now a popular space for students to use live wifi ... and more coming in to use the wifi [M2].

A strong perception amongst staff emerged about how 'tech savvy' their students were. Staff appeared very conscious of the degree to which students were engaging with technologies, particularly mobile devices, and the impact this was having on the tertiary education environment. Comments to this effect are:

> The students are so much more digitally-oriented now. They no longer even carry pencils, they use their phones [L3],

> The students are pretty savvy (some of them) at working with new technology, they are not afraid of it, they will have a crack at things [G1].

The concern that staff were not keeping up with the changes in student behaviour, particularly in relation to the influx of technological knowledge and competencies, emerged:

> Having a young student group, they are getting ahead while the library staff are just getting on board. The staff are struggling with learning things that came out two months ago. The students are five steps ahead of the library staff in their use of technology [I2].

The table below shows the major categories containing the most commonly-cited observations and the positions responsible for these observations. Library managers were represented in slightly higher numbers than the other positions for awareness that the availability of wireless in the library area was having an impact on the student experience and that students were more digitally-aware. Both systems librarians and qualified librarians had noticed the increase in the use of laptop in the library, while qualified librarians were also very aware that students were keen to receive notification from the library via texting. This awareness is possibly the result of that particular position being more likely to deal with students at the service desk and arrange for texting to be sent to their cell phones.

Table 5.5

Student Library Experience Change by Category

Category	**Position**		
	Library Manager	Systems Librarian	Librarian
Increase in usage of own laptops	5	8	8
Students are positive about the wireless availability	5	4	3
Students are more digitally-oriented	7	2	2
Increase in library loaned laptops, netbooks, e-book readers	5	2	3
Students are keen to receive library notifications by text	2	3	5

Where obvious change had occurred, categories such as ‘Library is no longer seen as just a place for books but also technology’, ‘Different student demographics have different expectations of library services’ and ‘Increase in technology-related questions from students’ emerged. Some participants observed the positive aspect of student behaviour, from a library perspective, ‘Increased numbers of students are using the library’, ‘Library is beginning to provide services that actually meet student expectations’, ‘Library is seen as being responsive to students’. It also emerged that ‘The library is becoming a more social space’ and included ‘More immediacy in interactions between the library and students’ in relation to texting to students generating much faster responses and more resulting interactions. Participants also expressed the belief that library staff needed to be aware of what technologies students were using, in order to assist their queries at the service desk, and also to be aware of trends in student information accessing behaviour, including difficulties, such as:

> It is hard to keep current, to know what trends to follow, what will be adopted and used by the students, to keep current, and what trends to follow, for example,

> FaceBook as learning space as opposed to a social presence. We had a library presence on FaceBook but no-one used it [B2].

Not all changes in student experience were noted as being positive. Some categories contained comments indicating problems, such as the obvious 'Not all students have technology' and 'Institution network problems can affect students' laptop connectivity'. Others revealed 'Student uptake of some library services has been insignificant' where analytics and surveys had shown students not engaging with library social media sites, or situations such as, "texting for reference work hasn't been big, but students do sign up for library notices. But the uptake hasn't been that huge. … students thought they might be spammed" [B3]. The implications of technologically-competent students meant expectations of library services had changed. The category 'Students expect faster response' contained comments such as:

> Students are expecting a faster, more instantaneous response. They also experience frustration if they don't find library resources fairly quickly and easily [F1],

> They want a quick fix, with databases. The library needs to make sure they are getting the very best of help the library can provide for them. A lot of students won't ask, they will just carry on [G1].

Finally, some staff believed the student library experience had not changed as a result of technologies being implemented, shown in such categories as 'Student behaviour has not changed much' or 'Students continue to value personal contact'. The personal contact aspect arose predominantly from the perception that not all students were comfortable with using technology, and also from one librarian who believed she added value to the student experience of library services through direct personal assistance rather than technology-mediated contact.

The intermediate, focused coding phase of data analysis generated three conceptual themes. Again, these are defined below, in the manner described previously:

1. Service expectations – defined as receiving the quality of service required to satisfy particular needs
2. Interactions – defined as student interactivity with library facilities and services, both physically and digitally
3. Technology usage – defined as student engagement with computing hardware/devices and software within the information environment

The 39 categories that emerged in the initial analysis contributed 15 categories each to the first two themes formed during the intermediate coding stage, with the remainder comprising the technology usage theme.

The themes indicate that the VET library staff sample were conscious of a change in student behaviour and experience of the library. This finding corroborates the beliefs and opinions exhibited in the earlier discussion, that the implementation of new technologies was not undertaken as an end in itself, but rather for the purpose of improving service delivery to library users. Staff identified three crucial aspects that assist planning for technology implementation; how, within the changed environment, students are interacting with library services and facilities, how they are engaging with technology and what their service expectations are. These themes form an additional component of the environment with which the investigation was concerned and are included within the observed consequences by staff of technology implementation.

In comparing the conceptual themes that emerged from the intermediate, focused coding stage, more abstract concepts emerged, which further contributed towards the formation of overarching theories encompassing the focus of the original interview questions. As outlined below, questions 1-4 comprised the background to the investigation and form the abstract concepts of context, consequences (immediate) and consequences (observed). The conceptual themes defined above that comprise each abstract concept are included. Each of these abstract concepts has been subjected to a unique impact, as illustrated below. The impacts were identified as influencing the conceptual themes, each containing potential for disruption and uncertainty within the affected area/theme under consideration. They could be regarded in the light of catalysts. They are not random, however, and appear to be sequential, in that each impact has elements of the previous abstract concept contained within it. As analysis of the abstract concepts proceeded it became evident that management of the impacts was central to explaining the individual and organisational responses that were occurring. The abstract concepts and impacts are combined within the three overarching umbrella themes.

Environment impact

Q 1 – Context

Q 2 – Consequences (immediate)

Q 3/4 – Consequences (observed)

Impact - new technologies

Context

Augmented delivery of service, information

Workplace infrastructure

Impact – personnel

Consequences (immediate)

Staff attitude

Immediate and wider workplace support

Impact – attitudes

Consequences (observed)

Focus on skills, technology and workplace change

Altered student expectations and interactions

The overarching umbrella theories will be presented at the conclusion of each section and subsequently combined in Section 5.6 to enable reference to the resulting integrated theory that emerged during the advanced coding stage of grounded theory analysis.

5.4 Knowledge Generation

Having gathered information on the changing environment of VET library staff, from both a technology and a technology impact perspective, the investigation next sought to establish what types of library services could most appropriately be delivered within the mobile environment discussed in the previous sections. From this understanding, the knowledge and skills required of VET library staff in order to work effectively in this environment and methods by which they could identify any gaps existing between their current knowledge and skills and the required levels were examined. The second part of the investigation focused on the new knowledge that would be generated as a response to mobile technology-enhanced environment.

5.4.1 Respondents' Perceptions of Potential Mobile Service Delivery

The investigation now focused specifically on the impact of the mobile technology environment. Participants were asked to consider what library services they believed could be most effectively and appropriately delivered within a mobile environment. Fifty-five categories relating to mobile library service emerged, again a considerable number of possible services. Some services were common to many of the participants and these tended

to be already established services, others were mentioned by a sole participant only. In many cases, the latter represented more innovative aspects of library service delivery. Systems librarians tended to be the participants most likely to offer suggestions for innovative service delivery, such as students using their cell phones to issue a book in the stacks to themselves, or sending information to a patron-established profile. The most frequently-mentioned categories show VET library staff participants believed that services considered important within the 'traditional'(non-mobile, lacking social media interactivity) library environment would also be important in the mobile library environment. The provision of e-books is one of the more recent services offered by libraries and was the most frequently-cited as being appropriate for the mobile environment. This builds on the earlier comments on recently implemented technologies, where e-book readers and e-books were identified as newly-adopted technologies (the fourth and sixth most-frequently mentioned technology respectively).

The second most frequently mentioned category related to the provision of the 'Online library catalogue' (mentioned by nearly a half of the sample) as being appropriate for delivery within a mobile environment. This builds on the responses to the question about newly-implemented technologies, where 'LMS upgrades' was identified as a newly adopted technology (the third most-frequently mentioned technology and mentioned by a third of the sample). As shown in Table 5.6 below, systems librarians mentioned the library catalogue as an appropriate service to mobile technologies most frequently. Given the online catalogue is an area of responsibility for most systems librarians this is not surprising. The similar focus by qualified librarians may result from some of the sample being involved in cataloguing activities. The most frequently-mentioned services, shown in the following table, are all examples of services currently being offered by libraries within the online environment. It would appear that the participants were 'taking the next step' in their thinking. In other words, they were considering services that had already been proven successful in an online environment and extending them into the mobile environment.

Table 5.6

Mobile Library Service Delivery by Category

Category	**Position**		
	Library Manager	Systems Librarian	Librarian
e-book provision	5	6	7
Library catalogue	4	7	6
Electronic database resources	4	6	5
Holds, reserves, recalls, overdues	5	5	4

A range of other services were suggested, including 'Library hours', 'Messages', 'New books', 'Library information/news', 'Library maps'. Three participants suggested that mobile library services should be considered as a subset of general institutional services and that students would not differentiate between library services, the institution's services and the other range of services already available on a mobile device. In a similar vein, a couple of systems librarians and a qualified librarian felt that mobile service delivery was simply an expansion of what the library was currently offering and not a separate scenario. Conversely, a couple of library managers believed that services should be redeveloped to support mobile devices, for example:

> There is an ongoing battle with ITS to shift away from desktop PCs. A survey has revealed the majority of students are moving to Netbooks and iPads, and moving away from PCs. Do we show students how to connect to the wifi network on their phone? [N1].

Some participants considered how emerging trends could be adapted to mobile library service delivery, particularly in relation to social media opportunities, such as 'Library blog, Web 2.0 services' and 'QR codes'. Other areas for service delivery focused on reformatting, for example 'MP3 music files' and 'Foreign language resources'. Instruction to students was seen as a useful area to convert to mobile delivery, as seen in the categories 'Online tutorials' and 'Information Literacy', illustrated with the comment, "Information Literacy sessions, resources, configured for an iPad or smart phone" [N2] would be useful.

Several participants urged caution in considering the move to mobile service delivery, their concerns being included in such categories as 'Not appropriate for all students' where a participant noted "I am not certain how relevant mobile services would be for hands-on students such as those learning the trades" [J3]. Additionally, 'Problems with bandwidth/connection/authentication' where either IP authentication for products was causing ongoing problems or technical issues were involved resulting in "Problems with both laptop and mobile devices are similar with downloading PDFs – the bandwidth required for downloading" [G2] were also matters of concern. The issue of resizing was raised by a number of participants, with small screens causing difficulties with resolution and detail. Also mentioned was the matter of high data charges, particularly in New Zealand, being a concern that could limit usefulness of small screen mobile devices for students.

The intermediate, focused coding phase of data analysis established the emergence of three conceptual themes. Again, these are defined below, in the manner described previously:

1. Study-related – defined as services conveying information supporting the conduct of study
2. Informational – defined as guidance on the operations, functions and purpose of the library
3. Technical issues – defined as service matters relating to hardware, software or telecommunications features

Nearly half the 55 categories that emerged in the initial analysis contributed to the first, study-related theme, the other two themes were comprised of approximately one quarter each of the categories. This grouping indicates that VET library staff participants believed the most effectively delivered library services within a mobile environment were study-related. They identified technology enhanced services closely with contribution to student academic success, as explained by a library manager, "we would need to simplify our web pages, currently they are too text-based. The students want a simple, quick, easy solution. They can then be easily displayed on a mobile device" [N1].

The themes indicate that the VET library staff sample saw potential for a wide range of existing and new library services to be developed and delivered within the mobile environment. They were aware of benefits and problems involved in developing these types of services and content having, in many cases, familiarity with proceeding down the track of developing online library services and making the necessary judgements required in that undertaking. A positive, sometimes enthusiastic, attitude pervaded responses and echoes the

findings noted earlier in the chapter where staff demonstrated a positive attitude towards the impact of the new technologies.

5.4.2 Workforce Knowledge and Competencies Required in the Mobile Environment

Having established the types of services that could usefully be delivered within a mobile environment, the investigation moved on to examine the skills, knowledge and competencies participants believed were required of library staff in order to work effectively within that environment. Forty-two skills, competencies and knowledge categories emerged from the interview data. The categories containing the most frequently-mentioned skills and knowledge covered two quite different types of competencies, the technical skills required to work with the new technologies and also the more soft skills relating to attitude, an area of response to change that participants had already discussed at some length earlier in the interview. For example, of the five categories containing the most data segments, or comments, three focused on skills and knowledge of mobile devices, the other two related to staff attitude (see Table 5.7 following). Nearly half the sample believed library staff required competence in a range of mobile devices in order to work effectively in the mobile environment. This constitutes a practical, performance-related skill as do the categories, 'Being able to create accessibility to resources via mobile devices' and 'Knowledge of devices students are using'. These types of competencies and knowledge support the findings reported earlier in this chapter where staff identified the need to be familiar with the devices students were bringing into the library. The other categories focused on attitude, such as willingness to try things out, and recognising opportunities.

The category 'Competence in using different mobile devices', indicated the need for all staff to have physical access to a range of mobile devices and to trial them in order to build their levels of knowledge and competence. Participants felt strongly about the opportunity to learn on their own devices and virtually every comment stressed this in terms of need, "They *need* to know how to navigate on these different devices" [B3], "They *need* familiarity with the devices available. Access to these devices to see what is possible [E3], and "They would actually *need* to have their own so they could learn how to use them and learn how to programme" [J2]. The strength of the language indicates the importance participants placed on this precursor to knowledge and competency acquisition. This issue emerged strongly again when participants were subsequently asked about acquiring skills through capability development opportunities. As one librarian indicated, the institution could provide mobile devices to students and the environment within which to use them, if staff were excluded from contributing to this environment it would work, however, with properly skilled staff it would work more effectively for students.

Qualified librarians and systems librarians identified competence in using mobile devices as important to working effectively in the mobile environment. Library managers did not rate this competence as highly, their focus on knowledge acquisition lay in a slightly different area, as will be discussed shortly.

A 'Willingness to try things out' (mentioned by nearly a quarter of the sample) is an attitude and it is interesting to note that participants regarded attitude as a competency, for example:

> The biggest competency is acceptance of trying things out, being more experimental and curious about trying things out, that is a state of mind not a skill [C1],

> The skills area is easily taught, this is not a problem. More important is interest, enthusiasm; the ability to embrace change and curiosity about new technology, how the tools can be used … If the interest, passion and curiosity is there, then the skills and the usefulness will follow [D1].

A willingness to jump in and get one's feet wet summed up the opinion of some participants, reflecting Rogers' (1962) early adopters, where leading the way and influencing the opinions of others was in evidence, for example, "It is interesting to see how the staff will take devices, have a play, become excited and show others how to do things" [J3]. In some ways, as with the previous competency, attitude can be viewed as a precursor to the acquisition of knowledge and competencies. What has emerged from the responses is an awareness that, in moving into new manifestations of the known work environment, certain facilitators for change need to be in place before any progress can be made with the development or identification of specific skill requirements. As the following table shows, all three position types noted attitude was critical in moving into a new environment, with qualified librarians placing more emphasis on a willing attitude than either of the other positions.

Table 5.7

Mobile Technology Skills, Knowledge, Competencies Required by Category

Category	**Position**		
	Library Manager	Systems Librarian	Librarian
Competence in using different mobile devices	4	8	7
Willingness to try things out	3	3	5
Knowledge of devices students are using	4	4	2
Skills to enable library resources /services to be accessible on mobile devices	2	4	3
Ability to link new technologies with new opportunities	1	3	5

The category ‘Skills to enable library resources/services to be accessible on mobile devices” contained some opposing views. Some staff took a pragmatic approach, believing mobile devices to be another iteration of the continually changing information environment, one that would be assimilated, in the same way that other challenges to the library profession had previously been. For example, a qualified librarian believed that the skills necessary to provide library service in the mobile environment were already in evidence:

> It is an extension of current competencies that the library staff have, tailored to mobile devices. Library users are coming in, they are trying to find information, mobile technologies are just a tool, the aim is still the same of delivering information to users. Essentially it is almost the same, just how we are doing it [I3].

On the other hand, concern was expressed that librarians were allowing opportunities to be wasted through lack of knowledge or foresight, for example:

> It seems like there is whole lot of stuff that is possible even right now that we are really not aware of and none of us has the skills to implement, even in terms of making a version of the Web OPAC for people to view on a mobile phone [L3].

This aspect was discussed by a number of participants who believed that the new technologies provided libraries with opportunities for improving library services and staff skills. Comments such as the following provide an example of how some participants identified the new skills required to be closely linked to opportunities as much as to the technologies themselves:

> If you were going to be doing this you would need to learn how to write and communicate in such an environment, you would need to take on new skills in that area - how to teach and provide information in this online environment [I2].

Other categories focused on specific areas participants regarded as necessary in order to engage competently in the mobile environment, such as 'Hardware and software troubleshooting competencies', 'Skills in multimedia, delivery method', and 'Connecting to the wireless network'. Differences of opinion emerged between the staff positions. Systems librarians showed particular concern for gaining knowledge of specific programming skills, compatibility issues between devices and confidence in working with a small screen, with comments such as:

> They need knowledge of compatibility issues with various devices, for example. iPads and Flash, XML to make it flexible for different age, size, screen size … They would have to know what the differences are and really understand that how to cope with Flash files [L2].

Library managers expressed different concerns. They regarded an understanding of the main trends and capabilities of mobile technologies as important knowledge, likewise, an ongoing awareness of technology changes, "They don't need to be all experts at this but they need to be aware" [F1]. They felt staff should possess IT or technical knowledge, as well as demonstrating adaptability and an ability to learn. Above all, they believed the knowledge and skills staff required would result from being in constant communication with library users:

> … collaboration and communication with users and others. How do users want to use information and engage with library services? Learning to love ubiquity. We are

> moving from gatekeeper/facilities of access to facilitator or connector to vast network of resources available. We need to provide services that are relevant to students, not necessarily from the library [F1].

Armed with knowledge of what students actually required in the mobile environment, library managers felt libraries could avoid the worst types of mistakes. The following example explains why enthusiasm was considered by one library manager as no proper substitute for knowledge:

> Libraries are really bad at things like setting up FaceBook pages. It is kind of embarrassing. Don't go into student social platforms if it is not necessary, it is not appreciated, library FaceBook pages are only used by other librarians. Libraries don't have a social relationship with students [L1].

The intermediate, focused coding phase of data analysis established the emergence of three conceptual themes. These are defined below, in the manner described previously:

1. Adaptability – defined as the ability to engage with work-related opportunity
2. Technical – defined as information technology, software or hardware skills
3. Management – defined as facilitating the attainment of organisational goals

The initial analysis contributed nearly half the categories to the adaptability theme; the technology theme contained about a third of the categories and the management theme the remaining. It appears that VET library staff participants believed that, of the types of skills, knowledge and competencies required in order to work effectively in the mobile environment, the most critical were those of curiosity and willingness to give things a go, problem-solving, and a positive attitude towards change. These are soft skills more easily acquired within a supportive environment. Interestingly, the categories containing the most frequently-mentioned competencies were all related to adaptability. Technical competencies were also regarded as important and covered a range of areas from very specific competencies such as knowledge of coding languages through to a grasp of computing basics. Surprisingly, twice as many library managers made comments relating to required technical competencies as did systems librarians. Systems librarians were more concerned with adaptability. Finally, the management theme, covering such aspects of knowledge as an understanding of the main trends and capabilities of mobile technologies, and developing a collaborative relationship with the IT department around skills development, highlighted the need for a wider understanding of where the library should be positioned. A comment by a

library manager provides evidence that planning is an important competency in order to gain the most value from technological change:

> A lot of planning is needed, environmental scanning and understanding upcoming trends, collaboration and communication with users and others. How do users want to use information and engage with library services? [F1]

The themes indicate that the VET library staff sample viewed the necessary knowledge and competencies required as being inextricably linked with student expectations of library services. They saw staff requiring knowledge to answer student queries, competencies to deliver value-added services and a capacity to distinguish between what were worthwhile challenges to address in the mobile environment and what was best left alone.

5.4.3 Methods to Identify Competency Discrepancies

The VET library staff participants were asked to consider what methods could be used to identify the gaps between the required and current knowledge and skills of library staff in relation to delivering mobile services. Forty-five categories describing methods of identifying gaps emerged from the interview data. The categories cover an extensive range of methods, from the individual self-assessment through to organisational review. The category containing the most-frequently identified method was the 'Use of staff surveys' (mentioned by nearly half the sample). Responses indicated that a number of libraries or institutions had not attempted to gather any survey data on staff technology competencies, while others were conducting this type of assessment on either an ad hoc or regular basis. While various different survey methods were discussed by participants, several mentioned the use of specific online survey software:

> You could design a survey, ask library staff how much they know about m-technologies, then create on SurveyMonkey about mobile technology and knowledge [A3].

One institution had instituted a comprehensive approach to gathering information across both staff and students and was actively using the information gathered to plan capability development activities:

> We are using a range of surveys – we have the Australian Flexible Learning Framework – around IT and mobile components. We survey both staff and students and the institution as a whole. We also run our own surveys across all campuses. So

> we have quite a body of data where we can identify differences between the staff, students and the library. The staff/student expectation and where the students and staff identify areas where they need assistance and some of the skills that might be required [J1a].

Such a comprehensive approach appears to be the exception rather than the norm. Most participants reported minimal or no data gathering in regard to mobile technology implementation within the library or elsewhere on campus. Qualified librarians showed stronger interest in the use of surveys to identify a skills gap, with this group of participants represented at twice the number of library managers. Nevertheless, one library manager expressed her expectations that a survey method would supply critical information in order to assist the overall requirements of the institution:

> Survey staff competence before and after the introduction of new technologies. Managers don't have a clear idea of staff skill levels regarding information technologies, if the level it is at is appropriate to meet the business needs of the organisation. More attention is required to surveying staff capabilities, testing staff capabilities, raising staff capabilities and then testing again [F1].

The direct questioning approach was also favoured by participants. 'Ask staff' emerged as the second most frequently mentioned method. Over a third of participants believed direct questioning of staff, either verbally or in written form, would best identify skills gaps. Some suggested a more formal approach of interviews; others took an informal approach, for example: "Ask them what skills they thought were needed. They would probably come up with something different from what I had" [L3], and "Ask the staff if they can use the devices. If they can't, train them" [H1].

Self-analysis by staff of their own levels of competency emerged as a method considered useful by a number of participants. Some indicated they were engaged in informal self-analysis as part of their routine work, for example, when students requested technology assistance which could not be supplied by the staff member, it was identified as a knowledge gap and addressed. Several comments were made to the effect that library staff were good at self-identifying gaps, for example:

> They are pretty self-sufficient. It is up to the staff to identify what they don't know and to report back to the manager what they need, self-assessment [H2]

Self-analysis was a method favoured by systems librarians, possibly because their routine contact with technology necessitated their reviewing their own competencies on a more regular basis. Library managers were not as interested in self-analysis; they saw more benefit in implementing a professional development plan. Participants in this position spoke of needing a proper approach to a plan and having the resources there; possibly bringing in training and warning that it was not a simple undertaking. One library manager linked methods of identifying gaps back to the operational plan, requiring the professional development of all staff to link back to bigger projects in determining what skills are required. Another manager commented similarly on the necessity for a properly-planned approach:

> Within the next 2-3 years, a five year plan is too long. What skill levels are required? Up skill the staff who have the capability to up skill in that area. Go through a basic introduction to technology, allocate a project team, one or two technological expertise staff on the team, go through the documentation then implement the product and refine this [I1a].

Another method that received mention was the hands-on learning approach. This approach will be discussed at more length later in the chapter when participants identify preferred capability development training. In response to identifying skills gaps, participants saw benefit in this method through practising with mobile technologies and determining where skill deficits lay, advocating that:

> The best way to identify the training is to use technologies in our work spaces and that will help bring staff up to speed as well [L1].

Table 5.8

Methods of Skill Gap Identification by Category

Category	**Position**		
	Library Manager	Systems Librarian	Librarian
Survey staff	4	6	8
Ask staff	4	4	4
Staff self-analysis	2	4	2
Professional development plan	4	2	1
Hands-on learning	1	3	3

A range of other methods were mentioned by participants including ‘Identify type of training and trainer required’, ‘Staff development matrix’, ‘Run a Web 2 programme to determine’, ‘Determine what other ITPs are doing’, ‘Early innovators to support library staff’ and ‘Staff identify training and opportunities not thought of’. These methods generally involve staff being aware of their skills levels and identifying these through some type of assessment, or an external person (who may be part of the institution) is brought in to assist with identifying requirements.

Differences in approach were noticeable between the three positions. Technology competency or service length analysis did not contribute any meaningful differences. Systems librarians saw value in methods such as brainstorming, getting innovators in to determine gaps and requirements, and technology boot camps. They were interested in approaches that were hands-on-focused, where those staff with expertise could be used to assist colleagues who lacked competencies. In many cases, such innovators would be the systems librarians themselves, as seen in the following suggestion, “Get people who already use the products (about three in the library) and brainstorm the skills required. Apply that to those who don't have mobile units” [A2].

Qualified librarians were interested in methods such as a technology checklist that staff could work through, staff demonstrating examples of good use, or scenario-based learning and reflection, such as:

> Experiential learning and then reflective learning might be useful. Put the staff in the real world or a scenario-based environment and then afterwards reflect on what they didn't know and then identify the gaps they would need to fill [B3]

Bringing in colleagues with expertise from technology or e-learning units was another approach that qualified librarians believed would be useful in advising on new technologies and determining required skills.

Library managers, unsurprisingly, favoured a more strategic approach to identifying skills gaps. Annual performance management reviews, as part of the organisational review of staff development, were suggested, as well as modifying the institutional professional development plan or library peak body professional development guidelines. In-house workshops were suggested, with a focus on workshops arranged by the institution and run within the unit. Holding conversations between manager and staff were seen to be helpful, as were mapping competencies to job descriptions and key performance indicators (KPIs). This was an approach library managers thought would prove useful, with expectations being set:

> We will map competencies to job description and KPIs for each position. This would vary according to the level and job description of the various staff [B1],

> We are entering a new phase in our management problems, a new positive phase now. There will be a real drive and people will be made accountable as they need to undertake learning and manage to retain that learning [J1].

Finally, library managers recommended conference attendance as a way for their staff to learn about new technologies and the sorts of competencies required to use them effectively.

The intermediate, focused coding phase of data analysis established the emergence of three conceptual themes. These are defined below, in the manner described previously:

1. Internal review – defined as a formal assessment conducted within the boundaries of a specific work unit
2. Organisational processes – defined as the structured activities through which the organisation arranges its work
3. External opportunities – defined as events related to professional development that occur outside the organisation or, in some cases, outside the operational unit

The initial analysis contributed 29 categories to the internal review theme; both the organisational processes and external opportunities themes contained eight categories. The preferred method for identifying knowledge and skills gaps and training needs was in-house opportunities. Participants felt that they possessed the expertise within their units to undertake the necessary analysis, either through formal structures such as professional development planning, surveys or interviews, or more informal arrangements such as self-analysis, general conversations or hands-on practice. Different types of training identification methods were favoured by the three staff positions and this has implications for planning change implementation in the academic library environment.

In continuing the grounded theory approach of constant comparison and continued conceptualisation, comparison of the conceptual themes that emerged from the intermediate, focused coding stage, enabled the development of more abstract concepts, which allowed the formation of overarching, umbrella theories encompassing the focus of the original interview questions. As discussed previously in Section 5.3.4, sections of interview questions were categorised and analysed at a higher conceptual level. Continuing on from the environmental context established earlier in the chapter, new knowledge needed to be generated in response to the environmental changes established. Questions 7-9 formed the framework around which the new knowledge required by participants was presented. This framework comprises the concepts of content, capabilities and correlation (establishing a connection between that which is known by participants and that which is needed to be known). The conceptual themes that comprised each abstract concept are included. Each of the abstract concepts has been subjected to a unique, pre-determining impact, identified as a catalyst containing the potential for disruption and uncertainty within the affected area/theme, as shown below:

New knowledge generation

Q 7 – Content

Q 8 - Capabilities

Q 9 – Correlation

Impact – mobile technologies

↓

Content

Study- and information-related services

Potential technical issues

Impact – new knowledge

Capabilities

Technical competencies

Management issues

Ability to adapt

Impact – techniques

Correlation

Internal reviews

Routine organisational processes

External opportunities

5.5 Capability Development

Equipping staff to meet the demands of environmental change with confidence is a crucial responsibility of a healthy, responsive organisation. VET library staff participants had identified how they believed their workplace environment was changing as a result of the impact of mobile technologies. They had also reflected on their response to this change and what was required by way of new knowledge and skills in order to work effectively within a mobile environment. The investigation now sought to examine what on-the-job training was required, how it would best be delivered and the overall impact upon staff roles and relationships resulting from accommodating the impact of mobile service delivery. The third part of the investigation focused on the capability development of VET library staff.

5.5.1 On-the-Job Training Requirements to Address Mobile Delivery Skill Acquisition

Having established the skills, competencies and knowledge required for working in the mobile environment and the methods for identifying gaps between existing skills/knowledge levels and those required, VET library staff participants were asked to identify specific on-the-job training they believed necessary in order to attain the necessary levels of knowledge and competence. Participants responded with a wide range of training options. Thirty-nine training requirement categories emerged from segmenting and then grouping the interview data by defining characteristics. Unsurprisingly, given the interest of participants in hands-on practice with mobile devices, noted above in the methods to identify gaps, the two major training methods categories emphasised hands-on opportunities for staff to acquire skills with mobile devices.

Aspects of the training requirements demonstrated the strong links between perceived benefits of physical access to mobile devices, the resulting impact upon adoption of these

devices into working practice, and their subsequent deployment. The emerged categories were, firstly, 'Hands-on working with a range of mobile devices' (mentioned by a quarter of the sample). This category supports the findings in the most frequently-mentioned category for the skills and competencies question (Q. 8) and demonstrates the importance respondents placed on having physical access to the technologies they believed they required competency in. Participants noted, "[We] need time to play with the device and see how the functions work" [D3] and "It would be ideal to have access to a variety of devices to experiment. We have a Learning Technology unit, they hope to work with the library to provide devices to play with" [C1]. A qualified librarian outlined an informal, semi-structured programme of training that would enable staff to learn at their own pace but with the assurance of knowledgeable assistance:

> Demonstration of existing mobile devices and how they work - hands-on workshop, one-on-one training within the workshop, access to devices for longer than just the workshop, follow up from trainer and step-by-step guides for technical issues [F3].

Participants had identified a type of training approach which allows learners to form a learning group early in the programme, gain the benefit of a knowledgeable expert, continue to implement what they have learned at their own pace with assistance, possibly with the trainer now adopting the role of mentor or guide, and have access to relevant materials for future reference. As they noted, the success of such a programme was dependent upon having access to the mobile devices staff need to gain familiarity with, it was also dependent upon having allocated time in which to acquire competency. Library managers and qualified librarians were equally concerned that staff should have hands-on opportunity to acquire technology skills. The lesser concern demonstrated by systems librarians may indicate that they were already involved in such processes and access to devices was no longer an issue for them.

The second major training category included respondents identifying 'Using an e-book reader' (mentioned by approximately one fifth of the sample) as a necessary training requirement. This aspect of training supports the opinion expressed earlier by participants that e-book delivery was the most effective library service to deliver in a mobile environment. A number of participating libraries were either including e-book readers in their range of resources or intending to. While some believed use of this particular device should be intuitive:

> You can't help a student download an e-book unless you know how to do it yourself. However, I would not expect library staff to need to know how to ... nor require training on using an e-book reader. That should be intuitive." [E1],

others identified a specific training need, "Training on how an e-book works and how to download the programmes for it. Need time to play with the device and see how the functions work" [D3]. Those libraries that had run training in the use of e-book readers had taken the approach of considering how students would be likely to use the devices and tailored basic troubleshooting for staff. One library had extended their training programme and provided staff with an understanding of how e-books fitted within the pedagogical paradigm to enable staff to assist learning areas integrate e-books into learning. For both the categories discussed, library managers and qualified librarians were interested in such training; systems librarians were not as interested. This variation might be the consequence of systems librarians already having access to devices as part of their role, as noted by one participant:

> We all have access to a mobile phone in the library. I have my own mobile phone. I could have access to whatever is available at ICT and could have access to what is available in the Faculty of IT [H2].

VET library participants, particularly library managers and systems librarians, identified training being required on web applications for iPhones and other mobile devices. Specific types of training were identified by systems librarians, such as, "Training in coding and the use of Mac computers to use iOS software development kit for developing iPad, iPhone and iPod Touch applications" [E2], and "how to load applications onto these devices - Android Market or via microSD card, iTunes" [G2]. Library managers spoke in more general terms of knowing how to load applications onto the different brands of mobile phones students were using.

Training to acquire knowledge of how to develop web pages for small screen size was another focus for library managers. They saw the ability to develop mobile-friendly web pages as being crucial to the delivery of library services and resources to students with mobile phones. As a student-facing service, library staff reported being aware of how best to meet changing student expectations, and that not all areas of their organisation were equally aware, which caused a concerned library manager to comment:

> Also it is a matter at the moment to convince the IT department to get the web page mobile-friendly, this is a priority. Last year we didn't manage to get our Web Master to think the time was right. IT hadn't surveyed the students [C1].

Table 5.9 below shows the five major training requirements categories with a break down by staff position.

Table 5.9

On-the-Job Training Requirements by Category

Category	**Position**		
	Library Manager	Systems Librarian	Librarian
Hands-on working with range of mobile devices	5	3	5
Using an e-book reader	4	1	4
Web applications for iPhones, mobile devices	3	3	1
Creating mobile-friendly web pages	6	0	2
No current training or plans to introduce	2	2	2

A range of more technical categories was recommended by systems librarians; for example, training on browser displays, file size requirements, coding and programming languages, text editing tools and digital data management. They were interested in training on comparison of device functionalities, for example:

> Equivalent programmes between Android and iOS and Windows 7. Getting connected. Where to access settings for wifi and vpn (also need a cheat-sheet for these!), physical commands for multi-touch devices: zoom, scroll, flick, etc., how to access the keypad, (demo different possible keypad designs/layouts), what the sensors do: optical pad; gyro; accelerometer ... using QR codes (explanation, applications that can 'read' them, limitations, security, etc.) [G2].

Six participants stated their libraries had no plans to implement either new mobile services or mobile technology training. One library manager suggested her staff might engage in something arising from their own curiosity or from what students were asking, but she did not intend to run anything formal.

Library managers showed interest in training related to the context within which their libraries were operating. They suggested training on identifying requirements for developing mobile services, on matching essential technologies with users, on the use of mobile technologies within education, and on a general understanding of the mobile environment. In contrast to the library manager above, who was fairly vague as to what she expected of her staff, one library manager was quite definite, stating:

> With all library staff … new IT developments will become a normal part of our library system. They all need and they will be forced to undertake professional development in these new technologies. The new technologies will be purchased and they are expected to have a good level of knowledge to provide support to teachers and students about the new technologies. We are entering a new phase in our management problems, a new positive phase now. There will be a real drive and people will be made accountable as they need to undertake learning and manage to retain that learning [J1].

Qualified librarians made strong connections between what they had noticed occurring within the library and what they believed would be most useful for direct service encounters with students. They recommended training that would enable understanding of file sizes suited to small devices, so that useful information literacy tutorials could be created; how to develop and include gaming within information literacy tutorials; knowledge of best practice for displaying files on mobile devices; and how to create LibGuides for small devices. Several qualified librarians cautioned that training would be determined by what the library manager decided would be implemented, for example, "It depends on what services would be delivered, this is up in the air at the moment" [J3]. This qualified librarian worked in the same library as the library manager quoted above who was determined her staff would both learn and retain knowledge of new technologies. This variance of opinion provides an example of the range of perspectives offered by different positions in the same environment.

The intermediate, focused coding phase of data analysis established the emergence of three conceptual themes. These are defined below, in the manner described previously:

1. Technical – defined as information technology, software or hardware skills

2. Service delivery – defined as enabling the provision of services to customers
3. Competence – defined as demonstrated workplace-related ability and understanding

The 39 categories that had emerged were evenly spread across the three conceptual themes. At first glance, it might be assumed systems librarians would have contributed most strongly to the technical themes, library managers to the service delivery and qualified librarians to the competence themes. Close analysis confirmed this to be the case, although the competency theme showed only slightly more qualified librarians contributing relevant comments than the other two positions. For the other two themes the difference between positions was noticeable. This indicates that participants were contributing their opinions on required training very strongly through the focused lens of their own particular role within the library.

5.5.2 Preferred Methods of Training Delivery

Extending the focus of the previous section, the researcher asked participants to consider how best to deliver the types of training they had just identified. Forty-two categories emerged from the responses. The categories covered such training methods as employing existing experts, modifying existing packages, using technology and developing communities of practice. Half the sample believed the most effective method of acquiring the necessary skills was to handle the technology and work through how best to use it. Comments such as, "Give the library staff some mobile devices and let them explore them themselves" [K1], demonstrate this attitude. It is interesting to note that none of the respondents cited employing user manuals or explanatory literature as a good method for training. The creation of user manuals is commonly associated with training delivery. As highlighted in Table 5.10 below, the second and third major categories highlight the belief that library staff who have acquired competence in using mobile technologies are the best trainers of their colleagues. Staff preferred to "Have an in-house library IT person to train the others" [F3]. This example is indicative of the degree to which participants viewed library-required or –acquired competencies as blurring the boundaries that traditionally existed between the IT department and the library.

The major training method category was, unsurprisingly, 'Providing the technology for hands-on learning', a response that links back to the previous major categories that emerged from the findings on methods of identifying competency gaps and on-the-job training requirements. Over half the participants made comments, which are typified in:

> The best training would be to have a range of particular devices and structure some sort of training around the use of the device ... The hands-on approach rather than a PowerPoint presentation. Play with the device, touch it, feel it [N2].

Many participants noted their library did not have the necessary devices and they expected the organisation to provide them, even in cases where some staff owned personal devices. The provision of mobile devices for training purposes in the workplace appeared to be viewed by participants as evidence that their employer actually was serious about their receiving appropriate training. The following comment indicates the general tone:

> We need the devices to become familiar with ... The institution may have to spend money and purchase devices. ... Have the devices available, use them for something specific [F3]

All three positions believed that practising on the actual mobile devices was the best way to learn.

The way in which the positions responded to this question varied noticeably from the responses contained within the category 'Hands-on working with a range of mobile devices', in the exploration of on-the-job training requirements. In that similar category, systems librarians were the lowest of the three position categories to regard this as an important training requirement, whereas in relation to the best way to learn, systems librarians identified this theme most frequently. Two of the three systems librarians who considered hands-on skills acquisition as important also regarded this type of training as their preferred method.

A second category, 'Innovator-led training' (mentioned by just over a third of the ample), similarly supported the finding first identified in the impact the adoption of new technologies was having upon library staff, where it had been noted, 'Some staff are keen to lead, others prefer to follow'. In exploring best training methods, comments were made to the effect that, "Those who are okay take on a more specialised role, managing and looking after them [those less competent]" [J1a]. The data within the category indicated that in 11 of the 14 libraries, training by "innovators" was already being employed as a technology training method. The other three identified this as an important training method although it was not one they were yet using. The innovators were not necessarily library staff but had been identified from within the organisation in terms of, "We would probably look inside the organisation but outside the library for someone who has the skills" [J3].

The term ‘early adopter’, once again, received mention by several participants, for example:

> You generally get a better response if the trainer was already known. Train the trainer approach to a small group of early adopters with a decent amount of knowledge behind them already, then they could up skill others [G2].

Participants were particularly generous in their descriptions of colleagues they regarded as early adopters, referring to them in terms of champions, keen members, competent people, very qualified and experts. Age was not considered an issue by one participant, who commented, “We have competent library staff who use mobile devices. This is not related to age. It is a generalisation that the younger members of staff take things in their stride” [N2]. This is an interesting comment made by a participant who had spent 40 years in the library profession. Participants also talked in terms of innovators *sharing knowledge* rather than training, the inference being that this type of training method is a more inclusive, participatory, collegial approach.

Two positions, library manager and qualified librarian, were equally of the opinion that innovator-led training was the best delivery method; systems librarians did not feature as strongly in mentioning this method. This feature may result from the fact that systems librarians were probably aware that they themselves were likely to be targeted as innovators and trainers and would be called upon to fill this role.

In-house workshops were a favoured training method for library managers. They had indicated previously that they believed this type of on-the-job training was required by their staff and reiterated that this was also a useful method for delivering training. There were mixed suggestions as to whether it should be best run by a library staff member with specific expertise or by experts from within the organisation. Responses indicated that this type of training was already well established and could be readily adapted for the purposes of developing mobile technologies competence. Picking up on the innovator-led category, some participants recommended such a role had been, or would be, involved in the in-house workshops, for example:

> We have had workshop sessions led by Electronic Services Librarian or Information Literacy specialists or specialists from IT department, Electronic Services Librarian, by [B] or library specialists [B1].

The particular interest in this training method shown by library managers may be the result of their having planned and routinely run such training opportunities for their staff in the past and found it to be an effective method for dissemination of information and up-skilling.

Six of the nine library managers who recommended in-house training also suggested bringing in experts from outside the organisation. One library manager outlined a comprehensive, graduated approach, "It would be a combination in terms of delivery of in-house and external professional development - conferences, and presenters" [M1], while others indicated they would approach vendors, publishers, or database aggregators to conduct systems-related training sessions. Surveying what similar educational institutions were doing and inviting their experts in to train staff was also suggested by a couple of participants. Systems librarians were not particularly interested in this training approach, with one commenting unenthusiastically, "If an expert was needed from outside, this would not be an issue" [N2]. Their preferred training methods, as will be discussed shortly, were for direct, hands-on experimentation or trialling.

Library managers were also well represented in the comments that comprised the 'Explore best training solution' category. The participants who contributed to this category showed concern for planning appropriately to make the most of resources through identifying what was needed, who needed it and how it would best be delivered. Library managers recognised that, in addition to learning new technologies and ways of working, staff were also busy with their regular duties. One commented:

> We need to identify what are the essential pieces of technology and who are they essential for … But people are busy with day-to-day jobs. Managers need to select training that will guide staff into new technologies that are important. You need to ensure the right training is done [F1].

Other managers also mentioned that a lot of training had been taking place during the past year or so and if staff were not aware of a plan with a goal at the end they would not benefit from any training delivered. A library manager believed training should be linked with KPIs, and that the method was not as important as the outcome:

> To measure success you would have outcomes that you want to see, you would have to set deadlines, to assess success. If what you are looking for is not happening, why? What else is happening? Could something be purchased from elsewhere? [G1].

The process of examining a variety of options and tailoring these to obtain the best solution was the preferred training method discussed by several managers.

The table following shows the major training delivery methods categories with the position preferences:

Table 5.10

Preferred Training Requirements by Category

Category	**Position**		
	Library Manager	Systems Librarian	Librarian
Provide the technology for hands on learning	6	9	7
Innovator-led	6	4	6
In-house workshops	9	3	3
External delivery	6	2	4
Explore best training solution	7	1	2

A number of participants showed preference for employing technology (not devices) for training, such as developing videos and vodcasts, YouTube videos, videoconferencing, or WebEx. These types of training methods were particularly mentioned by staff working in a distributed campus environment, where it was not easy to get all staff together from outlying branch libraries.

Systems librarians showed a preference for hands on training, giving examples related to: trialling services themselves; using real live situations within which to test technologies; and on-the-job training, which prompted enthusiasm from one systems librarian, "I think on-the-job training would be terrific" [L2]. They were also advocates for the informal, self-help style of training. Both of the other positions also recommended this approach, with one library manager taking a determined stand, "Throw people in at the deep end and use" [D1],

while her systems librarian envisaged something slightly less rigorous, “I envisage a play and muck about” [D2]. In general, systems librarians were particularly keen, with comments such as:

> It has been mostly a 'Give it a go' approach. People you would have thought are quite hesitant about using technology are quite happy to pick up skills if they are seen as useful and bring advantages. They are quite happy to explore new things. It is surprising sometimes to see people pick up on some things. This is the best way for training, to learn it yourself [C2],

> There would be self-directed training. Assessing their current level of e-resources themselves with the devices would be the easiest way to get them to develop the skills and knowledge [E2].

Continuing the self-directed approach, a number of participants believed the best training took place in a face-to-face situation and using mentors. In both these categories, the majority of comments were made by qualified librarians. They were keen to have an expert or early adopter come in and train library staff and be prepared to assist them subsequently at point of need. The present participants regarded mentoring as pairing up the experienced with inexperienced staff and dealing with problems as they arose. One qualified librarian was quite definite about the benefits mentoring brought to the workplace:

> By using skilled staff to work with unskilled. Inspire some curiosity. But first the unskilled staff need to want to do it. They need to see a purpose and have someone to help when they became stuck. If a beginner, I would want a person to train me - skilled, on call, on-the-spot support. It could be the person sitting at the desk next to me who has been using the software for two years, or someone on campus. I don't want an online session two weeks ago and nobody to follow up with. I want to be able to talk to someone on site who can explain what the problem is. You need someone who can make it simple, clear and answer a beginner's question [G3].

The use of experts was included in several other categories, such as developing communities of practice, where, in an informal setting, staff, both with and without expertise but with a common learning goal, would get together, develop and share expertise. Likewise, the creation of cross-section teams composed of members from across the organisation was identified as a useful way to develop expertise and then share it with others within work units.

Willingness to utilise existing institutional expertise and resources is highlighted in the several categories that proposed collaboration with experts from outside the library, such as 'Include Information Technology Services (ITS) in the training', 'Mentors', 'Communities of practice', and 'Use e-learning advisor'.

While not strictly a training method, several staff noted facilitating conditions that were necessary to ensure training was most effective. They identified the need for training to occur away from normal routines, at point of need and also with the necessary allocation of time to enable staff to learn without distraction, "so we can concentrate more and not be disturbed all the time. ... Time. Time as a staff to discuss and explore the potential of this – we would feed off each other [D3].

Attending conferences and keeping up with professional reading were suggested by a couple of library managers as being their preferred and usual training methods. Matching the training with the technology was a concern given by a number of staff who believed that any selection from the range of training options available to them would be determined by the type of technology being implemented. Not surprisingly, given the noted preference of systems librarians for trialling and experimenting with technology, this position was represented strongly in the technology-determined training approach category.

The intermediate, focused coding phase of data analysis established the emergence of two conceptual themes. These are defined below, in the manner described previously:

1. Informal availability – defined as gaining experience on the job through exploration
2. Formalised delivery – defined as meeting learning objectives through structured processes

The initial analysis contributed 42 categories to the training methods theme; VET library participants showed a preference for informal types of training methods, with more than half the categories describing this style. The preferred methods for training staff were hands-on experimenting and learning with the mobile devices, with the availability of an expert mentor to address problems at point of need. Systems librarians showed strong preference for this type of training, library managers were more focused on planning to ensure the training delivery made best use of resources. Qualified librarians were interested in having experts mentor them and being involved in communities of practice, sometimes involving staff from other libraries.

5.5.3 Adaptation of Roles, Relationships and Working Practices to Accommodate the Impact of Mobile Delivery

The investigation examined the types of capability development and training methods VET library participants believed were required to enable them to gain the knowledge and skills necessary for service delivery in a mobile environment. Finally, their opinions were sought on how their roles, relationships and working practices had evolved, or were expected to evolve, to accommodate the impact of mobile delivery.

Responses were wide ranging and resulted in 60 categories emerging from analysis of the data. For clarity, the categories have been separated into the three distinct components being investigated: roles (over a third of the categories); relationships (less than a fifth of the categories); and working practices (over half the categories). The findings will be presented within each of these components.

'Change to existing job descriptions' formed the major adaptation category relating to the advent of mobile delivery. Responses within this category revealed an almost universal trend across participating libraries towards the inclusion of e-learning outcomes or duties in library staff roles. It was seen as a collective requirement across job descriptions rather than a single staff member's responsibility, demonstrated in responses such as:

> Traditional library roles are changing; five years ago not many had IT skills, now they need those technologies and skills to do their jobs [N3],

> It would change a bit of the job descriptions; there would be more emphasis on mobile technology. You would need to know how to set up m-applications [A3].

All participants indicated the evolutionary nature of the changes through terms such as "tweaking", "tinkering", "graft onto", "evolving" and "added a dimension to". Tweaking of roles, in the sense of minor adjustments, indicated the transitional nature of responses; that participants believed the impact of mobile technologies on roles could be accommodated as part of the continuum of constant improvement, rather than marking a watershed in the provision of library services:

> I think there would be tweaking of job descriptions to accommodate changes it would not be that big a gap or change, all the staff are users of technology [M3],

> It would be nice to create new roles, but there are organisational issues. So we are tweaking existing roles. We are making an online and mobile presence part of the workflow, so it is not seen as an add on [J2].

The majority of the 21 role adaptation categories indicated transition rather than an overhaul. This was illustrated in such categories as "No change in job outcomes, only methods" and "Unwritten expectation of role evolution". The sole exception to this approach was 'Created a position requiring technology competence', undertaken, or being considered, by five libraries. Demonstrating similarity with the previous section on training methods, the expectation emerged that the changes would be part of a wider organisational impetus, with mention of common employment practices such as:

> I would hope a review of the person's specifications and their role and to acknowledge through an increase in pay and level [I1a].

Staff talked about jobs becoming bigger, noting that there were, "Expectations are that staff will need to add extra duties into their job descriptions" [I1a], and that library staff would need to absorb new tasks into their workload. Several comments indicated that staffing levels had not grown in recent years and were not expected to increase in the future, so a refocus of their duties was required:

> All library staff would need an added dimension in knowing how to use m-services and technology. It would be an extra dimension that all library staff would need to develop to accommodate various mobile devices. It would be part of the whole, just an extra thing not significant and separate [A1].

Six VET libraries had seized the initiative and specifically created a position requiring technology competence. Such positions appeared to be flexible in their design, possibly to accommodate future technology iterations. Two participants, newly-appointed to such positions, noted:

> My job is new with very fuzzy boundaries and was specifically created for e-learning. Some of the job is mentoring others into new technologies. It has been developed to accommodate the changes [B3],

> A new role has recently been created, the Systems Librarian. I started the role last month … [The role] investigates new technology and how to apply to the library. I will work across teams, this will impact upon the way service is delivered [E2].

The blurring of traditional roles was commented on, particularly between the library and the IT department, for example "There is more IT/library boundary blurring. It is now assumed that IT things are part of library duties" [B3]. One library manager predicted that with the increased blurring of library roles, in five years hence librarians, as such, would no longer exist, but she was uncertain what the new positions would be called.

Systems librarians were conscious that role change was more a reflection of the capabilities of certain staff members, suggesting that:

> The current roles will continue with more focus on technology, people with skills and the interest will get pulled into work [G2],

> Where staff show aptitude roles are changed quite radically. Obviously it is a real minority [B2].

Comments within the category show that role changes reflect the environmental impact of technology advances and the ability of individuals to respond flexibly and in a sustained manner to that impact.

Not all participants were convinced jobs were changing. They viewed the impact of mobile delivery as a new manifestation of what libraries had always done; delivering information to library users. Staff from six of the libraries noted no change in roles, while the category 'No change in job outcomes, only methods' included such comments as:

> There is not a huge change to the job descriptions, just how we do it is changing [I1],

> But in the end the library industry is a service industry, those core service skills are still very critical –we will always need people with a good strong background in those traditional skills of dealing with people and working face to face and really being client focused, and the technology is simply an aid to that [L1].

Functions traditionally associated with a library, such as collection management, reference services and information literacy, were regarded by participants as still relevant within a mobile environment, rather the format had changed.

In contrast to the belief that jobs were not fundamentally changing was the acknowledgement that unqualified staff were becoming irrelevant in the technologically-advanced library environment. Situations where staff lacked familiarity with technology could not be sustained and expectations of competencies and adaptability were changing. A couple of participants noted the replacement of unqualified staff with those who could be trained to work with technology, for example, "We are trying to phase out untrained assistants. It is reaching the point where someone who does nothing but shelve can no longer do the full scope of work anymore" [L1]. A systems librarian noted that the librarian's role was shifting from collection management to discovery

The importance of appropriate organisational management planning for the impact of mobile technology was stressed by several participants:

> I have been aware of mobile technology and vendors making it possible to use products on mobile technologies … but the manager is not providing any feedback either way on the suggestion we explore this. I think it should be implemented within the next year or so, I hope when we do our annual plan for next year it will get higher priority [C2],

> Working with the e-learning advisor, it depends on how good a case we can make, we need to get our manager on side. The main thrust is the strategic plan; align it to the teaching and learning plan priorities. Weave around the library business case. The plan says [D] is to be a connected institution, fit it within the high-level institutional plan, and convince the IT manager these things are necessary [D1].

Overall, participants commented upon the evolutionary impact upon roles, the closer collaboration with other areas of their institutions, and the continuation of library services, combined with a decline in manual tasks and greater emphasis upon technical ability.

In examining the evolution of professional relationships, the categories with the most frequently-mentioned changes indicated that closer relationships were developing with colleagues in both the e-learning and IT departments. Participants were engaging in a more outward-focused assessment of impact, part of wider organisational change, as evidenced by

the emergence of categories focused around ‘Collaborative team approach’, ‘New cross-unit grouping created’, ‘Blurring of boundaries with other units’ and ‘Closer relationships with academic staff’. The majority of the comments forming these categories were made by the systems librarians. This result might be explained by this position being the most likely to work with e-learning and IT units; however, the responses indicated that nearly all library staff from participating libraries were involved in this collaboration. Comments demonstrating this issue include:

> With the e-learning area, it is more the Information Literacy librarian’s relationship [D2]

> The eLearning team is currently within the library. We all work together [G3].

The changes to relationships indicated the blurring of traditional boundaries and the closer working relationships with staff in the IT and e-learning areas, for example:

> There are closer working networks with the IT people [A1],

> The Library staff are linking more with the Online Learning staff [H3].

Some tension was noted in relationships with the IT department and frustration was expressed that IT colleagues did not appreciate the degree to which librarians were competent with, and committed to, technology. Systems librarians, in particular, were finding their administrator rights being removed by IT departments. They discovered IT decisions involving the library were being made without reference to the library or found the IT department to be actively unhelpful. All three positions noted such problems.

Reponses also suggested the growing levels of interaction with faculty and the way in which library staff with technology skills were able to assist in the development of online courses on the learning management system (LMS):

> Currently a couple of the staff are using the Blackboard platform and they ensure administration things keep running. They work quite closely with the teaching staff for putting vodcasts on the LMS [N3].

The reported blurring of roles was echoed in the blurring of relationships, with greater collaboration becoming the expected arrangement, whether within appointed teams or between individuals.

A cautious approach typified the adaptation of working practices. The major categories contained comments such as 'Holding off, not rushing in', 'An add-on not a replacement', 'Exploring process improvement', and 'Great potential, need to explore it'. The responses indicated caution about rushing in and making radical changes, demonstrated in the comments "so much potential", "need to explore", "watching it fairly carefully", "we are slow to adopt" and "I think there is a little way to go before…". There were concrete reasons behind the hesitant approach, as two library managers explained. They were taking a wider, more outward-focused assessment of impact, part of wider organisational, even environmental, change when attempting to predict where mobile technologies were heading. They noted pragmatic realities such as telecommunications charges or availability, user costs and national trends:

> At this stage we have made very little progress in our collective thinking about this. Perhaps this is partly due to the lack of penetration of mobile services in New Zealand until relatively recently. It is only relatively recently that you have mobile sticks and 3G networks are starting to become much more prevalent. Only relatively recently have mobile technologies become prevalent. It is not cheaper but much more prevalent [E1],

> I think there is a way to go before mobile technology is implemented. A lot of this is because of the cost to the students [G1].

The latter point was echoed by a systems librarian who believed that students and the institution would determine the pace of change and students would need to be able to afford data plan packages and be comfortable with using *mobile services*, otherwise the institution was not making a worthwhile investment.

Specific areas of workplace practice were mentioned in relation to changes having an effect, for example, the introduction of texting library messages to mobile phones had had an impact upon staff involved. A qualified librarian mentioned being freed up from more labour-intensive communication with students following the advent of text messaging, resulting in being able to do other, more meaningful things. On the other hand, one library had struggled to implement SMS using a third party to develop the product. Problems had

plagued the introduction of the service and resulted in more problems and more work for staff.

The move from print to online resources required a change in thinking about work practices. A library manager commented that the move was from the visible to the invisible and the library needed to create as many ways as possible to ensure students accessed the resources they required. Another library was also finding that, with the influx of students from various socio-economic and cultural backgrounds all using mobile technologies, the library was responding by moving resources online:

> Two years ago, we were basically print-based; we are now 30% electronic. In another twelve months it will be 50/50. [I3]

Several participants moved a step further in commenting that progression into the online environment required a shift in focus away from traditional library provision towards the development of services and relationships with students. They felt the substantial changes that had occurred in libraries over the past several decades should be promoted and made obvious and that both librarians and library users would benefit from a shared understanding of the benefits of those changes.

A focus around needing competence in using technology rather than creating it illustrated the concern that librarians were being overly ambitious in their work practices. A library manager advised:

> You don't need to understand programming. It is important for librarians to understand where our users are … With mobile computing on the Web it is really important to be a savvy user but you don't need to be a competent creator or technical person because you can buy it or borrow it [F1]

A similar comment, encouraging understanding the most appropriate deployment of technology, came from the library manager who earlier had advised against libraries creating FaceBook sites:

> Libraries need to find the appropriate way to use technologies. They are trying to be cool but they don't understand it, for example, putting up a FaceBook site. People can tell and it just makes them end up looking silly. How do people relate to information and communication, develop services and tools that answer people's

needs, rather than trying to force people or traditional devices into a platform that doesn't relate to people [L1]

Where staff believed that fundamental aspects of library provision, such as making information available or answering queries, had not changed, they regarded the impact of mobile technologies as enabling an additional option of service delivery. They considered an increase in knowledge by staff was required in order to assist the changing nature of student queries.

The intermediate, focused phase of data analysis established the emergence of conceptual themes relating to the three concepts separated out for analysis. These are defined below, in the manner described previously:

Roles:

1. Refocus – defined as changing the emphasis or direction
2. Continuation – defined as remaining with particular requirements and conditions
3. Adjustment – defined as a small alteration made to align with a new situation

Relationships:

1. Collaboration – defined as active, interdependent engagement to provide a value-added solution

Working Practices:

1. Change accommodation (early adopters) – defined as acceptance or incorporation of change to enable a desired outcome
2. Cautious approach (late adopters) – defined as moving hesitantly to be alert for potential problems

The 21 categories that emerged in the initial analysis of role adaptation contributed 15 categories to the refocus theme formed during the intermediate coding stage, with four comprising the continuation theme and the remainder the adjustment theme. The themes indicate that the majority of the VET library staff sample believed that their roles had changed and would continue to evolve. This finding links closely to the next aspect, relationships, where all eight categories focused on the collaborative opportunities that had been recognised and developed as a consequence of the mobile technology environment. Library staff beginning to work closely with colleagues from outside the library was occurring in all 14 libraries sampled. Finally, of the 31 working practice adaptations, 18

categories related to change responses participants were aware of being incorporated into their workplace, while the remainder contained evidence of a wait and see approach.

Continuing the comparison of the conceptual themes that emerged from the intermediate, focused coding stage, higher analytical level theories were gradually formed. Having established the environmental context and the new knowledge aspects of delivering services to mobile technologies, the manner in which such knowledge and skills should best be acquired was investigated. Questions 10-12 formed the framework around which the capability development requirements of participants and the impact upon their roles and relationships was presented. This framework comprises the abstract concepts of capability, conduct (the process of being conducted) and consequences. The conceptual themes that comprised each abstract concept are included, with each of the concepts being subjected to a unique impact with the potential for disruption and uncertainty within the affected themes, as illustrated below.

Capability development

Q 10 - Capability

Q 11 – Conduct (the process of being conducted)

Q 12 – Consequences

↓ Impact – training

Capability

Address technical needs

Enhance service delivery

Develop specific or general competence

↓ Impact – delivery methods

Conduct

Formalised delivery

Informal availability

↓ Impact – change impact

Consequences

Refocused roles

Collaborative relationships

Continuum of adopter stages

5.6 Theoretical Concepts Continuum

The process of constant comparison of the coded data within the categories during the initial phase of grounded theory analysis generated commonalities and dissimilarities. As the categories continued to be compared, more abstract conclusions began to be drawn by the researcher. These have been presented as conceptual themes. Continuing comparison of the conceptual themes has gradually led towards a clearer, more encompassing theoretical, abstract concept. Elements of these, in turn, have been compared and combined and have led to the development of overarching theories which seek to explain the phenomenon under investigation. The overarching theories which have been presented at the conclusion of each section are now combined below to demonstrate the continuum of analysis and comparison that led to the development of an integrated theory. The emergence of this theory formed the advanced coding stage of grounded theory analysis and will be presented and discussed in the following chapter.

Throughout the analysis a range of impacts were identified that were related to the conceptual themes and the higher level abstract concepts. Some impacts were associated with technology and others with staff attributes; in fact the impact that students with mobile devices had on library services was fundamental in forming the problem that led to the investigation. Nine impacts, constituting a range of features from the initial new technologies that prompted the investigation through to change impact that affected response to changes, were identified as influencing the abstract concepts, each containing the potential for disruption. The presence of the nine impacts generated a condition of uncertainty upon specific aspects of the investigation. For example, examining the abstract concepts that developed during the focused coding stage, during the process of establishing environmental conditions, the impact of new technologies affected the context within which the investigation took place. It exerted the influence of uncertainty over the themes of augmented delivery of service, information and workplace infrastructure. In other words, it caused VET library participants to view alterations to the environment within which they worked through the specific focus or impact of new technologies. As the analysis continued, it became evident that management of these impacts was central to explaining the individual and organisational responses that were occurring.

The three overarching theories addressed the issues that emerged from the investigation at an abstract level. Environmental impact included the background context within which the impact of mobile technologies upon library staff was occurring. It included the immediate consequences of this context, in other words, the manner in which library staff believed they

had responded, and also the observed consequences, or the manner in which students had responded to the context and the resulting effect upon library staff.

As a consequence of these aspects of environmental impact, library staff indicated the creation of new knowledge was necessary with an accompanying increase in identified capabilities. The design and delivery of methods to address these requirements, with the resulting consequential changes experienced by staff form the components of the third overarching theory of capability development. As the resulting theoretical model will show, the overarching theories contributed major components of the model – organisational, individual and some contextual. Contained within the theoretical model is the core category, that central aspect of the phenomenon around which the other abstract themes are woven into a cohesive, meaningful relationship.

Environment impact

Q 1 – Context

Q 2 – Consequences (immediate)

Q 3/4 – Consequences (observed)

↓ Impact - new technologies

Context

Augmented delivery of service, information

Workplace infrastructure

↓ Impact – personnel

Consequences (immediate)

Staff attitude

Immediate and wider workplace support

↓ Impact – attitudes

Consequences (observed)

Focus on skills, technology and workplace change

Altered student expectations and interactions

New knowledge generation

Q 7 - Content

Q 8 – Capabilities

Q 9 – Correlation

↓ Impact – mobile technologies

Content

Study- and information-related services

Potential technical issues

↓ Impact – new knowledge

Capabilities

Technical competencies

Management issues

Ability to adapt

↓ Impact – techniques

Correlation

Internal reviews

Routine organisational processes

External opportunities

Capability development

Q 10 - Capability

Q 11 – Conduct (the process of being conducted)

Q 12 – Consequences

↓ Impact – training

Capability

Address technical needs

Enhance service delivery

Develop specific or general competence

↓ Impact – delivery methods

Conduct

Formalised delivery

Informal availability

Impact – change impact

Consequences

Refocused roles

Collaborative relationships

Range of adopter stages

The theoretical concepts continuum pulls together the various findings presented in this chapter into a sequential, cohesive explanation that feeds into the various parts of the theoretical model.

5.7 Student Perception of Mobile Library Services

Previous research has found evidence of increasing student use of mobile devices within higher learning and their strong opinions about the usefulness of mobile services. Student cohorts were surveyed at the participating VET libraries for the purpose of generating an alternative perspective of mobile services being offered by their library and their opinion of its contribution to their study needs (refer to Appendix D). This component of the research took a quantitative approach in the type of information being sought and the use of Likert scales for gathering responses.

The demographic profile of the student sample showed greater female response (62%), 44.6% of the sample between the ages of 16-25 and 26.1% between the ages of 26-35, with 47% studying at either certificate or diploma level.

5.7.1 Student Attitude to Technology

Of the 95 student responses regarding attitude to technology, half agreed they would consider upgrading to new devices and features if it suited their needs.

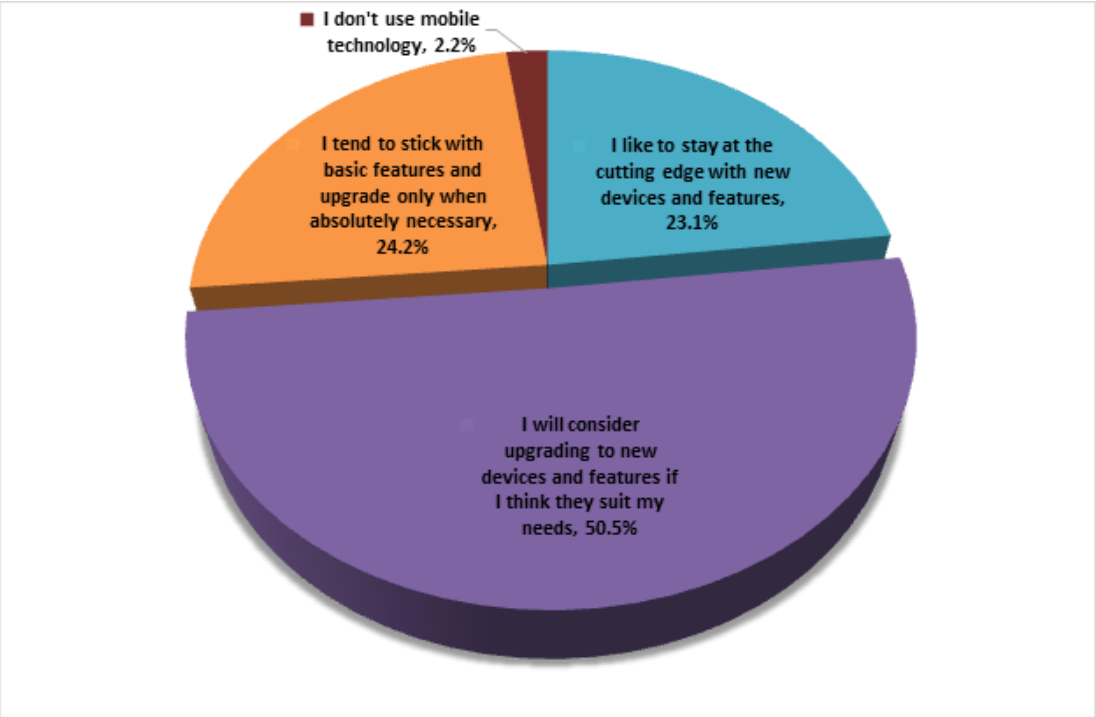


Figure 5.3 Student attitude towards new mobile technology adoption

5.7.2 Student Use of Mobile Devices

The majority of students (74.4%) used a cell phone as their mobile device of choice, with less than a quarter using a smartphone.

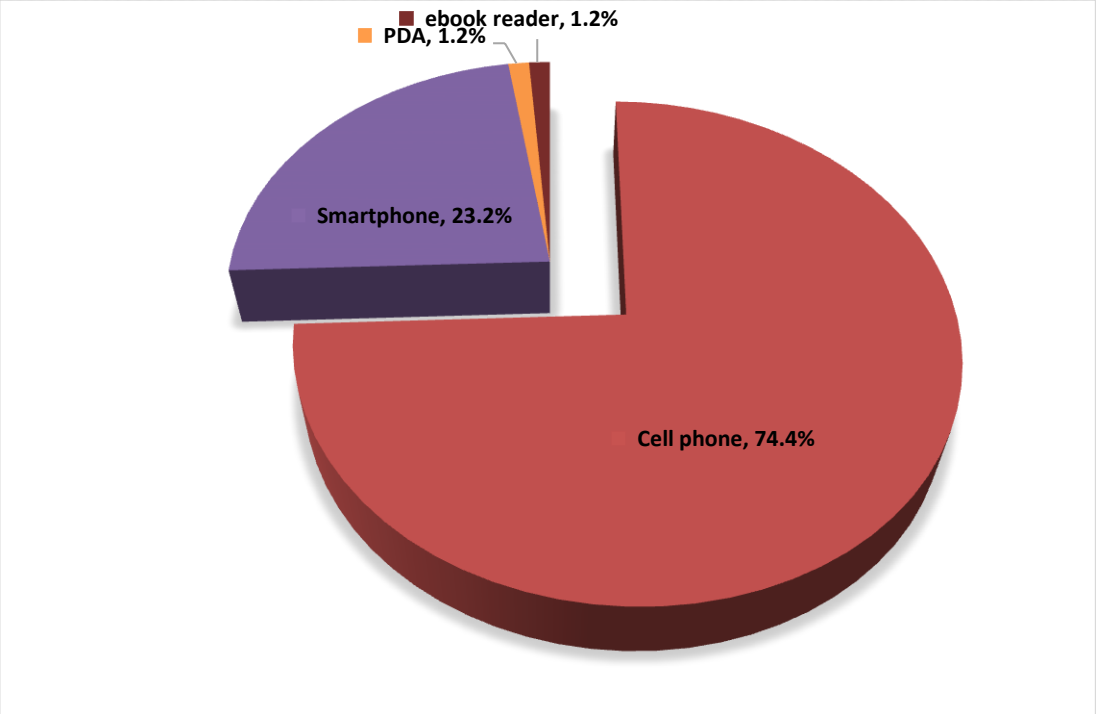


Figure 5.4 Student mobile device use

Students were using their mobile devices to access the Web, with 72.3% confirming their mobile device included this capability. Figure 5.5 below provides the breakdown of student ownership of web-enabled mobile devices across the TAFE and ITP sectors.

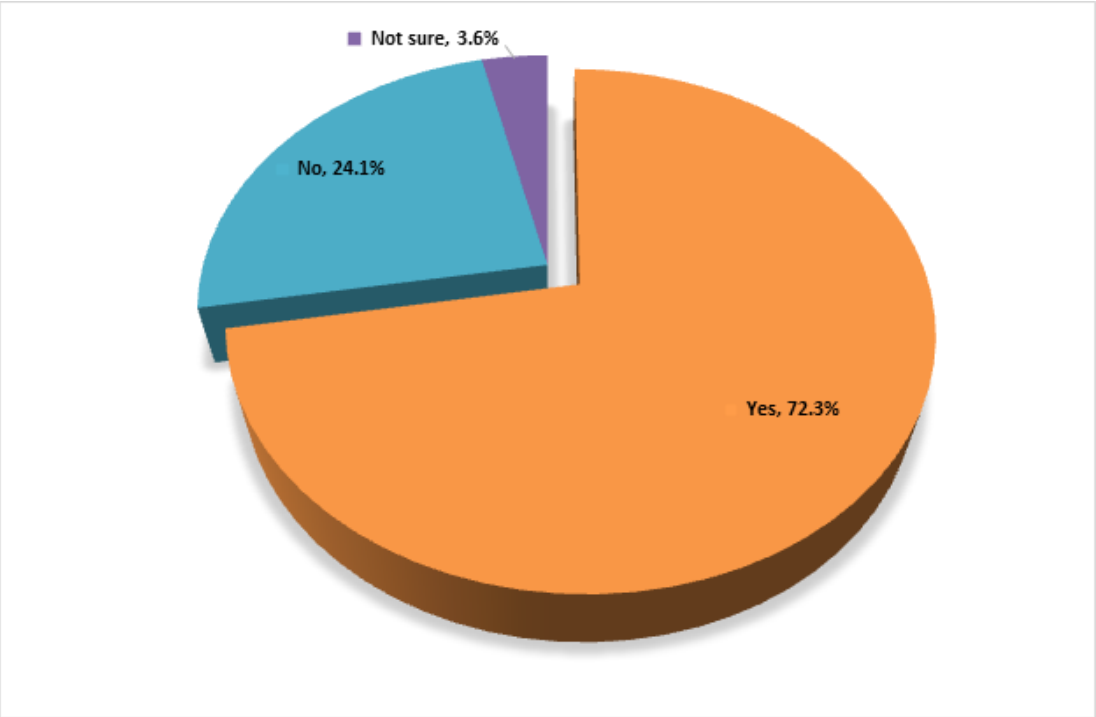


Figure 5.5 Student use of web-enabled mobile device

When using their mobile devices for various activities, both social and study-related, students demonstrated a strong preference to engage in social activities on at least a daily basis. Table 5.11 below compares the most-frequent and least-frequent mobile device activities engaged in by VET students. Text messaging and talking have the highest percentage of student engagement.

Table 5.11

Students' Most Frequent Activities using Mobile Device

Activity	**At least daily (%)**	**Never/Once a Year (%)**
Text message	73.5	11.4
Talk	49.3	19
Instant messaging	32.5	45.3
Email	30.4	51.9
Search	26	51.9

A range of activities available to web-enabled mobile devices, including a number of information-seeking, study-related options, features in Figure 5.6 below. Responses show that the majority of students never undertake these activities on their mobile devices.

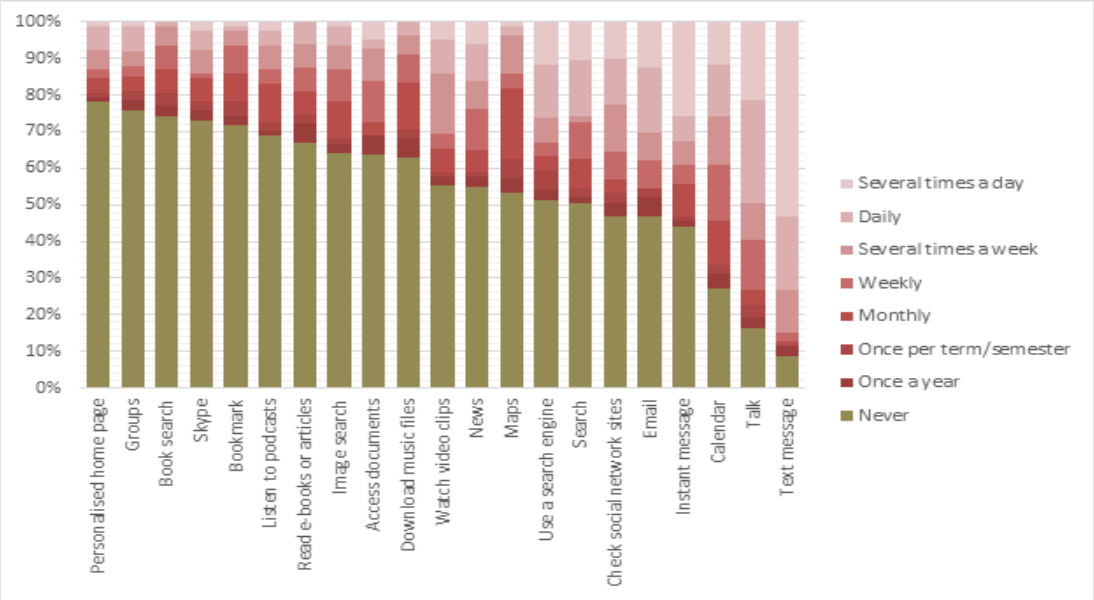


Figure 5.6 Student mobile device activities

5.7.3 Library Use and Evaluation

Students were asked how frequently they physically visited the library. The majority visited the library at least weekly (87.1%), with a third visiting daily. Only 3.9% of the sample stated they had never physically visited the library.

The students were surveyed on their awareness of some of the commonly-offered library services available across VET sector libraries. Figure 5.7 indicates a high level of awareness of the more traditionally-offered services such as digital media for borrowing (83.1%) and talking to a librarian in person (76.6%). Less awareness was evident for some of the more specialised services, such as research guides (36.4%) and online tutorials (35.1%).

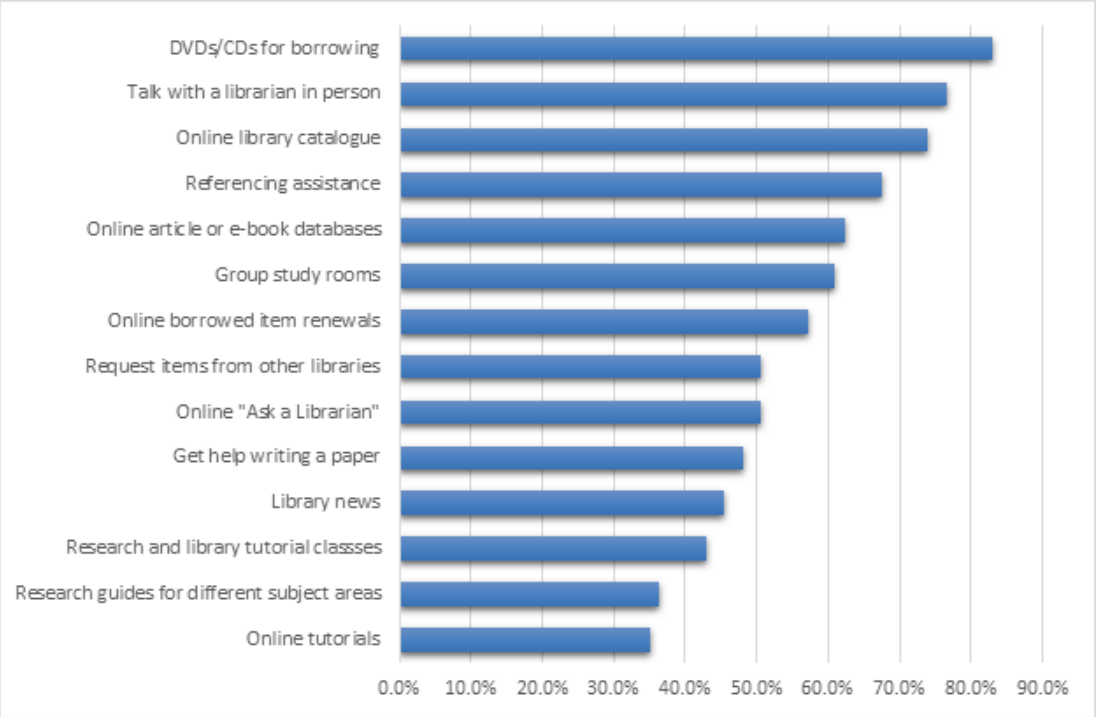


Figure 5.7 Student awareness of library services

Students were surveyed on the frequency with which they visited the library website. A breakdown of types of usage of the library website revealed the majority of students accessed the library catalogue (71.8% at least once per term), while undertaking research for an assignment at least once per term attracted 77.8% of the responses. The web-based library services students had rarely used included the online “Ask a Librarian” service (90.3% Never or Once a year), booking library training sessions (91.4% Never or Once a year) or listening to library audio tours/podcasts (83.3% Never or Once a year). Figure 5.8 below shows student usage of 17 web-based library services.

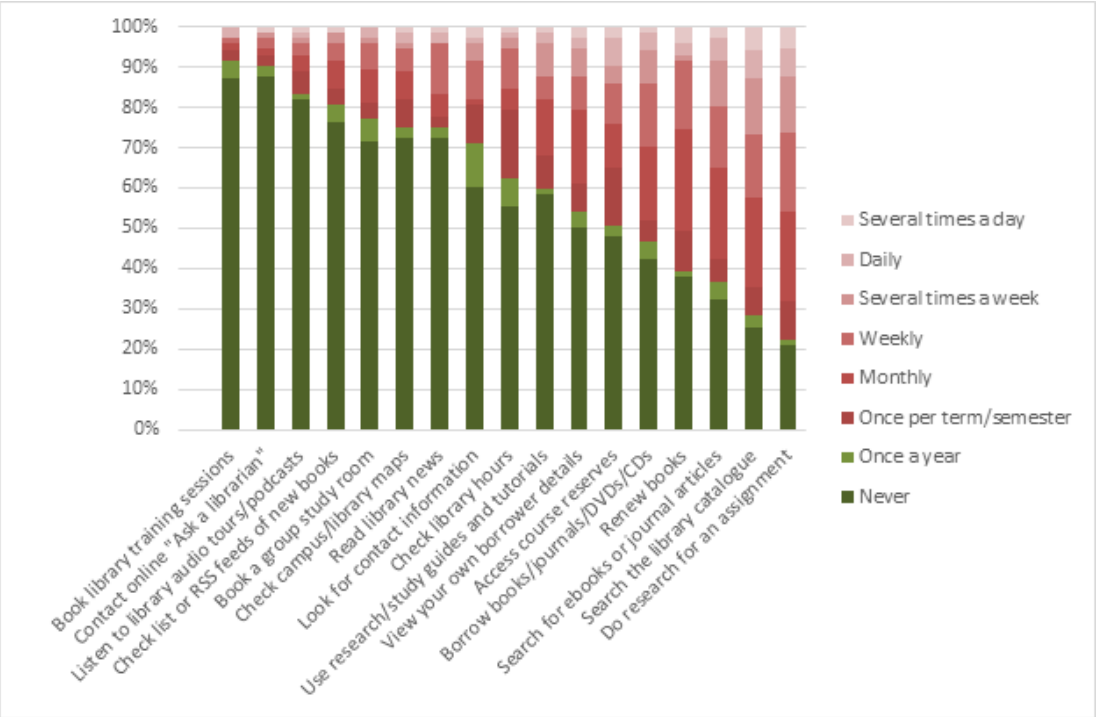


Figure 5.8 Student use of web-based library services

Students were then surveyed on whether they would be more likely to access those same 17 services if they were available for mobile devices. Cautious interest was shown in accessing library services on their mobile devices. Fewer were likely to visit the online library catalogue (OPAC) via mobile device, with 58.2% of students displaying interest and 41.8% of students unlikely to do so. Of slightly more interest to students was undertaking research for an assignment via mobile device with 64.4% showing interest and 35.6% unlikely to do so. Additionally, 56.7% students were likely to search for electronic books and journal articles with a mobile device, while 43.3% were unlikely.

Students indicated that the ability to access the online “Ask a Librarian” service by mobile device remained unlikely to interest them, with 65.7% being unlikely to do so. Also of little interest were services such as booking library training sessions (65.8% unlikely) or listening to library audio tours/podcasts (69.1% not interested). Comparing these responses with the interest students were demonstrating in accessing online library services through larger computing devices, there is a noticeable shift towards being more likely to do so. Figure 5.9 below allows comparison with Figure 5.8 above,

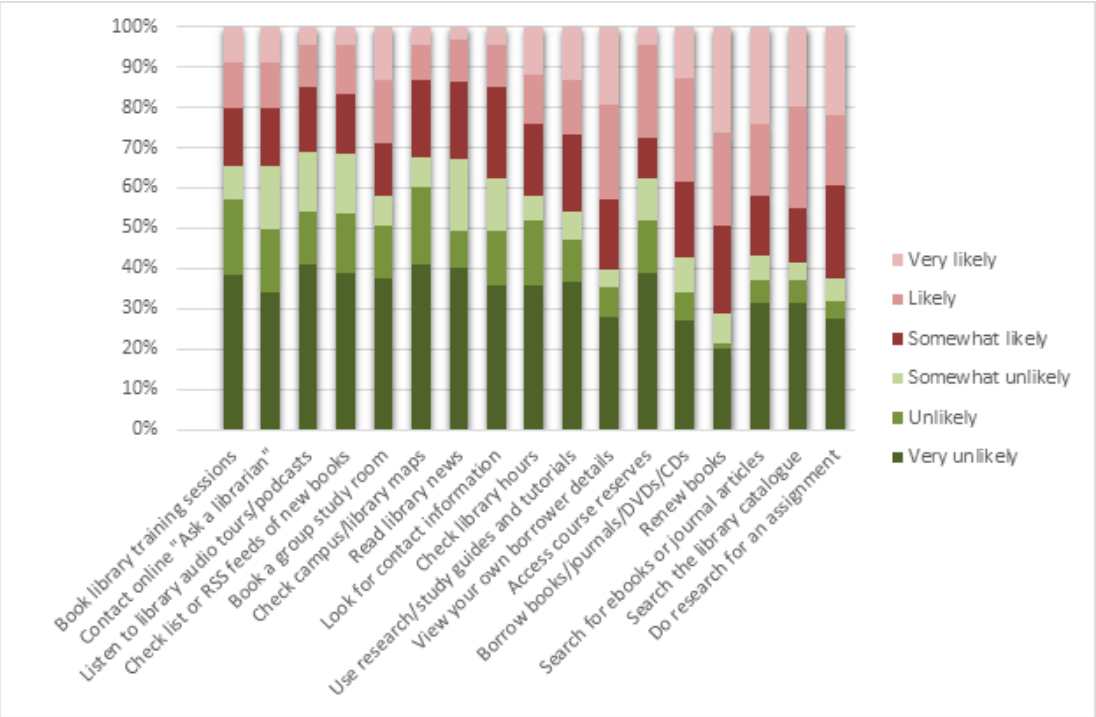


Figure 5.9 Student likely use of library services for mobile devices

Receiving SMS or using texting to deliver library information was perceived to be of value by the majority of respondents. Over half the sample reported they were likely to renew library materials using a mobile device, 62.6% were interested in receiving renewal or overdue notices, and 25.3% were not interested in this service. Reflecting the lack of interest already evidenced in the previous two questions, contacting the online "Ask a librarian" via text revealed 56.2% of the sample unlikely to use this service, as illustrated in Figure 5.10 below:

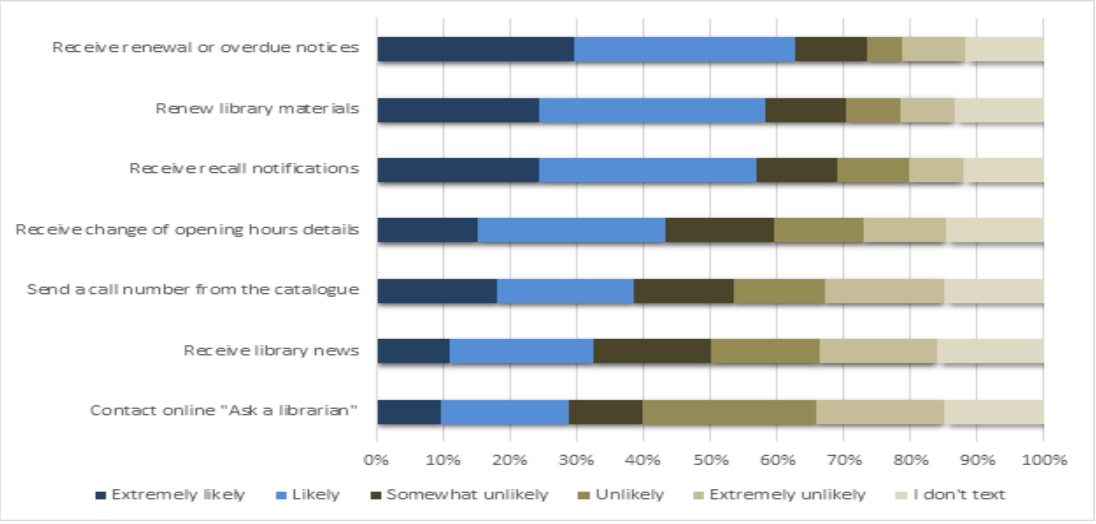


Figure 5.10 Student likely use of texting/SMS library services

5.7.4 Information Use and Evaluation

Students were questioned about the likelihood they would use various resources via a mobile device to start research for an assignment. Starting their research with Google was the most popular, with 67.6% of the sample very likely to do so, compared with 21.9% being very unlikely. The mobile library catalogue would be the starting place for 62.6% of the sample, with less than a quarter very unlikely to start there. Contacting instructors via mobile device to commence their research would be undertaken by half the sample, compared with 28.4% unlikely to undertake such activity. As Figure 5.11 reveals below, most of the sample would be likely to use their mobile devices to access various research resources:

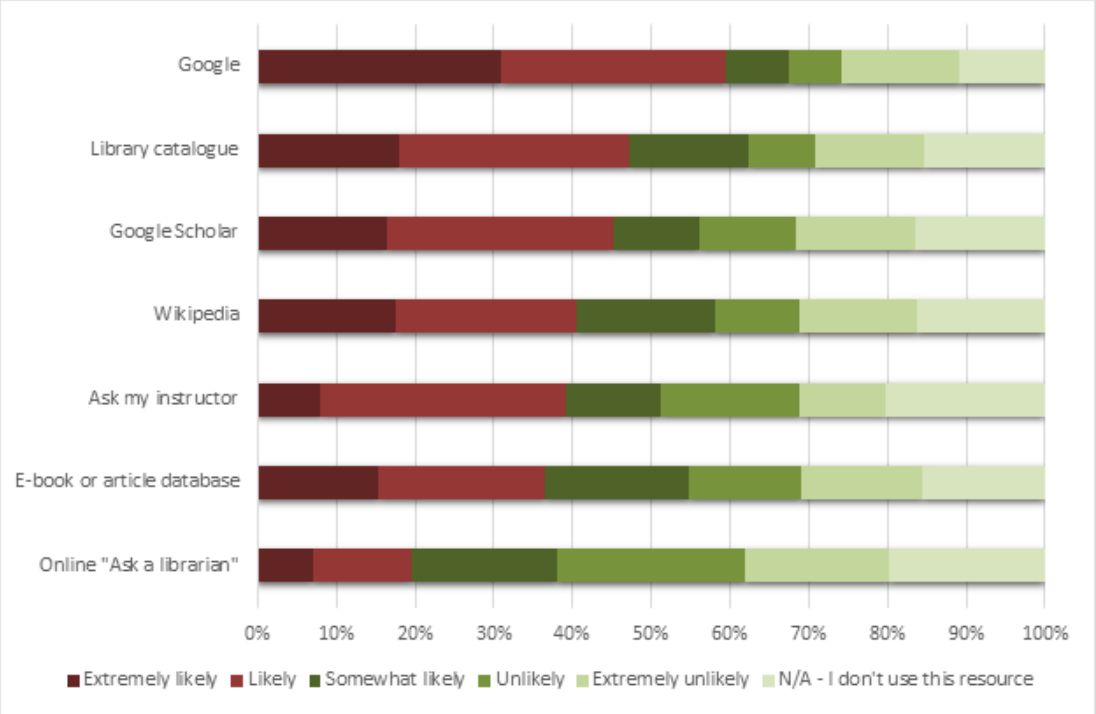


Figure 5.11 Student likely use of mobile devices to access research resources

5.7.5 Technology Use and Evaluation

The majority of the sample (36%) spent 11 to 20 hours per week online, followed by the next highest proportion (28%) spending 5 to 10 hours per week online, and a small percentage (2.7%) spending less than 5 hours per week. Of the time spent online, the students were questioned as to what percentage was devoted to study-related activities. Nearly a third of the sample (30.7% respectively) spent 26-50% and 51-75% of their online time engaged in study-related activities. None spent 0% of their online time on study. The preferred method of accessing course readings was to download and print readings (62.7%), with 17.3% happy to read course materials online, and 20% indicating they had no preference.

5.7.6 Library Service Delivery

Student respondents proved reluctant to supply opinions on library service delivery. They were asked how the campus library supported their learning experiences through technology deployment, what alternative library services or resources they would find useful if these were available for mobile devices and, lastly, what, if any, technological problems or challenges they faced when using their campus library.

Analysis of the responses provided by 42 students to the question on how the library supported their learning experience revealed that eight students (19%) identified the availability of databases, five (11.9%) mentioned the computers provided, and five mentioned the provision of internet access.

Twenty-nine students responded to the question on the mobile services and resources they would find useful. Five students (17.2%) identified date due reminders, three (10.3%) noted database access, two (6.9%) students would have liked renewals to be available, and 12 (75.9%) students were uncertain.

Lastly, 42 students responded to the question on technological problems or challenges with 10 (23.8%) identifying slow internet speed, nine (21.4%) stating internet breakdowns causing frustrations, and 12 (28.6%) students believing they had not experienced any problems.

5.8 Staff Awareness of Online Library Services

As mentioned in the previous chapter, triangulation of data collection was undertaken to permit fuller exploration of the research problem. Following completion of the staff interviews, the participants were requested to complete a short, four-item questionnaire accessible through an emailed link to SurveyMonkey (refer to Appendix C). From the sample of 42 library staff, 34 completed the survey. These participants represented 13 of the 14 participating ITP and TAFE libraries. The questionnaire sought the employing institution name and asked the participant to identify in a multi-response table “How many of the following options does your library currently offer?”. Fifteen online services were listed, in addition to an ‘Other’ open-ended option. Of the 27 participants who answered this question, all indicated their library offered DVDs/CDs for borrowing which, while not strictly an online service, was one which required students to use a computer to access the information. The other online services offered are presented in Figure 5.12 below:

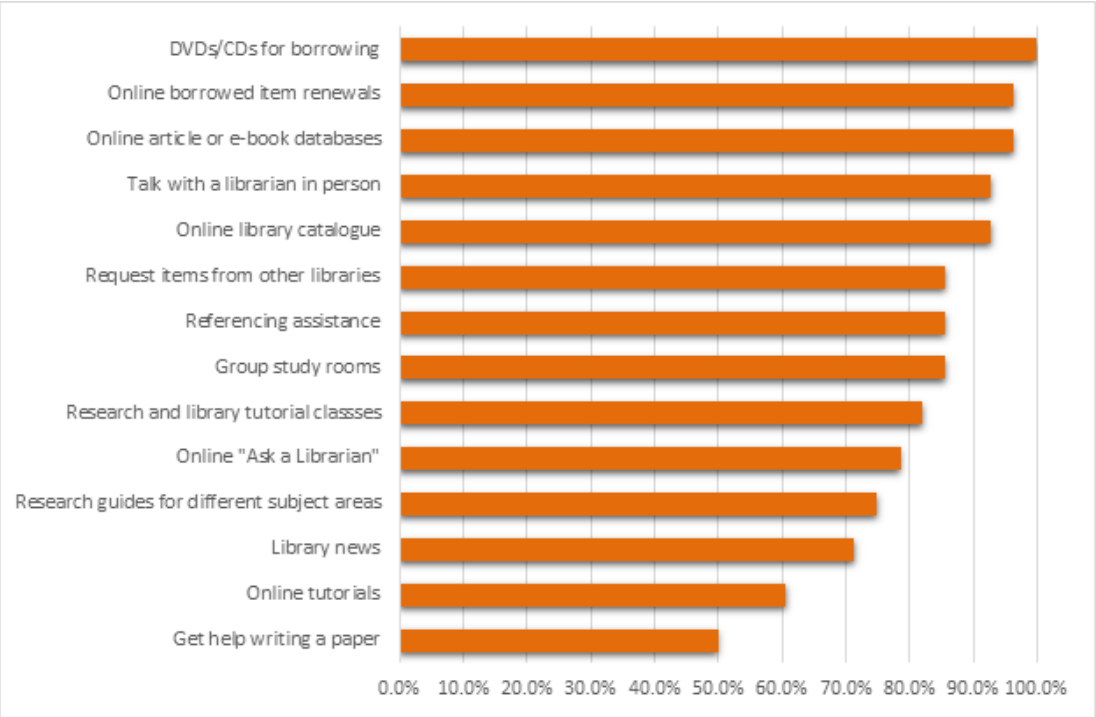


Figure 5.12 Online library services offered to students

The responses shown in Figure 5.12 indicate that VET sector libraries had developed a range of online services for student use, ranging from providing access to aggregated databases hosted offsite through to personal assistance in the form of referencing assistance. A range of online guides had been developed and made available online for student access.

The second question sought information on which services were offered via the library website. Seventeen options were listed accompanied by a Likert rating scale 'No', 'Have offered previously but removed', 'Yes' and 'Future planning'. Of the 24 participants who completed the question, all of the represented libraries offered 'Check library hours', 'Look for contact information', 'Renew books', 'Search the library catalogue', and 'View your own borrower details'. These responses were closely followed by 'Search for electronic books or journal articles" at 95.7%, with the remaining participant stating this was planned as a future development. The responses to this question are presented in Figure 5.13:

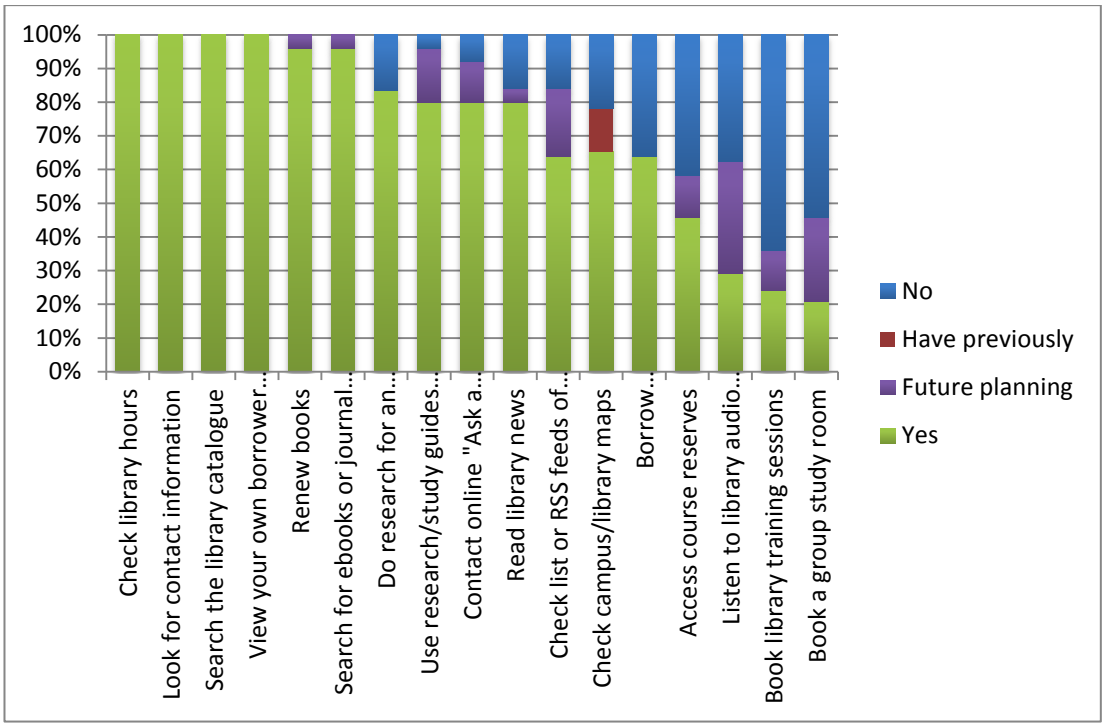


Figure 5.13 Services offered through the library website

Staff responses to this question indicate clearly that the online environment, including service delivery, was familiar to the VET library sector. This finding supports the results of the first interview question the staff sample were asked regarding the new technologies they were aware of that had been adopted by their library during the past two years.

The final question investigated what texting/SMS services to mobile devices libraries were offering. The same Likert rating scale was deployed as for the previous question. Responses indicate that SMS/texting information to student cell phones was an area under development for participating libraries. Figure 5.14 presents these findings:

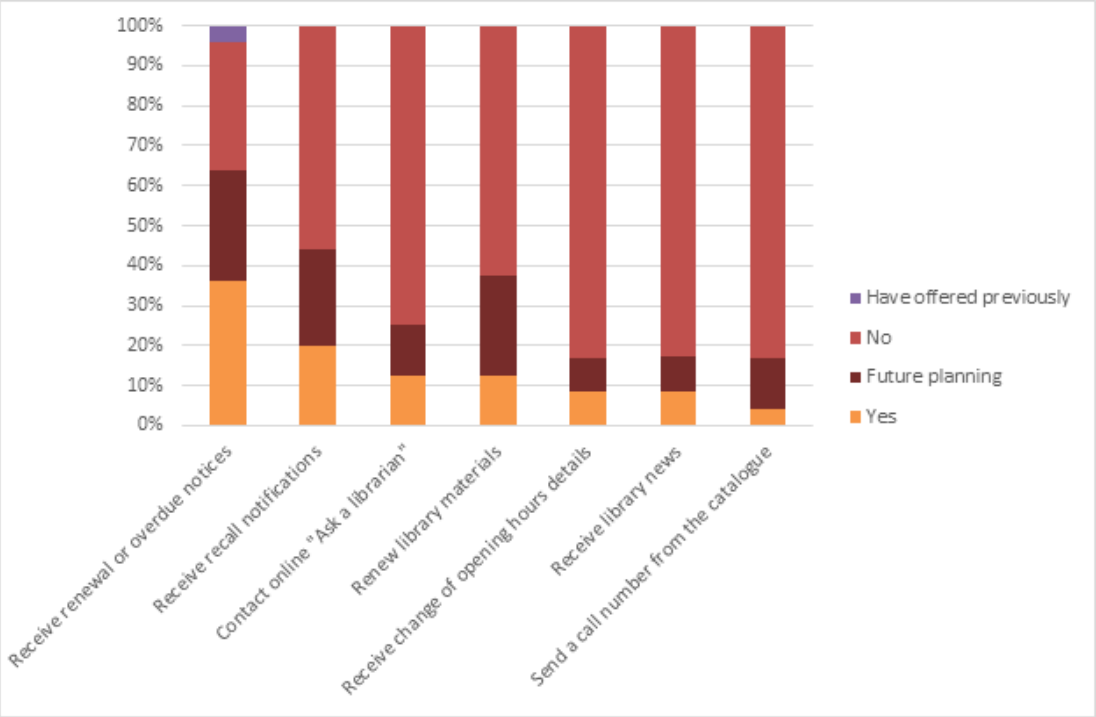


Figure 5.14 Library services available via text/SMS

The services most frequently being offered to students via cell phone were 'Receive overdue or renewal notices' (36%), with 28% planning this as a future service. The second most frequently-offered texting/SMS service to students was the delivery of recall notifications (20%), with a quarter of the sample mentioning this was a future planned service. Responses across nearly all the service options provided indicate very limited delivery of services to students via texting/SMS. It is possible this limitation is, in part, the result of lack of staff competence. If this is the case, then this finding would support the results from interview Question 2 'What impact do you believe the adoption of these new technologies is having upon the library staff/workforce?' in which the need to up-skill was indicated by the greatest percentage of the staff sample (40.5%) as a significant impact.

5.9 Validation of Responses

As mentioned in the Methodology chapter, data collection procedure included the process of triangulation to ensure the investigation, data collection and analysis phases were conducted from several angles to test robustness. Results from the two online questionnaires designed

to cross-reference responses and to test the validity of staff responses found that many of the online services staff indicated their library offered to students were never used by students. While this situation may also be a reflection of other environmental aspects such as lack of student awareness, nevertheless, it indicates a disconnect between staff perception of student behaviour and student responses. This situation was demonstrated in such areas as the online Ask a Librarian service, where 78.6% of the staff sample indicated their library offered such a service, while 90% of the student sample indicated they had never used such a service. Similarly, the findings show 82% of the staff sample indicated their library offered research and library tutorial classes; nearly 90% of the student sample had never booked a library training session. The inconsistencies in awareness these findings highlight are supported by previous research in the field.

5.10 Chapter Summary and Evaluative Overview of Data Analysis Process

This chapter presented the key findings on the skills, knowledge and competencies required by library staff within the Australasian VET library sector obtained from semi-structured interviews and two online questionnaires. The emphasis throughout has been to allow the voices of the library staff to emerge. This has been achieved through the incorporation of illustrative examples taken from the interview transcripts; such rich data being threaded through the qualitative reporting phase. Constant comparative analysis of data resulted in the emergence of categories indicating those aspects the library staff sample believed to be important or relevant. The findings indicated that all participating libraries were actively implementing technology advancements and there was keen awareness amongst staff that up-skilling was required in order to leverage the potential benefits of these technologies. The findings also revealed that the majority of staff participants were positive about new technology; they believed that students were similarly positive and were actively taking advantage of benefits, such as being able to use their own laptops in the library. The analysis indicated that participants were conservative in their opinions as to what could most effectively be delivered within a mobile environment, citing services traditionally associated with library provision, such as e-books, and the library catalogue. What the staff sample demonstrated most clearly was their perceived need to become competent in using a range of mobile devices and to acquire this competence through hands-on training with such devices. They reported a strong preference for in-house training provided by innovator colleagues. In terms of the preferred methods to identify gaps in knowledge and skills, this was the direct approach of either surveying or asking staff what they needed. Participants indicated their perception that changes to roles resulting from adaptation to the impact of mobile delivery were evolutionary rather than radical and they also found themselves in closer working relationships with their e-learning and IT colleagues. With regard to adaptation of working

practices in response to mobile delivery, the analysis revealed that while a cautious was being adopted by a number of the sample libraries, overall the majority were proactively accommodating the changes.

An online questionnaire for staff and another for students were undertaken to test the robustness of staff responses from alternative angles. The findings emerging from these instruments highlighted the focus of students on using their mobile devices primarily for social purposes and the discrepancy between library staff and student awareness of online library service provision. In addition to allowing triangulation of data, the student questionnaire also enabled comparison with existing student survey findings from previous research in the field.

CHAPTER SIX

INTERPRETATION AND DISCUSSION OF RESEARCH FINDINGS

6.0 Introduction

The continuing impact of technology upon all educational environments has focused attention on how best to meet the inherent challenges and opportunities presented. As discussed previously, the VET sector has not been extensively investigated in this regard and VET sector libraries remain virtually unexplored. It is, therefore, timely to explore the perceptions and response of VET sector library staff to technology impact, with particular focus upon future developments in mobile service delivery. This study investigated the current state of preparedness of VET sector library staff to deliver mobile services to students and contributes, in particular, to three areas: an understanding of the perceived impact of technology upon libraries and their services; knowledge of technology competencies required, and the best approaches to address identified requirements. The impacts of staffing position, personal levels of technology competence and length of service upon attitudes and perceptions were also investigated as staff considered the present and future implications of mobile technologies upon their service delivery environment. The findings demonstrated at individual staff member level the likelihood of technology acceptance within the specific context of their workplace environment. The involvement of wider, organisational factors, while not the specific focus of this study, also began to be raised when the analysis considered various impact, linkages and interrelationship aspects. What has emerged from the investigation is a clear picture of an evolving educational library culture responding positively to the perceived need to optimise technology-generated benefits.

The problem that initiated the investigation was an assumption that level of technology competency is directly related to level of technology usage which, in turn, impacts upon technology-enhanced service delivery. The investigation sought answers to two questions:

> What skills, knowledge and competencies are required by library staff to develop and deliver mobile technology services in the vocational education sector?

What specific on-the-job training is required by library staff in the vocational education sector to acquire the skills, knowledge and competencies to effectively develop and deliver mobile technology services?

The specific objectives were: to identify the library services most effectively and appropriately delivered through the medium of mobile technologies to VET students; to identify gaps between the existing and the required knowledge and capabilities of library staff in relation to mobile service delivery; and, thirdly, to determine the most effective means of ensuring library staff engaged in mobile delivery have opportunities for professional development and workplace learning programmes and activities. The findings of the research highlight the complexity of the factors, interdependencies and relationships that influence technology acceptance and make practical and theoretical contributions to the three areas indicated above.

The chapter presents the major aspects and findings of the analytic framework and the theoretical model. The development of the model is discussed and linked to the continuum presented in Chapter Five. The chapter then analyses the contribution of the theoretical model to the issues under investigation. The researcher believes that the theoretical model is an accurate statement of the complex features of the topic under investigation and could prove useful to others entering examination of this same field.

In continuing, the significance of the demographic features is considered. The discussion then moves to examine the findings that emerged within the environmental context, in particular, the impact of technology, a comparison of staff and student awareness of library services. The workplace technology knowledge and competencies participants identified as being required are discussed, and the chapter then considers significant aspects of professional development. The impact of introduced mobile technologies on roles and relationships is discussed. Linking back to the integrated theoretical model which was developed through the analysis phases of the investigation and presented at the commencement of the chapter, and the various technology acceptance and adoption theories that influenced the research, a modified version of the model based upon components of the various theories, including the Technology Acceptance Model (TAM), Diffusion of Innovations theory (DOI) and Unified Theory of Acceptance and Use of Technology (UTAUT), which influenced the investigation is presented and discussed.

The chapter closes with reflection on limitations which emerged during the process of investigation.

6.1 Integrated Theory

The process of grounded theory methodology includes the formation of categories, or "abstractions of phenomena observed in the data" (Chenitz & Swanson, 1986, p. 94). These categories, through constant comparison, gradually develop into a theory intended to interpret the meaning of the collected data. As discussed earlier, during the present investigation the emergence and relationship of categories to one another contributed to the gradual development of theoretical links between the categories and the development of higher level concepts. Resulting from the process of continuing interrogation, a continuum of theoretical concepts and accompanying impacts was developed, and was presented and discussed in the previous chapter. As constant comparative analysis of the themes continued and moved into the advanced (theoretical) coding stage, the development of an integrated theory resulted that served to address all major facets of the phenomenon under investigation. The theory encapsulates the commonalities and diversity of data captured in the investigation and is presented in diagrammatic form (see Figure 6.1 below) to demonstrate progression through the sequences of the various analytical phases. The background need/problem of a changing environment led to awareness of new knowledge being required to cope with these changes. The process of acquiring such knowledge occurred through the availability of capability development opportunities. The outcome of such activity was a new model of delivery and an environment of dynamic equilibrium, a situation described by Rogers (2003, p. 471) as denoting the rate of change in a social system being commensurate with the system's ability to cope with it.

During the development of the theory a central or core category emerged which pulled the other themes into a cohesive, meaningful relationship. The core category providing the pivot around which the other abstract themes revolved was termed Impact consolidation. The presence of impacts has been noted throughout the investigation and discussed in detail in Chapter Five; in fact the impact students with mobile devices had on library services was fundamental in forming the problem that commenced the investigation. The nine impacts identified and integrated into the theoretical continuum proved to be central to the investigation. Through managing their effects the major components of the theoretical model could be brought into meaningful relationships. Consolidation of the impacts indicates acknowledgement of their influence. A fundamental requirement of being able to address the influence of impact conditions, processes or consequences is the ability to minimise the uncertainty they have the potential to create. This was addressed in the present investigation through the two major stages of generating new knowledge and developing capability. If, in the process of defining, acknowledging and managing the effect of impacts, the generated uncertainty can be minimised, then the resulting, desired condition of maximised benefit

may be realised. For the present investigation, maximised benefit was described by VET library staff participants as including a stage of capability development which would assist the attainment of anticipated consequences, such as effective mobile service delivery, and dynamic equilibrium, the stage where attainments become normalised.

The core category, impact consolidation, shown in Figure 6.1 below, consists of two conditions: impact requirement and impact management, and two associated strategies: minimise uncertainty and maximise benefit. Impact consolidation means that all associated impacts are identified and brought together in such a way that their influence, if not necessarily able to be controlled, can at least be recognised and responded to. Within the core focus of impact consolidation two major activities are occurring. Impact requirement has as its impetus the activity of minimising the uncertainty the impacts have been identified as creating. In part this is achieved through the influence of the new knowledge component of the model. The condition of minimising uncertainty means, within the context of the present investigation, the ability of affected staff to be aware of environmental and contextual changes and to know how to respond effectively to these.

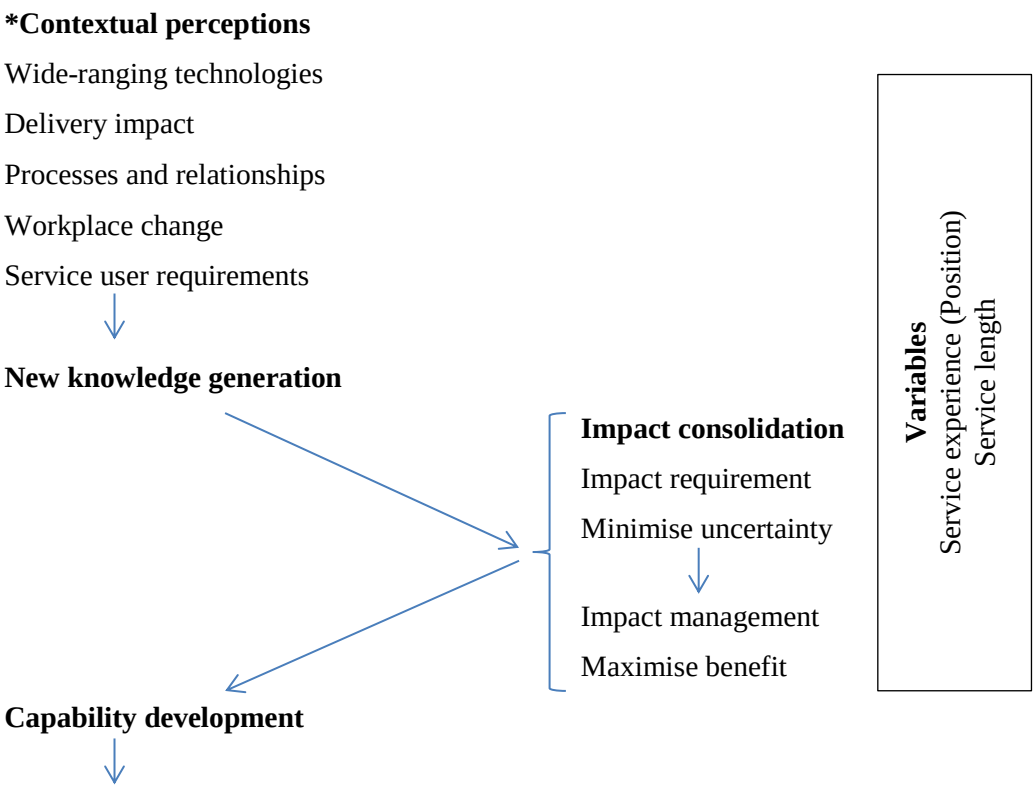
The second condition, impact management, has as its central impetus the activity of maximising the benefits to be gained from the impacts. The model component of capability development is a substantial result of this. The condition of maximising benefits, as viewed through the lens of the present research, means to address identified requirements, or rectify observed disruption, in the most effective, sustainable manner.

For the specific purposes of the present investigation a selection of variables was included through which to collect and analyse the data. Although they influence all stages of the investigation as illustrated in the theory, their purpose is most evident during the second and third components of the theory – new knowledge generation and capability development - where factors influencing personal acceptance and use of mobile technologies are focused upon. The first and final components – contextual perceptions and anticipated consequences and dynamic equilibrium - describe service unit (library)/organisational level factors and are less influenced by the selected variables.

In applying the theory to the questions the investigation sought to answer it becomes clear that the answers will be complex. The theory indicates that skills, knowledge and competencies and the training required to develop these cannot be isolated and offered out of the contextual environment. There exists an impetus behind the desire to acquire knowledge and there is a consequence of the acquisition and application of that new knowledge. As will

be discussed in detail in the following sections, VET library staff who participated in the investigation showed a strong awareness of changing environmental conditions; they perceived an alteration in the context within which they were working. While some participants believed their organisations were not paying sufficient regard to contextual alteration, all participants provided evidence of how, as individuals, they were responding. They were quite articulate in their perception of anticipated consequences of mobile devices upon the work unit/organisation and how far they had moved towards the attainment of dynamic equilibrium, or the normalisation of their attainments.

The core category of impact consolidation, resulting from the nine impacts identified during the focused coding stage, enables the generation of new knowledge to result in a beneficial outcome through the acquisition of appropriate skills. Throughout the theory components, the influence of variable factors is present. These are selected from the three original demographic variables selected for the investigation – position, service experience and technology competence. Of the three, the findings showed position as having the most influence on responses, with service length showing lesser influence. Analysis revealed technology competence did not appear to have any clear cut influence and this variable has, therefore, been omitted from the theory. The theory commences at organisational level, narrows to individual unit of analysis, and then expands to organisational level at the final process outcome. It identifies four areas of contribution to understanding the research results: contextual perceptions (including various environmental aspects operating at the work unit or organisational level): new knowledge generation (including the beliefs and interpretations of staff participants regarding the type of content knowledge they required to be successful: the range of capabilities they needed to master and the manner in which they could best attain these): the development of capability (including identification and establishment of outcomes, and the consequences of such activity): and the implementation and normalisation of emergent thinking structures and processes. This state, using the term coined by Rogers (2003) as dynamic equilibrium, is subject to continually-altering contextual perceptions. The theory can be regarded as being inherently cyclical.



(* Organisational level)

Figure 6.1 Theoretical model explaining impact of mobile technologies on library services

The following sections feed into components of the theoretical model and provide fuller explanation of what each component comprises. A modified version of the model is examined in Section 6.9 in relation to the theories that informed the present investigation.

6.2 Participants' Background

6.2.1 Staff

The selection of library staff participants for the research was intended to gather a representative section of the VET library sector, to enable comparisons to be made, implications to be assessed and possible recommendations generated from the findings. The profile of participants included the aspects of position, length of employment and technology competence. As discussed in Chapter Three, previous researchers have identified these attributes as influencing attitude towards technology usage and deployment within the workplace. While information on professional qualifications was not overtly sought, such

detail was implicit in all three position types, library manager, systems librarian, and qualified librarian. Gender was not considered useful to the present study, given the known predominance of female library staff across the sector under investigation, and age was regarded by the researcher as being integrated within length of service and, to a lesser degree, position.

The majority of the sample had been employed within the library profession for longer than 10 years. The medium service length period of 11-20 years captured 40.6% of library staff, while only 16.6% had been in the profession for 10 or less years. The greater service length period of 21 to 40 years included 38% of participants. As mentioned in Chapter Five, the NeXus survey of Australian library staff, conducted four years earlier, had shown similar career lengths for TAFE staff (Hallam, 2008, p. 36). This tendency towards greater service length appears to be a marked feature across all library sectors, and the TAFE library staff were no exception. The mean service length for each position type was library managers 23.3 years, systems librarians 16.3 years and qualified librarians 19.7 years. While the inclusion of library managers in the sample is likely to influence the findings towards greater service length, nevertheless, these figures support a widely-held view that the library profession is aging and is not attracting entrants in the numbers required to provide balance. It also provides evidence that when people enter the library profession they remain within it for considerable time, a situation confirmed in a variety of library contexts by several researchers (Chan & Auster, 2005; Lynch, 2002; Stroebe, 2010) and described as the 'greying of the library profession' (Rabina & Walczyk, 2007).

The implications of staff demonstrating considerable career stability, in other words, remaining within one profession for what, by twenty-first century standards, is a considerable length of time, are crucial when addressing technology acceptance factors. As discussed in Chapters Two and Three, research into age and technology acceptance has indicated that older staff are more likely to evince scepticism towards adopting new technologies. The medium to longer term staff in the present study showed more positive attitude towards incorporating technology into their workplace than their shorter term colleagues. One staff member, of long-standing service, had commented quite assertively on the fact that generalisations were being made relating to younger staff members taking things in their stride, when her observations were that all staff appeared to be prepared to develop technical competency. This comment links back to Prensky's (2001) early theories on digital natives and immigrants and also contradicts some of the technology acceptance theories (Schaper & Pervan, 2004, 2007; Venkatesh et al., 2003, p. 450) discussed in Chapter Three. This indicates that planners preparing for technology implementation should not assume that

longer-term, or possibly older, staff will prove resistant to change. Such an attitude appears to be entrenched in the present workforce, with participants, in this case two library managers, making such statements as:

> The more traditional staff who have been here a long time may see change as a threat rather than an opportunity, particularly technology [N1],

> The other three staff are very old-fashioned in their view of the library … They feel quite threatened by the new technology because they are not familiar with it and they honestly don't want to invest the time and effort into learning about new IT developments [J1]

These statements were not borne out in the responses of the colleagues they were "accusing".

When the VET library staff assessed their knowledge and use of mobile technologies, the majority regarded themselves as competent users (35.7%), followed by those who designated themselves beginners (28.6%). When comparing length of service with technology competence, staff who had longer employment length regarded themselves as less competent mobile technology users. The average employment length for Beginners and Average competence was 24 and 25.6 years respectively. A difference of 18 months is not a great length of time in a profession where some of its members continue for 40 years. It may have been a case of participants regarding themselves as advanced beginners rather than competent users and giving the response of Average. At the other end of the competence spectrum were the advanced users who had the shortest length of employment, averaging 8.75 years. This appears to support the school of thought proposed by exponents such as Prensky (2001) in his opinion piece on digital natives and immigrants, who noted that younger students, growing up in the midst of technology, were confident in its use unlike their older instructors who spoke an out-dated, pre-digital language. However, the responses to other interview questions revealed that many of the longer-serving staff were also very positive in their attitudes towards proficiency in using technology and could clearly see benefits. Overall, slightly more than half the sample (n=24) regarded themselves as being competent or more advanced in using mobile technologies. These findings indicate that when investigating skills and competencies required in the workplace to utilise technology effectively in service delivery, information on existing personal technology competencies should be gathered at the same time, if not previously. Such personal competencies will influence the investigative outcome.

The breakdown of technology competence by position revealed library managers were nearly equally distributed between Beginner (41.7%) and Competent (50%), a pattern repeated by qualified librarians (40% and 33.3% respectively). The systems librarians stood out as assessing themselves clearly as Competent (45.5%). Three of the four library staff who identified themselves as Advanced were systems librarians. In summary, 29% of staff considered themselves mobile technology beginners; the rest considered themselves at least average through to advanced users of mobile technologies. The researcher acknowledges this particular demographic information will change quickly as mobile technologies become more pervasive in everyday life and, therefore, forms a snapshot in time. For the purposes of the present investigation, however, it may be possible to make an association between this finding and the positive response staff made towards the impact of technologies upon the library environment and their interest in learning to use this array of technologies effectively and to adapt their roles and working relationships accordingly. For the purposes of library planners wishing to gather data on staff technology acceptance, an overview of their staff's personal technology competency levels may be useful precursor information with which to analyse findings.

In considering the demographic profiles of the library staff, what emerges is a strong level of commitment to the profession, as evidenced by service length, and an interest in using mobile technology. All respondents indicated they used mobile technologies and all were in positions that involved them in workplace technology assessment and implementation, service development and delivery, and professional development activities. These factors assisted the staff sample in providing considered opinions on the impact of mobile technology upon their workplace environment and contributing appropriately to the present research. They provided useful information for either supporting or contradicting previous work in the field, which can be used for comparative analysis by others intending to pursue a similar line of research.

6.2.2 Students

The student sample was drawn from participating VET libraries and library users who were likely to have some awareness of service availability were sought. The student profile included contextual information on institution attended, gender, age, specialty subject area, course level, and ownership of mobile device(s). Of the 95 participants, students responded from 13 of the 14 participating institutions, with nearly twice as many females (62%) completing the online questionnaire. There is insufficient information available to reach conclusions as to why more females were involved.

The majority of the student sample was under the age of 35. While, overall, ages ranged from 16 to over 65 years, 71% were within the 16-35 years range. This weighting towards a younger demographic should be borne in mind when interpreting the responses. Research has shown that younger, better educated adults tend to respond to internet-based surveys (Czaja & Blair, 2005; Mayr, Gefeller, Prokosch, Pirkl, Fröhlich, & de Zwaan, 2012), which may partially explain the response results. The sample was also reflective of the age distribution for VET sector institutions, which typically demonstrate a greater percentage of students from the younger age range (Berthelsen, 2008). Specialty subject areas ranged across the courses offered throughout the VET sector, from the arts to the sciences, with nearly 50% of students studying at Certificate or Diploma level. What emerges from these two findings is that the student participants were representative of the overall demographic profile of the parent institutions and were, therefore, suitable participants in the study (National Centre for Vocational Education Research, 2013).

A clear preference was demonstrated by students for ownership of mobile devices such as a cell phone (74.4%), with considerably fewer owning smartphones and/or other handheld devices such as an iPod, iPad, or handheld computer (23.2%). This finding may be compared with similar investigations into student ownership of mobile devices. Booth found greater cell phone ownership (95% for digital native and 86% for digital immigrant) compared with 6% digital native and 5% digital immigrant ownership of smartphones (Booth, 2009, p. 53), while the ECAR findings showed 62.7% students owned handheld devices (Smith & Borreson Caruso, 2010, p. 41). The conclusion can be drawn that VET students in Australasia, in keeping with their global counterparts, come to campus prepared to engage in study with powerful, portable devices containing more computing power than typical desk top computers a decade ago. The implications of this are that VET students expect to be able to use their mobile devices in a variety of learning opportunities. However, the findings did not entirely bear this implication out, with VET students showing a very selective attitude towards accessing mobile library services. A variety of reasons may lie behind this hesitancy, including lack of promotion of services by libraries, technical difficulties in access, costs of access or no requirement to access in the course being studied. Library staff providing services to such cohorts of students need to be fully cognisant of their preferences in order to provide the most targeted, effective service.

6.3 Environmental Context

The following three sections (Sections 6.3 to 6.5) feed into the abstract component of contextual perception illustrated above in the theoretical model. The VET library environment has been experiencing considerable change as evidenced by the number of

technology adoptions introduced during the investigated two-year period. Sixty-four unique technologies were identified as having been implemented across the 14 libraries during the period 2009-2010. This is a considerable number for any workforce to be dealing with, given that technology is only one aspect of the various changes in librarianship occurring at any given time. The impact of new technologies upon the VET library environment could therefore be considered both major and disruptive. The technologies adopted included those involving substantial resource investments such as library management system upgrades (33%), the implementation of a learning management system (21%), RFID (11%) or a discovery layer product (10%). Other technologies such as Twitter, Facebook, blogs and wikis are moving the libraries into the social networking space, with the implied requirement of addressing how best to deliver services through the most effective avenues. The subscription to e-books and loan of e-book readers, laptops, notebooks and computers on wheels (COWs) indicate the participating libraries were conscious of, and responding to, alternative expectations of information access. The strong move to provision of a wireless environment (70%) is indicative of institutional ICT student support strategies, and the library/learning commons, as a central place where students tend to congregate, is often a primary location for wireless hotspots. The implementation of these latter technologies is clear evidence of the transition already underway across the VET library sector towards acknowledging the arrival of mobile technologies, and developing, and potentially promoting, services for handheld devices. These major organisational changes, along with the influx of students using mobile devices on campus, were identified by participants as being prime motivators for individual change. Rogers (2003) noted that organisations, as adopters of innovations are relatively stable and yet innovation occurs all the time. In part, he related organisational innovativeness to independent variables such as centralisation of power in a system, complexity of occupational specialities and their associated knowledge and expertise, formalisation through rules and procedures, interconnectedness of staff through interpersonal networks, and organisational slack involving uncommitted resources (Rogers, 2003, p. 412). These aspects, with the possible exception of the final variable, all received mention from the participants as they examined their personal responses. As discussed in Chapter Three, Rogers also identified and explained the types of innovation decisions which manifest within an organisation. These included the optional decision, where the individual has the choice to adopt or reject an innovation, and the collective, where members of a system adopt or reject an innovation through consensus. Both these types of innovation decision making were present in the participating libraries and comments discussed in Chapter Five illustrate this feature. For example, staff spoke of "You have got to keep the skills up, you can't sit back, it's always changing" [I3] or "The adoption of new technologies in our institute is always driven by our relationship with our library clients"

[K1], which provide evidence that the adoption of innovation was not mandated but, rather, encouraged at both an individual and group level. Those planning future library services need to acknowledge the substantial technology change that appears to have become established as workplace routine. In situations where technological systems changes had yet to be formally implemented, staff, nevertheless, appeared to be very aware of impending changes and the majority had prepared themselves in some manner.

6.4 Library Services Most Effectively Delivered to Students within a Mobile Environment

The past several decades have seen libraries being challenged to demonstrate their effectiveness, responsiveness and value (Lakos & Phipps, 2004). Technology adoption accompanied this challenge as offering a panacea to libraries as they embarked upon intensive self-reflection. The 2010 Mobile Libraries Survey indicated 44% of academic library respondents offered some type of mobile services, while 40% of libraries planned mobile services in the near future. These included text messaging reference services and notifications, mobile library websites, and mobile-friendly online catalogues, as well as improving mobile access to databases and e-book content (Carlucci Thomas, 2012). Where libraries indicated no intention of offering mobile services, reasons included inadequate budgets, competing priorities, overburdened staff, insufficient skills on-site, and the overall perception that current methods of delivery were adequate, rendering mobile services unnecessary. The present research showed there were immediate consequences, with VET sector libraries actively implementing technologies, although only a small number were specifically regarded as mobile (n=13/64). Many of the other technologies mentioned had the potential to be developed into mobile versions.

When reality has failed to match technology expectations, libraries have realised that a well-planned technology development process can deliver tangible benefits (Dresselhaus & Shrode, 2012). This realisation may underpin the strong belief in the benefits of a comprehensive technology infrastructure that participants in the present study demonstrated when discussing the future of library services. More suggestions and resulting categories emerged from the issue of what mobile services should be delivered to patrons than for any of the other survey items, with fifty-six areas of mobile library service being identified. Given the issues raised by staff in their response to technology implementation it is perhaps not surprising that the service areas most frequently mentioned as important in the mobile library environment were also those perceived as important within the traditional library environment. As an example, e-book readers and e-books had been identified as newly adopted technologies and their provision was subsequently given as one of the library

services deemed most appropriate for the mobile environment. With the provision of e-books came a range of issues that libraries had been facing, such as licensing online content for mobile devices. Responses indicated libraries were discovering not all online content was accessible by mobile device, and licensing arrangements with publishers, database vendors or copyright owners for e-book content were proving complex and frustrating.

There appeared to be a strong relationship in the minds of participants between the concept of mobile delivery and traditional library service delivery. Three services that participants believed could be effectively delivered to mobile devices were already being offered by all participating libraries and comprised the core of traditional service delivery. They were the library catalogue (40.5%), online databases (35.7%), and management of materials (33.3%). These findings display similarities with Spires' (2008) investigation into 766 (mostly) academic librarians in the United States, where 44.1% of participants believed patrons were accessing the library catalogue using handheld devices and 43.2% believed similar access to online databases was being made by library users. Mills reported that 50% of her sample were in favour of being able to access the library catalogue from a mobile phone (2009, p. 8), while a 2004 University of Alberta survey found 75% of library users wanted mobile access to databases and 46% to the library catalogue (Carney, Koufogiannakis, & Ryan, 2004). The services identified by VET staff demonstrate their recognition of mobile technology's ability to enhance the present library environment rather than replace it and may have been a factor behind the enthusiasm demonstrated in some responses, for example:

> What couldn't? Everything that we do could very easily and effectively be adapted to that environment and delivered to these devices [E1],

> This is really exciting for us. The sky is the limit, with the time and finance [J2].

The findings revealed that librarians' functions in the online environment could be regarded as an extension or a transfer of those required to deliver service in a face-to-face context. Once again, the interest in delivering current services within the mobile environment came through strongly in the data. Of the 56 categories identified, 47 were for currently-delivered services that would have been routine service for most, if not all, of the sample libraries. Only nine categories could be considered non-traditional library service delivery. These included developing and downloading applications to mobile devices, signing with suppliers to deliver textbooks to any mobile device, the use of Quick Response (QR) codes, loaning pre-loaded iPads to students, social networking delivery through blog, YouTube and FaceBook, self-issue using a cell-phone with barcode reader, and the ability for patrons to

establish their own profile allowing information to be pushed to them from the library. Very few library staff mentioned these services and the responses were relatively-evenly spread across the three positions. Given the interest demonstrated by library staff in developing services to mobile devices, and the fact that participants had not been asked what *current* services could be delivered within a mobile environment, the question must be raised as to whether there were underlying factors which could explain the cautious approach and why more were not looking well into the future of library and information work and considering the potential shape of service delivery

Possible factors to explain the lack of future-scanning focus of service delivery were supplied by several staff, two of which identify barriers to effective service delivery and require further investigation. Firstly, the need to determine exactly what library users wanted, not what library staff thought they wanted, was commented on. The opinion that the approach to implementing mobile library services should commence with an understanding of the user experience and expectations is revealed clearly in the following examples:

> I think you need to focus on how are people using mobile technologies and what do they want from them? I suspect the catalogue is going to be of minimal interest to an awful lot of our students and it would just be a waste of time to develop that [L1],

> We might need to find out what technology the students are using and how they would like to interact with the library. This is something that is missing from the whole approach [E3].

This finding supports Booth's survey of Ohio University students and her conclusions that academic librarians should build an awareness of their local student culture in order to determine how and where best to offer social technologies. Booth cites the contextual unpredictability of new technologies as a warning to planners to ignore local conditions at their cost (Booth, 2009, p. 103), while Lippincott (2010, p. 212) identifies the challenge for academic libraries to create compelling service tailored to the needs of their user community. Lippincott (2008a, p. 2) also recommends that libraries firstly clarify the meaning of 'mobile library users' in the context of their campus. A number of other studies have focused on the need to collect evidence of user demand for mobile delivery (Cummings et al., 2010; Spires, 2008; Wilson & McCarthy, 2010; Yee, 2012). Including such an approach and acknowledging the importance of student feedback is a preliminary step to including users in the future design of library services. This is a path that VET library staff have yet to feel

confident in progressing down, given only two of the 42 staff acknowledged its relevance to effective service design.

Another factor that may explain the cautious approach to moving into the mobile environment is difficulties with information technology support. Several staff revealed frustrations with technology and their information technology units, claiming:

> There is an on-going battle with ITS to shift away from desktop PCs. A survey has revealed the majority of students are moving to Netbooks and iPads, and moving away from PCs … A simple authentic process is needed for wireless, We had discussion with IT earlier to simplify the wireless login process, most students are not interested in the login process but just want to connect to the internet, without all their file drives. Now they want to only have one step to log on to wireless, rather than ten [N1],

> We have tried e-books three times unsuccessfully. eBrary – there were connection issues; EBL- there were problems with single login not being available. Computer Services are not up with the play [H1],

> Authentication of online resources, particularly the databases, are [*sic*] being looked at. The current IP doesn't allow proper authentication, the students have needed passwords … We have had student feedback in the past regarding problems with passwords, it is a frustrating situation. In this day and age they don't expect to have to do this [I1].

While the issue of authentication is not unique to mobile technology, one of the great promotional aspects of this technology is its ability to be used 'anytime, anywhere, anyhow'. Organisational factors such as technical problems frequently lie outside the library's ability to resolve, but strengthen the advantages to be gained from a measured approach to innovative mobile service development. Library staff also indicated the importance of units within institutions working collaboratively together to address issues of common concern. This significant individual and organisational development is discussed later in Section 6.8 when the evolution of working relationships is examined.

6.5 Comparison of Staff and Student Awareness of Library Services

Knowledge of user behaviour has been identified as crucially defining the effective delivery of services. In examining VET library staff and student opinions on similar aspects of library

service a comparison of perceptions could be made. Previous studies have revealed an element of pragmatism amongst student library users that library planners are well advised to consider. Across the British and American higher education (HE) sectors students appear to be interested in mobile library services only when they perceive a need and immediate benefit (Callaghan, Lea, Charlton, & Whittlesea, 2008; Cummings et al., 2010; Library Journal, & Patron Profiles, 2012; Sheikh & Mills, 2012).

The present research found similar reserve. VET students used their web-enabled cell phones to visit the library website, use the library catalogue and online e-journal databases for research and assignments and manage their borrower details. Library staff had already commented on this behavioural change in the category 'Students are using mobile devices for information access'. However, the findings also revealed students displayed a marked preference for using their cell phones for social purposes, such as texting (73.5% at least daily), and calling (49.3% at least daily). This type of use far exceeded library-related use. An understanding of this sort of student behaviour with mobile technologies is necessary to guide staff in the types of mobile services they direct resourcing into. Not all library staff were keen that the library should use this knowledge to rush blindly into the social space and attempt to engage with students in their own territory. Caution was sounded by a library manager who warned against the library appearing "try hard" through invading student space when they clearly weren't wanted. This opinion was corroborated by a couple of staff indicating that their library had a presence on FaceBook but no-one used it, with the usage of blogs for library news dropping off considerably by the students [B2, D1].

Overall, students displayed strong awareness of the services their library was offering, their responses closely matching library staff indications of the services being offered. They were not interested in add-on type services such as checking campus/library maps, checking library hours, receiving RSS feeds, reading library news, booking library training sessions or contacting the online "Ask a Librarian" service. This should sound a warning to library staff. If, from the 17 services currently listed as being offered by the VET libraries, only three were being used by students, with the other 14 identified as never being used, then it is reasonable to question why resources were being channelled into their development, delivery and maintenance. Likewise, it is useful for staff to be aware of students demonstrating preference for using their mobile devices for social activities, such as text and instant messaging, talking, emailing and using an internet search engine, and actively differentiating between study-related use and social use. These findings constitute part of the organisational aspects impacting upon mobile technology development and will challenge VET libraries to

ensure the student stakeholder voice is included in planning for mobile service delivery and services are well promoted.

Students were actively using the library. The majority visited the library at least weekly (87.1%), with 32.5% doing so daily. Only 3.9% of the sample stated they had never physically visited the library; these students may have been accessing library services online instead. Library staff had uniformly commented on observed consequences, of changes in the student library experience since the implementation of new technologies. Nearly half noted an increase in students bringing in their own laptops, and over a quarter perceived students both being positive about wireless availability and also being more digitally-oriented. These changes were regarded as overt manifestations of student engagement with mobile technologies. The findings reveal that library staff perceived students actively engaging with mobile devices and using these within the context of the library environment, and that there is a relationship between the two events of technology introduction and changed student behaviour. The comments from the students about using their mobile devices for social activities tends to contradict staff perceptions and would require clarification through actively gaining feedback from student users.

VET students indicated awareness of some of the technologies being deployed in their libraries and used those services and resources that had immediate bearing upon their studies, such as the website, online catalogue and databases and receiving text messages for reserved items. Generally, students were positive about technology in the library and expressed this view to library staff. They were happy to use technologies that allowed them greater control over their learning experience, such as self-issue, wi-fi, online reservations.

The feedback students provided directly to library staff was in a positive vein and staff were able to report:

> We have had some positive comments about the website and interactive map [A2],
>
> We can get feedback from the students and they feel the Library is responsive to them [F1].

The introduction of technology-managed processes appears to have increased the speed and efficiency of service delivery, which had evoked a favourable response from students. Developments such as text messaging a requested item's availability had resulted in prompter student response and item turnover, a situation regarded positively by both students

and library staff. The ability for students to take greater control over their library activities had also been received favourably, according to the staff. They reported students had expressed appreciation of self-check machines, being able to bring their own mobile devices into the library, and having the ability to make their own reservations and bookings online, for example:

> A lot of students are happy to do things themselves. They are happy to have new technologies to allow them to get on with their studies. They like having SMS and email notices, being able to login to their own accounts and make reservations, bookings etc. themselves. There is a high take up of these services [I2],

> We survey students twice a year. We have noticed they seem to have been very positive about self-service and the introduction of the Resource Locator, where they can find things for themselves [K1].

As noted above, some of these findings contradict the students' responses in the online questionnaire, where they expressed interest in using mobile services such as the library catalogue, online databases, and some borrower-related SMS services but very little else. Discrepancies that arise between what students were relating directly to staff and the responses they provided in the self-directed, online questionnaire may be the result of their not appreciating the full availability of services.

When questioned about using library services if they were available for mobile devices, students were interested in undertaking the sorts of activities they were already engaged in, such as borrowing library resources, doing research for an assignment, searching the catalogue, renewing books and viewing their own borrower details. Such response suggests that students are not associating the learning potential of their cell phones with library services. Of the 17 services listed for students to consider accessing by mobile device, they were likely to use only six (Figure 5.9). Of the six services students expressed an interest in, five had been mentioned by library staff as being suitable for offering within a mobile environment. On the other hand, of the seven services students expressed no interest in accessing via mobile device, all had been identified by library staff as being suitable to be offered. Again, this type of disconnect of understanding highlights the requirement for library staff to survey their students prior to proceeding with developing mobile services. It should also serve as a recommendation for staff to promote library services effectively and to engage users at all stages of their development.

Students were keen to receive renewal, overdue and recall notifications via text/SMS. This was corroborated by library staff who had noted students' preference in receiving text messaging when assessing the changes in student behaviour following the introduction of new technologies. The benefits of greater speed, in some cases an immediate response, and turnover of resources had been noted by staff as a positive outcome of generating text/SMS notices. This observation supported comments in the final section of the online survey where students had responded to the sorts of mobile services and resources they would find useful. More had identified circulation services such as date due reminders and renewals than any other type of service or resource. The implementation of such services might be considered small but effective steps in the move into mobile library service delivery.

Students expressed a preference, if using a mobile device for starting a research assignment, for beginning their search with Google. They would then move to Google Scholar for assistance. Only at that point would students either ask their instructor for assistance or use the library catalogue. This information retrieval behaviour was remarked on by several library staff in the category 'Library needs to offer services in the spaces familiar to students, e.g. Facebook'. Moving into online spaces where students congregate was identified as an area to treat cautiously by at least one library manager and the students themselves gave no indication that they wished library services and resources to be made available through their social networking sites. Attempts to establish library blogs and wikis had met with disappointing results, and in this reluctance VET students displayed similarities with their counterparts at other institutions (Booth, 2009; Cummings et al., 2010). Lack of awareness of library services and innovations by students may have been an influencing factor in their reluctant engagement. If this is the case, use of the library catalogue or other library resources in the mobile environment might be increased through targeted promotion to students or website redesign. Once again, gaining student feedback through discussions or surveys should be considered a starting point.

A positive result for staff participants of the perceived alteration in user activity was a belief that the student view of the library had changed, illustrated in comments such as "Views of the library have changed; it is no longer just a place of books, it is now computers, wireless, you can access the internet for free" [A3] and "We have had some positive comments about the website and interactive map. People have found that useful [A2]. There is strong likelihood that this altered student perception of library services had impacted upon how library staff perceived the implementation of technologies and their need to up-skill in the use of these technologies. Service orientation was a dominant theme underlying staff responses throughout the survey and an association may be made, and offer opportunities for

future investigation, that an organisational factor such as favourable library user behaviour will positively influence staff response towards technology adoption.

6.6 Skills, Knowledge and Competencies Required to Develop and Deliver Mobile Technology Services

One of the assumptions that initiated the present investigation was that library staff lacking confidence and competence in the use of mobile technologies would be unlikely to develop or deliver mobile services. Understanding the skills and competencies required by VET sector library staff is a foundation stone for any planned professional development to build staff capability. As will be explained in the following sections, the impact of mobile technologies upon participants was the acknowledgement that the generation of new technical and service-related content was required; an understanding that feeds into the abstract component illustrated in the theoretical model of new knowledge.

6.6.1 Skills Required to Work Effectively in the Mobile Technology Environment

Three factors emerged as important skills, competencies and knowledge required by library staff to work effectively in mobile technology environments. These were technology immersion, attitude and knowledge of patron behaviour. Technology immersion, that is the practical mastery of handheld devices, was regarded as crucial. Nearly half the sample suggested that their employer should provide a range of mobile devices and allow staff access to these devices during work time to enable experimentation with features and functionalities, even to allow them to take the devices home. Lack of familiarity with any handheld devices was seen as a risk to library staff being able to work effectively in the mobile environment. A number of library staff participants believed they could not assist students with mobile devices if they lacked familiarity. It was felt that:

> They could provide all the tools for the students to use and the staff could have no part of that and it would work. But it would work the best if the staff were up-skilled as the users of the devices [F3].

This belief supported staff opinions of changing student experiences in the mobile environment. It was commented on that students increasingly expected library staff to assist them with the technology they were using and, moreover, that they did not differentiate between information or technology requirements, “They expect more of library staff in the technology they are trying to use” [I2]. Participants were very aware of the need to

demonstrate technology competency, in addition to their traditional information management knowledge, in order to provide responsive service.

The concern that library staff were not familiar with mobile devices repeatedly emerged, evident in comments such as:

> Even our most IT-type person in library is not familiar with mobile devices, he does not want to put his hand up because he doesn't know anything about mobile devices [L3].

This is interesting given participants' self-assessed level of mobile technology competency which indicated all 42 staff used cell phones. There is the possibility that staff used mobile phones for private use but did not relate this knowledge to the workplace or else they held the belief that students were using more sophisticated technology that would challenge the depth of knowledge possessed by basic cell phone users. Concern was expressed that:

> Some of the older library staff have never used smart phones, We need to give hands-on experience if they have not used some of these devices in their personal life [K1].

Overall, of the staff skills and knowledge required, competence with technology received emphasis. Aspects such as IT skills, operating systems knowledge, compatibility issues, skills in programming and multimedia, knowledge of internet communication styles, setting up library applications were also discussed. Staff focused quite specifically on the skills they felt they did not possess and would require if they were to cope with mobile technologies. In many cases, a high level of competency was not considered to be required "You don't need to be highly skilled with programming, but able to identify a need and then find a technology to meet that need and then learning from that" [G3] but, in general, VET library staff appeared to equate working effectively in the mobile environment with relatively advanced technology competency. Their comments also indicated that level of technology knowledge and skills was the area in which they required most assistance.

The researcher earlier defined attitude as a disposition towards an event, an object or a person, but attitude was also seen in an individual's positive or negative evaluation of the effect of a particular behaviour. It emerged as the most important skill factor for staff to possess. The importance of attitude in technology acceptance has been noted in a number of previous studies (Fishbein & Azjen, 1977; Lapczynski & Calloway, 2006; McDonald et al.,

2009; Parayitam, Desai, Desai, & Eason, 2010; Rabina & Walczyk, 2007; Venkatesh & Davis, 2000), a positive attitude to technology implementation was evident in nearly half the staff sample interviewed. This emerged in statements by staff who felt they could more readily assist student queries, that they were gaining useful knowledge in IT, their jobs were being made easier, they were pioneers or at the forefront of technology within their institution, and were keen to demonstrate this to students, for example, "I think my colleagues are taking things on board and are excited, amazed about them. ... I feel more fulfilled being able to assist the distance students. We feel that we are not stagnant, we are moving ahead, learning" [H3]. Despite a note of caution being offered by Cunningham (2010, p. 225) that technology does not make life easier for librarians, rather it creates an easier experience for library users, the positive attitude which emerged in this study has been found in previous investigations (de Veer & Francke, 2010; Rizzuto, 2011; Yen, Wu, Cheng, & Huang, 2010), which lends support to the belief exhibited by VET library staff that using technologies effectively can lead to better service provision.

Adaptability and a willingness to try things out were considered crucial to developing skills and knowledge in the mobile environment. Attitude was considered to affect the ability to extend existing services and competencies into the mobile environment. Staff spoke of the need for curiosity, keenness, and experimentation, and felt that:

> The skills area is easily taught, this is not a problem. More important is interest, enthusiasm; the ability to embrace change and curiosity about new technology, how the tools can be used. If the interest, passion and curiosity is there, then the skills and the usefulness will follow [D1].

All three positions saw the need for curiosity and considered state of mind as being more important than skill acquisition. No differentiation was made regarding length of tenure, age of staff (only one library manager mentioned problems with older library staff lacking interest in adopting new technologies and embracing change), position within the library, and contact with patrons. Age, as a factor in technology acceptance, has been widely studied (Akman & Mishra, 2010; Morris & Venkatesh, 2000; O'Brien, Rogers, & Fisk, 2012) with findings strongly acknowledging that older employees react more positively to implementation of IT initiatives than their younger counterparts, contradicting conventional beliefs that older adults resist IT innovation (Rizzuto, 2011). The present research corroborated these findings with VET sector library staff, the majority of whom were of longer tenure, demonstrating a positive attitude towards technology implementation.

In noting ambivalence towards technology changes, it was library managers, in particular, who commented on this, noting the following:

> Satisfaction is not uniform across the staff. It is affecting different people in different ways [F1],
>
> Some of them love it and are hungry for it, they are prepared to do the training and are out there. Others bury their heads and don't want to know anything about it, they are just riding their time out [G1],
>
> All found it challenging, some in a very positive way. It has given them new things to work with, new ways to provide service and to get more satisfaction out of their work, others are more negative, it is something new to learn and "I'll never manage that" [I1].

These comments reinforce the earlier theme that some staff are keen to lead while others preferred to follow and it is a situation that managers, perhaps owing to the nature and focus of their role, are more acutely aware of. One library manager mentioned the tension between the old and the new. Other staff raised concerns about the shifting balance they perceived in relation to the future focus of what it meant to be a librarian, illustrated in the comment "We feel like there is a real trade off-between people who have the technical skills and people who have got other sort of content expertise skills" [L2].

Library staff perceived the mobile environment as another evolutionary stage in the changes that had been taking place for many years in the library profession. As one librarian remarked:

> A lot of current skills they already have, they just need to become familiar with the technology, the devices. It is just another iteration of what happens with libraries, nothing ever stays the same [J3].

This belief that librarians possess the fundamental competencies required to fulfil their role within changing environments, including the ability to link new technologies with new opportunities, was consistent across all positions and all lengths of service tenure.

Knowledge of patron behaviour was another important factor identified by library staff as enabling effective work in the mobile technology environment. Participants from the three

position types believed that effective service meant being able to anticipate the technology-related questions students would be asking, having a working knowledge of the devices they were using and being able to assist when approached for help. This was described by several staff as providing basic troubleshooting. A change in traditional service provision focus was noted by several staff who identified the need to be able to think in a different way in order to provide relevant service. They felt that the goal of customer focus should include flexibility and acceptance that the learning styles and technology attitudes of their student cohort were changing, "Skills that staff need are different from what was needed five years ago; we have to be in the student space, anticipate what the students are going to use" [N1]. This view has been corroborated by other researchers investigating the implications of mobile devices for library services (Carlucci Thomas, 2010; Cummings et al., 2010; Foster & Evans, 2008; Lippincott, 2010; Paterson & Low, 2011; Wilson & McCarthy, 2010) and several have articulated the need for libraries to establish a staff and student profile specific to their institution (Booth, 2009; Lippincott, 2008a). There appears to be common acceptance across the research that the mobile segment of the library user group, while still relatively small, will continue to grow, both in size and importance, and the devices they are using will increase in sophistication and capacity.

The ability to assess the library's contribution to the development of the mobile environment featured as a necessary skill. An earlier study on libraries and mobile users challenged libraries to be very involved, not only at internal library level but also at an institutional level in examining issues relating to mobile content, services and users (Lippincott, 2008a). This requires consideration of wider, organisational implications and the ability to identify the library's role and contribution to strategic policy making. It emerged as an important component of the knowledge and competencies required of library staff and was identified by one of the library managers, who expressed the need for higher level planning to study trends and collaborate with users to determine the future look of the library, mentioning:

> A lot of planning is needed, environmental scanning and understanding upcoming trends - collaboration and communication with users and others. How do users want to use information and engage with library services? Learning to love ubiquity [F1].

Library staff were very aware of the need to harness the potential of mobile technologies to realise the benefits available. They displayed concern for a wide range of skills and competencies, some of which were very technical and specialised in nature and others that more evolutionary in nature, building upon existing competencies and translating them in new ways. Overall, attitude was seen as crucial. A willingness to try things out and to

experiment, a sense of curiosity, in other words, a state of mind rather than a skill emerged as a key attribute, supporting the findings of the technology acceptance studies discussed in Chapter Three. The Technology Acceptance Model (TAM) proposed by Davis et al. (1989) has been used in a number of studies to determine the importance of attitude, concluding that when perceived usefulness of a technology occurred, it positively influenced attitude.

6.6.2 Skills Required to Respond to the Changing Environment

The ubiquity, power and adaptability of the variety of technologies libraries use to drive operations provide opportunities for interconnectedness on a scale hitherto unrealisable. Technology is forcing consideration of optimised information delivery, streamlined work methods, networking and interrelationships and heightened user expectations. This carries costs as well as challenges (Cunningham, 2010), not least of which is moving the human element of technology change into primary focus (Chu, 2012). Increasingly, librarians are being urged to understand the trends in mobile use, incorporate that knowledge into professional skill sets and engage with user technology expectations and preferences (Cartwright et al., 2012; Greenall, 2010; Walsh & Godwin, 2012). The current investigation supported these studies in demonstrating that the impact of technology implementation raised strong awareness amongst library staff of the need to acquire skills to realise the associated benefits.

The impact of new knowledge resulted in staff identifying how they would best acquire the capabilities to address technical, management and adaptability issues. The need to up-skill was identified as the most crucial outcome of technology implementation by 40.5% of staff across all three positions. Despite this strong awareness, the comments offered by participants suggested that despite substantial technological implementation and advancements occurring during the past two years, libraries that had implemented new technologies had not adequately prepared their staff through professional development or workplace learning activities prior to implementation. Such a situation is commonly reported across the global education environment where failure to incorporate technology training into planning or preparation has been presented as a barrier or limitation to effective practice (Drent & Meelissen, 2008; Krysa, 1998; Russell, Bebell, O'Dwyer, & O'Connor, 2003; Thompson, Schmidt, & Davis, 2003; Tondeur, van Braak, Sang, Voogt, Fisser, & Ottenbreit-Leftwich, 2012). What emerged from the comments of participants is that those staff with an interest in technology appeared to have taught themselves skills and acquired knowledge while others had held back. This was demonstrated by the categories ‘Some staff are keen to lead, others prefer to follow’ and ‘Some staff experiment with technology’. Responses such as:

> some staff are really motivated to learn, others are a bit apprehensive about taking on new technologies [I2],
>
> some people are really excited about it and are embracing the thing, they are very keen and see the benefit, others say why bother [N2]

illustrate the divide between the early enthusiasts and staff who are more hesitant. Previous studies have demonstrated this situation to be common across a range of workplace and social environments (Aldunate & Nussbaum, 2013; Muduganti, Sogani, & Hexmoor, 2005; Porter & Donthu, 2006; Rabina & Walczyk, 2007), and this phenomenon is at the core of Rogers' (1962) Diffusion of Innovations (DOI) theory.

The advantages of effective use of technologies came through strongly in the category 'Better service provision'. There is clear evidence that library staff saw the benefits of technology first and foremost in terms of direct benefits to student library users; commenting, for example:

> It makes it more flexible. We can operate outside the physical library, we can reach more audience, with SMS [F2],
>
> Information is getting to students easier and quicker. Less library staff are involved in getting information out; it is an instant, easy way of communicating [F3].

Some participants also revealed there had been 'Little impact' upon the work environment and offered several possibilities as to why their workplace had not been affected. Firstly, in a number of cases, participants reported limited introduction of new technologies within their libraries with staff being unaware of any differences in their working environment. Secondly, the suggestion of quick technology adoptions being rapidly integrated into practice, and thus becoming standard work, also emerged. Both cases indicate incremental introduction of technology and absorption into routines rather than a reaction triggered by dramatic arrival. Previous research supports the argument that the decision to adopt does not occur at a particular point but is a more extended process where adoption can metamorphose into implementation *(*Bikson & Eveland, 1991). A third possibility, although not expressed clearly, is that library management planned for the implementation of technology so well that its impact upon staff and procedures created minimal perceived impact. Given three of the six responses were from library managers (the other three were qualified librarians),

giving opinions such as “There has been a minimal impact of technologies upon our library” [J1], the scenario of limited introduction appears to be supported rather than carefully-managed implementation.

The majority of staff (90.5%) viewed the implementation of technology in their working environment as something inevitable; that the technology was there to stay and they were actively looking for ways to integrate it into their work. This is illustrated in the following comments:

> There are less manual things. Just the future of libraries in general, it is more about technology and less about books and processing [I2],

> Some have begun to think about how to incorporate technologies in their work, for example, how to include e-books in course materials and course forums that they are on, how can they answer reference enquiries differently [E1].

Systems librarians (55%) were most likely to investigate the potential of new technologies to be used in the library. When comparing this attitude to the number of new technology adoptions that had taken place during the previous 24 months, this approach is not surprising. It demonstrates awareness of the changing environment and staff willingness to incorporate technology in a tangible way into routine service provision. Staff were clear about the need to up-skill, to maintain the outward focus on user needs, to consider the delivery of services not previously possible, to utilise the expertise of their colleagues in new collaborative ways, and to commit to innovation and change. This approach is consistent with other studies investigating staff response to technology-related change (Chu, 2012; Cunningham, 2010; Hastings, 2007; Michalak, 2012: Missingham & York, 2011).

The workload issue appeared in the theme ‘Regard it as additional work’ and may be an influencing factor where lack of enthusiasm had been detected. Three library managers referred to the workload issue “It is also a huge extra workload on top of the workload they already have” [M1] and a systems librarian mentioned that senior management were monitoring workloads. A library manager expressed her own concern and ambivalence regarding workload and time management, “It is slightly more towards giving people time to experiment. I would like to encourage this more, but some don't see it as an appropriate use of their time” [C1]. This concern is not unique to library staff. Workload issues, including time allocation, have been identified across the education sector as a barrier to adoption (Bhati et al.,2010; Burnett & Meadmore, 2002; Carlucci Thomas, 2010; Kukulska-Hulme,

2012; Jasinski, 2007; McDonald et al., 2009; Walsh, 2008; WebJunction, 2009). Some of the more negative comments by participants appear to have as their basis the issue of work overload. These comments were expressed in terms of technology causing staffing reduction with remaining staff needing to do more, inadequate resourcing, lack of technology availability, and technology problems taking up extra time to resolve. While the impact of workload upon technology adoption or service delivery has not been explored in this study, it is a crucial factor that could benefit from future research.

Frustration resulting from technology not working was associated with a negative attitude towards technology implementation. Staff revealed concerns such as:

> There are more things to go wrong now, there are glitches in technology and this brings in an extra element of stress [J3],

> If the technology is not working, staff feel stressed [N3].

The opinion that technology was not part of traditional library work, that role slippage was occurring, with comments such as “The negative, dealing with attitudes such as “This is technology and it is not our job to deal with this”, "I don't have time to deal with this”” [B3], indicating underlying resentment and a sense of overwork. Staff discussed their perceptions of colleagues facing challenges of uncertainty about the future. The fear of being replaced by technology was raised, for example:

> Some may feel threatened by things becoming too automated, for example. self-check and RFID. They fear new technology may make them redundant [N1],

with additional anxiety relating to feeling threatened by the unknown being expressed as:

> They feel quite threatened by the new technology because they are not familiar with it and they honestly don’t want to invest the time and effort into learning about new IT developments [J1].

Concerns associated with poorly-planned change are evident in these comments. The concerns being articulated express rejection rather than scepticism, the “laggard” category proposed by innovation diffusion scholars. While laggards tend to be “suspicious of innovations and of change agents” (Rogers, 2003, p. 284), there may be very obvious reasons for their reluctance. For example, when participants discussed the impact of the new

technologies upon staff, many implied through their responses that the change had not been well prepared for or implemented. They described a situation of response rather than careful planning, with comments such as:

> A lot of the library staff are more comfortable just giving things a go, whereas a lot of others are not and don't understand how this works and don’t see it as a major responsibility [C2].

Inadequate planning is a management issue. The importance of organisational management providing a lead in setting both the tone and expectations around technology implementation was expressed by three library managers. All three had mentioned resistance from staff to some of the technology adoptions during the past several years and emphasised the importance of those in positions of managerial authority clearly setting out future technology directions to staff. They expressed the belief that:

> Our library manager can see that the future of libraries is seen as encompassing technology otherwise if we don’t move forward into that we will become a dinosaur and die [I1],

> But we do have a new manager who has come in place and she has made it quite clear that new technological developments will be very much a part of their future [J1],

> Management need to relook at the job and the tasks the staff need to do. Perhaps they need to look at removing things they no longer need to do. This is usually done when there have been staff cuts but we may need to do it when have additional or new technologies are coming in [M1].

It would be simplistic to state that the investigation revealed that some staff embraced technology change while others didn’t. The situation contained complexities involving a range of personal attributes such as technology innovators versus sceptics or late adopters. Library/organisational level factors such as technology not working properly or simply not available to staff, increased workload and decreased staffing levels, change fatigue and technology anxiety also came into play. Many of these factors are operational and able to be addressed by good management practice. Attitude is also a factor that can be influenced by good planning. Some staff considered age or length of tenure played a role in disinterest while others indicated that once staff were familiar with technology they became

enthusiastic. Anxiety in regard to the future and uncertainties around the concept of librarianship was reported, but there was also evidence of excitement in regard to the future, pride in demonstrating innovative, responsive service, and a belief that staff technology competency provided very tangible benefits for the students. It might have been anticipated that focus on specific technical knowledge, awareness of best practice or industry standards or even knowledge of particular devices would be considered crucial competencies. In fact, as illustrated above through the words of the participants, the skills, competencies and knowledge staff believed were critical to developing and delivering mobile technology library services were attitude, practical hands-on experimentation and environmental scanning, including knowledge of patron behaviour .

6.7 On-the-Job Training Required to Acquire the Skills, Knowledge and Competencies for Effective Mobile Technology Service Delivery

Having established the sorts of new knowledge and competencies required for working effectively in the mobile technologies environment, VET sector library staff then examined the best methods to identify gaps between their existing knowledge and skill levels and the consequent training they believed would be required.

The findings contribute towards the second and third objectives of the present investigation which were to examine areas of competency deficiencies and to determine the most effective means of ensuring library staff engaged in mobile delivery received opportunities for professional development and workplace learning programmes and activities.

6.7.1 Ascertaining Professional Development Requirements

The impact of developing various techniques to work effectively in the mobile environment required a linkage between the new content required and the best manner of acquiring it. Participants responded by identifying a range of internal, organisational and external opportunities. Staff participants showed a preference for simple, direct methods of determining skills gaps. Almost half the sample of 42 staff indicated a survey would be the best way to obtain the information. The survey method was more popular with qualified librarians than with either library managers or systems librarians. The next preferred method was to ask staff. This method was supplemented through holding general conversations with staff to pick up gaps in competence and by library managers initiating individual discussions with staff regarding training opportunities. A range of survey methods was suggested to collect information and it appeared that no specific mobile technologies surveys had been undertaken either of library staff, or of academic staff and students in the libraries involved in the study. One library manager suggested a comprehensive approach to gauging staff

competencies, recommending managers run both pre-and post-implementation surveys, to enable them to:

> Survey staff competence before and after the introduction of new technologies. Managers don't have a clear idea of staff skill levels regarding information technologies, if the level it is at is appropriate to meet the business needs of the organisation. More attention is required to surveying staff capabilities, testing staff capabilities, raising staff capabilities and then testing again [F1].

This type of approach enables the collection and analysis of longitudinal data. It provides management, facilitators and the institution with a clearer picture of the professional development cycle. It would also serve as a useful tool for engaging staff in a programme of competency acquisition; a more proactive approach, rather than the reactionary, ad hoc situation so many staff described existing in their specific organisations.

When asking the staff directly about their professional development needs, two approaches were recommended. Firstly, questioning the staff about how or whether they were using mobile devices would elicit a baseline of use and/or competency and enable assessment to be made regarding training focus. The second approach was to ask staff for their technology competency self-assessment "Ask them what skills they thought were needed. They would probably come up with something different from what I had" [L3]; an inclusive approach which encouraged self–awareness and reflection and put the library staff member at the centre of the competencies assessment process. Participants indicated that sitting down with staff members and asking them what competencies and training they believed they required could be undertaken informally within the individual work area. Other, more formal activities staff recommended consisted of conducting online surveys able to capture, analyse and report on data.

When comparing types of assessment methods, qualified librarians showed greater preference for methods such as using mentors, getting the e-learning unit to run the gap assessment, examining examples of good use, and the provision of a technology skills checklist. These participants believed the best training took place in a face-to-face situation using mentors both known and available to staff as required. This finding supports those in the NeXus report discussed in Chapter Two that showed 43% of the TAFE libraries surveyed supported internal mentoring programmes (Hallam, 2009, p. 88). Library managers took a slightly different approach. They expressed preference for methods such as mapping competencies to job descriptions and key performance indicators (KPIs), in-house

workshops, an annual performance review, a multi-year professional development plan, the manager observing and identifying competencies and needs and, finally, modification of either the institutional professional development plan or a national technology competency standards guideline. Systems librarians favoured technology showcases, innovators determining the gaps, and staff self-analysis. These slightly different approaches to the same issue suggest that position within the library may influence preferences for establishing baseline data. The findings also extend existing knowledge relating the influence of position within an organisation upon professional development delivery.

A warning was raised against making assumptions regarding staff knowledge and competencies, with one staff member noting "When we did 23 Things four years ago, it was really interesting to see that those who were expected to know actually didn't, others less experienced really took to it" [J2]. This sentiment was echoed by a library manager, annoyed at assumptions being made that levels of technology-related knowledge were very low amongst her staff, with training consequently being offered to all staff, regardless of how technologically-competent they might have been. Examples of this nature, where assumptions have clouded the true situation, provide further support for the preference shown by the respondents for gathering the information directly from staff in order to identify gaps between required and current knowledge and skills.

6.7.2 Workplace Training Requirements and Delivery

The following section feeds into the abstract component of capability development in the theoretical model illustrated above. The dual impacts of training and delivery methods were responded to by participants through identifying technical, service delivery or particular competency needs allied with the conduct of informal and formalised delivery methods. Having access to technology for hands-on training was the preferred method of training delivery for half the staff sample interviewed. They repeatedly extoled the benefits of an explorative approach, which included the allocation of time to learn and experiment. The use of PowerPoint as an instructional tool was inveighed against, with a number of staff making comments such as:

> There is no point having a PowerPoint up on how to use mobile phones or an iPad. We need access to the technology so everyone can use it and experiment [D3].

VET library staff clearly expressed the wish to be at the centre of experiential learning rather than being passive learners. Such preference may be linked back to the positive attitude demonstrated by staff, and their belief that the new technology offered tangible benefits

which affected their attitude towards training. Service length did not appear to influence this attitude. Staff with both greater and lesser service lengths expressed preference for hands-on training, assisted at point of need by a more experienced colleague. When assessing the preference by position, little difference emerged. From these findings it may be stated with confidence that, offered a range of training options, staff will display a preference for on-the-job, hands-on experimentation with technology, regardless of position or length of experience.

As highlighted in Chapter Five, the training requirements identified by staff illustrate the strong link they were making between the availability of physical access to mobile devices and the resulting impact upon adoption of these devices into working practice and their subsequent use. When identifying the training they required in the workplace, library staff considered hands-on working with a range of mobile devices as a first priority. This training requirement supports the opinion provided by staff that competence in using different mobile devices was the most important skill to acquire in order to work effectively in the mobile technology environment. It further demonstrates the importance participants placed upon having physical access to new technologies and comprises several components. Firstly, staff indicated their interest and ability to learn new technologies themselves, and that the learning should occur in-house without the need for external intervention. Secondly, staff re-emphasised the need for time to experiment with the devices, offering comments such as:

> Need time to play with the device and see how the functions work [D3],

> Training with a mobile device. Ideally hands-on training with a range of devices, to gain familiarity with what a mobile device is, and what library patrons are using [E2].

Hands-on training, which places the learner at the centre of the skills development paradigm, is a method well-established in the research into effective training models (Kukulska-Hulme & Pettit, 2008; Lefoe & Olney, 2007; Lefoe, Olney, & Herrington**,** 2008; Olney & Lefoe, 2007). The position types which believed this training to be preferable were five library managers, three systems librarians and five qualified librarians. The lesser preference shown by systems librarians for hands-on learning may have two explanations. Firstly, systems librarians are the position most likely to have early access to technology and already to possess familiarity through their own hands-on experimentation. Secondly, they may have been aware that expectations of any unofficial assistance or training of colleagues would, most likely, fall upon them.

The preference for the hands-on training approach continued with the suggestion for training on using e-book readers. This training need supports the inclusion of, or intention to include, e-book readers in service delivery and also the stated required knowledge of what students are using, as discussed earlier. Staff regarded the practical training approach as something they should be attempting themselves but with training from experts, such as their flexible learning team.

The requirement for time to experiment with the equipment and software emerged repeatedly from participants' comments and reflects concerns identified in the previous research discussed in Chapter Two (Chesemore et al., 2006; Gannon-Cook et al., 2009; Jasinski, 2007; Summers-Morrow, 2008). Staff spoke of being able to experiment at their own pace, away from usual workplace disruptions, with time to explore the potential of the devices and offered comments such as:

> Training on how an e-book works and how to download the programmes for it. Need time to play with the device and see how the functions work [D3].

Service delivery and the need to be able to assist students with use of the reader, downloading e-books and licencing issues emerged as motivators for this training need. Again, the positions which identified this training displayed a similar pattern to the hands-on range of devices: they were four library managers, one systems librarian and four qualified librarians. Possible reasons for this pattern of training priority is the direct contact qualified librarians have with students as part of their role and being aware of the types of questions students presented at the service desk or in library training sessions. Library managers' comments in relation to training on e-book readers focused on services they believed students were expecting of the library and ensuring staff were capable of meeting this need. The systems librarian's comment related to technical issues associated with using an e-book reader. As systems librarians are less likely to have a training role with students, it is possible this resulted in a lack of concern for such type of training requirement.

Systems librarians showed more interest in specific training requirements such as web applications for iPhones and other mobile devices, wireless connectivity, programming or evaluative software relating to scripting, coding languages, comparison of different device functionality, and text editing tools. These constitute more specialised areas where systems librarians would be likely to have involvement, often in conjunction with other organisational areas such as e-learning and information technology units. In fact, such very

specific training needs were compatible with their positions within the library and neither the qualified librarians nor the managers identified these types of specialised training requirements.

Library managers believed the sorts of training staff would need related to identifying requirements at an institutional level for developing mobile services, for example, "Overview of how we might deliver library services and resources via mobile platforms and future trends" [K1]; the use of mobile technology in education; web-based applications for iPhones, mobile devices; creating mobile-friendly web pages, and applying social media in library and educational contexts. Qualified librarians took a more pragmatic approach to training needs and were concerned that training should match what was planned for delivery. They considered that training would be determined by what was being implemented, for example, "It depends on what services would be delivered, this is up in the air at the moment" [J3], while believing there was also a need for an awareness of mobile technologies, their possibilities and functionalities. This was shown through the wide spectrum of comments offered. On the one hand, a couple of qualified librarians mentioned very specific requirements such as training on developing resources in the appropriate file size, while on the other, several qualified librarians mentioned the overall lack of current training or plans to introduce mobile services.

Staff were interested in practical and immediate requirements, not in theory or generalised concepts. They showed preference for receiving training on the devices students were using or those available for loan. The conclusion may be drawn, therefore, that staff were using their understanding of the context and culture of their environment as a crucial factor in determining their requirements for on-the-job training. Staff also displayed a preference for hands-on, self-paced learning with the time commitment being factored in. Their primary interest lay in action-based, applied learning. Apart from library managers, they displayed little interest in spending time learning theoretical concepts. This finding is supported by other studies in the education sector that have identified a similar lack of interest in technology courses that were heavily focused on theoretical concepts and have seen a preference for action-based, collaborative professional communities of learning (Avalos, 2011; Goktas, Yildirim, & Yildirim, 2008; Snow-Gerono, 2005; Zuber-Skenitt, 1993).

The way in which training is delivered is an important contributor to successful acceptance of change. Studies have shown if the method of training delivery does not meet expectations, participants are unlikely to apply or even value their learning (Borko, Jacobs, & Koellner, 2010; Earley, 2010; Garet, Porter, Desimone, Birman, & Yoon, 2001). Preferred training

delivery methods discussed by the VET library staff ranged from the general, such as exploring the best solution and the technology determining training requirements, through to the specific, for example, developing videos and podcasts, creating communities of practice, including the information technology or e-learning advisors in the training, modifying existing training packages, and using tailored software or websites. The availability of training through external delivery was mentioned, particularly in relation to large projects such as new library management system implementation, although some staff suggested bringing in their peers with experience in implementing technologies from other libraries.

Some overlap appeared between the categories 'innovator-led training' and 'in-house workshops'. Continuing the theme discussed earlier relating to responding to the changing environment, some staff were keen to lead, while others preferred to follow. Various terms were applied to staff that showed early interest, including:

> Early adopters providing workshops [A1],
>
> Using advanced users to show, teach and outline the issues. I envisage a play and muck about [D1],
>
> They could have champions and who would share that knowledge with the library would be very useful [E2].

Rogers (2003, p. 283) has noted the opinion leadership status that early adopters enjoy within their local social system, with potential adopters looking to such colleagues for advice and information about an innovation. The benefit of this method, according to several participants, was that the trainer was known to the other staff, trusted as someone with required knowledge who would guide, prompt and hand-hold when necessary. Early adopters were identified by colleagues and managers and described in terms of being more technologically-skilled or capable, with the ability to share their knowledge with the less competent. This type of feature was noted by Rogers when he described early adopters as being identified by unit managers or the organisation, as possessing the ability to "decrease uncertainty about a new idea by adopting it" (Rogers, 2003, p. 283). Given that overcoming the uncertainty brought about through impacts, discussed in Section 6.1, is crucial to technology acceptance, it is unsurprising that early adopters were, *ipso facto*, also assigned the role of trainer or mentor. Several library managers mentioned they used their systems librarians to provide documentation and guidance, while others regarded their staff as having natural training abilities, such as the library manager who commented:

> Get everyone involved and have an advocate on each campus. Some people have amazing skills and the manner to implement anything and bring people in. Some people are natural in learning, implementing, documenting and can take on new things and training [M1].

The innovator-led training method linked with the mentoring theme, in which library staff indicated those staff with acquired skills would assist their less advanced colleagues "mentoring - the more experienced staff train the less experienced" [K1]. Examining the responses contributing to the in-house workshops theme, again competent library staff were seen as leading these sessions, either individually or in teams. What emerges from these responses is that hands-on learning is a two-way process, the less competent staff acquire technology skills through hands-on training, while the more advanced staff, or early adopters, acquire training skills through the same process. This is illustrated in the following comment by a qualified librarian who had been instrumental in training her colleagues:

> With the development of LibGuides, I made appointments with all the liaison librarians, they sat in the driving set and I talked them though setting up. I provided them with a template; they filled in the details [B3],

and her library manager discussing how the institution had made use of skilled staff as a training method of choice:

> We have had workshop sessions led by electronic services library or information literacy specialists or specialists from the IT department, Electronic Services Librarian, by [B3] or library specialists [B1].

In examining the impact of position type on the two categories, six library managers preferred innovator-led training as did four systems librarians and six qualified librarians. There is not a huge difference in preference by position, although, given systems librarians would expect to be more closely involved in taking on the trainer role, the fact that only four from a potential 14 preferred this method indicates this position may favour alternative delivery methods. Another method that systems librarians favoured was on-the-job training, which links closely with hands-on training on the devices, and includes:

> Real world training, adopt the devices within the library, do a demonstration, give people time with the device, give people real world examples [E2].

Complementing such methods, systems librarians indicated the suitability of the informal, self-help situation where staff could ‘give it a go’ without the need for formal structure to be placed around learning. In stepping back a bit and adopting a more strategic stance, they also felt that organisational-level decisions, such as the technology to be implemented, would determine the sort of training required. They also felt that the type of service delivery being considered would be a factor affecting selection of training techniques.

Qualified librarians demonstrated a preference for modifying existing training packages or using demonstration software or websites; creating communities of practice, either within the institution or across the profession, for a particular learning purpose; face-to-face training and the use of mentors. The following comment from a qualified librarian sums up much of the essence of the training methods comments made by VET library staff participants:

> By using skilled staff to work with unskilled. Inspire some curiosity. But first the unskilled staff need to want to do it. They need to see a purpose and have someone to help when they became stuck. If a beginner, I would want a person to train me; skilled, on call, on-the-spot support. It could be the person sitting at the desk next to me who has been using the software for two years, or someone on campus. I don't want an online session two weeks ago and nobody to follow up with. I want to be able to talk to someone on site who can explain what the problem is. You need someone who can make it simple, clear and answer a beginner's question [G3].

Immediacy of assistance at point of need was seen as important, as was a collegial approach to learning where the innovators/champions/early adopters/skilled staff guided their colleagues through the competencies acquisition process. While this training style has many features to recommend it, not least of which is cost, time and widespread impact on staff competency levels, management need to be cautious when planning to ensure the innovators do not find themselves acting as *de facto* trainers and carrying a burden they are unprepared for.

Library managers favoured the use of technology in the form of webinars and videoconference sessions, particularly in situations where a distributed campus system existed. They were also interested in bringing in external trainers from vendor companies and for large-scale implementation projects. Library managers preferred to link training methods into established organisational processes and were keen on professional development planning days being used effectively, including within mandatory staff

induction programmes. They linked training back to key performance indicators with a focus on performance outcomes, explaining:

> To measure success you would have outcomes that you want to see, you would have to set deadlines, to assess success. If what you are looking for is not happening, why? What else is happening? Could something be purchased from elsewhere? [G1].

Conference attendance, with its opportunities for professional sharing, was viewed by library managers as suited to training delivery in that staff could talk directly to vendors, try things out on their equipment and bring that knowledge back to the library.

In summary, a wide range of training methods was considered suitable by VET library staff participants for the acquisition of competencies and knowledge to work effectively in the mobile technologies environment and to deliver appropriate library services. Strong preference was demonstrated for informal, hands-on training, delivered by knowledgeable colleagues who could supply assistance when needed. A willingness to learn was also deemed a necessary factor in successful training, but staff spoke of colleagues who might have been expected to show hesitancy in accepting new technologies, in fact, exploring and acquiring the skills without problem once they had seen the benefits to be gained from such acquisition. Organisational factors that influenced training methods were the provision of time to experiment and access to devices, both considered critical features of successful workplace training delivery. The formal, organisation-wide programme of professional development or staff induction was regarded as another option for consideration.

6.8 Changing Roles and Relationships

VET library staff were asked in the final part of the interview to assess the impact of mobile service delivery upon roles, relationships and working practices. While not specifically addressing the skills and competencies required of staff, it does relate to an aspect mentioned in two of the research objectives. The first and second objectives, outlined in the chapter introduction, included the concept of effective delivery of mobile library services to students. It was seen by the researcher as useful to understand the consequences of mobile technology upon staff roles and relationships to ensure the link between competency acquisition and practical outcomes was fully explored. The theoretical model indicates that impact of change resulted in consequences such as refocused roles, collaborative relationships and a range of adopter stages. These consequences, in fact, form the new context within which participants are working and, within the theoretical model above, constitute the anticipated consequences

component of change which assists the state of dynamic equilibrium, wherein the new context becomes normalised, for the present.

Technology within higher and further education has been viewed as an enabler of redesigned, cross-functional teams based upon strategic outcomes, such as curriculum development, pedagogical paradigms, digital literacies, delivery and assessment methods. Opportunities have emerged for specialists such as e-learning designers, information technology technicians, librarians and academic staff to work collaboratively. The evolution of hybrid roles across disciplines has been noted (McDonald et al., 2009). The emergence of local experts with recognised capabilities and knowledge, such as the innovator and early adopter library staff discussed in the previous section, has resulted. One of the problems associated with this change is that "such roles may come to be expected and relied upon, often through an unwritten psychological contract" (McDonald et al., 2009, p. 28) which may, potentially, result in a mismatch between official job specifications and unofficial expectations. The authors also noted role slippage where traditional boundaries between roles have blurred and staff find themselves taking on responsibilities they may not associate with their roles. This investigation found role slippage and comments to this effect were noted earlier in Section 6.6.2.

A major aspect of role adaptation to the changing technology environment was the change to job descriptions. Staff described added dimensions and additional layers of complexity; they mentioned tweaking roles and evolution of job specifications, for example: "Job descriptions have been evolving over time, bits are being added in to jobs and job descriptions" [B3]. As noted in previous research, role slippage is associated with technological capabilities rather than the result of strategic planning around business processes (McDonald et al., 2009, p. 28) and this was raised in the present investigation by staff expecting that changes would be incorporated within an overall institutional review of employment practice, with the library aligning its service planning with institutional drivers. One library manager raised this point:

> The staff may feel the traditional services are not valued with the position role changes. We could potentially outsource traditional services and move towards newer roles around outreach to international partnerships. It would be cheaper to do and would meet the strategic direction of the institute and how is the library supporting that [N1].

Library managers commented on existing job descriptions being tweaked, the impact of technology adding a dimension to roles, and the blurring of roles, particularly in relation to

the library and the information technology units. They also mentioned undertaking job assessments when vacancies arose and stressed that the move to mobile service delivery required planning by management.

A number of systems librarians commented on role changes reflecting a staff member's technology aptitude, and the opinion was offered that the current ad hoc arrangement would eventually be formalised:

> The current roles will continue with more focus on technology, people with skills and the interest will get pulled into work then, as those people go, their positions will be assessed [G2].

Qualified librarians were divided over whether there was greater impact on front-of-house roles or on all roles. They also commented on the blurring of roles but from an internal business processes aspect:

> The division of [technical and reference services] is becoming blurred, we need to consult with others with particular skills – eLearning, multimedia. We are all very dependent on one another [N3].

Two trends in relationship dynamics resulting from the impact of technology were identified by previous research (McDonald et al., 2009). The creation of collaborative teams to deliver a specific business function and the formation of communities of practice which developed more organically from shared interests or expertise (McDonald et al., 2009, p. 29). The present research identified similar relationships, for example, the majority of staff believed one of the relationship outcomes arising from the impact of mobile delivery was the development of closer relationships with both information technology and e-learning staff. The creation of collaborative teams for a specific technology outcome was mentioned by a number of staff, for example, a systems librarian commented:

> There has been a project team, the [eLearning] team. It has involved the Learning Centre and other parts of [M] to implement the [eLearning] system [M2].

Library staff mentioned the need to ensure library involvement in a range of projects across their institutions, particularly in relation to delivery of teaching resources. Participants believed their areas of expertise had expanded and they needed to promote this development in order to make an impact upon organisational decision-making. They felt that:

> Working more in teams across the Polytechnic are having impact. Be part of functional teams undertaking non-traditional library services. The library teams need to exist and remain relevant and useful. It is expected and be essential that library staff need to collaborate with teaching staff, programme writers, learning advisors, those involved in teaching and learning and involved in creating the infrastructure for teaching and learning. We need to collaborate with all those different aspects [F1].

Responses indicated that, as part of wider organisational change, library roles were evolving and aligning more with other areas of the institution and all stressed the importance of working closely and harmoniously with e-learning units and with the academic staff, a situation noted elsewhere (Corrall, 2010). Similarly, staff spoke of the necessity to establish good working relationships with the information technology department, although many stated this had proved difficult to achieve. Reasons for these difficulties related to a difference in focus between the two areas and a history of poor relations. However, the benefits to be gained from a closer relationship were clearly felt, particularly as library staff saw their roles blurring more into information technology, evidenced in comments such as "Get the IT ... on board. It is more effective if they participate" [F2]. In regards to positions holding differing viewpoints, library managers were concerned about all relationships with other units, systems librarians were particularly interested in close relationships with the IT department and e-learning staff, and they also noted the blurring of boundaries between technology responsibilities. Qualified librarians were particularly aware of closer relationships with academic staff and were also more likely to mention problematic relationships with the information technology department. Studies in the area of relationship dynamics and collaboration within the education sector have identified similar concerns in the tensions that can occur in regard to politics, role ambiguity and conflicting agendas (Adamson & Walker, 2011; Shupe & Pung, 2011; Sun, Chen, Tseng, & Tsai, 2011).

The impact of mobile technologies upon working practices was viewed cautiously by the staff. Responses focused on a measured approach, including holding off and not rushing in, the existence of great potential needing to be explored, the process being one of continual evolution, with no substantive difference to the provision of information access being noted, and, finally, a lack of staffing causing delay in change. Several staff mentioned that altered working practices had resulted in a greater focus on service delivery and relationships with library users rather than on traditional library tasks. Staff reiterated that traditional professional concepts such as ease of information access, responsive service delivery,

provision of relevant, mediated resources, and maintenance of close relationships with library users were drivers for change to working practices. They stressed that technology might be the vehicle for change but not the driver, and their focus was on service-led rather than technology-led delivery. This view supports similar concerns raised elsewhere, that technology-driven change must take account of the interdependencies between an organisation's technology, structure and culture when considering the impact of technology on traditional working practices (Blackburn, 2011; Booth & Philip, 1998; Cabrera, Cabrera, & Barajas, 2001; Whitworth, 2012).

In summary, it can be seen the VET library staff participants considered that effective delivery of mobile services to students included the acquisition of specific technology skills and knowledge, and that a consequence of such acquisition had resulted in a refocusing of strategic priorities and an evolutionary blurring of professional role boundaries. Concern with the replacement of traditional library competencies was balanced by belief that closer collaboration with other areas of the institution benefitted the library and had resulted in improved delivery and quality of services to students.

6.9 Contribution of a Modified Theory

As the review of literature earlier in the thesis demonstrates, a range of technology acceptance or innovation diffusion theories have been developed over a number of years designed to explain the phenomenon of technology acceptance. It is of interest to compare the present theory with several of those discussed to assess whether specific features of those theories are suitable to be consolidated into a similar framework to the one developed in the present investigation. The four theories which are examined are Davis' (1989) Technology Adoption Model (TAM), Fishbein and Ajzen's (1975) Theory of Reasoned Action (TRA), Venkatesh et al.'s (2003) Unified Theory of Use and Acceptance of Technology (UTAUT) and Rogers' (1962) Diffusion of Innovations theory, all discussed earlier in the review of technology acceptance and adoption literature.

The stages proposed by Rogers (1962) in his organisational innovation process are distinct and linear in that the first two, comprising the overarching initiation phase, identify a problem and attempt to match it with an innovation, during which process a performance gap will be identified. The performance gap is the "discrepancy between the organization's expectations and its actual performance" (Rogers, 2003, p. 422). The outcome of the initiating phase is the overarching implementation phase which includes the latter three processes described above and during which the innovation is modified, becomes more widespread and is then normalised within organisational activities. Rogers' process contains

within it the potential for a modified approach through including the individual employee as a unit of analysis. For example, the agenda-setting stage could form the environmental context of the innovation process; the matching could include the individual level whereby the innovation matched with the problem is actually the generation of new knowledge by the individual. Returning to the organisational level, the restructuring phase that then occurs could include a pivotal situation in which key modification of processes or impacts occur which influence, again at the individual level, the clarifying stage, where benefits dependent on the previous two stages are realised and fed through into the final stage. Finally, once more returning to the organisational level, the routinising, or attainment of an altered state of operation that is now considered normal procedure, can be completed. The suggestion for such an interpretation of Rogers' organisational innovation process arises from the framework of the theoretical model developed through the data analysis, which follows this pattern and which has been modified to test alignment of the theories that influenced the present study.

The environmental factors of organisational innovativeness that Rogers used to distinguish organisations are partnered with Venkatesh et al.'s (2003) determinants that focus on factors external to the individual, although subject to their intrinsic beliefs - social influence and facilitating conditions. These features provide the context within which individuals operate. From this environmental context certain perceptions related to technology are present and perceived ease of use and perceived usefulness create a focus of the three models (TAM, TRA and UTAUT). These perceptions form the perception generation stage which equates to the knowledge generation component of the theoretical model developed in the present investigation. The perceptions are generated by the individual and influence intention to use a technology.

The presence of impacts performing a catalytic function upon phases throughout the process of technology acceptance is not noted in any of the models. Instead the existence of various influences relating to perception and intention has been investigated. The core category of Influence moves through individuals' attitudes towards a technology through to the improved performance and gains they believe using such a technology will deliver. The included factors of attitude and subjective norm leading to expected performance gains are explanatory terms relating to intention to use technology in the three technology acceptance models being examined. The anticipated gains to performance lead to the development of intention to use technology. The intention to use the technology influences the outcomes of actual usage and the normalisation of such technology into the workplace at the service unit or organisational level.

The pattern of influence reflects the model developed in the present study – abstract components move from organisational level through several individual level components and then return to organisational level with the outcomes of adoption and normalisation. The two variables used in the present investigation have been replaced by three of the four UTAUT moderators first investigated by Venkatesh et al. (2003) and since modified by successive researchers. The moderator of age influenced the decision to use the variable of service length in the present research, the moderator of experience resulted in the variable position being adopted, while the third moderator, voluntariness of use, while not explicitly examined in the present research, emerged as an implied aspect. The modified theory is presented below:

Modified integrated theory

***Contextual perceptions**

Organisational innovativeness

Centralisation of power

Occupational specialities

Rules & procedures

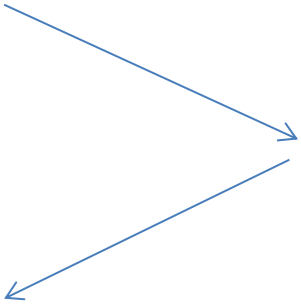
Social influence

Facilitating conditions

Perception generation

Perceived usefulness

Perceived ease of use



Influence consolidation

Attitude

Subjective norm

Performance gains

Expected Performance

Moderators

Age

Experience

Voluntariness of Use

Intention development

Intention to use/Behavioural intention

***Anticipated consequences and Dynamic equilibrium**

Adoption/use behaviour

Interconnectedness through interpersonal networks

(* Organisational level)

Figure 6.2 Comparative alignment of technology acceptance/diffusion of innovations theories

The theoretical framework can be used to identify elements of previous theories that are suitable for consolidation within a similar framework. The influence of these theories on the present investigation can be traced in the model; they could be regarded as offering a complementary view.

6.10 Reflection on Identified Limitations

Every research study carries limitations, "No study can be so thorough as to provide anything but an incomplete window of insight into your users" (Booth, 2009, p. 41), and some of these were raised in Chapter Four.

6.10.1 Sample Selection

Several limitations appeared in the approach to sample gathering. Firstly, sample selection was purposive and targeted experts in the field of library and information studies in two neighbouring countries, distinguished by strong similarities in professional culture. Such a sample, limited in its nature, can be assessed on its own characteristics which may not be applicable across a wider population. There remained a considerable pool of library staff in the VET sector who could also have contributed to the study. This situation creates the issue of whether the sample was representative of the population from which it was drawn (Babbie, 2010; Cohen et al., 2010; Denscombe, 2010; Silverman, 2010). On the other hand, saturation point, where no new themes or findings are likely to emerge with expansion of the sample, is a feature of qualitative research and influenced the decisions on size and representation in the present investigation. The decision to use a purposive sample of experts from three professional positions was believed to offer the most valuable insights and data for a limited sample size.

Within the VET library sector, only those libraries employing a minimum of ten staff were selected for participation in the study. As a result, nearly half the ITP sector libraries were eliminated. None of the TAFE libraries approached lacked the requisite staff numbers. This selection criterion was based upon the observation that those libraries with smaller staffing numbers had not, at the time of data collection, implemented mobile library services. Amongst the various factors contributing to this situation was the absence of a dedicated systems librarian position in many of these libraries. The decision to use a purposive sample of experts from three professional positions, from libraries with a minimum staffing level of 10, while providing the opportunity to gather valuable data, also limited the sample size. The researcher believed that continuing to extend the sample size would not similarly add to the value of the data.

More problematic was obtaining the student sample. Several issues are associated with poor response by students. Firstly, online surveys generally attract low response rates (Clayton, 2007) and secondly, sample self-selection also introduces an element of uncertainty as to whether preferred sample size will be achieved. A range of factors have been identified in relation to response rates, including the visual appeal of the questionnaire and the ease with

which it can be answered (Denscombe, 2010, p. 21). Previous work has noted that contacting potential respondents beforehand may boost response rate (Babbie, 2010, p. 285; Cohen et al., 2010, p. 231). Lack of student response was an issue in the present study and was addressed by a contingency plan to place print copies of the survey in the participating libraries. Five factors were believed to be involved in the poor student response rate. The timing may not have been conducive to completing an online survey as the placement coincided with end-of-year exams. It is possible students were not using the library homepage for their searching strategies but rather going directly to saved or linked pages. The survey may not have been sufficiently visible on the web pages, nor was an incentive offered to students to engage with the survey. Finally, the possibility of survey fatigue, particularly at the end of the academic year, may have caused students to refrain from participating. These factors need to be considered if replicating this study.

6.10.2 Neutrality of Researcher

The influence of the researcher's level of involvement upon the study must be acknowledged. In some cases a close professional relationship existed between researcher and participants, which required self-monitoring and reflexivity to ensure the findings were not exposed to undue, unintended interference by the researcher. Personal and professional experience as motivators for research are acknowledged as being potentially problematic (Strauss & Corbin, 1990, p. 35) and from a constructivist grounded theorist point of view, it is acknowledged by the researcher that personal histories and theories were brought to the field of enquiry. These required scrutiny during the research process (Mills, Birks, & Hoare, 2014, p. 111). The opportunities for bias are threaded throughout the investigative process, from framing the research problem, selection of methodological approach, selection of the sample (discussed above), through to personal involvement in interviews, coding and analysing data as the instrument of interpretation, and reporting style. The researcher aimed to minimise the potential for bias in a number of ways. The research problem and approach selected in the present study were drawn from extensive reading of research already undertaken in similar areas, such as mobile technologies, the learning environment, professional competencies for the twenty-first century library and information worker, and technology acceptance studies. This reading informed the planning and design of this study. Personal involvement in the interviews was minimised through utilising a range of technologies, including sending the questionnaire to interviewees beforehand to reduce the potential for bias and establish a neutral approach during the interviews. The researcher was aware that, in the act of interviewing and obtaining data from participants, a relationship was established that differed from any previous relationship of collegiality. In reflecting upon the relationship, it was important for the researcher to enable a mutually-beneficial environment

in which to allow equality within the collection gathering phases of the study (Birks & Mills, 2011). By informing the participants of the purpose of the study, the format of interviews, and the treatment of data prior to commencing that phase, participants were enabled the opportunity to seek clarity, engage with the study's purpose and to indicate what benefits they saw the study providing them. A number chose to do so, requesting details of the findings and recommendations when the research was completed. Throughout the various stages of the investigation and, particularly, when engaging directly with the participants during the interview process and during the data analysis stage, the researcher engaged in an ongoing process of self-reflection. This was intended to address the issues of the researcher's personal interpretations influencing her analysis and understanding of what the participants were saying and the meanings they were giving to their understanding of their environment.

6.10.3 Methodology

The constructivist grounded theory approach that formed the data collection and analysis stages was considered appropriate to the present investigation as it sought answers through the lived experience of VET library staff. Constant comparative analysis, the development of categories from data segmentation, and the formation of conceptual theories through to the emergence of an integrated theory intended to explain the major dimensions of the phenomenon under study.

The research methods used in this study included a range of measurement tools that have been used widely and subjected to validity testing in previous studies. Triangulation was employed to enable comparison and further data analysis. As explained previously, the qualitative methods considered and selected by the researcher were intended to be most useful in offering an in-depth and valuable approach to addressing the research problem.

Data from the student component of the study were collected via the use of self-report scales and this gave rise to the possibility of a common method bias for some of the results. Common method bias is a situation in which the observed variance among variables in the study was attributed to the mode of administration instead of the relationships among the variables. Future research could use both objective and subjective measures, in order to compare the differences (or lack thereof) between them.

The study measured participants' perceptions and intentions at a point in time. Given that perceptions and intentions are shaped by experience and change over time, the study provides a snapshot of library staff intention to use mobile technology for service delivery. This can be seen as a limitation of the study; as mentioned previously, intention to use is not

the same as sustained usage and embedding the technology into routine practice. In fact, because the move to mobile service delivery was regarded by participants as imperative, a number of respondents indicated their answers would be very different within the coming year.

Research design, including sample size, leads to the question of generalisation and how appropriate it is to make theoretical generalisations from research results. The use of a purposive sample, with limited numbers, within a qualitative design does not enable the ability to generalise, however, Flick (2009, p. 138) suggests that triangulation enables greater generalisation from collected data. The purpose of this study was not to make generalisations but rather to answer specific questions on what appeared to influence staff in their adoption of new technologies. It might be claimed that the study findings are specific to the Australasian VET sector library profession, but they offer significant implications for technology development across the wider library community. In addition, some of the findings should be of interest to researchers in the field of professional development.

6.11 Chapter Summary

This chapter discussed the implications of the findings that emerged from the investigation and analysed these within the framework of an integrated theory. The experiences of VET sector library staff responding to the impact of mobile technology upon the workplace were considered and interpreted. A theoretical model was presented and discussed and linked back to the theoretical continuum presented in Chapter Five. An explanation of what staff regarded as important in the generation of new knowledge and the acquisition of competencies, as well as the implications of demographic factors upon staff responses were also discussed. Many of the findings from previous work in the field were shown to be supported by the results of the present investigation and, where alternative results were obtained, such as the influence of age on technology acceptance, possible reasons for such variations have been considered. Student behaviour in regard to mobile library services corroborates the results of previous studies and reinforces the advice from previous research (Booth, 2009) to gather a detailed understanding of the local student population prior to designing and delivering new technology-enhanced services.

A modified version of the theoretical model was presented. Based on the theoretical framework explaining the impact of mobile technologies on library services, the researcher went back and assessed the other technology acceptance and adoption models to determine

whether aspects of these previous, influencing models were suitable to be consolidated into a similar framework.

The influence of a variety of impacts upon specific areas of the investigation were explained and illustrated in a model of the integrated theory. The theory was used as a basis for comparing essential features with previous technology acceptance models discussed as background to the present investigation. Consideration was given to the complexities that influence technology acceptance and usage.

CHAPTER SEVEN

CONCLUSIONS AND RECOMMENDATIONS

7.0 Introduction

This study investigated the competencies required of vocational education and training (VET) sector library staff in Australia and New Zealand to deliver services to mobile technologies. In particular, the investigation examined how library staff were responding to the concept of the mobile technology library, their knowledge and competency levels within this environment, how on-the-job training needs were identified, the preferred manner of addressing professional development requirements and any resulting changes to roles, relationships and working practices.

The research was conducted to address the following questions:

> What skills, knowledge and competencies are required by library staff to develop and deliver mobile technology services in the vocational education sector?
>
> What specific on-the-job training is required by library staff in the vocational education sector to acquire the skills, knowledge and competencies to effectively develop and deliver mobile technology services?

Qualified library and information science professionals from 14 Australasian VET sector libraries were surveyed, as were student library users from the participating institutions. Student perceptions of the current and future state of, and their preferences for, mobile library service delivery were sought to enable comparisons with staff responses.

The paucity of research relating to mobile technology in the VET library sector resulted in the researcher examining a broader context for trends that could be extrapolated and applied to the library sector. Studies revealed many academics at HE and further education institutions were facing similar technology challenges to those identified by the library and information professionals. A combination of environmental factors, such as the global, economic imperative for a highly-skilled, flexible workforce allied with the rapid growth of mobile technologies has meant the VET sector remains a focus for producing work-ready graduates. Staff working with these students must be capable of assisting in the development of required graduate attributes, including technology-related competencies. It is, therefore,

crucial that VET library staff are appropriately prepared to engage with the new technologies that are playing an increasing role in campus life. The information generated from the present investigation permits a greater understanding of issues affecting VET sector library and information science professionals in relation to technology impact.

7.1 Overview of the Study

Chapter One introduced the central issues relating to the study, including an overview of the tertiary education environment and the growing impact of technology. It noted that failure to embed new technologies resulted in compromised outcomes and unrealised benefits. The unique features of mobile technologies were reviewed, particularly in relation to their application to the learning environment, and the concept of the mobile library, where mobile technology is employed for outcomes such as service delivery, was outlined. Professional development provision for library staff within the context of technology acceptance, including methods for assessing and addressing staff competency requirements was introduced, along with an overview of the Australasian VET sector and the role of the VET library. The lack of extant studies investigating the impact of technology upon the VET library sector has resulted in incomplete knowledge of the sector; given the advances of the knowledge society, it was important to understand whether information professionals were fully prepared for the demands of ubiquitous service access.

Chapters Two and Three reviewed the literature on technology and the tertiary education environment and identified the scant amount of research about the VET sector. The higher education environment was surveyed in order to extrapolate to the VET sector and potentially form comparisons and observe similarities. Libraries were viewed as a microcosm of their larger parent environment. The increasing presence of students using mobile devices on campus required educators to be aware of how to incorporate mobile technologies into the pedagogical framework. Staff development programmes highlighted the need for faculty to have opportunities to make connections between their technology training and demonstrated results of improved student learning. Staff development emerged as a whole-of-organisation responsibility requiring on-going commitment, including a personal responsibility, a supportive, rewarding environment, a wide range of professional development options and a demonstrable benefit to all staff. Many of these wider, institutional features were also identified within the library setting. A blurring of boundaries occurring in library positions in relation to faculty, e-learning and information technology colleagues was discussed in the literature. The emergence of the mobile library seemed a fluid situation, with most libraries showing an awareness of the emergence of mobile technologies as an on-campus phenomenon and the need to integrate mobile service delivery

into their operations. However, very few had planned comprehensively for this outcome. Studies into student culture and technology expectations on campus indicated the high level of cell phone ownership amongst students in higher education, with increasing numbers of devices containing sophisticated computing capability. Student survey results relating to mobile library engagement showed students choosing to access a very limited range of mobile library services with a definite preference for services of immediate relevance to their studies. Prior to the present study, information on student use of mobile library services was limited to the university sector, with research lacking from the VET sector on student perceptions and use of mobile library services.

The importance of user adoption of new information technologies, which persists as a crucial challenge in implementing new information systems, was discussed. Several theories of innovation and the evolution of technology acceptance models predicting behavioural intention and user behaviour were presented, including Rogers' (1962) seminal work on the diffusion of innovations and the range of models that led to the development and validation of the Unified Theory of Use and Acceptance of Technology (UTAUT). Debate continues to exist over model suitability, with the UTAUT model demonstrating the ability to explain as much as 70% of pooled variance in behavioural intention to use a technological innovation (Venkatesh et al., 2003). As suggested in Chapter Three, this enhanced predictive efficiency offers a compelling reason to consider investigating its use within the library and information field in research taking a quantitative approach.

The research design, methodology and methods used to collect and analyse data were presented in Chapter Four. A four-step planning approach was taken to ensure the conduct of the investigation was undertaken in a manner that satisfied the researcher's desire to understand the problem in a meaningful way. The epistemological stance established the importance of the creation of meaning by those who participated in the study. The rationale behind the selection of a constructivist, interpretivist perspective from within the range of epistemological and ontological perspectives available to the research community was presented. The researcher considered such a theoretical stance as the most useful in enabling understanding of the research problem. The research methodology influenced the choice of methods chosen, with a range of qualitative approaches employed, including grounded theory methodology, purposive sampling method, questionnaires and online surveys. Grounded theory analysis involved both extensive and intensive immersion of the researcher in the data; segmenting and coding the data, enabling categories to emerge, and constantly comparing and interrogating the categories. The use of triangulation allowed comparison of results and greater robustness throughout the investigation.

Chapter Five presented research findings and comprised three main sections, commencing with the analysis of the environmental impact of technology upon the library workforce. The impact of the considerable volume of new technologies adopted by the participating VET sector libraries was considered by staff participants, in addition to the effect upon the workforce and staff attitudes. They also discussed their observation of changes in student behaviour as a consequence of the introduction of the technologies. The second section moved from unit level (library)/organisational factors to the individual level wherein participants identified those library services they believed could be most effectively delivered within a mobile environment, the skills knowledge and competencies they personally required in order to undertake such service delivery, and how they could identify gaps between existing and required skill/knowledge levels. Following on in the third section, participants considered the training required in order to acquire the identified skills and knowledge, how such training would best be delivered and then assessed how their roles, relationships and working practices had changed, or would change, as a consequence of accommodating the impact of mobile delivery. The theoretical concepts discussion which concluded each section were drawn together into a theoretical concepts continuum that illustrated the presence and importance of impacts upon specific aspects of the investigation. Abstract concepts were drawn from the conceptual themes and presented under three overarching umbrella theories which contributed towards the development of the theory.

Student perceptions of online library services were analysed and compared with staff opinions. Findings from the student online survey confirmed students were using library services and were aware of the range of services offered. Their expressed lack of interest in using a number of mobile services confirmed findings from previous studies. Triangulation of data revealed discrepancies between the services library staff believed students would use and student reported actual use. These types of discrepancy had been found by previous studies into student use of library facilities and services.

Chapter Six presented the integrated theoretical model, drawn from the conceptual theories discussed in the previous chapter. The contribution of impacts to the model was discussed. A modified version of the theoretical model based upon the technology acceptance and adoption theories which had influenced the present study was created to determine whether aspects of the previous theories were suitable to be consolidated into a similar framework.

Findings showed a profession very aware of the impact of mobile technologies upon the workplace. Many of the issues discussed in relation to the wider implications to the higher

education sector were confirmed in the findings on the VET library profession. VET library staff understood the need to respond to the impact of mobile technologies through up-skilling and having access to technology. However, length of service and technology competency did not provide the level of variation that previous research or models suggested. The concept of the 'early adopter' emerged strongly from library staff comments and, where the early adopter assumed the role of trainer or mentor, was acknowledged as the preferred method of receiving guidance and training. These results support previous studies into recommended professional training methods across the education and library sectors (Jasinski, 2007). The study also strongly supported previous findings which noted the blurring of boundaries across roles and relationships as technology impacted upon professional duties. The chapter closed with a review of the limitations of the methodological approach employed and concluded that some of the methodological issues that distinguished the qualitative approach taken need to be considered carefully when planning future research.

7.2 Review of Crucial Findings and Conclusions

The preceding chapters have examined the response of VET library staff to the concept of the mobile technology library and their perceived levels of confidence and capability within this environment. The investigation arose from an interest in advances academic libraries had made towards implementing service delivery to the mobile devices the majority of their student users were bringing on campus. Underpinning this interest was an assumption that the apparent slowness in adoption of mobile technologies and service delivery was at least partially, and on an individual level, the result of a lack of confidence and competence amongst the library staff themselves. The empirical investigation revealed a profession very aware of technological change, believing the change to be evolutionary rather than disruptive, and an extension of the traditional library mandate but requiring evidence of wider institutional commitment and alignment to strategic planning.

The phenomenon of intensive technology change was a feature of the VET library sector. This type of environmental background was discussed by Rogers in his assessment of organisations as units of innovation rather than the individual. The larger the organisation, the more likely it was to demonstrate aspects of innovativeness (Rogers, 2003, pp. 409-411). The present study sought operational units with staff numbers larger than 10 and this may have been a factor in the degree of technology implementation in evidence across the sample. Accompanying the major technological change was acknowledgement amongst library staff of the need to acquire a range of suitable skills in order to realise the associated, potential benefits. The types of changes staff identified within their immediate and wider environment were categorised as service and information delivery and infrastructure. This

indicates that technology was being implemented for the purpose of improving the library's mandate within the organisation. Technology adoption characteristics examined within Rogers' (1962) diffusion of innovations adopter categories, including innovators, early adopters and late majority, were evident from the library staff comments. A number of staff were viewed by their colleagues as natural experimenters with technology and were promoted in this capacity as mentors. Overwhelmingly, VET library staff demonstrated general acceptance of the inevitability of technology advances and identified benefits in relation to improved service delivery.

Library staff revealed a degree of conservatism in predicting which library services could effectively be offered in the mobile environment. Their responses were categorised as constituting informational, study-related and technical service delivery, focused on what had been successful up to the present point in time, but displaying little evidence of future-casting or addressing the issues relating to the convergence of information provision and technology advancements. They showed preference for traditional services, such as library catalogue and online databases, although they had scant evidence that this was what students either wanted or used. This lack of evidence was an acknowledged deficiency that a number of staff recommended be addressed prior to proceeding further. Nevertheless, overall, staff were of the opinion that students both used and wanted mobile technology-enhanced service and expressed the belief they would be capable of offering improved service through acquiring mobile technology capability. A positive attitude accompanied this belief and emerged as a competency, although tempered by the 'excited versus hesitant' tension associated with Rogers' (1962) technology adopter categories.

Staff perceptions of changes in student behaviour in the library included an observed increase in students bringing their own laptops into the library and being increasingly technologically-savvy – "five steps ahead of the library staff" was the comment of one participant. This aspect of student behaviour had been highlighted by Alexander (2004) as a challenge to institutions of higher learning, when he queried how they would respond to the phenomenon. It has continued to occupy planners since (Middleton, 2011; Tamarkin & Rodrigo, 2011). Students had offered library staff positive feedback on the increased availability of wifi and the overall responsiveness of the library in relation to the provision and support of new technologies. Such comments resonated with library staff as they were critically aware of the need to align technology with service improvement, and the indication that the library was perceived as innovative and technologically-advanced was a source of pride for a number of staff.

Students showed a tempered response to the prospect of mobile service delivery. They used their mobile devices extensively but for social rather than educational purposes, including accessing library services. Students were interested in searching the library catalogue and online databases and renewing their books, but little else. From these findings it can be concluded that students are using their mobile devices to a limited degree within the context of the library environment. This behaviour confirmed the staff belief, to a limited degree, that there is a relationship between the two events of technology introduction and changed student behaviour. A note of caution must be added, however, in that students did not appear to be interested in accessing a more comprehensive range of potential library services. This was highlighted in the discrepancy between services library staff believed were suitable for mobile delivery and those students identified they were likely to use. They were interested in those mobile services of immediate benefit to their studies however, where benefit was not overtly apparent, VET students expressed themselves as unlikely to use such services. This finding supports previous research that urges library staff to make the effort to familiarise themselves with their own student culture prior to launching into the uncertain waters of matching technology-enhanced services to perceived student requirements. It also serves as an opportunity for staff to assess the manner in which they promote library services, not only newly-released services or resources but also under-utilised services.

A crucial aspect relating to technology implementation was the generation of new knowledge. The research findings indicated that, at a more theoretical level, the skills and competencies participants believed they required were technical competencies, a facility to be able to adapt to the demands of the changing environment, and the ability to properly manage the process. Staff were keen to acquire mastery of mobile devices, regarding this competency acquisition as crucial to working effectively in the mobile environment and to offering the sorts of technology-related services and assistance that students were increasingly expecting of them. Overwhelmingly, staff wanted access to mobile devices and time to experiment with them. They believed attitude, adaptability and a willingness to try things out were important. The ability to link new technologies with new opportunities and to deliver services through a different medium were also regarded as necessary skills, knowledge and competencies required to develop and deliver mobile technology services. When discussing the preferred methods to identify gaps in knowledge and competencies, staff participants showed a definite preference for being surveyed or asked directly. Gap analysis formed the correlation (defined by the researcher as establishing a connection between that which is known by participants and that which is needed to be known) between identifying knowledge and skills and the methods useful to develop these. This linkage comprised the factors of internal review, the availability of external opportunities, and the

inclusion of information gathering activity within routine organisational processes. Staff favoured internal review completion as the preferred method for obtaining such information.

Where ambiguity of attitude in relation to technology acceptance was demonstrated, the influencing factors included practical workload and resourcing issues, frustration arising from technology malfunction and, on a more philosophical level, tensions stemming from uncertainty as to the future focus of the profession. The uncertainty that librarians would be rendered redundant by technology advancement appeared to occupy some staff. These findings add support to a number of the studies discussed earlier which examined the integration of mobile technologies into the further and higher education teaching and learning environment.

Factors such as length of service and technology competency did not reveal the level of influence upon staff opinions that previous technology acceptance and professional development literature had suggested. The concept of the digital native versus the digital immigrant that has occupied researchers for over a decade was not supported by VET sector library staff. It appeared that longer-serving library staff were more likely to view positively the benefits mobile technologies would bring to their professional environment and were prepared to make the effort to learn new systems. Therefore, caution should be applied to considering factors such as length of employment or age as indicators in acquiring new technology competencies. The role of professional position appeared to be a stronger influence on perceptions of ability to learn new technology.

Personal levels of competency with mobile devices did not appear to influence staff attitudes in relation to the benefits to be gained from acquiring the necessary skills, the effort required or organisational expectations. Greater technology competence was associated with increased expectation that the organisation would provide the necessary supporting infrastructure to enhance successful technology rollout.

The position of a staff member was associated with different attitudes to technology acceptance. The findings indicated library managers placed greater emphasis on planning for technology impact while other staff positions realised the benefits of positively accepting mobile technologies. Systems librarians were not concerned with perceived ease of use of mobile technologies as an impact upon the work environment; however, this concern was noted with regard to training methods.

In regards specific on-the-job training required to enable effective development and delivery of mobile technology services, the research findings indicate that training is needed to address technical needs, to ensure the enhancement of service delivery, and to develop both specific and general competencies. Participants wanted training in the use and understanding of the types of mobile devices students were bringing onto campus. Their requirements ranged from awareness of mobile technologies, their possibilities and functionalities, through to learning how to gain familiarity in particular coding languages or testing different browser display. In determining how best to deliver training, staff identified a montage of informal availability of easily-accessible training opportunities and more formalised, planned delivery. Preferred methods of professional development delivery were hands-on, self-paced learning with guidance or training provided by a trusted, expert colleague available to assist at point of need. The provision of such a mentor was viewed as a particularly acceptable training method. The types of training staff did not want were PowerPoint sessions, and training that seemed irrelevant and, especially, training that was divorced both physically and chronologically from the training need. External training opportunities were not viewed particularly favourably by staff, although library managers saw value in external trainers where distributed campus systems existed and for large-scale implementation projects.

Roles, working practices and relationships had metamorphosed as a consequence of library staff acquiring greater technology competency. A blurring of boundaries was mentioned, indicating that the traditional delimiters of a librarian's role and duties were losing relevancy. The evolutionary nature of these adaptations was stressed, and tweaking of job descriptions was frequently noted. as was closer collaboration with colleagues in e-learning and information technology areas. Staff believed they were witnessing a range of adopter stages within the workplace and hesitancy was being replaced by confidence. This indicates a reactionary rather than proactive response to the inclusion of technology within a library's sphere of operations.

By applying a theoretical lens through which to examine the findings, an abstract theory emerged with the potential to explain in generalised terms the complexities of the problem under investigation. The theory highlighted the existing wider environmental factors that brought the problem into focus. It moved through several thematic layers where the individual formed the unit of analysis and concluded at organisational level. Within the interrelationships depicted, a core category provided a central pivot around which the findings revolved. The theoretical model illustrated the background need/problem of a changing environment leading to awareness of new knowledge being a requirement to cope with these changes. The process of acquiring such knowledge occurred through the

availability of capability development opportunities. The outcome of such activity was a new model of operation (service delivery) and an environment of dynamic equilibrium or normalisation of processes,

7.3 Reflection on Process

The initial driver behind the study was to understand a specific aspect of mobile technology impact upon the sector in which the researcher was employed. From general observation, it appeared that those libraries that were addressing the issues raised by student use of mobile devices were the ones that had planning and resourcing in place. While it seemed logical to suppose that the more competent the staff were in using mobile technologies, the more likely they would be to deliver services to mobile devices, there was an absence of research to support this assumption. Although the university library sector and higher education in general have been subject to a reasonable level of investigation, few empirical investigations into the VET library sector are available. It was necessary for the researcher to adopt as neutral an approach as possible when dealing with professional colleagues for the purposes of the study. Within aspects of a qualitative study, such as the interviewing process, the condition of trust is crucial between participant and researcher because of the nature of the interaction. The participants approached for involvement in the study uniformly expressed interest in the outcome of the study with a desire to have access to the findings when it was completed. They saw benefits to their participation, for their own library and for others. This may have been an underlying factor in the reason why no participant approached by the researcher for inclusion in the study refused. The staff sample surveyed provided rich data able to be analysed through a constructivist, grounded theory research design**.** The purposive staff and student samples were small but, as the findings demonstrated, representative of both the sector and profession under study and able to illustrate aspects of a specific library culture.

The research design resulted from the researcher's interest in the qualitative approach with its ability to gather rich data and allow the voices within to emerge. The process of continued immersion in the data, with segmentation, coding and constant comparison, which distinguishes the grounded theory approach, enabled the researcher to gain a deep understanding of how the research participants viewed their world and the technological changes they were dealing with. Certainly, the complexity of the findings that emerged from the study have provided the researcher with a greater respect for her colleagues and the challenges they are facing, both as individuals and as a sector. The development of a theoretical model enabled the researcher to interpret the findings in the form of concepts, themes, interrelationships at a level of abstraction that offers opportunities for further testing.

7.4 Recommendations for Professional Practice

Multiple factors contribute to the successful delivery of mobile library services and the following recommendations are intended to inform practice. These recommendations are not necessarily specific to mobile technologies or to the VET sector and it is likely that many libraries will already have a number in place. They provide a framework to facilitate the adoption of new technologies into the workplace.

To ensure that staff are supported to view new technologies positively, it is recommended library management provide strong direction in understanding and advocating the benefits of new technologies in the workplace, develop a clear continuing professional development (CPD) plan and ensure the provision of a supportive environment.

To gain accurate information on existing levels of staff technology competency, regular, comprehensive surveys should be conducted. These surveys can be designed in-house, purchased or adapted from international best practice guidelines. The results should inform planning processes for professional development.

To allow staff the opportunity to develop technology competencies, a range of mobile devices should be made available for all staff to train on. It is essential that each staff member should have easy access to the devices and to personalise them. Budget should be allocated to maintain currency of devices and software.

Research has revealed that lack of time for learning new technology competencies is a problem for professional staff (Chesemore et al., 2006; Hallam, 2009; Summers-Morrow, 2008). It is recommended that specific time allocation be planned into routine operations as part of continuing professional development. Extending this recommendation further, it is also recommended, when implementing new technologies, to reprioritise operational functions to address the noted issue of overwork.

The availability of competent professional colleagues to provide timely assistance at point of need has been identified as a preferred method of receiving training. It is recommended that technology champions be identified from amongst staff, not necessarily restricted to library staff, who can be trained to assist their colleagues. This responsibility should be formalised either through inclusion in their job descriptions or through a process of secondment. A possible consequence may be the creation of new library technology positions, designed to assess opportunities to incorporate new technologies into planning, processes, and outcomes.

These positions may cross traditional boundaries with other areas such as e-learning and information technology.

The ability to work collaboratively on a common focus of interest creates positive synergies amongst staff. It is recommended that, where possible, communities of practice or interest be encouraged to develop and continue. These communities may include staff from outside the library who contribute specific expertise and work towards a common objective.

A sound knowledge of student culture is crucial to successful implementation of mobile technologies. The research has shown students engage with those aspects of the learning environment they perceive to be of immediate and practical use. Studies have revealed discrepancies between staff and student awareness of mobile technologies, which can result in a costly situation (Cummings et al., 2010; Sheikh & Mills, 2012). It is recommended that, at a minimum level, annual surveys of student mobile technology behaviour are conducted and the information contribute to library and IT strategic planning. It is also recommended that libraries rigorously plan and evaluate the outcomes of promotional or instructional activities designed to assist students to engage more effectively with library services.

Finally, in order to enhance overall levels of technology competency amongst current as well as new library and information science professionals across the range of Australasian library sectors, it is recommended that online, micro-credentialed professional development courses be offered through national or sector continuing professional development programmes. One way to ensure currency of knowledge of technology competency would be to require re-credentialing every five years.

7.5 Suggestions for Further Research

The findings that emerged from the current investigation offer opportunities for further enquiry within the broader fields of library technologies, technology acceptance and workplace training. A range of methodologies lie at a researcher's disposal when planning a study. The particular methodological research approach selected to investigate the present phenomenon has potential for amendment, for example, a quantitative approach using a technology acceptance model could also offer valuable insights.

The present study investigated the intention to deliver mobile library services as a consequence of competency in the use of mobile technologies. The quality of such service delivery is crucial to the uptake of use and the benefits for users. The sustained development and delivery of high quality services to mobile devices as a consequence of library staff

competence with mobile technologies is an area yet to be investigated. In order to test the relationship between competency with mobile technologies and service quality it is recommended that mobile technologies usage behaviour and service delivery be extended into the area of service quality; that is measurement of the difference between what the user expects from a service and what is actually provided and continuance intention. The latter investigation could include a longitudinal study or pre-and post-adoption testing. Such an investigation would enable fuller understanding of the extrinsic consequences of technology acceptance.

When being guided through reflection on their current professional environments, library staff were asked about the impact of mobile technologies upon their workplace. The impact of workload upon technology adoption has been widely reported in the literature on academic staff and their incorporation of new technologies into models of teaching (Buabeng-Andoh, 2012**;** Samarawickrema & Stacey, 2007). This aspect awaits investigation within the context of the library and information science profession, having emerged as a factor in the present study. It is recommended that future research investigate the provision of effective mobile service delivery from a workload perspective.

The findings revealed a discrepancy existing between library staff perception of student requirements and what the students themselves identified as being of interest to them in regard to mobile library services. Previous studies into library service provision have highlighted this as a potential problem in cases where libraries have not been rigorous in undertaking a comprehensive assessment of their specific student culture (Booth, 2009; Mills, 2009; Paterson & Low, 2011). A mismatch in service development and delivery is costly in terms of resourcing and credibility. A number of respondents in the current study indicated an awareness of the need to survey their students regarding use of mobile devices and expectations of library services. Given the ease with which projects can be completed without supporting empirical evidence, it is recommended that future research examine mobile library service from various stakeholder angles.

The present study sought to gather information on the VET sector library profession. While the methodology demonstrated the sample was representative of the sector and the responses of the sample reflected previous work, nevertheless, the sample was small, unique and limited to a certain geographic area – Australia and New Zealand. While it is possible to postulate the applicability of the findings to libraries in both developed and developing countries, as a contribution to further research, it is recommended that the present investigation be extended to other library sectors and regions to enable comparative findings.

Such information would strengthen the understanding of the profession's reaction to innovation and technological change.

The use of technology acceptance models within the library and information field is relatively uncommon but not unknown. To date, the Technology Acceptance Model (TAM) has been most widely applied among information systems researchers with a focus on perceived usefulness and perceived ease of use in relation to users' attitudes, intentions and actual computer adoption behaviour. TAM is noted for parsimony and wealth of empirical support (Agarwal & Prasad, 1999). The UTAUT model is a more complex framework but has the benefit of extensibility and ability to provide fine-grained data. It is, therefore, recommended that investigation into advantages of using the UTAUT model within the field of library and information science be undertaken.

Existing studies into technology acceptance served to inform decisions in designing the present study. In addition to the suggestion above of extending work on the UTAUT model it is also recommended that further exploration of library professionals and their intention to accept technology be undertaken exploring additional moderating factors, such as attitude, anxiety, satisfaction, knowledge as individual characteristics; or system characteristics such as relevance, terminology, or system constraints. As discussed earlier, some of these factors have formed the basis for studies into technology acceptance but in fields other than librarianship (Parayitam, Desai, Desai, & Eason, 2010; Sievert, Albritton, Roper, & Clayton, 1988; Thatcher & Perrewé, 2002).

The development of a theoretical model in the present study serves to capture and portray the major factors identified by VET library staff as influencing both personal acceptance and use of mobile technologies, and also library/organisational level factors that influence this use and the development and delivery of mobile library services. It is recommended that the model be further tested in a variety of contexts to contribute to greater understanding of the impact of mobile technologies within the workplace environment.

7.6 Significance of the Study

The ability to predict staff acceptance of technology innovation is of crucial importance to any organisation investing substantially in system development. The rapid influx of hand-held technologies onto campus has had significant impact on the education landscape. Higher and further education libraries have demonstrated early awareness of uptake of content and service delivery to mobile devices. They have expressed concern to understand the student user profile in order to tailor services in social and personalised spaces that

increasingly challenge the traditional model of information provision. This is evidenced in the growing range of innovative projects that exemplify the academic library world, primarily with an end focus on the student rather than the technology.

The significance of this investigation lies in its contribution to the several fields of library and information services, professional development and technology adoption. The contributions are six-fold. Firstly, through the provision of detailed information on the technology capability of Australasian VET sector library staff, a field lacking extensive study, an overall understanding of the vocational and training education sector is enhanced. Staff were closely investigated as to their existing levels of technology competency, their attitudes towards technology and their perception of its impact in the workplace. The majority of participants identified themselves as being competent in their use of mobile technologies, followed by beginner users. As noted earlier, the findings from this self-assessment are expected to change rapidly as use of mobile devices becomes routine in everyday life. VET students were found to be strongly engaged in using mobile, internet-enabled devices, but used them for social activities in preference to learning-related activities. This finding displays similarities with similar research undertaken in the higher education sector (Gosper et al., 2013; Wilson & McCarthy, 2010). Again, it is suggested this response will change rapidly as more learning activities and supporting services effectively leverage the educational potential of mobile devices.

When considering the capabilities of members of an organisation, it is useful to be aware that a range of interrelationships exist that enable more accurate prediction of outcomes. The second contribution of the present investigation is to demonstrate the influence certain demographic features – position, service length and technology competency – have on the interpretations and meanings staff construct within their environment. Noticeable differences occurred between the responses of the three different positions chosen for the sample population. There were lesser differences occurring as a result of service length or technology competency, and where these were noticeable they have been presented in the findings. However, in contradiction to earlier technology acceptance model studies (Plude & Hoyer, 1985, as cited in Venkatesh et al., 2003; Venkatesh et al., 2003), longer serving staff in the present investigation were positive in their attitude towards technology and believed it would bring benefit to themselves and their workplace. This finding, therefore, supports those studies that found older employees reacting more positively to the implementation of information technology initiatives than their younger counterparts (Akman & Mishra, 2010; Morris & Venkatesh, 2000; O'Brien, Rogers, & Fisk, 2012).

The third contribution of the investigation has been to provide detailed evidence of the sorts of knowledge library staff require in order to deliver services to mobile devices. One hundred and seventy-five comments, comprising 42 categories, enable close understanding of exactly what skills, knowledge and competencies are required. The main knowledge and competencies staff identified were willingness try things out, competence in using mobile devices and knowledge of the devices students were using. Participants' comments contributed to the three conceptual themes of technical, adaptability and management competencies, with adaptability being regarded as the most important. These competencies fed into the new knowledge generation component of the integrated theory. This sort of information provides valuable insight into how employees self-reflect on uncertainty in the face of change and can identify characteristics of an effective solution.

All organisations benefit from matching requirements closely with effective solutions. Successful change management depends on planning, implementation, sustainability and institutionalisation or normalisation of the change. Understanding the factors involved in the effective preparation, delivery and monitoring of workforce capability development improves the likelihood of desired outcomes. Therefore, the fourth contribution of the study is the documentation of required training that will enable staff to develop the knowledge and competencies previously identified. Through the process of self-reflection, individuals considered their own competency requirements and how they would prefer to have these met through training. They also reviewed those of their immediate colleagues and proposed the sort of on-the-job training deemed to be most effective within that particular social culture. Participants have, therefore, offered training solutions at both an individual and an operational unit level.

Method of delivery is an integral component of successful training. Therefore, the fifth contribution of this investigation is to describe the sorts of training delivery methods staff across 14 different organisations considered to be most effective. Overwhelming preference has been shown for the practical hands on approach, with access to the devices for each staff member a prerequisite, a findings which supports previous research (Fisher et al., 2006; Jasinski, 2007; Kukulska-Hulme 2012). Staff were prepared to explore a range of training options to determine which would best fit the need, but they were very keen for the involvement of innovators, or champions, who were colleagues expert in the competencies being developed and had the time and accessibility to assist them at point of need. Differences in approach were noted between the three positions and this should be taken into account when undertaking any needs assessment. Library decision-makers would be well

advised to consult staff and not assume that the work unit is unified in their preferences. A single goal may have many approaches.

Finally, the sixth significant contribution of the research is the description of changes taking place in a tertiary education work environment as a consequence of mobile technologies. Staff described an evolutionary process, one of tweaking job descriptions, rather than radical change. A blurring of boundaries between roles, teams, and work units was commented on, with most staff regarding this as a beneficial change (Broady-Preston & Preston, 2007; McDonald et al., 2009). Change in working practices was less obvious, and the findings indicate that many of the participating libraries were delaying adopting mobile technologies into their routine environment. A wait-and-see approach prevailed, and in a number of cases this was the result of organisational uncertainty at the strategic level. Organisational commitment at all levels to technology implementation was identified as critical factor for the realisation of potential benefits in the literature reviewed in Chapter Two. The importance of this contribution is the evidence provided of what is happening in VET libraries as a result of technology changes. A number of the studies examined earlier have explained what is not happening in the environments under investigation (Drent & Meelissen, 2008; Krysa, 1998), the present study details evidence of actual response, both ad hoc and planned.

In a field where previous research is sparse and empirical investigations even fewer, the findings and recommendations presented in this study offer meaningful insights, and are available to library decision-makers in planning development of their staff competencies and confidence in the use of mobile technologies and related service delivery. The investigation, therefore, can be considered to contribute to the body of knowledge in the broader field of library and information science with particular reference to mobile libraries, workplace training, technology adoption and library service provision.

7.7 Conclusion

Increasingly, organisations seek assurance that the investments made in technology will be realised through staff acceptance and deployment. Motivators for staff to gain competence may be intrinsic or extrinsic, but they are measurable and should, by extension, be predictable. Above all, they should be based upon empirical evidence. To achieve this, the present investigation employed a range of qualitative methodologies to enable rich data to be collected, analysed and interpreted. The investigation contributes new knowledge to methodological discussions as it is the first known study to employ a constructivist, grounded theory approach to uncover individual and organisational level factors impacting

upon delivery of services to mobile devices by vocational education and training sector library staff. It also presents recommendations to inform practice and suggests the application of the theoretical model be further tested in various contexts to extend understanding of library service delivery within a mobile technology environment.

The research analysed the state of the VET sector libraries as they responded to the impact of rapid technological change. The results of the investigation serve to inform policy makers and library directors for planning and staff development purposes. Finally, with technology use in education and wider society becoming globally pervasive and increasingly linked with intellectual capital and economic prosperity, comparative studies across library sectors, cultures or regions could be conducted to identify the professional variables that influence the acceptance of technology by library staff. The library staff in this investigation generally displayed a positive attitude towards technology acceptance and an awareness of the potential benefits offered. On this note, the thesis concludes with a reflection from one of the library managers:

> So even though our history in the last couple of years have been grim and completely substandard when it comes to adopting new technologies, I think the future is incredibly bright. So if we had this conversation in a year's time there is a lot of potential for me to be raving on about how wonderful my staff are. So even though the current situation is quite hopeless, in the very near future it should be quite positive [J1].

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APPENDICES

Appendix A: Staff Invitation and Fact Sheet

Invitation to participate in research project [TAFE] (**A similar, tailored form was sent to ITP library managers)**

Dear

I am writing to invite your library to participate in a research study being undertaken to fulfil the thesis requirements for Doctor of Philosophy at Curtin University of Technology. The purpose of the research is to examine the current state of preparedness of vocational education libraries to deliver mobile services to students. An outcome of the study will be the development of a best-practice framework to guide future action and planning for successful, sustained mobile library (m-library) initiatives.

I am intending to gather data from a sample population that will include library staff and students at six of the larger Further Education Institutions – one from each State – with library staffing numbers greater than ten, as well as from New Zealand Institutes of Technology and Polytechnics libraries. It is intended to interview three professionally-qualified staff on an individual basis form each library and this will include the library manager, one staff member who has involvement with systems or IT and another qualified staff member whose duties do not include such focus.

I am also hoping to interview students at the participating TAFEs through an online survey which would either be included on your library web page or the link to the survey provided on your site.

No identifying information will be used in the written report, articles or any other literature that comes out of the research, participant confidentiality is critical to successful data gathering throughout the surveys.

Once my research is complete, the thesis will be deposited in the Curtin University of Technology Library and may also be used for publication in an academic or professional journal or conference presentation. A summary of my results will be available to participants if requested.

My supervisor in this project is Dr Gaby Haddow, G.Haddow@curtin.edu.au , Lecturer, School of Media, Culture & Creative Arts at Curtin University of Technology.

This study has been approved by the Curtin University Human Research Ethics Approval Committee (Approval Number HR 54/2010).

It would be very helpful for me if your library would take part in the surveys. If you are happy to participate, please respond by Friday 3rd September. I will then send all information and documentation through and arrange a time to contact you.

Yours sincerely,
Sarah-Jane Saravani

Participant Invitation – Staff

Implementing the Mobile Library: Implications for Library Staff

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Version 1.0: 7 April 2010

You are invited to participate in a research study being undertaken to fulfill the thesis requirements for Doctor of Philosophy, Curtin University of Technology. The purpose of the research is to examine the current state of preparedness of vocational education libraries to deliver mobile services to students. An outcome of the study will be the development of a best-practice framework to guide future action and planning for successful, sustained mobile library (m-library) initiatives.

Before you decide whether to participate, it is important for you to understand why the research is being done and what it will involve. Please take time to read the following information carefully and feel free to ask me if you would like more information or if there is anything that you do not understand. Please also feel free to discuss this with your professional colleagues if you wish. I would like to stress that you do not have to accept this invitation and should only agree to take part if you want to.

Thank you for reading this.

What is the purpose of the study?

The purpose of this study is to examine the current state of preparedness of vocational education libraries to deliver mobile services to students and, from the findings, to develop a best-practice framework to guide future action and planning for successful, sustained mobile library (m-library) initiatives. Particular focus will be upon the impact on library staff of implementing service delivery to mobile devices. It is intended to learn how staff respond to the concept of the m-library, their perceived levels of confidence and capability within this environment, their actual levels, and how best to address any gaps identified in a systematic and replicable manner that can be included in strategic planning processes and translated across the sector. Comparison will be made with competencies required for working within the online environment. The targeted focus of the research will be vocational education sector libraries across two countries – New Zealand and Australia.

Why have I been chosen to take part?

Sampling across the New Zealand Institutes of Technology and Polytechnics (ITPs) (10 libraries with staffing numbers greater than ten) and Australian Technical and Further Education (TAFE) (6 libraries with staffing numbers greater than ten) library sectors is being undertaken. It is intended to interview three professionally-qualified library staff on an individual basis from each library (n=48) and this will include the library manager, one staff member who has involvement with systems or IT and another qualified staff member whose duties do not include such focus.

Do I have to take part?

Participation is completely voluntary and you are free to withdraw at anytime without explanation and without incurring any disadvantage.

What will happen if I take part?

Contact will be made by the researcher, Sarah-Jane Saravani, initially by email requesting participation in the study. If the staff member contacted is agreeable, further contact will include information sheet and a consent form to be completed. The survey will take place either face-to-face, by telephone or online communication technology, such as Skype. The conversation will be recorded and subsequently transcribed. Participants will receive the survey questions prior to the interview to allow the preparation and focus during the actual interview. It is anticipated this should last approximately 40 minutes. The transcript of the interview will be returned to the participant for checking prior to its being used for analysis by the researcher.

Are there any benefits in taking part?

There are no immediate intended benefits to participants, although the release of the findings and ultimate guidelines are hoped to be of potential benefit to those involved in the study.

What if I am unhappy or if there is a problem?

If you are unhappy, or if there is a problem, please feel free to contact Sarah-Jane Saravani, sarah-jane.saravani@wintec.ac.nz and I will try to help. If you remain unhappy or have a complaint which you feel you cannot come to me with then you should contact my research supervisor, Dr Gaby Haddow, G.Haddow@curtin.edu.au . When contacting Dr Haddow, please provide details of the name or description of the study (so that it can be identified), the researcher involved, and the details of the complaint you wish to make.

Will my participation be kept confidential?

The initial data collection will take place via audio recording; it will then be transcribed and stored in an online database, with offsite backup. All data will be anonymised, It will be used for the purposes of the doctoral thesis requirements and consequential research publications or conference presentations. The researcher and her supervisor will have access to the data.

All data will be securely stored for five years after the completion of the study before being destroyed.

What will happen if I want to stop taking part?

You may withdraw at anytime, without explanation. Results up to the period of withdrawal may be used, if you are happy for this to be done. Otherwise you may request that they are destroyed and no further use is made of them.

Participant Information Sheet – Staff

Implementing the Mobile Library: Implications for Library Staff

Part A: Information about the research study.

1. Researcher: Sarah-Jane Saravani
2. Contact details: Waikato Institute of Technology, Private Bag 3036, Hamilton, New Zealand. Phone: (+647) 834 8800; e-mail: sarah-jane.saravani@wintec.ac.nz
3. Purpose of the study: To examine the current state of preparedness of vocational education libraries to deliver mobile services to students and, from the findings, to develop a best-practice framework to guide future action and planning for successful, sustained mobile library (m-library) initiatives.
4. What will happen: Participants will be directly interviewed by the researcher for approximately 40 minutes. The interview will be recorded on audio tape.
5. Major outcomes from the research: Publications, conference presentations, doctoral thesis
6. What will happen to the information collected: Data will be kept in secure storage and destroyed after 5 years after completion of the study.
7. Confidentiality and anonymity: All responses will be treated with strict confidentiality, no persons or institutions will be named, or described in such a way as to breach confidentiality.

Part B: Declaration to Participants.

 Individuals, or their institutions, will not be identified in any publication/dissemination of the research findings without their explicit consent.

 All information collected during conversation/meetings/interviews will only be viewed by the researcher, and her supervisor if requested, and remain strictly confidential

If you take part in the study you have the right to among other things to:

- Refuse to answer any particular question, and to withdraw from the study up to
  the time of submission.
- Ask any further questions about the study that occurs to you during your participation.
- Be given access to a summary of the findings from the study, when it is concluded.

RESEARCH CONSENT FORM - LIBRARY STAFF

Name of Researcher *Sarah-Jane Saravani*
Title of study *Implementing the Mobile Library: Implications for Library Staff*

Please read and complete this form carefully. If you are willing to participate in this study, ring the appropriate responses and sign and date the declaration at the end. If you do not understand anything and would like more information, please ask.

- I have had the research satisfactorily explained to me in verbal and / or written form by the researcher. **YES / NO**
- I understand that the research will involve an interview, either face-to-face or via Skype or telephone, lasting approximately 40 minutes and this will be audio taped. **YES / NO**
- I understand that I may withdraw from this study at any time without having to give an explanation. This will not affect my future care or treatment. **YES / NO**
- I understand that all information about me will be treated in strict confidence and that I, or my institution, will not be named in any written work arising from this study. **YES / NO**
- I understand that any audiotape material of me will be used solely for research purposes and will be destroyed on completion of this research. **YES / NO**
- I understand that you will be discussing the progress of your research with your supervisor, Dr Gaby Haddow, Curtin University of Technology, and co-supervisor, Prof. Mohamed Ally, Athabasca University. **YES / NO**

I freely give my consent to participate in this research study and have been given a copy of this form for my own information.

Signature: ……..…….

Date: ……

This study has been approved by the Curtin University Human Research Ethics Committee (Approval Number HR 54/2010). The Committee is comprised of members of the public, academics, lawyers, doctors and pastoral carers. Its main role is to protect participants. If needed, verification of approval can be obtained either by writing to the Curtin University Human Research Ethics Committee, c/- Office of Research and Development, Curtin University of Technology, GPO Box U1987, Perth, 6845 or by telephoning 9266 2784 or by emailing hrec@curtin.edu.au.

Appendix B: Staff Interview Schedule

General technology adoption

1. What new technologies are you aware of that have been adopted by your library in the past two years?

2. What impact do you believe the adoption of these new technologies is having upon the library staff/workforce?

3. In your opinion, has the adoption of new technologies affected staff attitudes towards their work?

Student library experience

4. Have you observed changes in the student library experience since the new technologies were adopted? Please specify.

Demographic

5. How would you describe your knowledge of, and competence in, the use of mobile technologies?

6. How long have you been employed in the library profession?

7. What library services do you believe could be most effectively and appropriately delivered within a mobile environment?

Workplace competencies

8. What skills, knowledge and competencies would be required of library staff in order to work effectively in mobile technology environments?

9. What methods could be used to identify the gaps between the required and current knowledge and skills of library staff in relation to delivering mobile services?

Training delivery

10. What specific on-the-job training is required by library staff to acquire the skills, knowledge and competencies to effectively develop and deliver mobile technology services?

11. How would training best be delivered?

Impact on roles

12. How have (or how do you anticipate) staff roles, relationships and working practices adapted or evolved to accommodate the impact of mobile service delivery?

Appendix C: Staff Online Questionnaire

1. Information and Consent

Implementing the Mobile Library

Part A: Information about the study.

Researcher: Sarah-Jane Saravani
Contact details: Waikato Institute of Technology, Private Bag 3036, Hamilton, New Zealand. Phone: (+647) 834 8800 e-mail: sarah-jane.saravani@wintec.ac.nz . You may address any questions or concerns about this research, including the results obtained to the researcher

Purpose of the study: To investigate the current state of vocational education libraries to deliver mobile services to students. You will be asked to respond to several questions that are included in the online student survey. This is to enable cross-referencing to that data.

What will happen to the information collected: Data will be kept in secure storage and destroyed after 5 years after completion of the study.

Part B: Declaration to Participants.

All information collected from this online survey will be viewed only by the researcher, and her supervisor if requested, and will remain strictly confidential

If you take part in the study you have the right to among other things to:

o Refuse to answer any particular question, and to withdraw from the study up to the time of submission.
o Ask any further questions about the study that occurs to you during your participation.
o Be given access to a summary of the findings from the study, upon request, when it is concluded.

Your Consent to Participate in the Study

By clicking on the Next button below you are consenting to participate in the study "Implementing the Mobile Library" being conducted by Sarah-Jane Saravani.

You are free to discontinue your participation in this research at any time without penalty.

If you have any questions about your rights as a study participant, or are dissatisfied at any time with any aspect of this study, you may contact—anonymously, if you wish—Dr Gaby Haddow, Lecturer, School of Media, Culture & Creative Arts, Curtin University of Technology by phone: (+618) 9266 2707 or e-mail G.Haddow@curtin.edu.au

If you prefer not to participate in this study, please click the Exit This Survey link at the top right hand of this page.

"This study has been approved by the Curtin University Human Research Ethics Committee (Approval Number HR 54/2010). The Committee is comprised of members of the public, academics, lawyers, doctors and pastoral carers. Its main role is to protect participants. If needed, verification of approval can be obtained either by writing to the Curtin University Human Research Ethics Committee, c/- Office of Research and Development, Curtin University of Technology, GPO Box U1987, Perth, 6845 or by telephoning 9266 2784 or by emailing hrec@curtin.edu.au".

2. Definition of Mobile Technology

Definitions that may help in answering this survey:

Mobile technology: Highly compact and portable digital devices containing multiple features that typically use wireless connectivity to link to resources whenever and wherever the user requires.

Mobile library: A library accomodating access and display for mobile devices of its services and resources.

3. Demographic Information

***1. By which institution are you employed?**

4. Online Library Services

2. How many of the following options does your library currently offer? Check all that apply.

- [ ] DVDs/CDs for borrowing
- [ ] Online "Ask a Librarian"
- [ ] Get help writing a paper
- [ ] Group study rooms
- [ ] Library news
- [ ] Online article or e-book databases
- [ ] Online borrowed item renewals
- [ ] Online library catalogue
- [ ] Online tutorials
- [ ] Referencing assistance
- [ ] Request items from other libraries
- [ ] Research and library tutorial classses
- [ ] Research guides for different subject areas
- [ ] Talk with a librarian in person

Other (please specify)

5. Survey Complete

Thank you for taking the time to complete this survey.

Appendix D: Student Online Questionnaire

1. Student Participant Information and Consent

Implementing the Mobile Library

Part A: Information about the study.

Researcher: Sarah-Jane Saravani
Contact details: Waikato Institute of Technology, Private Bag 3036, Hamilton, New Zealand. Phone: (+647) 834 8800 e-mail: sarah-jane.saravani@wintec.ac.nz . You may address any questions or concerns about this research, including the results obtained, to the researcher.

Purpose of the study: To investigate the current state of vocational education libraries to deliver mobile services to students. You will be asked to respond to a series of questions relating to your current use of your academic library and your expectations of service delivery to mobile devices, e.g. cell phone.

What will happen to the information collected: Data will be kept in secure storage and destroyed after 5 years after completion of the study.

Part B: Declaration to Participants.

□ Individuals, or their institutions, will be treated confidentially and will not be identified in any publication/dissemination of the research findings without their explicit consent.

□ All information collected from the online survey will be viewed only by the researcher, and her supervisor if requested, and will remain strictly confidential

If you take part in the study you have the right to among other things to:

o Refuse to answer any particular question, and to withdraw from the study up to the time of submission.
o Ask any further questions about the study that occurs to you during your participation.
o Be given access to a summary of the findings from the study, upon request, when it is concluded.

Your Consent to Participate in the Study

By clicking the Next button below you are consenting to participate in a study called "Implementing the Mobile Library" being conducted by Sarah-Jane Saravani.

You are free to discontinue your participation in this research at any time without penalty. Participation in this study will require about 10 minutes.

If you are a minor (under the age of 18), you cannot participate in this study.

If you have any questions about your rights as a study participant, or are dissatisfied at any time with any aspect of this study, you may contact—anonymously, if you wish—Dr Gaby Haddow, Lecturer, School of Media, Culture & Creative Arts, Curtin University of Technology by phone: (+618) 9266 2707 or e-mail G.Haddow@curtin.edu.au

If you prefer not to participate in this study, please click the Exit This Survey link at the top right hand of this page.

"This study has been approved by the Curtin University Human Research Ethics Committee (Approval Number HR 54/2010). The Committee is comprised of members of the public, academics, lawyers, doctors and pastoral carers. Its main role is to protect participants. If needed, verification of approval can be obtained either by writing to the Curtin University Human Research Ethics Committee, c/- Office of Research and Development, Curtin University of Technology, GPO Box U1987, Perth, 6845 or by telephoning 9266 2784 or by emailing hrec@curtin.edu.au".

2. Definition of Mobile Technology

Definitions that may help in answering this survey:

Mobile technology: Highly compact and portable digital devices containing multiple features that typically use wireless connectivity to link to resources whenever and wherever the user requires.

Mobile library: A library accomodating access and display for mobile devices of its services and resources.

3. Demographic Information

***1. Which institution do you attend?**

2. Gender

- ◯ Male
- ◯ Female

3. Your age group is

- ◯ 16-25
- ◯ 26-35
- ◯ 36-45
- ◯ 46-55
- ◯ 56-65
- ◯ Other

4. What best represents your major or specialty subject area? Please specify.

5. Which of the following best describes the level of the course you are undertaking?

- ◯ Certificate
- ◯ Diploma
- ◯ Advanced Diploma
- ◯ Undergraduate degree - 1st year
- ◯ Undergraduate degree - 2nd year
- ◯ Undergraduate degree - 3rd year
- ◯ Undergraduate degree - 4th year
- ◯ Graduate degree - (e.g. Honour's, Master's)

Other (please specify)

6. Which of the following best describes your attitude towards adopting new technologies in mobile devices?

- ◯ I like to stay at the cutting edge with new devices and features
- ◯ I will consider upgrading to new devices and features if I think they suit my needs
- ◯ I tend to stick with basic features and upgrade only when absolutely necessary
- ◯ I don't use mobile technology (Please go directly to Q10)

4. Mobile Devices

7. What type of handheld mobile device do you use? (If you use more than one, please indicate the device you use most often)

- ☐ Cell phone
- ☐ Smartphone (e.g. iPhone, Blackberry)
- ☐ PDA
- ☐ Electronic book reader

Other handheld device (e.g. iPod, iPod Touch, iPad, handheld computer) (please specify)

8. Is your mobile device able to access the Web?

- ◯ Yes
- ◯ No
- ◯ Not sure

9. How frequently do you use your mobile device to do the following? Please tick all that apply.

	Never	Once a year	Once per term/semester	Monthly	Weekly	Several times a week	Daily	Several times a day
Access documents	◯	◯	◯	◯	◯	◯	◯	◯
Book search	◯	◯	◯	◯	◯	◯	◯	◯
Bookmark	◯	◯	◯	◯	◯	◯	◯	◯
Calendar	◯	◯	◯	◯	◯	◯	◯	◯
Check social network sites, e.g. Facebook, Flickr, MySpace	◯	◯	◯	◯	◯	◯	◯	◯
Download music files	◯	◯	◯	◯	◯	◯	◯	◯
Email	◯	◯	◯	◯	◯	◯	◯	◯
Groups	◯	◯	◯	◯	◯	◯	◯	◯
Image search	◯	◯	◯	◯	◯	◯	◯	◯
Instant message	◯	◯	◯	◯	◯	◯	◯	◯
Listen to podcasts	◯	◯	◯	◯	◯	◯	◯	◯
Maps	◯	◯	◯	◯	◯	◯	◯	◯
News	◯	◯	◯	◯	◯	◯	◯	◯
Personalised home page	◯	◯	◯	◯	◯	◯	◯	◯
Read e-books or articles	◯	◯	◯	◯	◯	◯	◯	◯
Search	◯	◯	◯	◯	◯	◯	◯	◯
Skype	◯	◯	◯	◯	◯	◯	◯	◯
Talk	◯	◯	◯	◯	◯	◯	◯	◯
Text message	◯	◯	◯	◯	◯	◯	◯	◯
Use a search engine	◯	◯	◯	◯	◯	◯	◯	◯
Watch video clips	◯	◯	◯	◯	◯	◯	◯	◯

5. Library Use and Evaluation

10. On average, how often do you physically visit the campus library?

- ◯ Never
- ◯ Several times per day
- ◯ Daily
- ◯ Several times per week
- ◯ Weekly
- ◯ Monthly
- ◯ Once per term/semester
- ◯ Once a year

11. How many of the following options are you aware that your campus library currently offers? Check all that apply.

- ☐ DVDs/CDs for borrowing
- ☐ Online "Ask a Librarian"
- ☐ Get help writing a paper
- ☐ Group study rooms
- ☐ Library news
- ☐ Online article or e-book databases
- ☐ Online borrowed item renewals
- ☐ Online library catalogue
- ☐ Online tutorials
- ☐ Referencing assistance
- ☐ Request items from other libraries
- ☐ Research and library tutorial classses
- ☐ Research guides for different subject areas
- ☐ Talk with a librarian in person

Other (please specify)

12. How often do you visit the library website?

- ◯ Never
- ◯ Several times per day
- ◯ Daily
- ◯ Several times per week
- ◯ Weekly
- ◯ Monthly
- ◯ Once per term/semester
- ◯ Once a year

13. How often do you use the library website to do the following?

	Never	Once a year	Once per term/semester	Monthly	Weekly	Several times a week	Daily	Several times a day
Access course reserves	○	○	○	○	○	○	○	○
Book a group study room	○	○	○	○	○	○	○	○
Book library training sessions	○	○	○	○	○	○	○	○
Borrow books/journals/DVDs/CDs	○	○	○	○	○	○	○	○
Check campus/library maps	○	○	○	○	○	○	○	○
Check library hours	○	○	○	○	○	○	○	○
Check list or RSS feeds of new books/resources by subject	○	○	○	○	○	○	○	○
Contact online "Ask a librarian"	○	○	○	○	○	○	○	○
Do research for an assignment	○	○	○	○	○	○	○	○
Listen to library audio tours/podcasts	○	○	○	○	○	○	○	○
Look for contact information	○	○	○	○	○	○	○	○
Read library news	○	○	○	○	○	○	○	○
Renew books	○	○	○	○	○	○	○	○
Search for electronic books or journal articles	○	○	○	○	○	○	○	○
Search the library catalogue	○	○	○	○	○	○	○	○
Use research/study guides and tutorials	○	○	○	○	○	○	○	○
View your own borrower details	○	○	○	○	○	○	○	○

14. If the following library resources and services were available for mobile devices, how likely would you be to use them?
(If you don't own a mobile device, please go to Q. 17)

	Very unlikely	Unlikely	Somewhat unlikely	Somewhat likely	Likely	Very likely
Access course reserves	◯	◯	◯	◯	◯	◯
Book a group study room	◯	◯	◯	◯	◯	◯
Book library training sessions	◯	◯	◯	◯	◯	◯
Borrow books/journals/DVDs/CDs	◯	◯	◯	◯	◯	◯
Check campus/library maps	◯	◯	◯	◯	◯	◯
Check library hours	◯	◯	◯	◯	◯	◯
Check list or RSS feeds of new books/resources by subject	◯	◯	◯	◯	◯	◯
Contact online "Ask a librarian"	◯	◯	◯	◯	◯	◯
Do research for an assignment	◯	◯	◯	◯	◯	◯
Listen to library audio tours/podcasts	◯	◯	◯	◯	◯	◯
Look for contact information	◯	◯	◯	◯	◯	◯
Read library news	◯	◯	◯	◯	◯	◯
Renew books	◯	◯	◯	◯	◯	◯
Search for electronic books or journal articles	◯	◯	◯	◯	◯	◯
Search the library catalogue	◯	◯	◯	◯	◯	◯
Use research/study guides and tutorials	◯	◯	◯	◯	◯	◯
View your own borrower details	◯	◯	◯	◯	◯	◯

Other (please specify)

15. If you own a mobile phone, how likely would you be to use the following TEXT/SMS library services?

	I own a mobile device but I don't text	Extremely unlikely	Unlikely	Somewhat unlikely	Likely	Extremely likely
Contact online "Ask a librarian"	◯	◯	◯	◯	◯	◯
Receive change of opening hours details	◯	◯	◯	◯	◯	◯
Renew library materials	◯	◯	◯	◯	◯	◯
Receive library news	◯	◯	◯	◯	◯	◯
Receive recall notifications	◯	◯	◯	◯	◯	◯
Receive renewal or overdue notices	◯	◯	◯	◯	◯	◯
Send a call number from the catalogue	◯	◯	◯	◯	◯	◯

6. Information Use and Evaluation

16. If you were using a mobile device, how likely would you be to use the following to start your research for an assignment?

	N/A - I don't use this resource	Extremely unlikely	Unlikely	Somewhat likely	Likely	Extremely likely
Ask my instructor	◯	◯	◯	◯	◯	◯
E-book or article database	◯	◯	◯	◯	◯	◯
Google	◯	◯	◯	◯	◯	◯
Google Scholar	◯	◯	◯	◯	◯	◯
Library catalogue	◯	◯	◯	◯	◯	◯
Online "Ask a librarian"	◯	◯	◯	◯	◯	◯
Wikipedia	◯	◯	◯	◯	◯	◯

7. Technology Use and Evaluation

17. On average, how many hours per week do you spend online?

- ◯ Less than 5
- ◯ 5-10
- ◯ 11-20
- ◯ 21-30
- ◯ 31-40
- ◯ More than 40

18. How much of this time is spent on study-related activities? Click the closest amount of time.

- ◯ 0%
- ◯ 1-25%
- ◯ 26-50%
- ◯ 51-75%
- ◯ 76-100%

19. How do you prefer to access course readings?

- ◯ Read entirely online
- ◯ Download and print
- ◯ No preference

8. Library Service Delivery

20. Explain how your campus library supports your learning experience through technology deployment.

21. Suggest or describe some alternative library resources or services that you would find useful if available for mobile devices?

22. Describe any technological problems or challenges you face when using your campus library?

9. Survey Complete

Thank you for taking the time to complete this survey.

Appendix E: Review Panel Invitation

Review Panel Invitation

Implementing the Mobile Library: Implications for Library Staff

Researcher: Sarah-Jane Saravani
Contact details: Wintec Library
Private Bag 3036
Hamilton 3240
New Zealand

Phone: (+647) 834 8800
Mobile: 021 827291

Email:sarah-jane.saravani@wintec.ac.nz

Dear X,

I am currently undertaking research investigation to fulfill the thesis requirements for Doctor of Philosophy, Curtin University of Technology. I would like to invite you to form part of a review panel to provide feedback on two survey instruments from the aspects of their potential validity, usefulness, comprehensiveness and focus. My intention is that the panel should comprise practitioners from the higher education or vocational education sectors - the national vocational education library sector, library professionals from the national and international university sector, from the fields of online learning and quality assessment.

I would value the specific expertise you would bring to this aspect of the survey design phase. It is intended that the feedback I receive from experts in the area will result in refinement of the survey instruments with a corresponding increase both in robustness of the instruments and validity of the data they generate. I will provide you with a copy of the amended survey instruments following the refinement process.

The purpose of the research is to examine the current state of preparedness of vocational education libraries to deliver mobile services to students. An outcome of the study will be the development of a best-practice framework to guide future action and planning for successful, sustained mobile library (m-library) initiatives.

For your information, I am including below part of the letter that is proposed to be sent to some of the survey participants – staff – who will be invited to participate in the investigation.

1. What is the purpose of the study?

The purpose of this study is to examine the current state of preparedness of vocational education libraries to deliver mobile services to students and, from the findings, to develop a best-practice framework to guide future action and planning for successful, sustained mobile library (m-library) initiatives. Particular focus will be upon the impact on library staff of

implementing service delivery to mobile devices. It is intended to learn how staff respond to the concept of the m-library, their perceived levels of confidence and capability within this environment, their actual levels, and how best to address any gaps identified in a systematic and replicable manner that can be included in strategic planning processes and translated across the sector. Comparison will be made with competencies required for working within the online environment. The targeted focus of the research will be vocational education sector libraries across two countries – New Zealand and Australia.

2. Why have I been chosen to take part?

Sampling across the New Zealand Institutes of Technology and Polytechnics (ITPs) (10 libraries with staffing numbers greater than ten) and Australian Technical and Further Education (TAFE) (6 libraries with staffing numbers greater than ten) library sectors is being undertaken. It is intended to interview three professionally-qualified library staff on an individual basis from each library (n=48) and this will include the library manager, one staff member who has involvement with systems or IT and another qualified staff member whose duties do not include such focus.

3. Do I have to take part?

Participation is completely voluntary and you are free to withdraw at anytime without explanation and without incurring any disadvantage.

4. What will happen if I take part?

Contact will be made by the researcher, Sarah-Jane Saravani, initially by email requesting participation in the study. If the staff member contacted is agreeable, further contact will include information sheet and a consent form to be completed. The survey will take place either face-to-face, by telephone or online communication technology, such as Skype. The conversation will be recorded and subsequently transcribed. Participants will receive the survey questions prior to the interview to allow the preparation and focus during the actual interview. It is anticipated this should last approximately 40 minutes. The transcript of the interview will be returned to the participant for checking prior to its being used for analysis by the researcher.

5. Are there any benefits in taking part?

There are no immediate intended benefits to participants, although the release of the findings and ultimate guidelines are hoped to be of potential benefit to those involved in the study.

6. What if I am unhappy or if there is a problem?

If you are unhappy, or if there is a problem, please feel free to contact Sarah-Jane Saravani, sarah-jane.saravani@wintec.ac.nz and I will try to help. If you remain unhappy or have a complaint which you feel you cannot come to me with then you should contact my research supervisor, Dr Gaby Haddow, G.Haddow@curtin.edu.au . When contacting Dr Haddow, please provide details of the name or description of the study (so that it can be identified), the researcher involved, and the details of the complaint you wish to make.

7. Will my participation be kept confidential?

The initial data collection will take place via audio recording; it will then be transcribed and stored in an online database, with offsite backup. All data will be anonymised, It will be used for the purposes of the doctoral thesis requirements and consequential research publications or conference presentations. The researcher and her supervisor will have access to the data. All data will be securely stored for five years after the completion of the study before being destroyed.

8. What will happen if I want to stop taking part?

You may withdraw at any time, without explanation. Results up to the period of withdrawal may be used, if you are happy for this to be done. Otherwise you may request that they are destroyed and no further use is made of them.

Appendix F: Permission to Modify Survey Instrument

Re: Online survey instruments

Tue 16/03/2010 8:06 a.m.

Greetings, Sarah-Jane. I was glad to get your email and would be happy to see you use/modify/publish any of the instrument items as you wish. While I would be happy to see them before implementation you need only send me your instruments if you are interested in my feedback - by no means consider this requisite for use. Thanks also for the positive comments on my blog, and I wish you the best of luck with your site and research. Please keep in touch about your findings as time progresses.

I've attached a more up-to-date and somewhat different set of tech-related survey questions, which were originally designed for a local survey project at UCB in late 2009 and based on the Informing Innovation instrument (these items, however, have more mobile-oriented content than the 2008-09 instrument. They should also be trialed locally for reliability/validity, and have never undergone a formal implementation). I'm planning to post this doc on my blog sometime soon, so you're definitely the first to see it - please let me know if anything glaring jumps out as problematic.

Best,

Char
Char Booth
E-Learning Librarian
University of California at Berkeley
cell 512.970.3573
@charbooth | www.infomational.com

On Sat, Mar 13, 2010 at 8:47 PM, Sarah-Jane Saravani <Sarah-Jane.Saravani@wintec.ac.nz> wrote:

Dear Char,

I am currently engaged in doctoral studies through Curtin University of Technology, Western Australia, into the implications for library staff of implementing the mobile library. I am intending to conduct several surveys - both online and "face-to-face", i.e. using communication technology where is it not possible to meet the person being surveyed - as well as interviews. I shall be focusing on the vocational education sectors across Australia and New Zealand and surveying a selection of students as well as library staff.

Since the release of your report Informing innovation: Tracking student interest in emerging technologies..., I have carried the thought that I would like to utilise some of your questions for the student sample of the surveys. While my focus is not specifically on how students use the library but rather aimed at gathering data on their expectations of mobile library services, nevertheless, there is considerable overlap in the types of data to be gathered.

I wonder if you would be kind enough to allow me to modify parts of your online survey instruments for the purposes of my research, the findings of which may also appear, prior to the submission of my thesis, in published form. I am happy to send you the instruments prior to their being subjected to pilot testing locally, and to take on board any comments you may wish to make.

I have also followed your blog with interest as it contains many current, relevant references which are of use to my research. I have recently set up an m-learning site for New Zealand and am encouraging contributions to the site in the hope of gathering a national focus on matters of interest pertaining to m-learning/m-libraries. The address is http://akoaotearoa.ac.nz/communities/m-learning

I look forward to receiving your response.

Kind regards,

Sarah-Jane Saravani

Sarah-Jane Saravani
Learning Hub Manager
Wintec
Private Bag 3036
Hamilton 3240
NEW ZEALAND

Ph: +647 834 8800 ext. 8527
Mob.: 021827291

Appendix G: Student Invitation and Fact Sheet

Curtin University of Technology

Information and Consent Page for Mobile Library Survey

Dear Participant,

My name is Sarah-Jane Saravani and I am currently completing a piece of research "Implementing the Mobile Library" for my PhD of Media and Information at Curtin University of Technology. The purpose of the research is to investigate the current state of vocational education libraries to deliver mobile services to students

I am inviting you to participate in this online research survey. Your participation would be very welcome, but is entirely voluntary. If you choose to participate in the survey you will be giving consent to use the data provided by you. It is not possible for your responses to be identified and all your responses will be used for research purposes only.

If you decide to participate you will be asked to respond to a series of questions relating to your current use of your academic library and your expectations of service delivery to mobile devices, e.g. cell phone. You are free to discontinue your participation in this research at any time without penalty. The online questionnaire will require about 10 minutes to complete.

Information gained from this survey will be used as part of this research project and results may be published in journal and conference presentations. Anonymity is assured. No institution or participant will be identifiable from any publication. Throughout the project the data will be stored securely and accessible only to the researcher and the project supervisor. All questionnaires destroyed five years after the conclusion of the study.

You may address any questions or concerns about this research, including the results obtained, to Sarah-Jane Saravani (phone: (+647) 834 8800; e-mail: sarah-jane.saravani@wintec.ac.nz) at the Waikato Institute of Technology Library.

If you are a minor (under the age of 18), you cannot participate in this study.

If you have any questions about your rights as a study participant, or are dissatisfied at any time with any aspect of this study, you may contact—anonymously, if you wish—Dr Gaby Haddow, Lecturer, School of Media, Culture & Creative Arts, Curtin University of Technology by phone: (+618) 9266 2707 or e-mail G.Haddow@curtin.edu.au

If you ever want to return to this page, you can simply hit the Back button on your browser.

If you prefer not to participate in this study, please click Here (hyperlink) to be returned to the (participating institution) home website

If you have read the information above and agree to participate in the study please click 'Enter' (hyperlink) below.

Curtin University of Technology

RESEARCH CONSENT FORM - STUDENTS

Online Research Consent Form

1. You freely consent to participate in a study called "Implementing the Mobile Library" being conducted by Sarah-Jane Saravani, Waikato Institute of Technology, Hamilton, New Zealand.
2. The study involves investigating the current state of vocational education libraries to deliver mobile services to students. You will be asked to respond to a series of questions relating to your current use of your academic library and your expectations of service delivery to mobile devices, e.g. cell phone.
3. Your responses will be kept strictly confidential. All your responses will be used for research purposes only. Your name will not be associated with any report of research findings. Within these restrictions, results of the study will be made available to you at your request.
4. You are free to discontinue your participation in this research at any time without penalty. Participation in this study will require about 10 minutes.
5. You may address any questions or concerns about this research, including the results obtained, to Sarah-Jane Saravani (phone: (+647) 834 8800; e-mail: sarah-jane.saravani@wintec.ac.nz) at the Waikato Institute of Technology Library.
6. If you are a minor (under the age of 18), you cannot participate in this study.
7. If you have any questions about your rights as a study participant, or are dissatisfied at any time with any aspect of this study, you may contact—anonymously, if you wish—Dr Gaby Haddow, Lecturer, School of Media, Culture & Creative Arts, Curtin University of Technology by phone: (+618) 9266 2707 or e-mail G.Haddow@curtin.edu.au

   If you ever want to return to this page, you can simply hit the Back button on your browser.

If you prefer not to participate in this study, click Here (hyperlink) to be returned to the (participating institution) home website.

If you are willing to participate in this study, click Here (hyperlink)to begin.

This study has been approved by the Curtin University Human Research Ethics Committee (Approval Number HR 54/2010). The Committee is comprised of members of the public, academics, lawyers, doctors and pastoral carers. Its main role is to protect participants. If needed, verification of approval can be obtained either by writing to the Curtin University Human Research Ethics Committee, c/- Office of Research and Development, Curtin University of Technology, GPO Box U1987, Perth, 6845 or by telephoning 9266 2784 or by emailing hrec@curtin.edu.au.

Appendix H: UTAUT Permission

From: Viswanath Venkatesh [mailto:vvenkatesh@vvenkatesh.us]
Sent: Tuesday, 2 July 2013 7:59 p.m.
To: Sarah-Jane Saravani
Subject: RE: Permission to use the UTAUT diagram

Thanks for your interest.

You have my permission.

You will find other related papers at:
http://vvenkatesh.com/Downloads/Papers/fulltext/downloadpapers.htm

You may also find my book (that can be purchased for a significant student discount and faculty member discount) to be of use: http://vvenkatesh.com/book

Hope this helps.

Sincerely,
Viswanath Venkatesh
Distinguished Professor and George and Boyce Billingsley Chair in Information Systems
Walton College of Business
University of Arkansas
Fayetteville, AR 72701
Email: vvenkatesh@vvenkatesh.us
Website: http://vvenkatesh.com
IS Research Rankings Website: http://vvenkatesh.com/ISRanking

From: Sarah-Jane Saravani [mailto:Sarah-Jane.Saravani@wintec.ac.nz]
Sent: Monday, June 24, 2013 5:37 PM
To: vvenkatesh@vvenkatesh.us
Subject: Permission to use the UTAUT diagram

Dear Prof Venkatesh

I am currently completing my doctoral studies through Curtin University, Perth, WA, on the capability of vocational and education training (VET) sector library staff to deliver library services to mobile devices. I have used your UTAUT model (2003) as the technology acceptance model with which to analyse the data. The thesis is near completion and I would seek your permission to include the diagram of the UTAUT model within the thesis, citing your permission and appropriate referencing. Your permission to reproduce the diagram would be greatly appreciated.

Regards,

Sarah-Jane Saravani
Learning Hub Manager
Wintec
Private Bag 3036
Hamilton 3240